



CORENET X

A One-Stop Integrated Digital Shopfront for Regulatory Processes

Code of Practice

First Edition | Published on 2023-09



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PREAMBLE

corenetX

CORENET X is a multi-agency effort by



Preamble

This Code of Practice (COP) is intended to help industry practitioners in understanding how to prepare multi-agency regulatory submissions across the key submission gateways in CORENET X.

This Code of Practice will include recommended procedures and good practices to address common Building Information Modelling (BIM) issues at general project collaboration level (e.g. multi-disciplinary project set-up, geo-referencing) and specific details that vary from firm to firm today.

This Code of Practice complements the IFC-SG Resource Kit (<https://go.gov.sg/ifcsg>), which provides technical templates and help resources from key proprietary BIM software for the generation of IFC-SG models.

Disclaimer

Section 1 and 2 of this Code of Practice details the envisaged end state of CORENET X. CORENET X is developed through Agile Methodology and hence, features and requirements mentioned in this COP will be developed progressively, and its technological enhancements will be made available in phases. For the exact implementation date, please refer to official circulars.

This Code of Practice does not substitute Handbooks, Circulars or other regulatory publications of our regulatory agencies. Readers should refer to the relevant Codes, Acts and Regulations on the compliance required for their projects, before referring to this Code of Practice on how to represent the compliance information in the CORENET X submission gateways.

Readers should consult relevant agencies if they need to determine the regulatory requirements to fulfil compliance.

Feedback

This Code of Practice will be updated progressively from its First Edition published on September 2023. Past editions and summary of changes can be found at <https://go.gov.sg/cxcop>. We welcome your comments and queries about the Code of Practice so that we can continue to develop and improve it. Please provide your inputs at <https://go.gov.sg/cxenquiry> or scan the QR code on the right.



<https://go.gov.sg/cxenquiry>

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Annex	:	Summary of Changes

How to use this Code of Practice

Note: CORENET X is developed through Agile Methodology and sections / requirements in this COP will be updated progressively and its technological enhancements will be made available in phases.

Section 1: Introduction to CORENET X

- What is CORENET X?
- What are the key aspects of CORENET X?
- What is a user journey of CORENET X like?



Section 2: General Requirements

- Which agency's approvals are covered under CORENET X?
- What do abbreviations like RABW and IFC-SG stand for?
- What happens to the QP's statutory obligations under CORENET X?
- What is each project team submission like and maximum file size?
- What is the model preparation process like?

Filter by



Section 3: Regulatory Agencies

- RABW Requirements categorised by Regulatory Agencies

Section 3: Key Gateways

- RABW Requirements categorised by Key Gateways

Section 3: Other Building Works

- RABW Requirements for
 - External Works
 - Direct Submission Process
 - Conservation



Note: Each RABW requirement in Section 3 is complemented by IFC common components from the BIM Model (where relevant)



Section 4: Typical Components in a Project (“Identified Components”)

- What does a BIM component need to contain / look like, in order to satisfy agency's regulatory requirements?

SECTION 1

Introduction to CORENET X



CORENET X is a multi-agency effort by



1

Introduction to CORENET X (CX)

Page



Overview of CORENET X

- About CORENET X 8
- Today's Separate and Concurrent Approval Process 9
- Tomorrow's Envisaged Streamlined Regulatory Approval Process 10



CORENET X User Journey

11



A future *ecosystem* of Regulatory Approval of Building Works that accelerates the transformation of the Construction Industry

About

Harnessing the power of digitalisation and technology, CORENET X will allow Qualified Persons (QPs, i.e. professional engineers and registered architects) to submit a three-dimensional model of a development or building - created and developed digitally through Building Information Modelling (BIM) to the regulatory agencies.

It allows the project team, which includes the QPs, to collaborate and review their designs in the model together, detect possible major conflicts before construction, and produce a coordinated BIM model for submission and regulatory approval. It changes the current practice of QPs dealing separately with multiple regulatory agencies, and producing different versions of building plans thereafter.

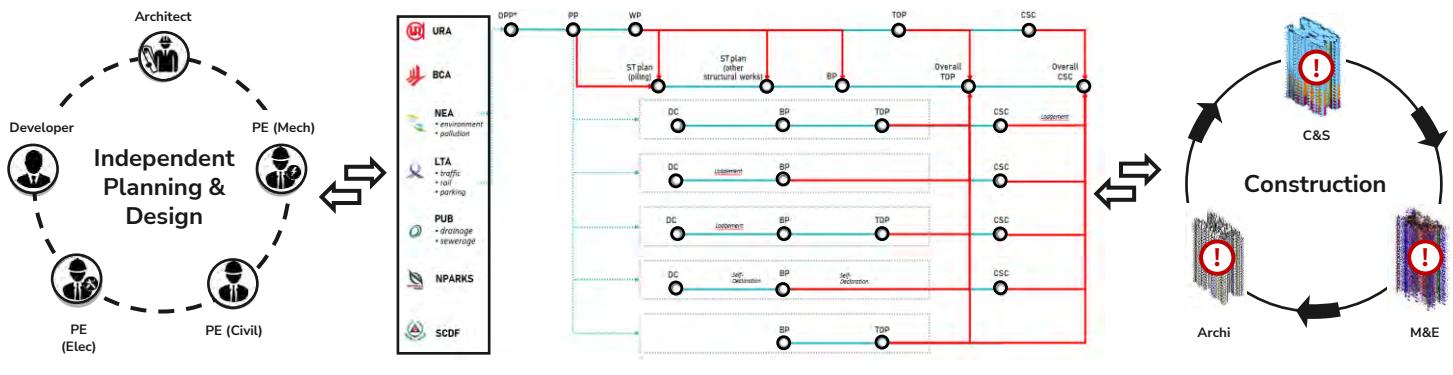
Led by BCA and URA and supported by GovTech, CORENET X was developed in close collaboration with the other public agencies¹ and leading built environment professionals, firms, and Trade Associations and Chambers (TACs). It is slated for implementation by the end of 2023.

See also:

[Minister \(MND\)'s Official Announcement of CORENET X at the International Built Environment Week 2021](#)

¹ CORENET X comprises of the following public agencies: BCA, URA, GovTech, HDB, JTC, LTA, NEA, NParks, SCDF and SLA.

Today's Separate and Concurrent Regulatory Approval Process



- Plans are prepared by **different professionals independently**
- Plans are **submitted separately** to different agencies at different milestones concurrently

- Each of the 7 agencies has a **different regulatory mandate**
- Comments from one agency may lead to **resubmission/ amendment** to others
- Approved plans can be **conflicting; no single integrated view** of the approved plan

- Plans contain **conflicts that need to be resolved** during construction
- Rectifications = **Abortive Works**
- Delayed issuance** of TOP/CSC

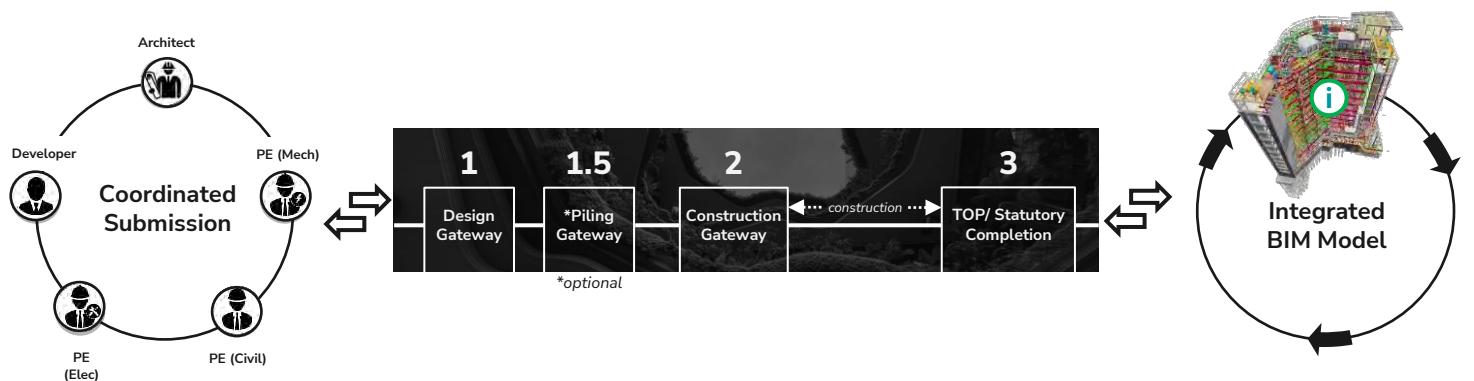
A key impetus for change is because of today's fragmented approval process. In today's process, the industry prepare submissions independently, and they then submit these plans separately to the different regulatory agencies.

This silo working environment is not conducive for coordinated design and regulatory reviews upstream, which often results in iterative submissions as well as conflicting or disjointed building information downstream during construction. This leads to abortive works, or resubmissions which delays TOP/CSC, ultimately affecting construction productivity.

See also:

[Latest CORENET X Circulars](#)

Tomorrow's Envisaged Streamlined Regulatory Approval Process



- Industry will need to **collaborate upfront with one another prior to submission**
- The Qualified Persons (QPs) will **submit Coordinated BIM Models** at the Gateways instead of submitting independently
- Over 20 approval gateways have now been streamlined to **3 Key Gateways: Design, Construction, Completion**
- These gateways are major submission milestones, where the submitted design needs to comply with cross-agencies' statutory requirements.
- Agencies will review the Coordinated BIM models together in a common data environment.
- Construction rectifications arising from competing regulatory requirements would be minimised as major conflicts would have been surfaced and resolved upstream prior to construction.

We wanted to radically rethink how the regulatory services can be delivered in a project centric manner, instead of today's silo manner. In tomorrow's process, industry will submit coordinated BIM models to the agencies for review, instead of submitting independently. The earlier 20 over approval gateways have now been streamlined to **3 key gateways**.

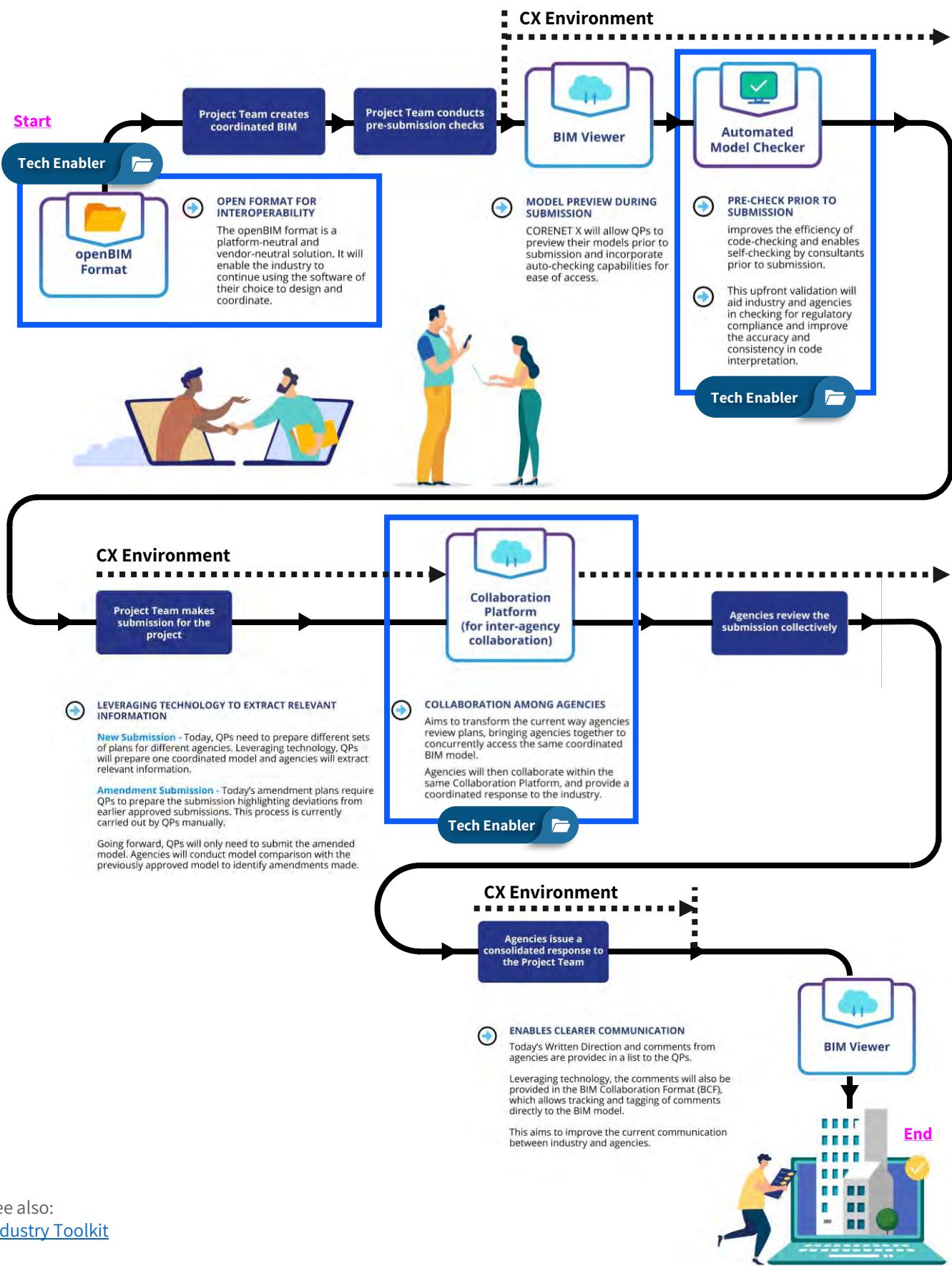
See also:

[Latest CORENET X Circulars](#)

Section 1: Introduction to CORENET X

User Journey

CORENET X User Journey



See also:

[Industry Toolkit](#)

SECTION 2

General Requirements

2**General Requirements**

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While the regulatory approval process is being redesigned to improve the current user experience to navigate across multiple regulatory agencies, the regulatory agencies' respective mandate and regime **remains unchanged**.

The current Development Control ("DC") and Building Plan ("BP") submissions, typically referred to by the agencies and industry, are now being mapped and consolidated under the Gateways of the new process. The amount of information required at the respective Gateways is also being recalibrated across the regulatory agencies to ensure that it is aligned with the intent of each Gateway.

Terms and Definitions

For the purpose of this Code of Practice, the following definitions shall apply:

Term	Definitions
RABW	Abbreviation for "Regulatory Approval Process for Building Works", and refers to the new process involving 3 key sequential submission gateways to all Agencies for one collective and coordinated approval at each gateway.
Gateways	Major submission milestones in CORENET X, where the submission needs to comply with multiple agencies' statutory requirements at each Gateway. <ul style="list-style-type: none"> Multiple <u>Agency</u> requirements listed under each regulatory agency can be found here. Multiple <u>Key Gateway</u> requirements listed under each gateway can be found here.
Supporting Mechanisms	Similar to today, there are 3 supporting mechanisms will continue to complement the approval process: <ol style="list-style-type: none"> 1. Pre-Submission Consultation <ul style="list-style-type: none"> Pre-submission consultation will continue to be available for industry to consult or seek clarification prior to submission. 2. Waivers <ul style="list-style-type: none"> Where necessary, the industry may apply for waiver under the respective Act and Regulations and the respective agency will assess the applications accordingly. 3. Escalation Mechanism <ul style="list-style-type: none"> Industry can table their case to seek resolution on inter-agency regulatory conflicts at the Inter-agency Coordinating Committee (IACC).
Federated Model	Combined Building Information Model that compiles multiple models from different disciplines or sections of the project into a single, complete model of the project. <ul style="list-style-type: none"> Federated models support concurrent authorship of different aspects of the project by multiple parties. Federated models also support multi-disciplinary coordination as models are geo-referenced to coordinates from the Singapore SVY21 coordinate system (EPSG: 3414) for Easting and Northing (x,y) and Singapore Height Datum (SHD) for Height (z).
IFC-SG	New representations for local regulatory requirements, in the Industry Foundation Classes (IFC) openBIM standard. More information of the mapping and configuration files for IFC-SG can be found here .
Level of Details	As long as relevant IFC-SG data requirements are embedded in the respective BIM components and minimum dimensions represented, BIM components do not need to replicate their real-life equivalent. <p>For example, trees can be represented as a lollipop object as long as IFC-SG parameters like "Girth", "Height" and "Status" are represented.</p>
Non-BIM submissions	Besides BIM submissions in the IFC-SG format, CORENET X will be able to accept non-BIM submissions.
Supplementary Documents	CORENET X will be able to accept non-BIM documentations that accompany each project team's submission of IFC-SG models (e.g. design calculation reports, 2D detail drawings)



QP's Statutory Responsibilities

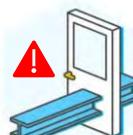
While the regulatory approval process is being redesigned to improve the current user experience to navigate across multiple regulatory agencies, the regulatory agencies' respective mandate and regime remains unchanged. Hence, the statutory responsibilities of the appointed QPs under the respective Acts and Regulations **remains unchanged**.

Under the RABW, part of the process requires joint submission by the relevant QPs within the project teams to the relevant regulatory agencies. To ensure clear delineation of responsibilities, the developer (or whoever is required under the respective Acts and Regulations) needs to first appoint the QP for the respective areas of work at the start of a project. The appointed QP will then be responsible for the relevant aspects of the submission.

Multi-Disciplinary Coordination

► Clash Detection

Prior to submission, models by the relevant disciplines should be coordinated, and the project team should ensure that in-principle, basic / key components from each discipline do not clash with one another, as indicated in the component clashes matrix below.



S2 – Fig 1 : Design Clash

Source: <https://www.bimcollab.com/en/products/bimcollab-zoom-b/>

For example, the Architectural Door should **not** have a design clash with the Structural Beam

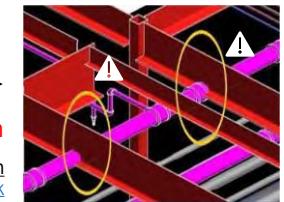
Architectural					Structural					
Structural	Floor (IfcSlab)	Wall (IfcWall)	Ceiling (IfcCovering)	Door (IfcDoor)	Window (IfcWindow)	Structural Column (IfcColumn)	Structural Foundation (IfcPile, IfcFooting)	Structural Framing (IfcBeam)	Structural Wall (IfcWall)	Slab (IfcSlab)
Structural Column (IfcColumn)				1						
Structural Foundations (IfcPile, IfcFooting)										
Structural Framing (IfcBeam)		2			⚠️					
Structural Wall (IfcWall)					3					
Slab (IfcSlab)										
Generic Models (IfcBuildingElementProxy)										
Mechanical Equipment (IfcTank, IfcPump, IfcUnitaryEquipment)	4									
Ducts (IfcDuctSegment)		5								
Air Terminals (IfcAirTerminal)										
Pipes (IfcPipeSegment)			6					⚠️		8
Plumbing Fixtures (IfcSanitaryTerminal)										9
Cable Tray (IfcCableCarrierSegment)			7							10
										11
										12
										13

S2 – Fig 2 : Multi-Disciplinary Coordination

For example, the MEP Pipes should **not** have a design clash with the Structural Beam

S2 – Fig 3 : Design Clash

Photo credit: Clash Detection Projects | Tesla CAD UK



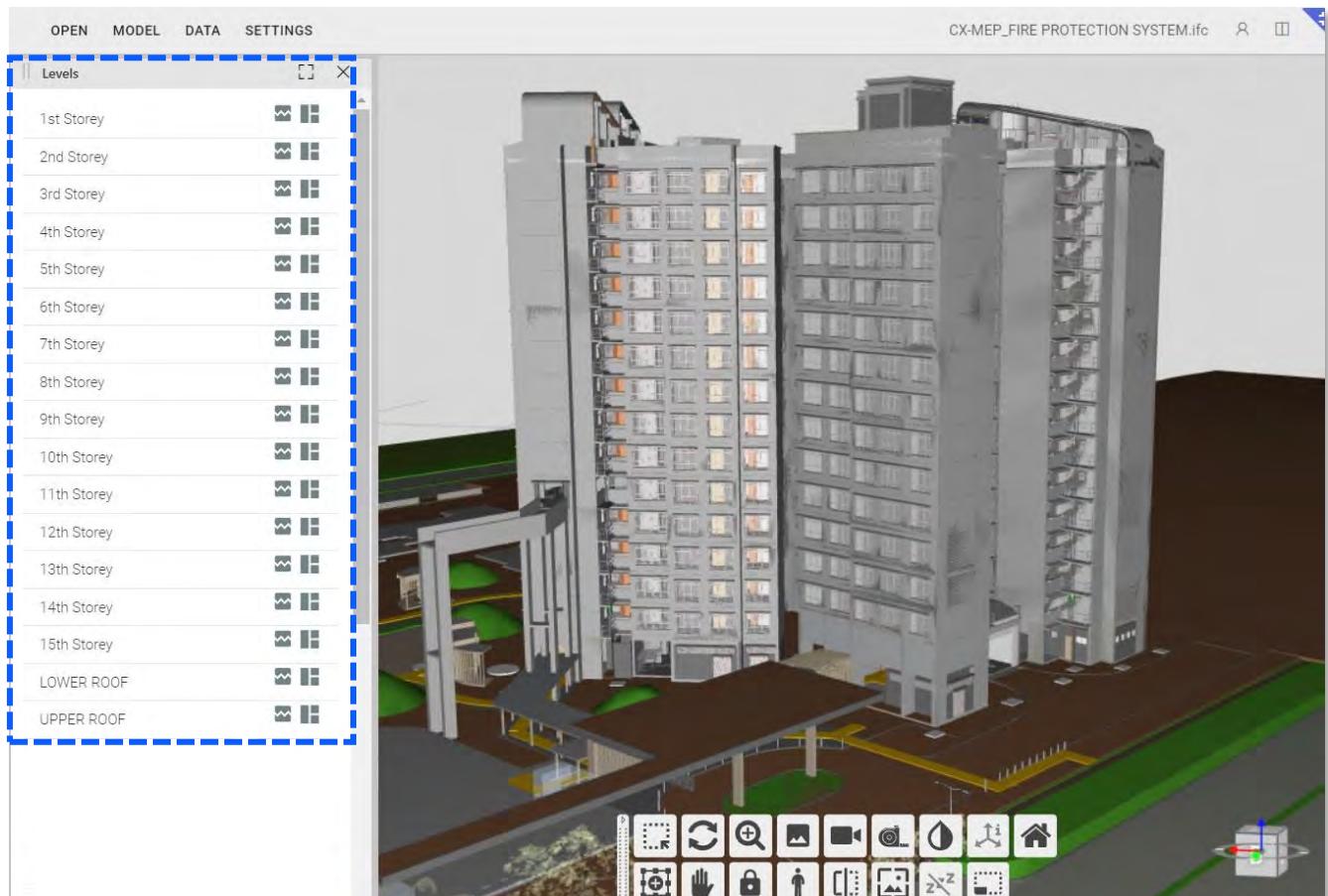
Note: Clash tolerance for specialist equipment such as an active chilled beam is acceptable.

Multi-Disciplinary Coordination

► Alignment of Levels and Zones Across All Disciplines' Models

Besides discipline-specific models, it may be necessary to divide the project into separate parts, zones and levels for better management of the model sizes, especially for larger and more complex projects. Models from all disciplines MUST name levels and zones identically.

- Only multi-disciplinary models with identical names and “Z” values for levels will be processed by Processing Officers in the CORENET X Collaboration Platform.
- Refer to Geo-Referencing on [Page 23](#).



S2 – Fig 4: Multi-Disciplinary Coordination

Typical Submission Package at a Single Gateway

The table below shows a sample of what is inside a typical CORENET X submission package for Construction Gateway.

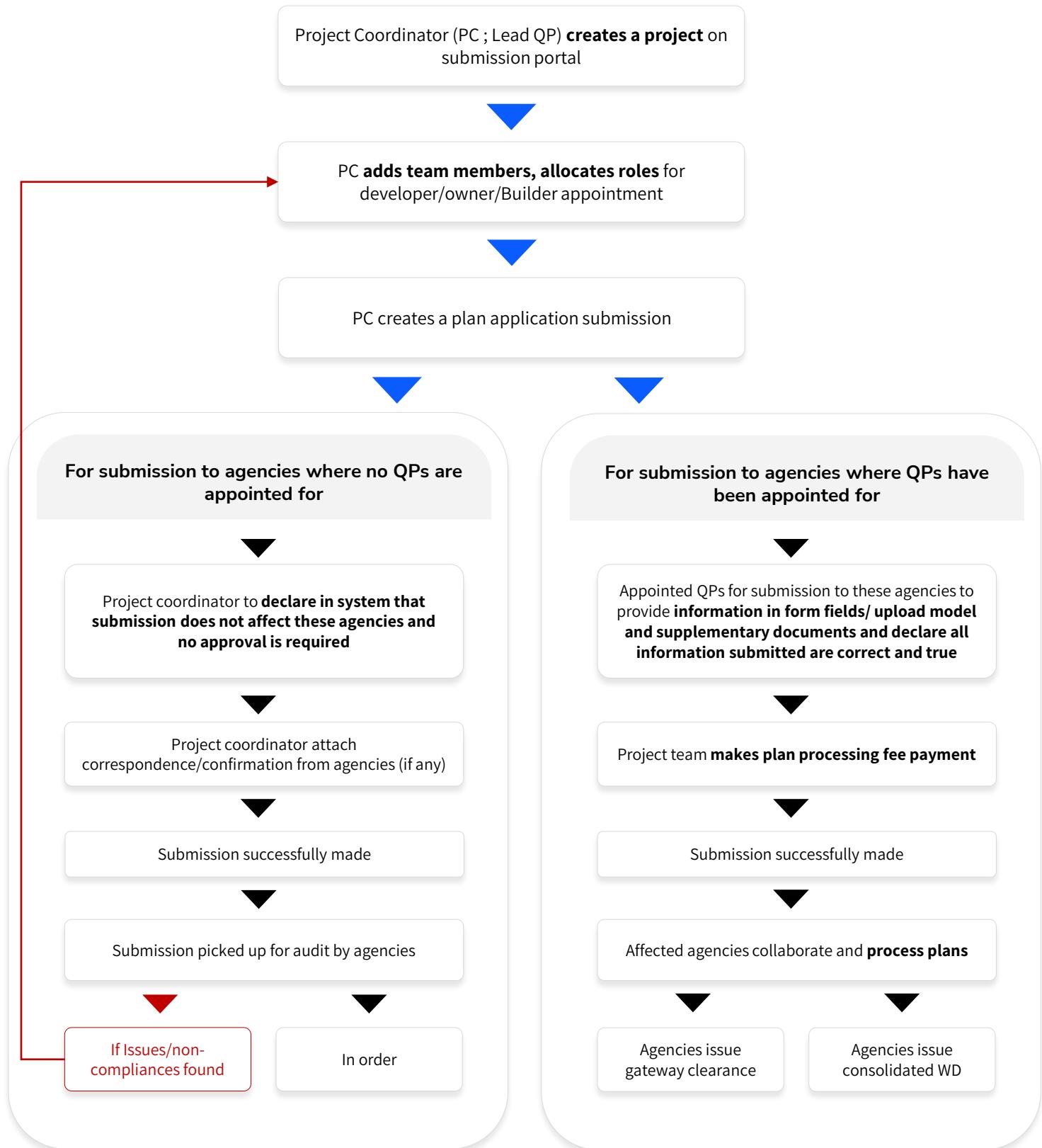
The purpose of this illustration is to highlight that not everything in CORENET X will have to be modelled in 3D. For practical reasons, it may not make sense to expect complex details to be modelled, and hence the submission package will also consist of other supporting documents such as 2D detailed drawings, design calculation reports etc.

We have highlighted in the yellow boxes examples of what may be required. Note that this differs across project types and is not exhaustive.

Examples	Architecture	C&S Engineering	M&E Engineering
IFC-SG models, all geo-referenced	<ul style="list-style-type: none"> • Blk 1 Model • Blk 2 Model • Podium Model 	<ul style="list-style-type: none"> • Blk 1 Model • Blk 2 Model • Podium Model • Substructure Model (For foundation and piling works) <p>Note: For projects which did not opt for Piling Gateway (G1.5), the project team will need to include all permanent foundation works in Construction Gateway (G2).</p>	<ul style="list-style-type: none"> • Blk 1 Model • Blk 2 Model • Podium Model
As mentioned on Page 16 , models from all disciplines <u>MUST</u> name levels and zones identically.			
2D drawings	<ul style="list-style-type: none"> • Details (e.g. household / storey shelter documentation and detailing) • External Works 	<ul style="list-style-type: none"> • General notes • Special details (e.g. slab reinforcement detailing, complex structure detailing, precast joints, prestressed details, steel connections) • External Works 	<ul style="list-style-type: none"> • Details (e.g. cooling tower documentation and detailing) • External Works
Design Calculation reports	-	Design calculation reports from QP, AC, [QP(Geo) & AC (Geo), if needed]	-
Additional supporting documents	<ul style="list-style-type: none"> • B-Score BDAS form • Public Communication Plans (if applicable) 	<ul style="list-style-type: none"> • B-Score BDAS form Supporting documents for piling works: • Site Investigation report in pdf & AGS format • Impact assessment report • Topography 	<ul style="list-style-type: none"> • B-Score BDAS form • Pollution Control Study (PCS) reports
Pre-consultation document	-	Completion letter of pre-consultation (for complex structure only)	-

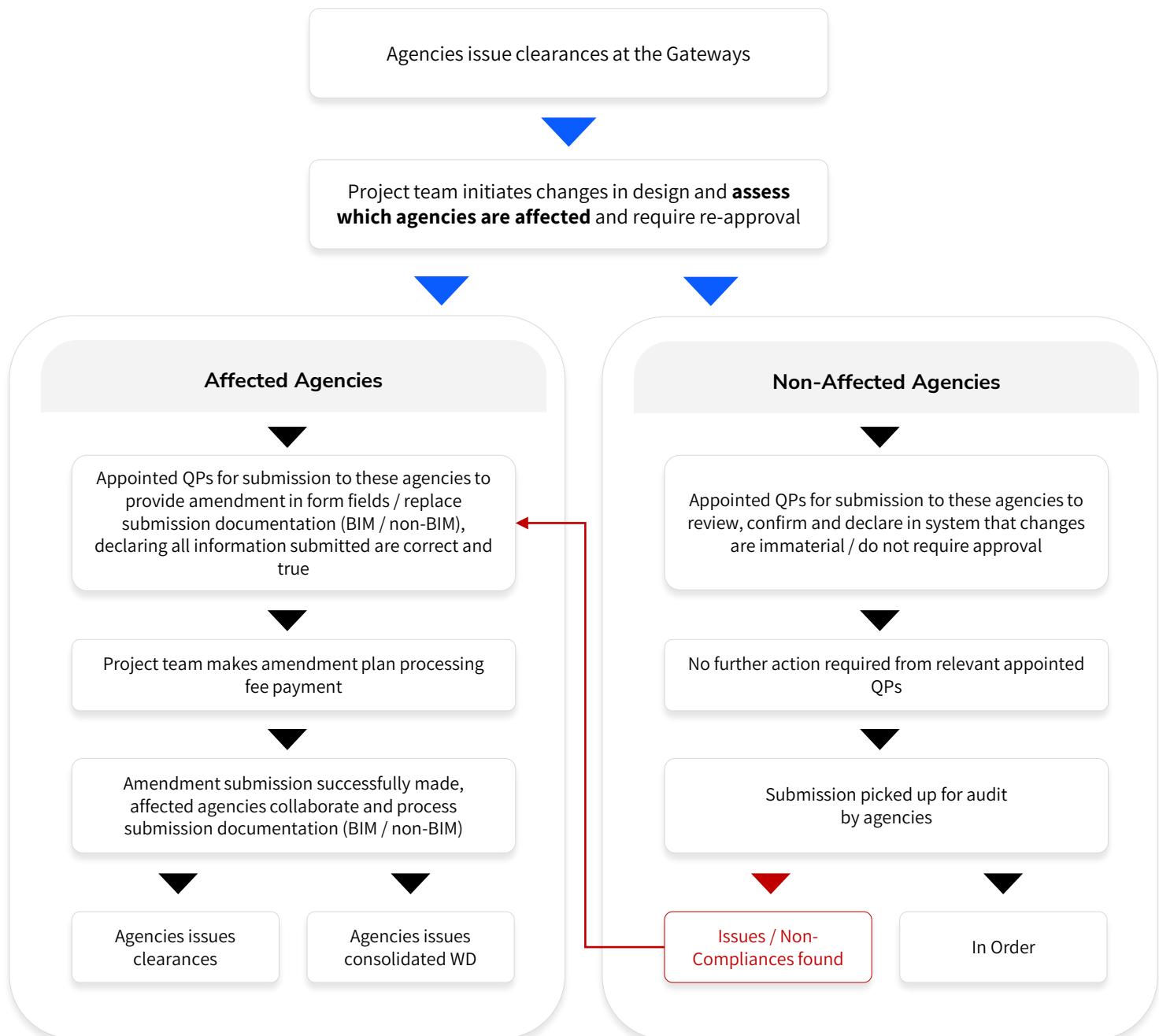
New Submission

► Joint Submission Workflow



Amendment Submission

► Joint Submission Workflow



Preparing Models for Submission

► Model Size

Each model should not exceed 800 MB, and be submitted by parts (i.e. 1 block per file). If a part model exceeds 800MB, the part model should be split into smaller files. Files compiled in zip folders are not accepted.

For huge developments that need to arrange their projects into different packages, please carry out a pre-submission consultation to seek agencies' concurrence for the proposal.

To help all project members understand the timing and delivery of data for every CORENET X submission, it is important to define the submission preparation and delivery details in the BIM Execution Plan. For more information, please refer to the BIM Essential Guide for BIM Execution Plan [here](#).

► Setting up Project Information

The Project Title, Address, QP Name & Professional Registration Number, and if applicable, Name & Professional Registration Number of Specialist QPs will be provided on the CORENET X Portal.

► Modelling in IFC-SG

- Most of the IFC parameter requirements are based on the international IFC 4 standards. A set of IFC-SG standards was developed to address specific regulatory requirements in Singapore that currently cannot be found in the international IFC standards.
- There are also IFC-SG parameters that had been defined & standardized to incorporate the current 2D drawings information and embedded in 3D models.
- A complete set of IFC-SG model shall consist of elements as described in [Section 4](#) of this COP. For example, a structural model can comprise of the following :
 - Piles
 - Footings / Pilecaps
 - Beams
 - Columns
 - Walls
 - Slabs
 - Staircases
 - Boreholes
- Industry practitioners shall use the [IFC-SG Resource Kit](#) to convert Native BIM models into IFC-SG models and verify no data loss occurred during the exporting.
- Details can be represented in 2D to supplement the IFC-SG model, such as:
 - Irregular pilecaps, raft foundation, slab elements, household shelter / storey shelter elements, transfer plates, precast elements, prestress elements, PPVC modules, steel connections.

Link:

[IFC-SG Resource Kit](#)

Preparing Models for Submission

► Reading the IFC-SG Mapping

- ✓ Know the element and its category
- ✓ What system it belongs to?
- ✓ What are the IFC Parameters that needs to map into it?
- ✓ To what Agency it will be submitted?

Agency	Identified Component	Identified parameters	Revit Representation	Archicad Representation	Domain	IFC Entities	IFC SubTypes ("= 0 UNDEFINED")	Property Set	Property Name
PUB	Cold Water System	-	Piping Systems	MEP System	PW	ifcDistributionSystem	"DOMESTICCOLDWATER	-	-
PUB	Bedding	Type	Generic Models	Model Element	ARC	ifcGeographicElement	"FOUNDATION	SGNet_GeographicElement	BeddingType
PUB	Manhole	Length	Plumbing Features	Flow Equipment	PW	ifcDistributionChamberElement	MANHOLE	SGNet_DistributionChamberElementDimension	Length
PUB	Manhole	Width	Plumbing Features	Flow Equipment	PW	ifcDistributionChamberElement	MANHOLE	SGNet_DistributionChamberElementDimension	Width
PUB	Manhole	Depth	Plumbing Features	Flow Equipment	PW	ifcDistributionChamberElement	MANHOLE	SGNet_DistributionChamberElementDimension	Depth
PUB	Sanitary System	-	Piping Systems	MEP System	PW	ifcDistributionSystem	"SANITARY	-	-
PUB	Sanitary System	-	Piping Systems	MEP System	PW	ifcDistributionSystem	"SANITARY	-	-
PUB	Inspection Chamber	Length	Plumbing Features	Flow Equipment	PW	ifcDistributionChamberElement	INSPECTIONCHAMBER	SGNet_DistributionChamberElementDimension	Length
PUB	Inspection Chamber	Width	Plumbing Features	Flow Equipment	PW	ifcDistributionChamberElement	INSPECTIONCHAMBER	SGNet_DistributionChamberElementDimension	Width
PUB	Inspection Chamber	Depth	Plumbing Features	Flow Equipment	PW	ifcDistributionChamberElement	INSPECTIONCHAMBER	SGNet_DistributionChamberElementDimension	Depth
PUB	Grease Trap	Height	Plumbing Features	Flow Equipment	PW	ifcInterceptor	GREASE	SGNet_InterceptorDimension	Height
PUB	Grease Trap	Width	Plumbing Features	Flow Equipment	PW	ifcInterceptor	GREASE	SGNet_InterceptorDimension	Width
PUB	Grease Trap	Length	Plumbing Features	Flow Equipment	PW	ifcInterceptor	GREASE	SGNet_InterceptorDimension	Length
PUB	Water Closet	-	Plumbing Features	Pipe Flow Terminal	PW	ifcSanitaryTerminal	"WATERCLOSET	-	-
PUB	Sanitary System	Gradient	Piping Systems	MEP System	PW	ifcDistributionSystem	"SANITARY	SGNet_SystemDimension	Gradient
PUB	Sanitary System	Length	Piping Systems	MEP System	PW	ifcDistributionSystem	"SANITARY	SGNet_SystemDimension	Length
PUB	Sanitary System	Diameter	Piping Systems	MEP System	PW	ifcDistributionSystem	"SANITARY	SGNet_SystemDimension	Diameter
PUB	Sump Pump	Standby Pump	Mechanical Equipment	Flow Equipment	PW	ifcPump	SUMPUMP	SGNet_Pump	Standby
PUB	Sump Pump	Duty	Mechanical Equipment	Flow Equipment	PW	ifcPump	SUMPUMP	SGNet_Pump	Duty
PUB	Sump Pump	Capacity	Mechanical Equipment	Flow Equipment	PW	ifcPump	SUMPUMP	SGNet_Pump	Capacity
PUB	Oil Interceptor	Height	Plumbing Features	Flow Equipment	PW	ifcInterceptor	OIL	SGNet_InterceptorDimension	Height
PUB	Oil Interceptor	Width	Plumbing Features	Flow Equipment	PW	ifcInterceptor	OIL	SGNet_InterceptorDimension	Width

S2 – Fig 5: IFC-SG Mapping

► Setting up the Model

Upgrading the current in-house BIM Template into CORENET X Template

- ✓ Study the existing object properties
- ✓ Know the properties that needs to be edited in-line with the IFC Configurator

Pull out the common properties and assign as the object type properties

- ✓ To avoid re-entering of properties.
- ✓ To avoid duplication of property when exported into IFC

Map the existing object library properties into configuration file

- ✓ One-time process
- ✓ Can be used into the future projects
- ✓ Eliminate duplicated work and errors
- ✓ Standard IFC exports for all your projects

Link:
[IFC-SG Resource Kit](#)

Preparing Models for Submission

► Examples of IFC-SG Parameters

IFC Structure		
Active	Type	Name
<input checked="" type="checkbox"/>	Beam	Concrete-Rectangular Be...
<input checked="" type="checkbox"/>	Beam	Concrete-Rectangular Be...
<input checked="" type="checkbox"/>	Beam	Concrete-Rectangular Be...
<input checked="" type="checkbox"/>	Beam	Concrete-Rectangular Be...
<input checked="" type="checkbox"/>	Beam	Concrete-Rectangular Be...
<input checked="" type="checkbox"/>	Beam	Concrete-Rectangular Be...

Properties		Location	Classification	Relations
		Name	Value	
SGPset_Beam				
BeamSpanType		Interior		
ConstructionMethod		CIS		
MaterialGrade		C32/40		
ReinforcementSteelGrade		500B		
SGPset_BeamDimension				
Depth		700		
Mark		2B11-3		
Width		200		
SGPset_BeamReinforcement				
BottomLeft		2H13		
BottomMiddle		2H13		
BottomRight		2H13		
StirrupsLeft		2H10-200		
StirrupsMiddle		2H10-200		
StirrupsRight		2H10-200		
StirrupsTypeLeft		Normal		
StirrupsTypeMiddle		Normal		
StirrupsTypeRight		Normal		
TopLeft		2H13		
TopMiddle		2H13		
TopRight		4H25		
SGPset_Material				

IFC Structure		
Active	Type	Name
<input checked="" type="checkbox"/>	Pile	Bored Pile:600mm Diamet...
<input checked="" type="checkbox"/>	Pile	Bored Pile:600mm Diamet...
<input checked="" type="checkbox"/>	Pile	Bored Pile:600mm Diamet...
<input checked="" type="checkbox"/>	Pile	Bored Pile:600mm Diamet...
<input checked="" type="checkbox"/>	Pile	Bored Pile:600mm Diamet...

Properties		Location	Classification	Relations
		Name	Value	
SGPset_Material				
MaterialGrade		C32/40		
SGPset_Pile				
BoreholeRef		BH2		
ConstructionMethod		CIS		
DA1-1_CompressionCapacity		3095		
DA1-1_TensionCapacity		0		
DA1-2_CompressionCapacity		2253		
DA1-2_TensionCapacity		0		
ReinforcementSteelGrade		500B		
StructuralCompressionCapacity		2280		
StructuralTensionCapacity		0		
SGPset_PileDimension				
CutOffLevel_SHD		-2.725		
Diameter		600		
Length		12 500		
Mark		PC5-2		
SGPset_PileReinforcement				
MainRebar		6H20		
PileType		Bored		
ReinforcementLength		12		
Stirrups		H10-300		
SGPset_PileStructuralLoad				

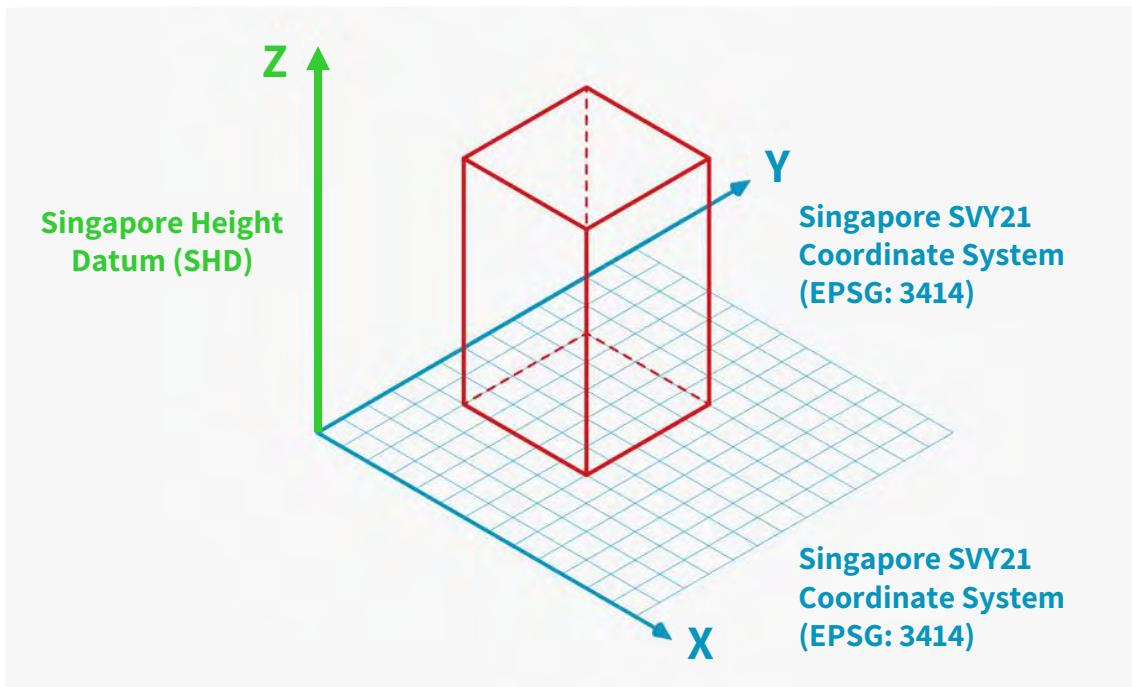
S2 – Fig 6 and 7 : Example of IFC-SG Parameters

Link:

[IFC-SG Resource Kit](#)

Geo-Referencing

Models should also be correctly geo-referenced and assigned real-world coordinates from the **Singapore SVY21 coordinate system (EPSG: 3414)** for Easting and Northing (x,y), including dimensions between grids. The layout of each model shall be presented in True North or real-world orientation, and the elevation levels or Height (z) of the model shall be set up based on the **Singapore Height Datum (SHD)**.



S2 – Fig 8: Geo-Referencing

The Singapore Institute of Surveyors and Valuers - Land Surveying Division has also come up with a video on geo-referencing, to explore how land surveyors and architects can work together to have more efficient workflow for future CORENET X submission.

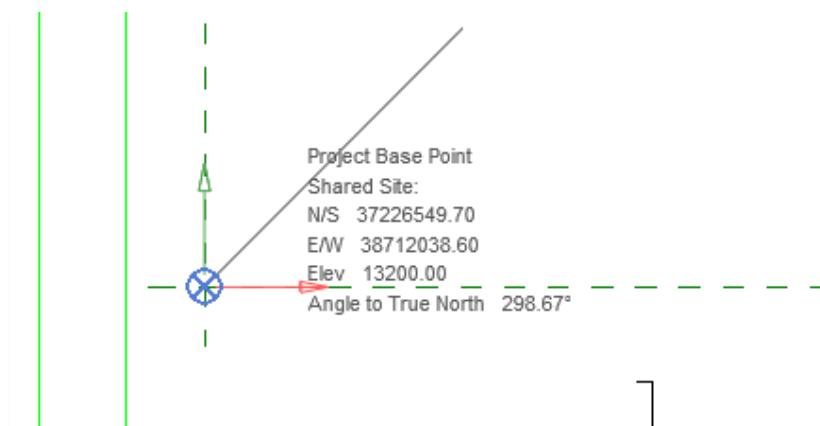
For details and video demonstration on geo-referencing, please visit the CORENET X website [here](#).

Preparing Models for Submission (Revit)

Example using Revit Configuration File

► 1. Set your model into the agreed coordinates

- To place model into the correct location with Architectural, Civil & Structural, Mechanical & Electrical models.



S2 – Fig 9

► 2. Identify the IFC properties to be tagged into each element of your model

- Element's properties can be assigned while Modelling.

Agency	Identified Component	Domain	IFC4 Entities	IFC SubTypes (* = USERDEFINED)	Property Set	Property Name	Property Value	Property Unit	IFC Material Set
PUB	Cold Water System	PLU	IfcDistributionSystem	*DOMESTICCOLDWATER		BeddingType	-	-	
PUB	Bedding	ARC	IfcGeographicElement	*FOUNDATION	SGPset_GeographicElement	Length	-	mm	
PUB	Manhole	PLU	IfcDistributionChamberElement	MANHOLE	SGPset_DistributionChamberElementDimension	Width	-	mm	
PUB	Manhole	PLU	IfcDistributionChamberElement	MANHOLE	SGPset_DistributionChamberElementDimension	Depth	-	mm	
PUB	Manhole	PLU	IfcDistributionChamberElement	MANHOLE	SGPset_DistributionChamberElementDimension				

S2 – Fig 10

Link:

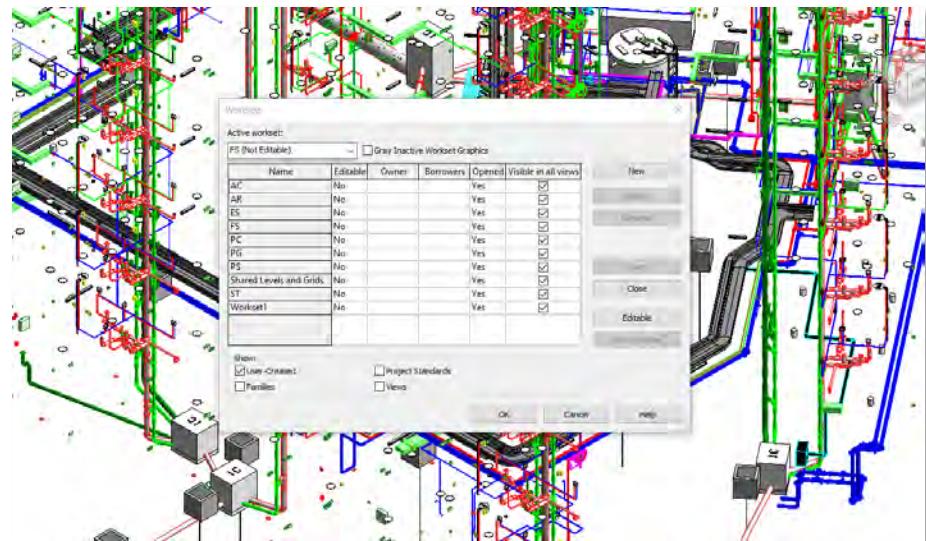
[IFC-SG Resource Kit](#)

Preparing Models for Submission (Revit)

Example using Revit Configuration File

► 3. Set the Revit Workset

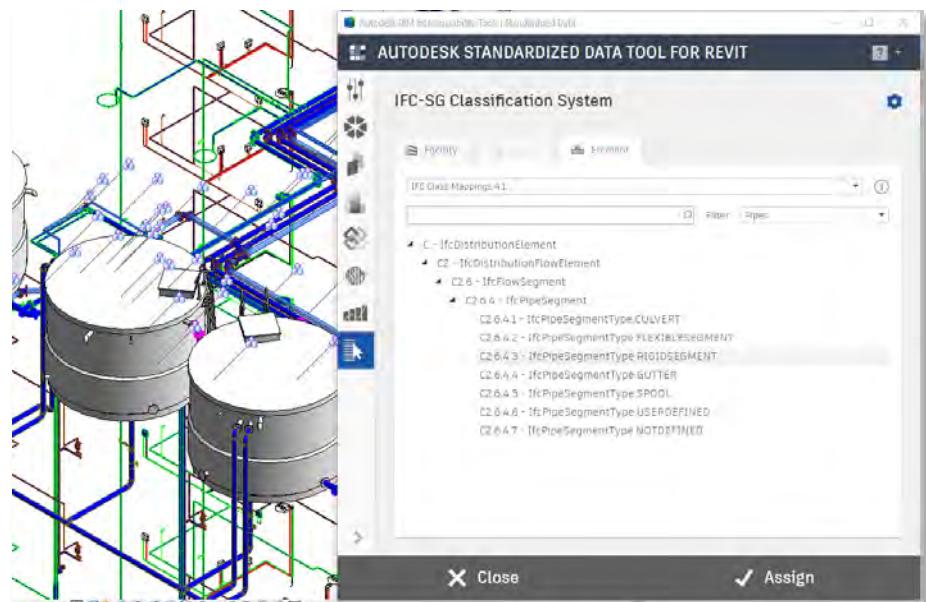
- To easily select the elements during IFC-SG Parameters mapping.
- To filter the views per Agency Submission.
- To reduce time when Exporting model in IFC format.
- To easily navigate when Modelling and model auditing.



S2 – Fig 11

► 4. IFC-SG Mapping

- **Use BIM Interoperability Tools to assign IFC parameters**
- To avoid misspelled IFC parameters (misspelled parameters will not be exported).
- Faster than manual parameter key-in.
- Elements will be exported into the correct IFC category.



S2 – Fig 12

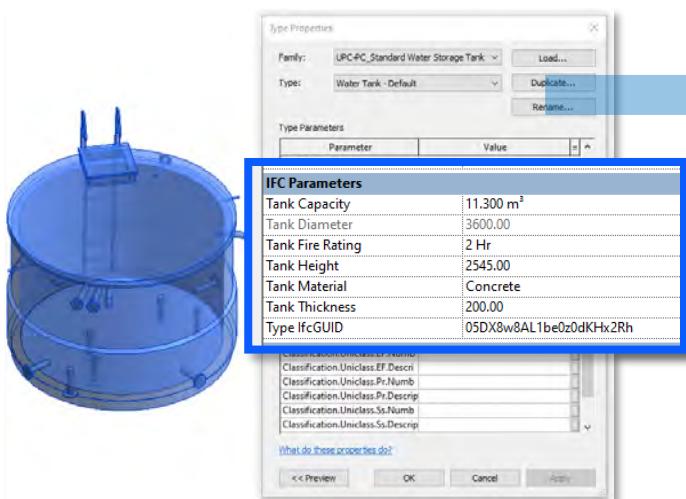
Link:
[IFC-SG Resource Kit](#)

Preparing Models for Submission (Revit)

Example using Revit Configuration File

► From Revit Library

- Editing the Configuration File to Adapt In-house Company Properties

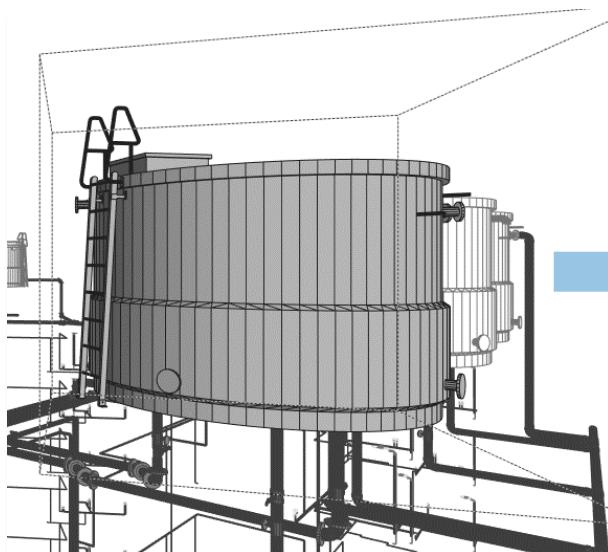


S2 – Fig 13: Revit Library

PropertySet:	SGPset_TankDimension	I	IfcTank
Diameter	Length	Tank Diameter	
Height	Length	Tank Height	
Length	Length		
Thickness	Length	Tank Thickness	
Width	Length	Tank Width	

S2 – Fig 14: Configuration File

► From IFC Model



S2 – Fig 15

Name	Value	Unit
Guid	05DX8w8AL1be0z0dkHwvvp	
IfcEntity	IfcTank	
Name	UPC-PC_Standard Water Storage Tank:Water Tank - Default:2376892	
ObjectType	UPC-PC_Standard Water Storage Tank:Water Tank - Default	
PredefinedType	STORAGE	
Tag	2376892	
Pset_EnvironmentalImpactIndicators		
Reference	Water Tank - Default	
Pset_TankTypeCommon		
Capacity	11.3	m³
IsPotable	Yes	
SGPset_Tank		
Diameter	3600	mm
Height	2545	mm
Thickness	200	mm

S2 – Fig 16

Link:
[IFC-SG Resource Kit](#)

Top 3 Common Modelling Challenges and Solutions (Revit)

Example using Revit Configuration File

► Challenge 1

Challenge	Implications	Solutions
Accidentally spelling IFC property wrongly <u>e.g.</u> ✓ IfcTank ✗ IfcTanl ✗ ifctank	<ul style="list-style-type: none"> ➤ Missing data in IFC • IFC properties cannot be exported • Existing in-house properties not mapped properly (to wrong IFC properties), thus also can't be exported 	✓ Avoid manual typing where possible <ul style="list-style-type: none"> • Use BIM Interoperability Tool, select from drop down list • Copy Paste the information from IFC-SG Industry Mapping (.XLS file from GovTech)

► Challenge 2

Challenge	Implications	Solutions
Forgetting to update IFC after changes / modifications to model	<ul style="list-style-type: none"> ➤ Missing data in IFC • IFC properties cannot be exported • Existing in-house properties not mapped properly (to wrong IFC properties), thus also can't be exported 	✓ Check Mapping <ul style="list-style-type: none"> • Redo the mapping • Use Schedule to cross check if all elements were tagged properly. ✓ Avoid manual typing where possible <ul style="list-style-type: none"> • Use BIM Interoperability Tool, select from drop down list • Copy Paste the information from IFC-SG Industry Mapping (.XLS file from GovTech)

► Challenge 3

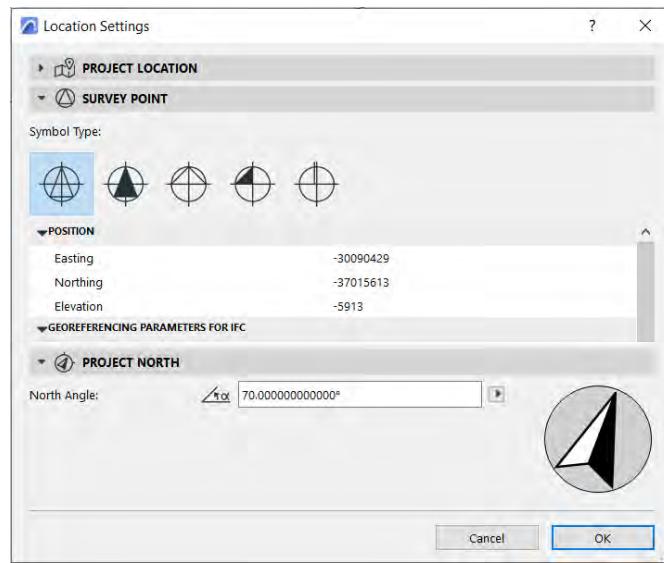
Challenge	Implications	Solutions
Cannot export Revit linked files to a federated IFC (model with multiple link files) <u>e.g.</u> MEP sub-discipline models	<ul style="list-style-type: none"> ➤ Missing data in IFC • Assigned systems will be lost • IFC properties cannot be exported • Existing in-house properties not mapped properly (to wrong IFC properties), thus also can't be exported 	✓ Today <ul style="list-style-type: none"> • Tag information after binding models • Use Group Models instead of Binding • Avoid binding if possible (i.e. export linked files one by one) ✓ Future <ul style="list-style-type: none"> • Through CORENET X community of practice, we have feedback to Autodesk to enable export of federated IFC • Autodesk shared that this is part of the Revit Roadmap and will be included progressively in early 2023

Preparing Models for Submission (Archicad)

Example using Archicad Configuration File

► 1. Geo-reference the project

- To geo reference the project for Architectural, Civil & Structural, Mechanical & Electrical Model, refer [here](#).



S2 – Fig 17

► 2. Identify the IFC properties to be tagged into each element in your model

- Element's properties can be assigned while modeling. Note: some parameters can be auto-filled using expressions.

Agency	Identified Component	Identified parameters	Archicad Representation	Discipline	IFC4 Entities	IFC Sub Types (* = USERDEFINED)
BCA	Beam	Depth	Beam	STR	IfcBeam	Need not specify
BCA	Beam	Mark	Beam	STR	IfcBeam	Need not specify
BCA	Beam	Member Section	Beam	STR	IfcBeam	Need not specify
BCA	Beam	Width	Beam	STR	IfcBeam	Need not specify

Property Set	Property Name	Property Type	Property Unit	IFC4 Material Set
SGPset_BeamDimension	Depth	Length	mm	N.A
SGPset_BeamDimension	Mark	Label	N.A	N.A
SGPset_BeamDimension	MemberSection	Label	N.A	N.A
SGPset_BeamDimension	Width	Length	mm	N.A

S2 – Fig 18

Link:

[IFC-SG Resource Kit](#)

Section 2: General Requirements Model Preparation (Archicad)

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

• KEY GATEWAYS •

• OTHER BUILDING WORKS •

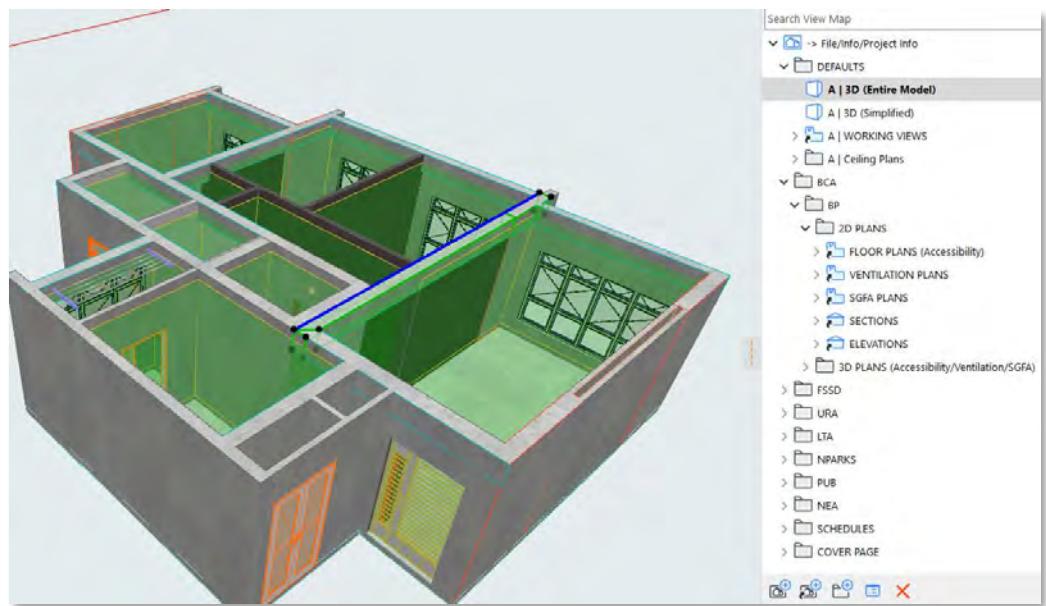
BIM DATA REPRESENTATION

Preparing Models for Submission (Archicad)

Example using Archicad Configuration File

► 3. Set the View for Export from Navigator

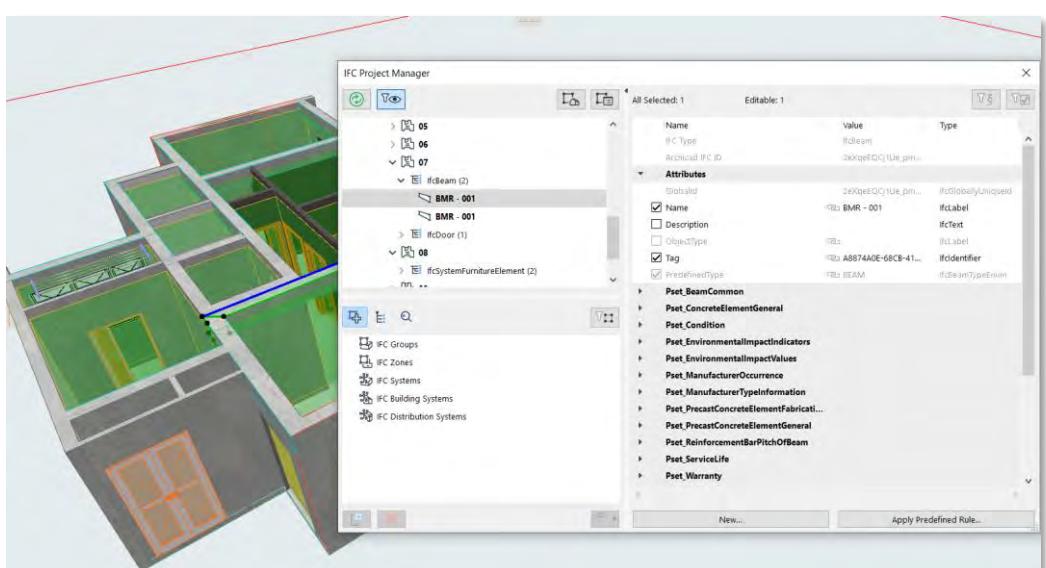
- To easily view and select the elements while modelling.
- To easily navigate while modeling and checking.
- To filter the views as per Agency Submission.
- To easily export only elements visible on the current view.



S2 – Fig 19

► 4. Model Verification using IFC Project Manager

- IFC Project Manager for Model Verification before export
- Assign or edit IFC-SG Property Values.
- Create custom IFC Property, Groups (Zones, Systems)



S2 – Fig 20

Link:

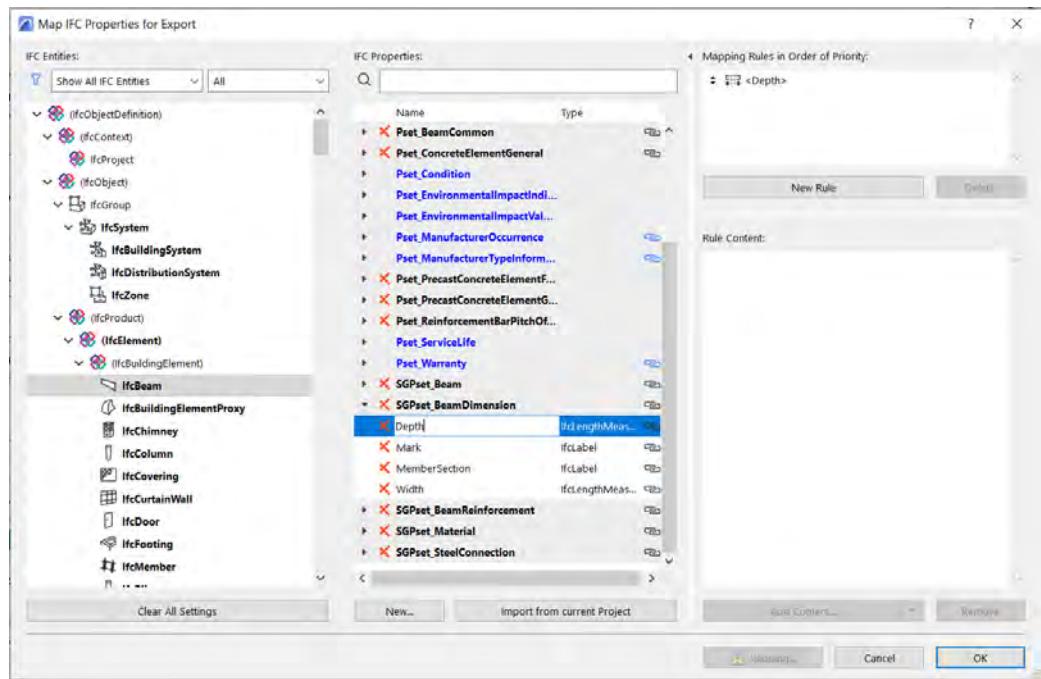
[IFC-SG Resource Kit](#)

Preparing Models for Submission (Archicad)

Example using Archicad Configuration File

► 5. IFC-SG Property Mapping

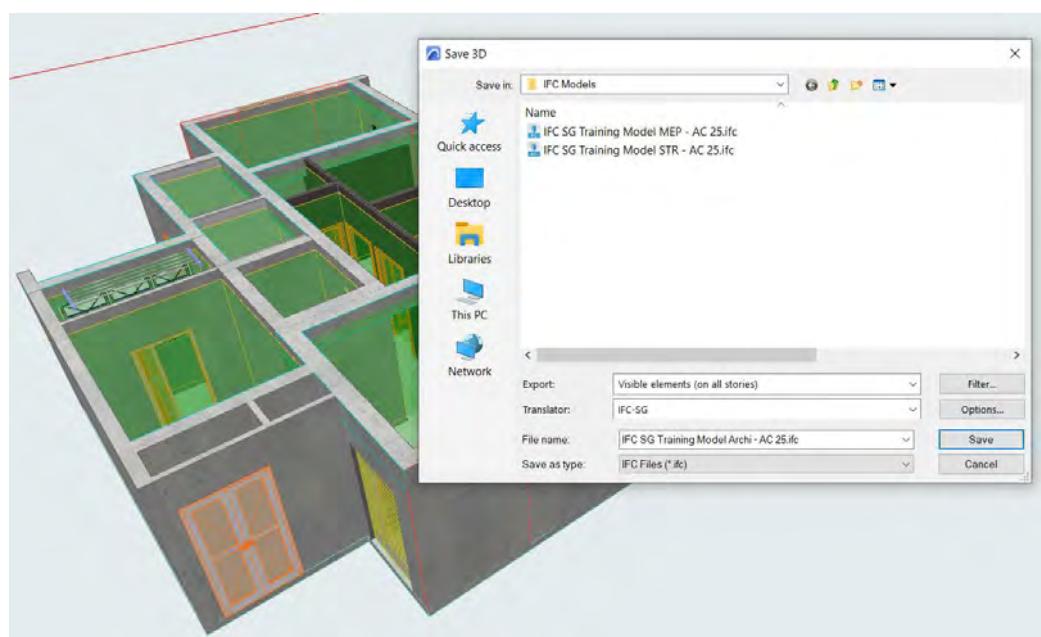
- IFC-SG Properties are already mapped in the IFC-SG Export Translator.



S2 – Fig 21

► 6. Export IFC Model

- Export visible elements (in all stories)
- Make sure to chose IFC-SG Translator
- Verify the IFC model in BIM Vision or Solibri Anywhere after exporting.



S2 – Fig 22

Link:
[IFC-SG Resource Kit](#)

Top 3 Modelling Tips (Archicad)

Example using Archicad Configuration File

► Tip 1

Scenario	Implications	Solutions
Updating latest IFC-SG requirements in Archicad project.	<p>➤ Missing data in IFC</p> <ul style="list-style-type: none"> Not importing latest IFC-SG requirements (config files) into the project. 	<p>✓ Import latest config files</p> <p><u>For ongoing project:</u></p> <ul style="list-style-type: none"> If expressions are used in properties, make sure to export those properties definitions (xml files). If IFC-SG parameters are populated with values, make sure to export those element parameters (Excel export from Schedules) Import the config files using the Import IFC-SG Classifications and Properties add-on. Import (merge) the properties xml exported in step 1. Import the excel schedule exported in step 2. <p><u>For new project:</u></p> <ul style="list-style-type: none"> Import the config files using the Import IFC-SG Classifications and Properties add-on.

► Tip 2

Scenario	Implications	Solutions
Update IFC-SG parameter values of non geometric entities. E.g.: IfcSite, IfcBuilding, IfcStorey	<p>➤ Missing data in IFC</p> <ul style="list-style-type: none"> Missing values of IFC-SG Parameters of Non geometric entities. 	<p>✓ Import latest config files</p> <ul style="list-style-type: none"> Use IFC Project Manager to update the values of IFC-SG Parameters of spatial entities like IfcSite, IfcBuilding, IfcStorey

► Tip 3

Scenario	Implications	Solutions
Update parameter values of IFC Systems, Groups, Building Systems, Distribution Systems	<p>➤ Missing data in IFC</p> <ul style="list-style-type: none"> Missing values of IFC-SG Parameters of IFC Systems, Groups, Building Systems, Distribution Systems 	<p>✓ Import latest config files</p> <ul style="list-style-type: none"> Use IFC Project Manager to update the values of IFC-SG Parameters of IFC Systems, Groups, Building Systems, Distribution Systems.

Section 2: General Requirements Model Preparation (Tekla)

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

• KEY GATEWAYS •

• OTHER BUILDING WORKS •

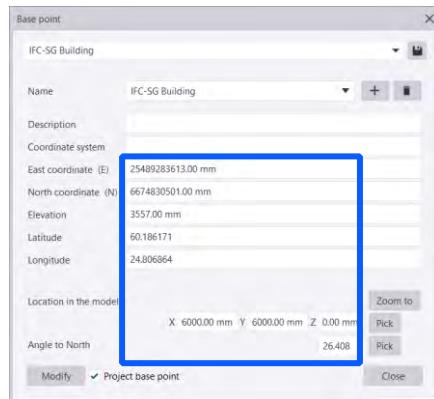
BIM DATA REPRESENTATION

Preparing Models for Submission (Tekla)

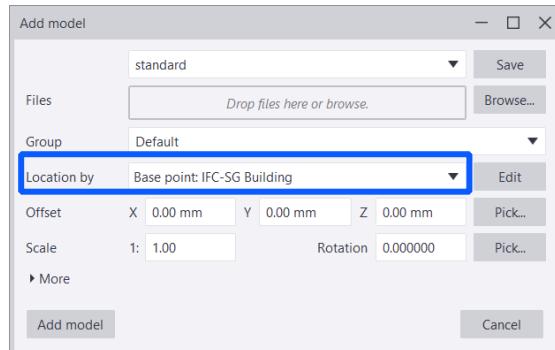
Example using Tekla Configuration File

► 1. Geo-reference the project

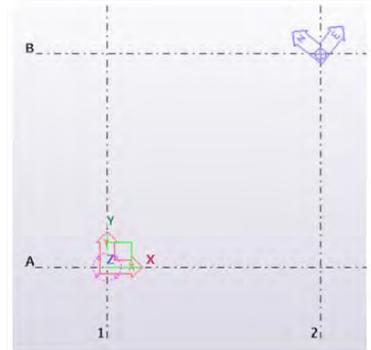
- To place model relative to the selected project base point using the coordinate system values.



S2 – Fig 23 :
Example of Base Point Dialog Box



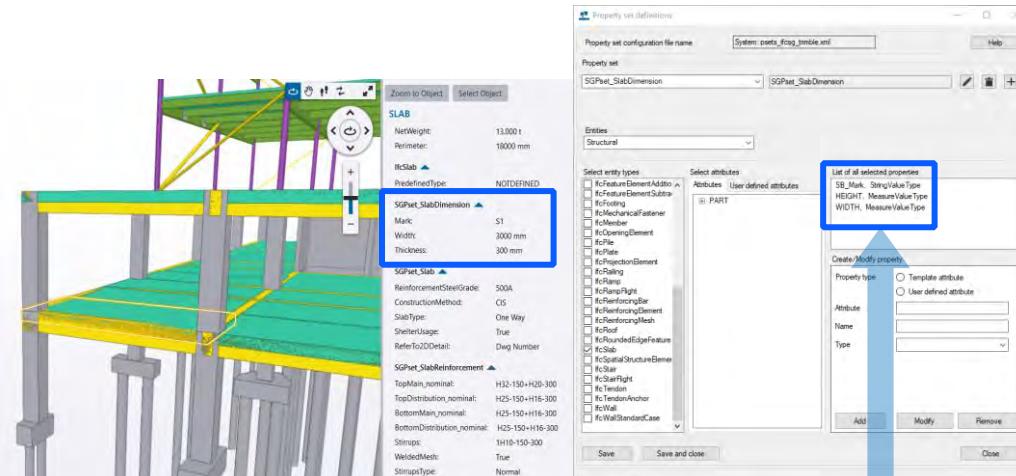
S2 – Fig 24 :
Example of Add model Dialog Box



S2 – Fig 25 :
Example of Base Point on model

► 2. Identify the IFC properties to be tagged into each element of your model

- Element's properties are automatically populated as measure type while modeling, no need to fill-in manually.



Discipline	IFC4 Entities	IFC Sub Types (* = USERDEFINED)	Property Set	Property Name	Property Type	Property Unit	IFC4 Material Set
STR	IfcSlab	Need not specify	SGPset_Slab	SlabType	Label	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_Slab	ConstructionMethod	Label	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_Slab	ReferTo2DDetail	Label	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_Slab	ReinforcementSteelGrade	Label	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_Slab	ShelterUsage	Boolean	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_SlabDimension	Mark	Label	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_SlabDimension	Thickness	Length	mm	N.A
STR	IfcSlab	Need not specify	SGPset_SlabReinforcement	WeldedMesh	Boolean	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_SlabReinforcement	BottomDistribution_nominal	Label	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_SlabReinforcement	BottomMain_nominal	Label	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_SlabReinforcement	TopDistribution_nominal	Label	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_SlabReinforcement	TopMain_nominal	Label	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_SlabReinforcement	Stirrups	Label	N.A	N.A
STR	IfcSlab	Need not specify	SGPset_SlabReinforcement	StirrupsType	Label	N.A	N.A

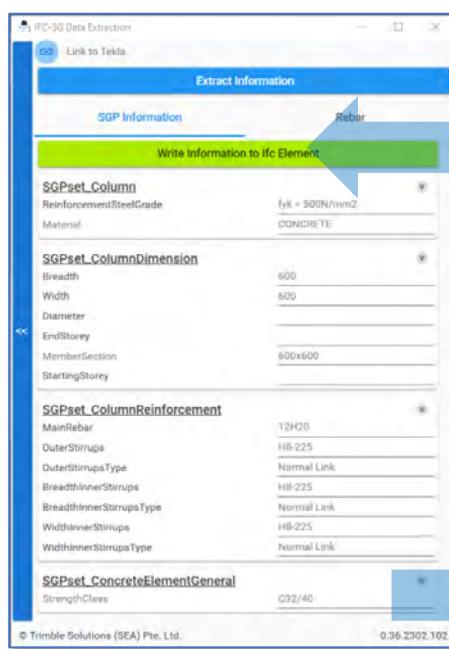
S2 – Fig 26

Preparing Models for Submission (Tekla)

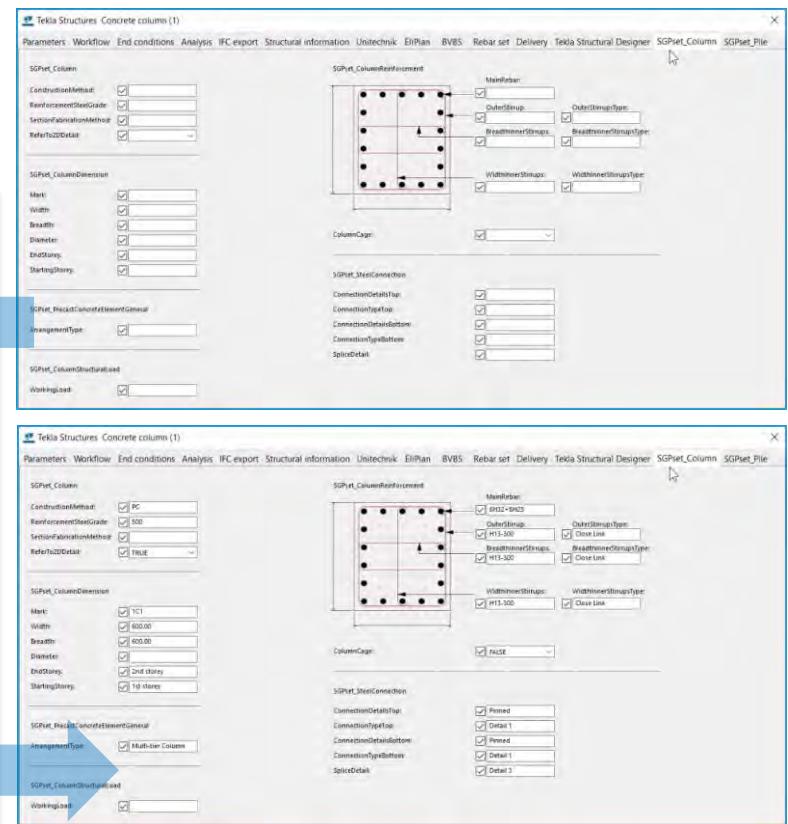
Example using Tekla Configuration File

► 3. IFC-SG Mapping

- Use IFC Data Extractor (Auto-Filler) Tool to assign IFC parameters
- Faster than keying in manual parameters



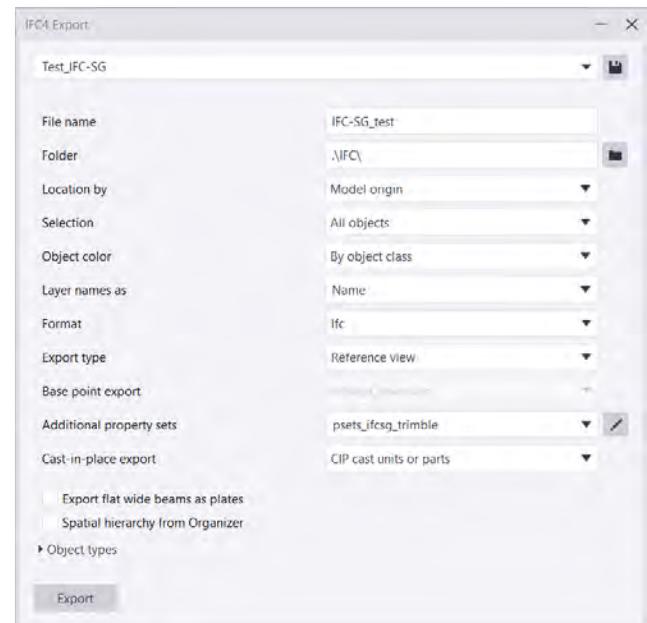
S2 – Fig 27



S2 – Fig 28 & 29

► 4. IFC Export Setup

- To simplify the process of choosing elements while mapping IFC-SG parameters
- To streamline the process of exporting a model in IFC format and save time

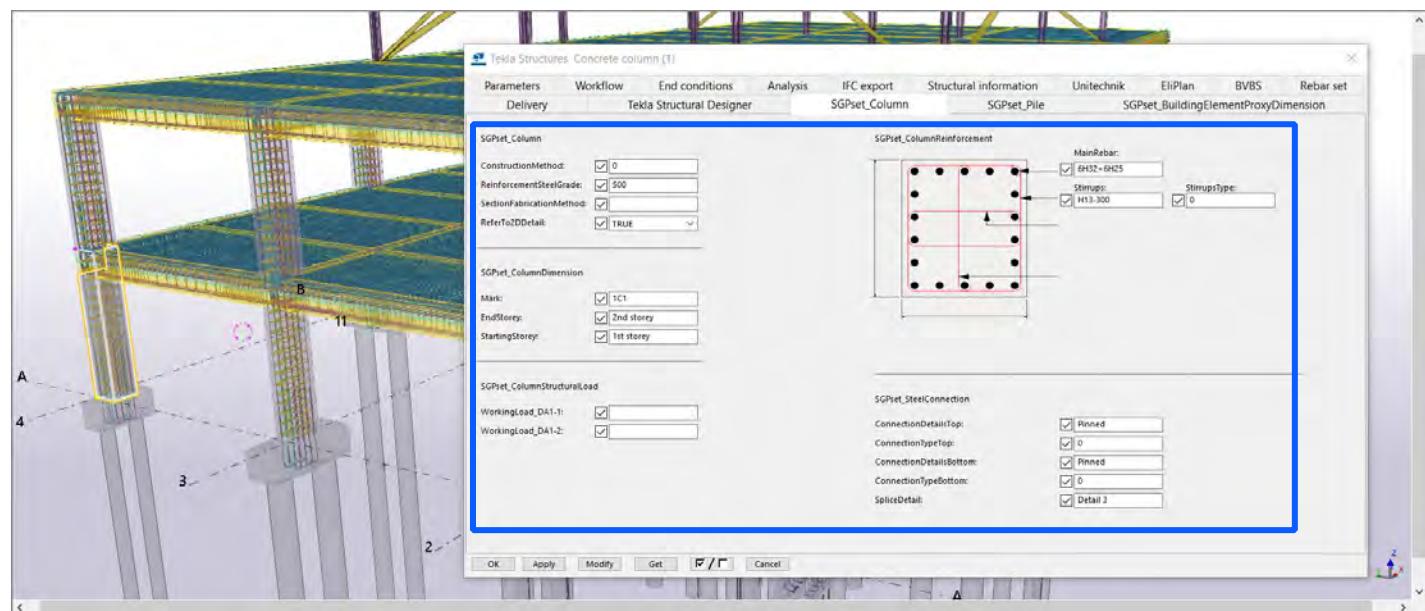
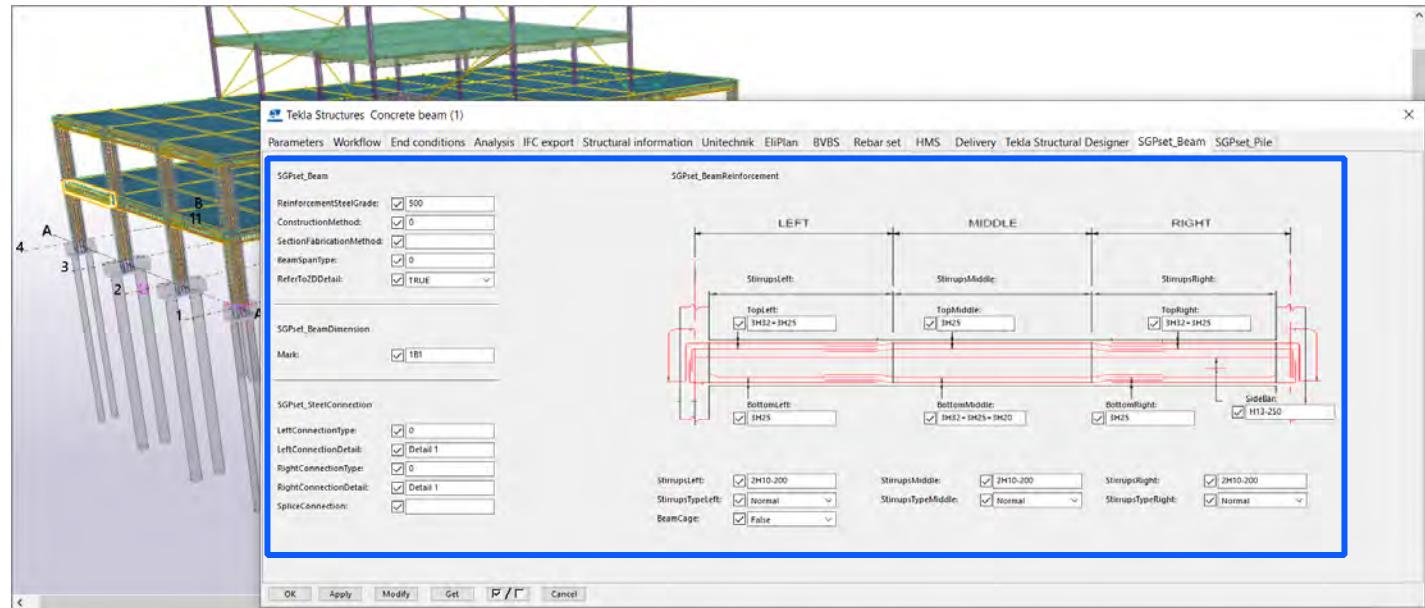


S2 – Fig 30

Preparing Models for Submission (Tekla)

Example using Tekla Configuration File

► Examples of IFC-SG Parameters



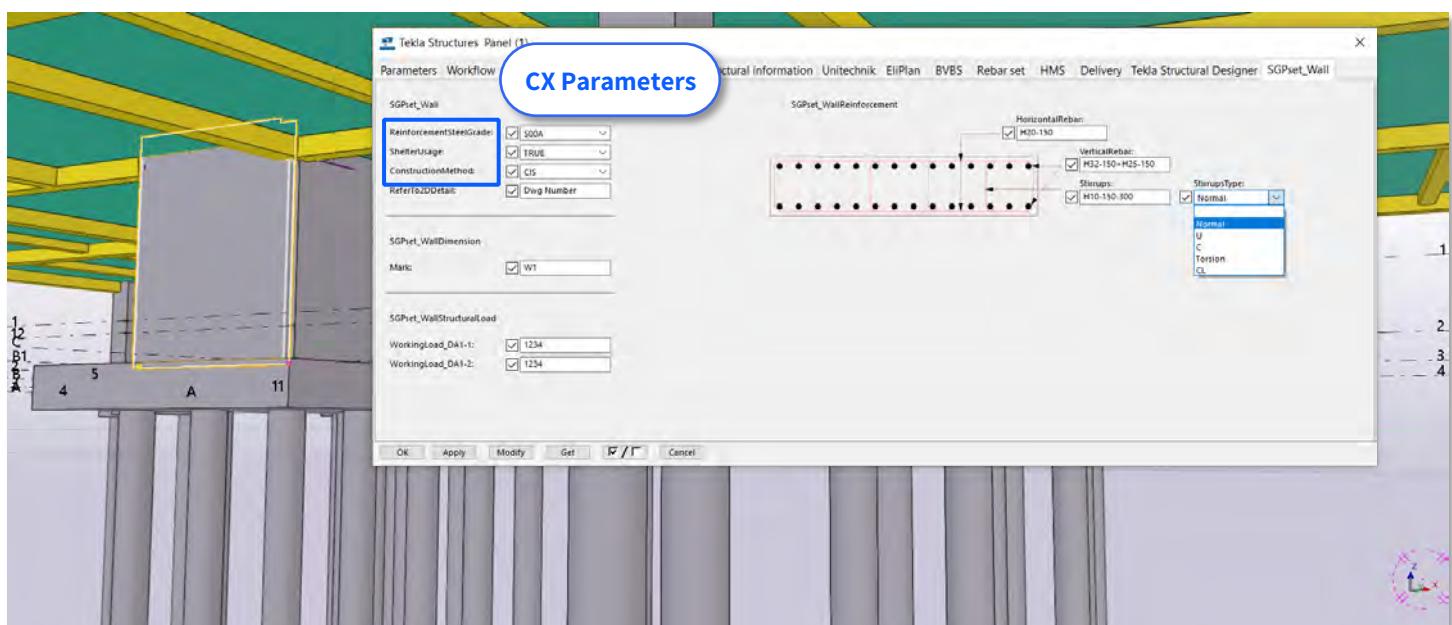
S2 – Fig 31 & 32 : Example of IFC-SG Parameters

Preparing Models for Submission (Tekla)

Example using Tekla Configuration File

► From Tekla User-Defined Attribute (UDA) Parameters

- Editing configuration file to adapt in-house properties



```
objects_ifcsg_trimble.inp - Notepad
File Edit Format View Help
/** SGSet_Wall ***/
attribute("", "SGSet_Wall", label, "%s", none, none, "0", "0", 22, 17)

attribute("", "ReinforcementSteelGrade:", label, "%s", none, none, "0", "0", 22, 60)
attribute("WA_ReinforcementSt", "", option, "%s", No, none, "0.0", "0.0", 250, 60, 160)
{
    value("", 2)
    value("500A", 0)
    value("500B", 0)
    value("500C", 0)
    value("600A", 0)
    value("600B", 0)
    value("600C", 0)
}
attribute("", "ShelterUsage:", label, "%s", none, none, "0", "0", 22, 90)
/* MODIFIED */
attribute("WA_ShelterUsage", "", option, "%s", No, none, "0.0", "0.0", 250, 90, 160)
{
    value("", 2)
    value("FALSE", 0)
    value("TRUE", 0)
}

/* MODIFIED */
attribute("", "ConstructionMethod:", label, "%s", none, none, "0", "0", 22, 120)
attribute("WA_ConstructionMet", "", option, "%s", No, none, "0.0", "0.0", 250, 120, 160)
{
    value("", 2)
    value("CIS", 0)
    value("PC", 0)
    value("PT (Pre)", 0)
    value("PT (Post)", 0)
    value("PF", 0)
    value("PPVC", 0)
}
```

Company Parameters

S2 – Fig 33 & 34

Section 2: General Requirements Model Preparation (Tekla)

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

• KEY GATEWAYS •

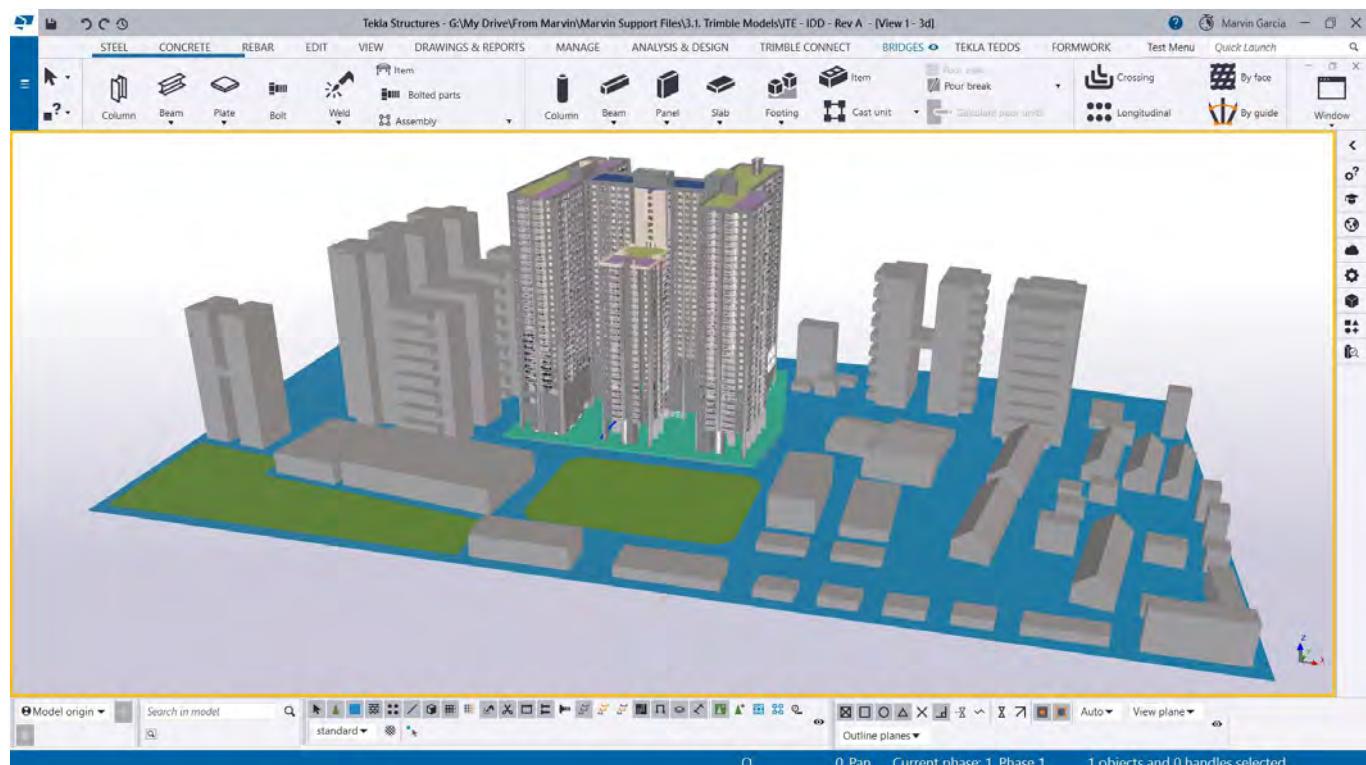
• OTHER BUILDING WORKS •

BIM DATA REPRESENTATION

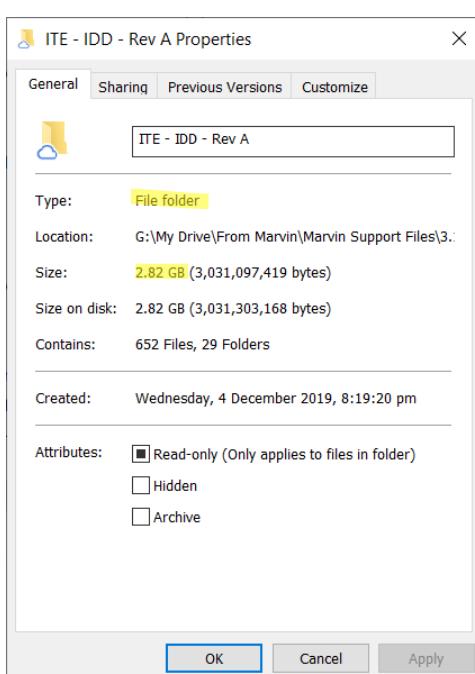
Preparing Models for Submission (Tekla)

Example using Tekla Configuration File

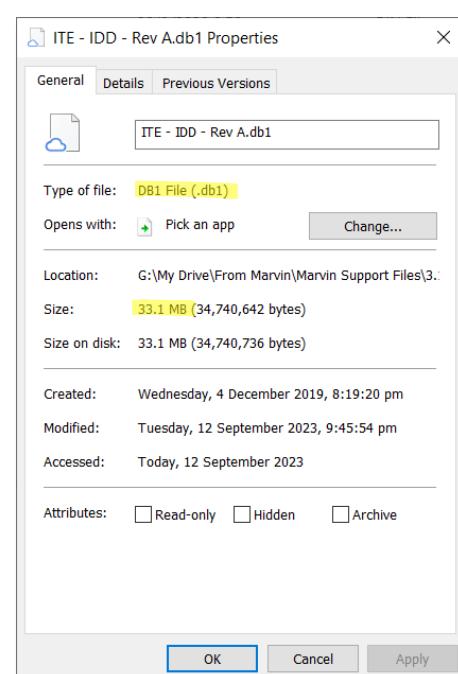
► Sample (Large) Tekla Structure Model and File Size



S2 – Fig 35 : Example of Large Tekla Model



S2 – Fig 36 : Example of a Tekla Model folder

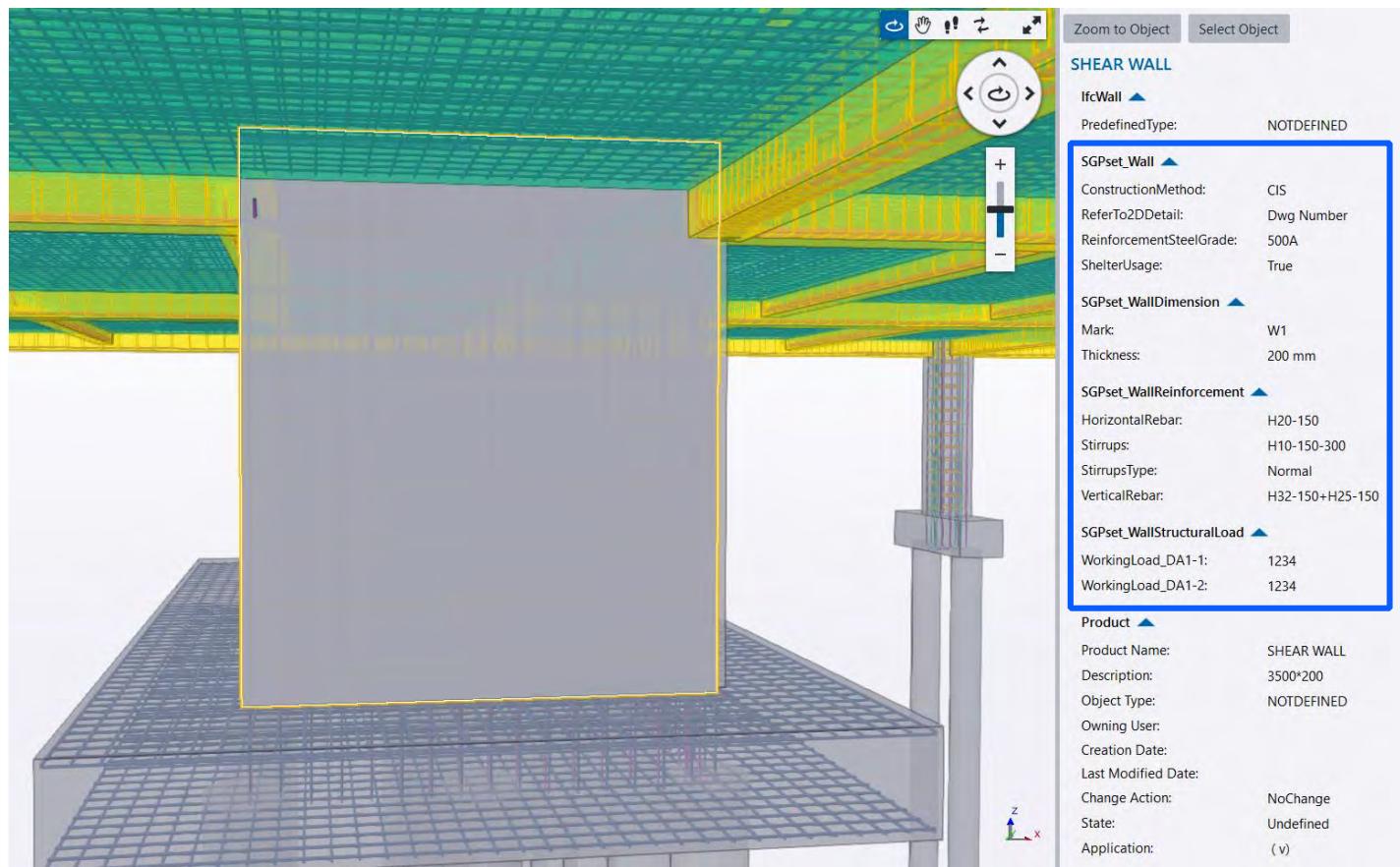


S2 – Fig 37 : Example of a Tekla model database *.db1

Preparing Models for Submission (Tekla)

Example using Tekla Configuration File

► From IFC Model Property Set (SGPset)



S2 – Fig 38

Top 3 Common Modelling Challenges and Solutions (Tekla)

Example using Tekla Configuration File

► Challenge 1

Challenge	Implications	Solutions
Forgetting to update the definitions of user-defined attribute after modifying the objects.inp	<ul style="list-style-type: none"> ➤ Incorrect data in IFC 	<ul style="list-style-type: none"> ✓ Avoid modifying the label unless necessary
	<ul style="list-style-type: none"> • Previously set in-house properties weren't correctly matched with the right IFC properties 	<ul style="list-style-type: none"> • Use Diagnose & Repair to detect and repair the incorrect UDA value types • Do not modify unless an experienced user

► Challenge 2

Challenge	Implications	Solutions
Forgetting to update IFC after changes / modifications to model	<ul style="list-style-type: none"> ➤ Missing or incorrect data in IFC 	<ul style="list-style-type: none"> ✓ Re-Export IFC
	<ul style="list-style-type: none"> • Previously set in-house properties weren't correctly matched with the right IFC properties 	<ul style="list-style-type: none"> • Load the pre-defined setting for IFC export • Use filter when selecting an object if not meant for all objects

► Challenge 3

Challenge	Implications	Solutions
Forgetting to set Subtype (IFC4)	<ul style="list-style-type: none"> ➤ Missing or incorrect data in IFC 	<ul style="list-style-type: none"> ✓ Check IFC Subtype (IFC4)
	<ul style="list-style-type: none"> • Previously set in-house properties weren't correctly matched with the right IFC properties 	<ul style="list-style-type: none"> • Set and define the needed IFC Subtype • Load the pre-defined types of the entity in the list of available drop-down option

Link:

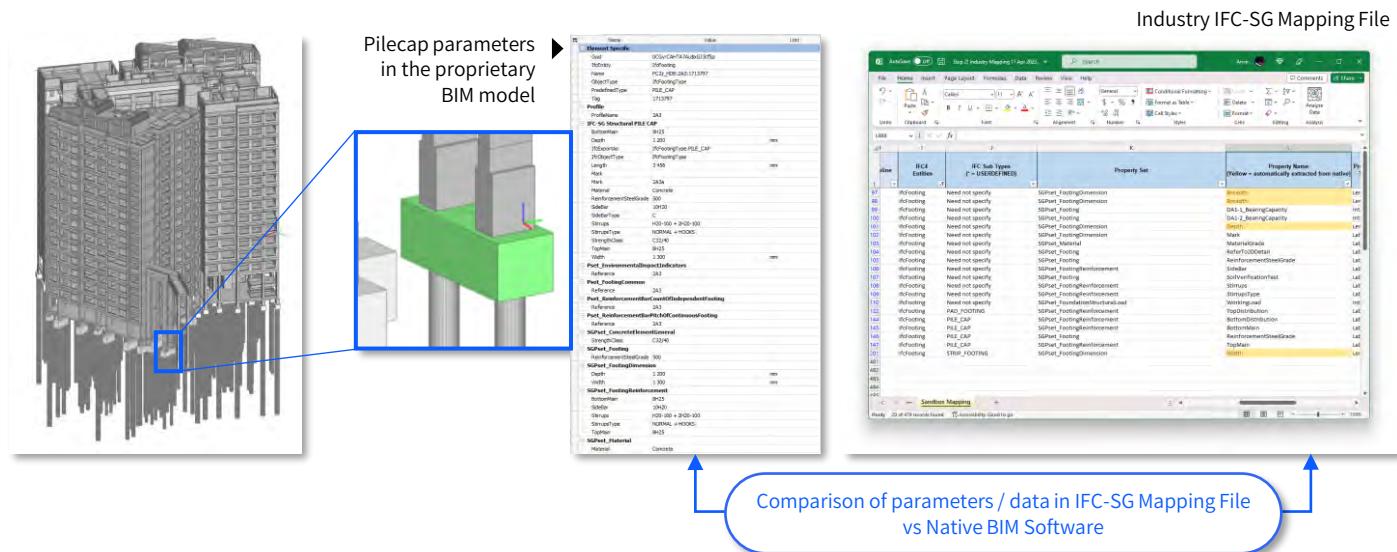
[IFC-SG Resource Kit](#)

3rd Party Application(s) to help with Preparation of IFC-SG Models (IFC-SG Validator)

Example using IFC-SG Validator
(Free to Use)

► How does the IFC-SG Validator work?

- The IFC-SG Validator extracts all elements from the model and check whether IFC-SG parameters have been added to the corresponding BIM components in the model. This helps to check whether the QP have missed out any IFC-SG parameters when mapping IFC-SG data into the proprietary BIM model earlier.



► Setting up the IFC Model

Pre-Requisite

- ✓ IFC Model
- ✓ IFC-SG Mapping File (Optional). Can be found in the [IFC-SG resource kit](#).



Preparing the Model

- ✓ Input parameters into model.
- ✓ Instructions can be found in the [IFC-SG resource kit](#).

Validation Overview

- Go to:
<https://www.code.builtsearch.com/ifcsg-validator>
- ✓ Upload IFC Model
 - ✓ Upload IFC-SG Mapping file (Optional)
 - ✓ View Result

Link:
[IFC-SG Resource Kit](#)

3rd Party Application(s) to help with Preparation of IFC-SG Models (IFC-SG Validator)

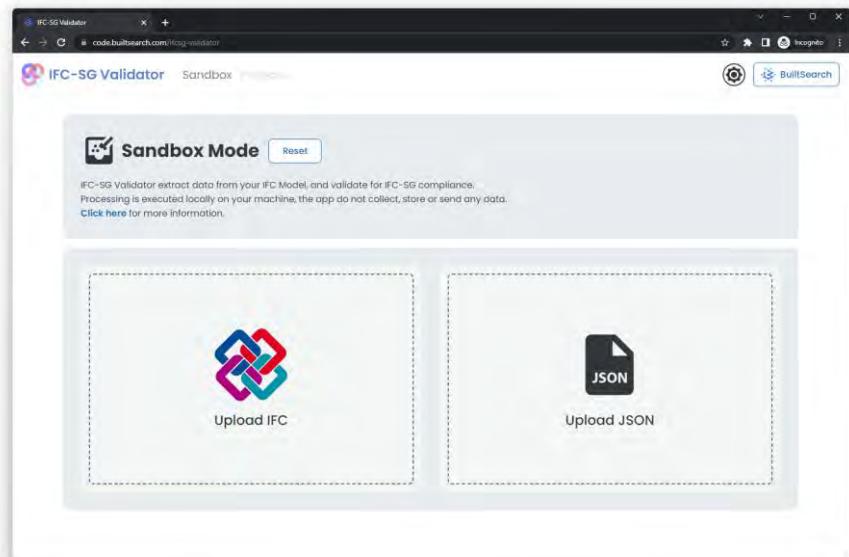
Example using IFC-SG Validator
(Free to Use)

► Guide to use the IFC-SG Validator Application

Step 1

Go to:
<https://www.code.builtsearch.com/ifcsg-validator>

- ✓ Click on 'Upload IFC' and select an IFC Model

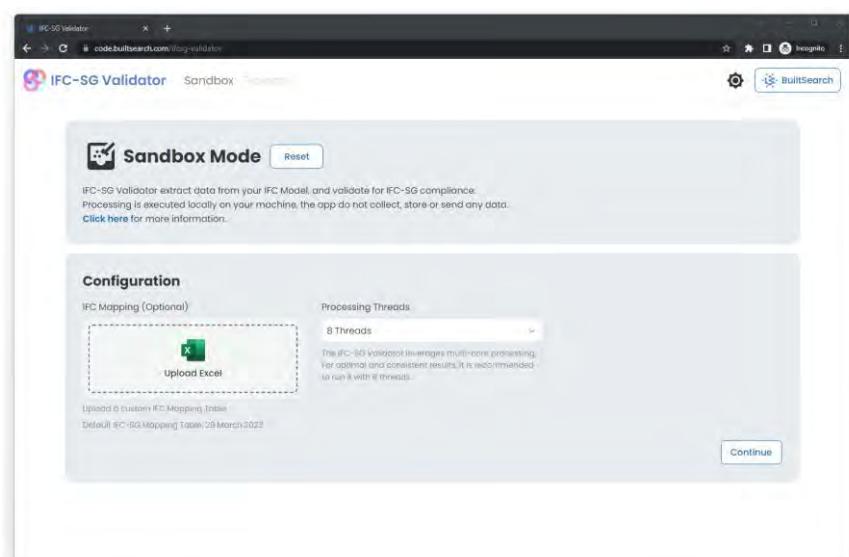


Note:

Work best on chromium-based browser (Microsoft Edge, Chrome, Brave, etc.) and Mozilla Firefox. For extremely large model >400mb, Firefox is preferred to avoid memory limit for chromium browser. All versions of Internet Explorer is not supported.

Step 2

- ✓ By default, IFC-SG Validator uses the latest IFC-SG Mapping file from [IFC-SG resource kit](#)
- ✓ To use a different Mapping table, upload your version of IFC-SG Mapping file.
- ✓ Leave processing threads as default for consistent results.



Note:

For extremely large model >400mb and when using chromium browser, lower processing threads to 2-3 to avoid hitting memory limit, which will crash the browser.

Link:

[IFC-SG Resource Kit](#)

Section 2: General Requirements

Model Preparation (IFC-SG Validator)

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

• KEY GATEWAYS •

• OTHER BUILDING WORKS •

BIM DATA REPRESENTATION

3rd Party Application(s) to help with Preparation of IFC-SG Models (IFC-SG Validator)

Example using IFC-SG Validator
(Free to Use)

► Guide to use the IFC-SG Validator Application

Step 3

- ✓ View results
- ✓ The score should not be taken at face value, as the score is calculated by the presence of each element for each entity property in your IFC Model as compared to IFC-SG properties listed in the mapping file.
- ✓ Depending on your project's nature, it may not be relevant to have certain missing elements, therefore the score should only be used as an estimation.

Guid	ElementId	ObjectType	Result	BeamSpanType	BottomLeft	BottomMiddle	BottomRight	Cr
2UB\$oZoDX3JeyhOCUMoofI	1099608	_pte_Beam_Rectangular_L	14.28%	SINGLE	3H20	3H20	3H20	
3kq25MfYyAUbzHzTChiUV	1646268	_pte_Beam_Rectangular_L	41.67%	SINGLE	3H20	3H20	3H20	

Step 4

- ✓ By clicking on the download button, you will download a JSON file of this model's IFC-SG Validator result, which can then be uploaded on the home page.
- ✓ This will load the result immediately without processing the model again.

Note: By using the IFC-SG Validator Application, users will have to agree with the terms of use and privacy notice as stated in the website.

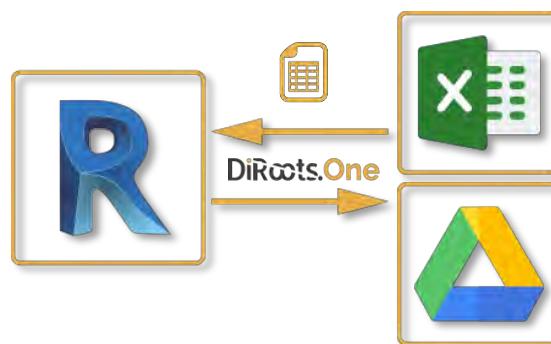
Link:
[IFC-SG Resource Kit](#)

3rd Party Application(s) to help with Preparation of IFC-SG Models (DiRoots)

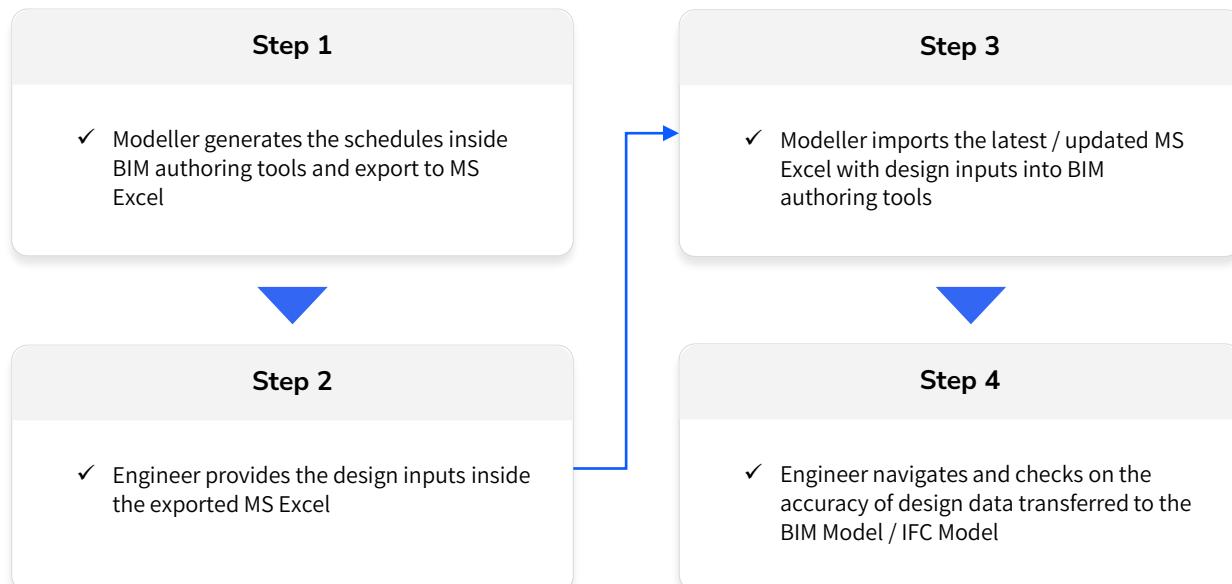
Example using DiRoots Plugin
(Free Plugin)

► How does the Plugin work?

- DiRoots is a free plug-in to export BIM data (Model and Annotation Categories, Elements and Schedules) from Revit to Excel or Google Spreadsheets, and import it back to update the model.



► Example of Workflow using the Plugin



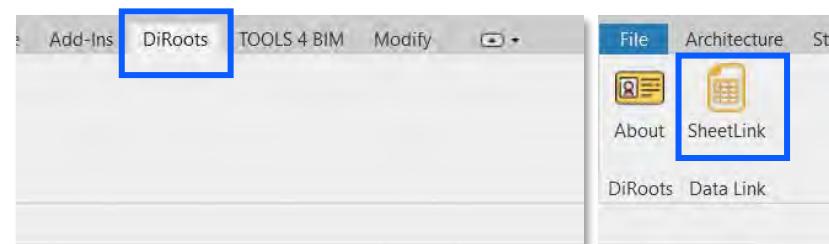
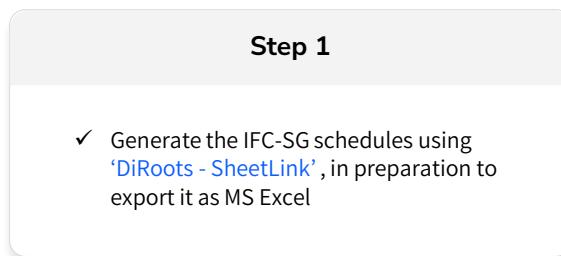
Link:
[IFC-SG Resource Kit](#)
[DiRoots Sheet Link Tutorial](#)

3rd Party Application(s) to help with Preparation of IFC-SG Models (DiRoots)

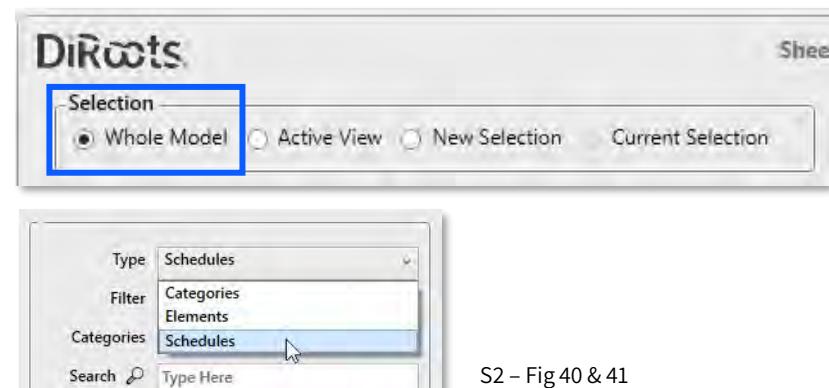
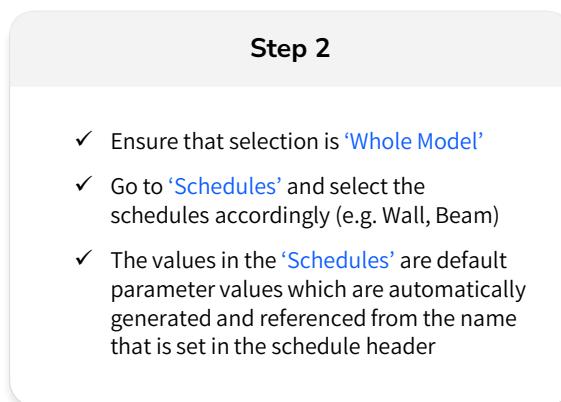
Example using DiRoots Plugin
(Free Plugin)

► Guide to use DiRootsOne Plugin

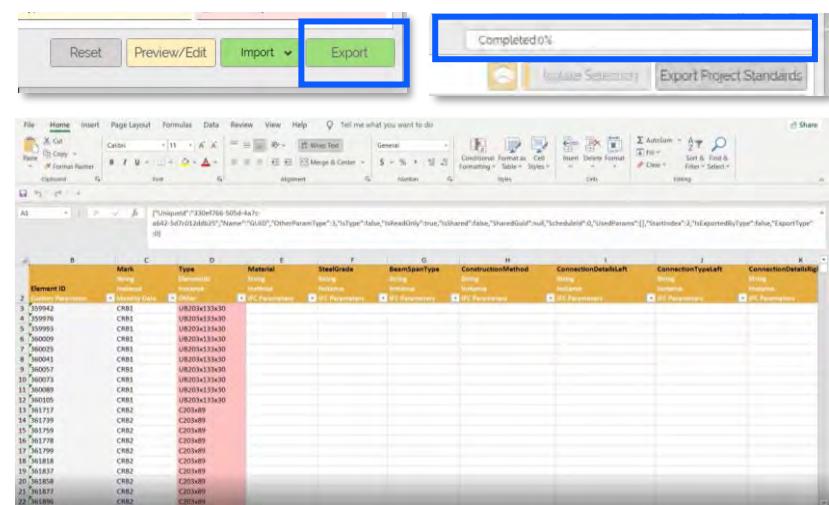
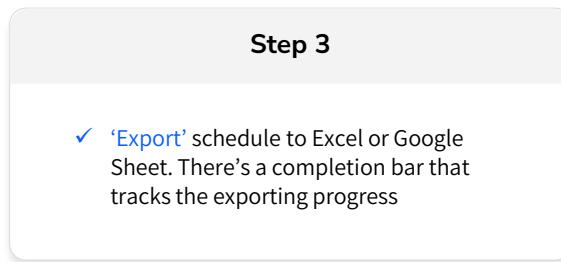
* Note user interface may differ for different versions of DiRoots



S2 – Fig 39



S2 – Fig 40 & 41



S2 – Fig 42

Link:

[IFC-SG Resource Kit](#)
[DiRoots Sheet Link Tutorial](#)

Section 2: General Requirements

Model Preparation (DiRoots)

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3rd Party Application(s) to help with Preparation of IFC-SG Models (DiRoots)

Example using DiRoots Plugin
(Free Plugin)

► Guide to use DiRoots Plugin

* Note user interface may differ for different versions of DiRoots

Step 4

- ✓ Design Engineer provides the design inputs (i.e. project specific parameters) into the exported ‘Schedules’ Excel

Element ID	Mark	Diameter	Base Level	Top Level	Starting Storey	Ending Storey	ConstructionMethod	Material	StrengthClass
1 354017	C11	300 x 600mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
2 354111	C9	300 x 400mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
3 354228	C7	300 x 400mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
4 354563	C5	300 x 800mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
5 354564	C6	300 x 700mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
6 354568	C8	300 x 700mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
7 354599	C3	300 x 400mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
8 354600	C4	400 x 600mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
9 354609	C7	400 x 600mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
10 354730	C4	400 x 600mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
11 354744	C6	400 x 600mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
12 354768	C8	400 x 600mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
13 354833	C10	400 x 400mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
14 354876	C12	400 x 600mm	1st storey plan	Footing	1st storey		Cast-in-situ	Concrete	C32/40
15									
16									
17									

S2 – Fig 43

Step 5

- ✓ ‘Import’ the updated ‘Schedules’ Excel back into DiRoots and the parameters will be updated accordingly



S2 – Fig 44

■ [Automated] Default Parameter Values populated by Revit Families
■ [Imported from Excel] Project Specific Parameter Values by Design Engineer

A	B	C	D	E	F	G	H	I	J	K	L	M	N
ItExportId	ItObjectType	GroupMark	Mark	Diameter	BoreholeRef	Material	StrengthClass	ReinforcementSteelGrade	ConstructionMethod	FileType	Length	HeadLevel	ToeLevel
ItPileType.BORED	ItPileType	Q1	P1E	1000	BH3	Concrete	C32/40	500	Bored Pile	CIS	24300	10.75	-12.55
ItPileType.BORED	ItPileType	Q3	P1C	800	BH3	Concrete	C32/40	500	Bored Pile	CIS	20500	10.35	-10.15
ItPileType.BORED	ItPileType	Q2	P2C	800	BH3	Concrete	C32/40	500	Bored Pile	CIS	20500	10.35	-10.15
ItPileType.BORED	ItPileType	Q3	P1C	800	BH3	Concrete	C32/40	500	Bored Pile	CIS	20500	10.35	-10.15
ItPileType.BORED	ItPileType	Q3	P2C	800	BH3	Concrete	C32/40	500	Bored Pile	CIS	20500	10.35	-10.15
ItPileType.BORED	ItPileType	Q4	P1E	1000	BH2	Concrete	C32/40	500	Bored Pile	CIS	24300	10.75	-12.55
ItPileType.BORED	ItPileType	Q5	P1E	1000	BH2	Concrete	C32/40	500	Bored Pile	CIS	20500	10.35	-12.55
ItPileType.BORED	ItPileType	Q6	P1C	800	BH3	Concrete	C32/40	500	Bored Pile	CIS	20500	10.35	-10.15
ItPileType.BORED	ItPileType	Q6	P2C	800	BH3	Concrete	C32/40	500	Bored Pile	CIS	20500	10.35	-10.15
ItPileType.BORED	ItPileType	Q7	P1E	1000	BH3	Concrete	C32/40	500	Bored Pile	CIS	24300	10.75	-12.55

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
ItExportId	ItObjectType	Mark	Width x Depth	MemberSection	Material	StrengthClass	ReinforcementSteelGrade	ConstructionMethod	BeamSpecType	TopLeft	TopMiddle	TopRight	BottomLeft	BottomMiddle
ItBeamType.BEAM	ItBeamType	PT401	(300x500)	Rectangl	Concrete	C32/40	500	PC	SINGLE	3H16	3H16	3H16	3H20	3H20
ItBeamType.BEAM	ItBeamType	PT401	(300x500)	Rectangl	Concrete	C32/40	500	PC	SINGLE	3H16	3H16	3H16	3H20	3H20
ItBeamType.BEAM	ItBeamType	PT402	(300x500)	Rectangl	Concrete	C32/40	500	PC	SINGLE	3H16	3H16	3H16	3H25	3H25
ItBeamType.BEAM	ItBeamType	PT402	(300x500)	Rectangl	Concrete	C32/40	500	PC	SINGLE	3H16	3H16	3H16	3H25	3H25
ItBeamType.BEAM	ItBeamType	PT403	(300x500)	Rectangl	Concrete	C32/40	500	PC	SINGLE	3H20	3H20	3H20	3H20	3H20
ItBeamType.BEAM	ItBeamType	PT403	(300x500)	Rectangl	Concrete	C32/40	500	PCU	SINGLE	3H20	3H20	3H20	3H20	3H20
ItBeamType.BEAM	ItBeamType	PT405	(250x400)	Rectangl	Concrete	C32/40	500	PCU	SINGLE	3H20	3H20	3H20	2H25-2H30	2H25-2H30
ItBeamType.BEAM	ItBeamType	PT406	(250x400)	Rectangl	Concrete	C32/40	400	PCU	SINGLE	3H20	3H20	3H20	2H25-2H30	2H25-2H30

S2 – Fig 45 & 46

Link:

[IFC-SG Resource Kit](#)

[DiRoots Sheet Link Tutorial](#)

List of Recommended IFC Viewers

Note that this list is not exhaustive
(Free to use)

► Importance of reviewing IFC models before submission

- It is strongly encouraged to review your project team's models in an IFC viewer to ensure the models did not experience errors during the export process from their respective BIM software.

	Name	View IFC4	Federation of IFC(s)	Viewing of System Entities *	View IfcGrid	Search Query	Remarks
1	BIMCollab Zoom	○	○	✗	✗	○	Suitable for federation of IFC files, handle large files well
2	BIMVision	○	Up to 2 files	○	○	○	Suitable for quick visualization of IFC files
3	Kit Model Viewer (replacing FZK Viewer)	○	✗*	○	○	○	Suitable for analysing smaller files (< 200 MB)
4	ODA (Open Design Alliance) Open IFC Viewer	○	○	✗	○	✗	-
5	Solibri Anywhere	○	✗*	○	○	○	-

* To view multiple IFC files in FOC viewers that are unable to federate IFC models, the "IFC-SG Integrator" could be used, available at the [IFC-SG Resource Kit](#). This application is based on C# and is able to bind multiple IFC files

Link:
[IFC-SG Resource Kit](#)

SECTION 3

Specific Requirements by:
Regulatory Agencies

3**Specific Requirements by**

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CORENET X Code of Practice

How to Navigate Section 3

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BIM DATA REPRESENTATION

Understanding the Table Format

Note: CORENET X is developed through Agile Methodology and sections / requirements in this COP will be updated progressively and its technological enhancements will be made available in phases.

The screenshot shows the BCA Construction Gateway interface. At the top, there's a header bar with the BCA logo and navigation links for 'REGULATORY AGENCIES', 'KEY GATEWAYS', 'OTHER BUILDING WORKS', and 'BIM DATA REPRESENTATION'. Below this is a sub-header for 'Section 3: Specific Requirements by Regulatory Agencies' under 'Building and Construction Authority (BCA)'. The main content area is titled 'G2 Construction Gateway (continued from previous page)'. It features a table with two columns: 'Key Words' and 'Requirement Category'. The 'Key Words' column lists 'Structural Design' and several icons representing different types of documents or models. The 'Requirement Category' column details requirements for 'Structural Design (Piling and Foundation Works)'. It includes sections for 'Piling & Foundation Works IFC-SG model', 'Ground Investigation', '2D Drawings limited to', 'Design Calculation reports', 'Additional Supporting Documents', and 'Complete set of IFC-SG model(s) for all structural elements & details'. Each section contains specific items like 'Compliance with minimum number of borehole required as stipulated in Circular APPBDA-2016-08' and 'General notes'.

Section, Main Header, Sub-Header

Other COP Sections
(Clickable Hyperlinks)

Regulatory Agency Involved

Legend
(Archi, C&S, M&E, IFC Component)

Requirements under the Key Gateways

(corresponds to the Gateway No.)

G1: Design Gateway

G1.5: Piling Gateway

G2: Design Gateway

G3: Completion Gateway

Key Words appearing in a particular Gateway

Broad Description of requirements relating to the Key Word

+

IFC COMPONENT
that may be required to be modelled for requirements under this keyword (linked to Section 4)

Format of Submission

3D	IFC-SG Model
2D	Examples: CAD Drawings, Reports, Supporting Documents, Supplementary Documents

CORENET X Code of Practice

How to Navigate Section 3

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Understanding the Table Format (Case Example)

Note: CORENET X is developed through Agile Methodology and sections / requirements in this COP will be updated progressively and its technological enhancements will be made available in phases.

I want to understand how to clear BCA's requirement for Structural Design under Construction Gateway (G2)

The screenshot shows the CORENET X interface with the following elements:

- Header:** Section 3: Specific Requirements by Regulatory Agencies, Building and Construction Authority (BCA).
- Top Navigation:** REGULATORY AGENCIES (highlighted with a blue circle), KEY GATEWAYS, OTHER BUILDING WORKS, BIM DATA REPRESENTATION.
- Main Content:** Building and Construction Authority (BCA) logo, navigation tabs (Legend, Orange, Architecture, Green, Blue, Yellow, AME), and a search bar.
- Table:** G2 Construction Gateway (continued from previous page).

Key Words	Requirement Category
Structural Design	Structural Design (Piling and Foundation Works) (tagged with a green circle) Can be provided at Piling Gateway (G2.5) or Construction Gateway (G2) ▪ Piling & Foundation Works IFC-SG model ▪ Ground Investigation: <ul style="list-style-type: none">Compliance with minimum number of borehole required as stipulated in Circular APPBCA-2018-08
	▪ 2D Drawings limited to: <ul style="list-style-type: none">General notesIrregular pile cap / Footing details
	▪ Design Calculation reports: <ul style="list-style-type: none">From QP, AC, QP(Geo) & AC(Geo), if needed
	▪ Additional Supporting Documents: <ul style="list-style-type: none">Site investigation report in PDF & AGS formatImpact assessment reportTopographyComplete set of structural framing plan for referenceComplete set of building plan for referenceCompletion letter of pre-consultation (for complex structure only)
	▪ Complete set of IFC-SG model(s) for all structural elements & details
	▪ 2D Drawings limited to: <ul style="list-style-type: none">General notesSpecial details (e.g. slab reinforcement detailing, complex structure detailing, transfer plate detailing, irregular section detailing, precast joints, prestressed details, steel connections)
	▪ Design Calculation reports: <ul style="list-style-type: none">From QP, AC, QP(Geo) & AC(Geo), if needed
	▪ Additional Supporting Documents: <ul style="list-style-type: none">Site investigation report in PDF & AGS formatImpact assessment reportTopographyComplete set of building plan submitted simultaneouslyCompletion letter of pre-consultation (for complex structure only)

- 1 Go to Section 3: Specific Requirements Regulatory Agencies
- 2 Find which Gateway "Structural Design" falls under. In this case, it's required under Construction Gateway (G2).
- 3 Find which *discipline is responsible for compliance. In this case, it's C&S (green). If all disciplines are involved, all three colors will be tagged.
- 4 Find out what are the broad requirements to comply and in what submission format. Note that QP is still required to refer to detailed codes & requirements in the appropriate docs (e.g. BC Act & Regulations)
- 5 Find out what BIM Data Representation is required to be modelled for "Structural Design". In this case, there are 8 IFC-Components tagged.
For example, "Pile", "Column", "Wall". Look for these in Section 4.
- 6 Click Hyperlink to navigate easily to Section 4: BIM Data Representation.

► Disclaimer

As disclaimed under Page 3, this Code of Practice does not substitute Handbooks, Circulars or other regulatory publications of our regulatory agencies. Readers should refer to the relevant Codes, Acts and Regulations on the compliance required for their projects, before referring to this Code of Practice on how to represent the compliance information in the CORENET X submission gateways

► Disciplines Color Tagging / QP's Responsibilities

*As stated under Section 2: Page 15, the statutory responsibilities of the appointed QPs under the respective Acts and Regulations **remains unchanged**. The color tagging is for reference only.

Section 3: Specific Requirements by Regulatory Agencies

Building and Construction Authority (BCA)

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Building and Construction Authority (BCA)

Legend:



Architecture



C&S



M&E

IFC COMPONENT

- Pre-Submission, Planning and Other Consultations		
	Key Words	Requirement Category
	Household / Storey Shelter	<ul style="list-style-type: none"> Pre-consultation on CD / TS shelter on architectural, structural or commissioning issues Can occur at any stage prior to TOP, for landed and non-landed residential projects
	Others	<p>Complex Building Requirements</p> <ul style="list-style-type: none"> Pre-submission consultation of structural concept on structural works involving complex building to be carried out during/after Design Gateway (G1) but prior to Piling Gateway (G1.5) or Construction Gateway (G2)

G1 Design Gateway		
	Key Words	Requirement Category
	Others	<p>Complex Building Requirements</p> <ul style="list-style-type: none"> Pre-submission consultation of structural concept on structural works involving complex building to be carried out during/after Design Gateway (G1) but prior to Piling Gateway (G1.5) or Construction Gateway (G2)

G1.5 Piling Gateway (Optional)		
	Key Words	Requirement Category
	Lightning Protection	<ul style="list-style-type: none"> For big projects adopting piles or rough foundation as natural earth-termination system. Provision of rebars for connection to the down-conductor system shall be provided during the piling stage. <p><u>Notes:</u></p> <ul style="list-style-type: none"> QP (Electrical) to provide inputs for submission by C&S Developer or Builder is required to appoint a QP (Electrical) to supervise the LPS works before LPS Plan submission is carried out at the Construction Gateway (G2).
	Structural Design BEAM BOREHOLE FOOTING / PILECAP PILE SLAB	<p>Structural Design (Piling and Foundation Works)</p> <p><i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i></p> <ul style="list-style-type: none"> Piling & Foundation Works IFC-SG model Ground Investigation: <ul style="list-style-type: none"> Compliance with minimum number of borehole required as stipulated in Circular APPBCA-2016-08 2D Drawings limited to: <ul style="list-style-type: none"> General notes Irregular Pilecap / Footing Details <p> Design Calculation reports:</p> <ul style="list-style-type: none"> From QP, AC, [QP(Geo) & AC (Geo), if needed]) <p> Additional Supporting Documents:</p> <ol style="list-style-type: none"> Site investigation report in PDF & AGS format Impact assessment report Topography Complete set of structural framing plan for reference Complete set of building plan for reference Completion letter of pre-consultation (for complex structure only)

Section 3: Specific Requirements by Regulatory Agencies

Building and Construction Authority (BCA)

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Building and Construction Authority (BCA)

Legend:



Architecture



C&S



M&E

IFC COMPONENT

G2 Construction Gateway

	Key Words	Requirement Category
	Access to Site ACCESIBLE ROUTE SLAB RAMP STAIRCASE	<ul style="list-style-type: none"> Passenger Alighting and Boarding Point Accessible Route (to the ingress / egress of the development entrance)
	Access within Building only ACCESIBLE ROUTE SLAB RAMP STAIRCASE	<ul style="list-style-type: none"> Headroom and Ceiling Height Accessible Route and Maneuvering Space (within the development)
	Barrier RAILING	<ul style="list-style-type: none"> Safety from falling Protection from injury by vehicles in building (e.g. provision of bollards)
	Buildability BEAM SLAB COLUMN STAIRCASE DOOR WALL HOUSEHOLD SHELTER PREFAB & MEP	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p>Buildable Design Score (B-Score)</p> <ol style="list-style-type: none"> BS01 Form (in Excel format) to be submitted
	Building Envelope	<p>ETTV</p> <ul style="list-style-type: none"> ETTV computation & tabulation of design parameters in the prescribed forms & formats; Architectural elevation drawings showing the composition of the different façade or wall systems that are relevant for the computation of the ETTV; and Architectural plan layouts & elevations showing the mode of ventilation & location for various spaces incl. air-conditioning areas. <p><i>ETTV/RETV Calculation Format in respect of an Air-conditioned Building (BPD_BP04): https://www1.bca.gov.sg/docs/default-source/docs-corp-form/bp04.doc?sfvrsn=c3a0dcf4_2</i></p> <p>RTTV</p> <ul style="list-style-type: none"> RTTV computation for roofs with skylight in prescribed forms and formats, where relevant; Architectural plan layout and sectional details of different roof types as well as the roof composition and respective U-values; and Technical material or product information and relevant calculation of U-value of the roof
	Dwelling Units	<ul style="list-style-type: none"> Bathrooms for future retrofitting Design of unit entrance for wheelchair users
	Environmental Sustainability	<p>Submit GM01 Main Submission from (BPD_GM01 + BPD_GM01_Appendix)</p> <ul style="list-style-type: none"> Please refer to the Guidance Notes and Documentation Requirements under Code for Environmental Sustainability of Buildings: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-new-buildings-existing-buildings-undergoing-major-aanda For Government Land Sales (GLS) programme requirement, please refer to the following link: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-new-buildings-existing-buildings-undergoing-major-aanda/mandatory-higher-green-mark-standard

Section 3: Specific Requirements by Regulatory Agencies

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Building and Construction Authority (BCA)

Legend:



Architecture



C&S



M&E

IFC COMPONENT

G2 Construction Gateway (continued from previous page)

Key Words	Requirement Category
Household / Storey Shelter DOOR SLAB SPACE WALL WINDOW ELECTRICAL FIXTURE	Architecture <ul style="list-style-type: none"> Compliance with technical requirements on shelter position, size, setback requirements C&S <ul style="list-style-type: none"> Compliance to structural requirements stipulated in technical requirements on household shelters and storey shelters M&E <ul style="list-style-type: none"> M&E inputs required for Transit Shelter
Lifts and Escalators LIFT ESCALATOR	Supporting Documents: <ul style="list-style-type: none"> Submit CD Shock Calculations as supplementary non-BIM documentation
Lightning Protection	2D Drawings <ul style="list-style-type: none"> Location of air-termination system, down conductors, earth electrodes Zone of lightning protection provided by the air-termination network for open roof spaces and the sides of the building Location of the points where there is equipotential bonding between the air-termination system, down-conductor system and earthed termination system; and Location of the points where there is equipotential bonding of the lightning protection system to electrically conductive parts of the building except M&E services. Supporting Documents: <ul style="list-style-type: none"> Material specification, photo, ppt, excel, words, etc. should be submitted
Materials	<ul style="list-style-type: none"> Use of Glass at height Daylight Reflectance
Staircase STAIRCASE RAILING	<ul style="list-style-type: none"> Minimum Width Tread and Riser, Handrail / Railing
Structural Design BOREHOLE PILE FOOTING / PILECAP SLAB BEAM COLUMN STAIRCASE WALL	Structural Design (Piling and Foundation Works) <i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i> <ul style="list-style-type: none"> Piling & Foundation Works IFC-SG model Ground Investigation: <ul style="list-style-type: none"> Compliance with minimum number of borehole required as stipulated in Circular APPBCA-2016-08 2D Drawings limited to: <ul style="list-style-type: none"> General notes Irregular Pilecap / Footing Details



Building and Construction Authority (BCA)

Legend:



Architecture



C&S



M&E

IFC COMPONENT

G2 Construction Gateway (*continued from previous page*)

Key Words	Requirement Category
<p>Structural Design <i>(continued from previous page)</i></p>	<ul style="list-style-type: none"> <u>Design Calculation Reports:</u> <ul style="list-style-type: none"> From QP, AC, [QP(Geo) & AC (Geo), if needed]) <u>Additional Supporting Documents:</u> <ul style="list-style-type: none"> a) Site investigation report in PDF & AGS format b) Impact assessment report c) Topography d) Complete set of structural framing plan for reference e) Complete set of building plan for reference f) Completion letter of pre-consultation (for complex structure only) • Complete set of IFC-SG model(s) for all Structural Elements & Details • 2D Drawings limited to: <ul style="list-style-type: none"> o General notes o Special details (e.g. slab reinforcement detailing, complex structure detailing, transfer plate detailing, irregular section detailing, precast joints, prestressed details, steel connections.) <u>Design Calculation Reports:</u> <ul style="list-style-type: none"> From QP, AC, [QP(Geo) & AC (Geo), if needed]) <u>Additional Supporting Documents:</u> <ul style="list-style-type: none"> a) Site investigation report in PDF & AGS format b) Impact assessment report c) Topography d) Complete set of building plan submitted simultaneously e) Completion letter of pre-consultation (for complex structure only)
<p>Vehicular Parking</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid #ccc; border-radius: 50%; padding: 5px; text-align: center;">PARKING LOT</div> <div style="border: 1px solid #ccc; border-radius: 50%; padding: 5px; text-align: center;">ACCESSIBLE ROUTE</div> </div>	<ul style="list-style-type: none"> • Provision of Accessible Lot(s)
<p>Ventilation</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid #ccc; border-radius: 50%; padding: 5px; text-align: center;">SPACE</div> <div style="border: 1px solid #ccc; border-radius: 50%; padding: 5px; text-align: center;">WINDOW</div> <div style="border: 1px solid #ccc; border-radius: 50%; padding: 5px; text-align: center;">PARKING LOT</div> </div>	<ul style="list-style-type: none"> • Provision of Ventilation (Natural Ventilation for residential development) • Minimum 5% opening for Natural Ventilation • Maximum distance (12m) from Natural Ventilating opening • Natural Ventilation (dimension of recess / airwell) • Carpark Ventilation
<p>Washroom</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid #ccc; border-radius: 50%; padding: 5px; text-align: center;">SPACE</div> <div style="border: 1px solid #ccc; border-radius: 50%; padding: 5px; text-align: center;">SANITARY APPLIANCES</div> <div style="border: 1px solid #ccc; border-radius: 50%; padding: 5px; text-align: center;">CUBICLE</div> </div>	<ul style="list-style-type: none"> • Sanitary provisions for wheelchair users and ambulant disabled



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Builder

IFC COMPONENT

- Independent Submissions		
	Key Words	Requirement Category
	Buildability	<p><u>Constructability Implementation Plan (CIP)</u></p> <ul style="list-style-type: none"> • BIM Plans which describe and define the type, extent of use and details of the system framework <p> <u>Supporting Documents for CIP:</u></p> <ul style="list-style-type: none"> a) Documents (e.g. photos, 2D plans, etc.) on the use of construction techniques, processes, plant, equipment and innovative methods <p> <u>Constructability Score (C-Score)</u></p> <ul style="list-style-type: none"> a) C-Score Calculations (to be computed and submitted by Builder in PDF format)
	Environmental Sustainability	<ul style="list-style-type: none"> • Air-Tightness and Leakage • Building Energy Performance (e.g. Plant efficiency, Air distribution efficiency, Total System Efficiency, Lighting system performance etc) where applicable • Measurement and Verification (M&V) Instrumentation • Electrical Submetering • Maintenance of Building Cooling System Performance • Carbon Reduction Measures, including Resource Efficiency Measures such as CUI , Embodied Carbon etc. <p>For more information, please refer to the Guidance Notes and Documentation Requirements under Code for Environmental Sustainability of Buildings: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-new-buildings-existing-buildings-undergoing-major-aanda</p> <p><u>Major Energy Use Change during Operation</u></p> <ul style="list-style-type: none"> • Design and As-built clearance for major energy use change. • For more information, please refer to Code on Environmental Sustainability Measures for Existing Building: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-existing-buildings <p><u>Periodic Energy Audit during Operation</u></p> <ul style="list-style-type: none"> • Submission of Periodic Energy Audit • For more information, please refer to: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-existing-buildings/mandatory-submission-of-periodic-energy-audits
	Signage	<ul style="list-style-type: none"> • License for Outdoor Advertising Sign or Signboard
	Structural Design	<p><u>Structural Design (Other Works e.g. demolition, ERSS, cladding, safety barrier, temporary traffic decking)</u></p> <ul style="list-style-type: none"> • 2D Drawings are acceptable for independent submissions. • Structural design of ancillary works and component such as demolition, temporary ERSS, barriers & cladding, temporary traffic decking • Structural design of localized works for ancillary structures e.g. cladding, barrier • These plans will need to make reference back to the coordinated model submitted by the Main QP at the Construction Gateway (G2). <p> <u>Design Calculation Reports</u></p> <ul style="list-style-type: none"> • From QP, AC, [QP(Geo) & AC (Geo), if needed]) <p> <u>Additional Supporting Documents:</u></p> <ul style="list-style-type: none"> a) Site investigation report in pdf & AGS format b) Impact assessment report c) Design consideration for Earth Retaining or Stabilising Structures (ERSS)) – ERSS_Annex A d) QP's & AC's Certification for fixings of ancillary structures



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IFC COMPONENT

G3 Completion Gateway				
	Key Words	Requirement Category		
	BP TOP / CSC	<ul style="list-style-type: none"> Record Plans 		
	Buildability Score (B-Score)	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p> Buildable Design Score (B-Score)</p> <ol style="list-style-type: none"> BS03 Form (in Excel format) to be submitted 		
	CD Shelter Commissioning	<ul style="list-style-type: none"> Application for approval of commissioning of CD Shelter Checklist for submission with application for commissioning 		
	Constructability Score (C-Score)	<p>Constructability Implementation Plan (CIP)</p> <ul style="list-style-type: none"> BIM Plans which describe and define the type, extent of use and details of the system framework <p> Supporting Documents for CIP:</p> <ol style="list-style-type: none"> Documents (e.g. photos, 2D plans, etc.) on the use of construction techniques, processes, plant, equipment and innovative methods <p> Constructability Score (C-Score)</p> <ol style="list-style-type: none"> C-Score Calculations (to be computed and submitted by Builder in PDF format) 		
	Environmental Sustainability	<p>Submit As-Built / GM02 Main Submission from (BPD_GM02 + BPD_GM02 Appendix)</p> <ul style="list-style-type: none"> For more information, please refer to the Guidance Notes and Documentation Requirements under Code for Environmental Sustainability of Buildings: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-new-buildings-existing-buildings-undergoing-major-aanda For Government Land Sales (GLS) programme requirement, please refer to the following link: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-new-buildings-existing-buildings-undergoing-major-aanda/mandatory-higher-green-mark-standard 		
	Facade	<ul style="list-style-type: none"> Submit the Certificate of Completion of works (i.e. Form D, Form SB) For more information, please refer to: Industry requirement for installation, retrofitting, replacement or reinstatement of Windows Building and Construction Authority (BCA) 		
	Record Plans of Structural Works and Certificates	<ul style="list-style-type: none"> Certificate of Supervision of Piling Works Certificate of Supervision of Structural Works Certificate of As-Built Structural Works (in IFC-SG structural model & 2D Drawings) Builder Certificate 		
	-	<table border="0"> <tr> <td> <ul style="list-style-type: none"> QP Declaration(s) Certificate of Supervision for Lightning Protection System (LPS) Permit to Operate (Lift & Escalator) ACMV CD shelter </td> <td> <ul style="list-style-type: none"> Environmental Sustainability Universal Design Index FormSG Acknowledgement CONQUAS / QM Photos of Rectification Phasing Plan </td> </tr> </table>	<ul style="list-style-type: none"> QP Declaration(s) Certificate of Supervision for Lightning Protection System (LPS) Permit to Operate (Lift & Escalator) ACMV CD shelter 	<ul style="list-style-type: none"> Environmental Sustainability Universal Design Index FormSG Acknowledgement CONQUAS / QM Photos of Rectification Phasing Plan
<ul style="list-style-type: none"> QP Declaration(s) Certificate of Supervision for Lightning Protection System (LPS) Permit to Operate (Lift & Escalator) ACMV CD shelter 	<ul style="list-style-type: none"> Environmental Sustainability Universal Design Index FormSG Acknowledgement CONQUAS / QM Photos of Rectification Phasing Plan 			



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IFC COMPONENT

- Pre-Submission, Planning and Other Consultations

Key Words	Requirement Category
Impact Studies only	<p>Transport Impact Assessment (TIA)</p> <ul style="list-style-type: none"> Generally, a TIA submission is required if the type and size of the proposed development meets one or more of the criteria stipulated in LTA's guidelines. The traffic consultant shall arrange scoping meeting with LTA to discuss the scope of study, TIA classifications and confirm if Walking and Cycling Plan (WCP) is required. The TIA report is to be set out logically with clear analyses, conclusions and recommendations. All assumptions and sources of information are to be clearly documented. Executive Summary shall be included to provide concise and clear information on the study purpose, major findings, conclusions and recommendations. Improvements recommended in the TIA are to be illustrated using appropriate plan(s) with sufficient detail to substantiate their feasibility. All the analysis files and data related to the study are to be submitted as appendices to the Report for LTA's records. All recommended improvement works to be carried out by the developer shall be incorporated in the development plan submissions at Design Gateway (G1) and Construction Gateway (G2) to LTA for clearance.
	<p>Pre-Application Feasibility Study & Recommendations</p> <ul style="list-style-type: none"> LTA should be consulted to confirm whether a PAFS is needed for the proposed residential site if they are undergoing redevelopment arising from a collective or en-bloc sales. The traffic consultant shall arrange scoping meeting with LTA to discuss the scope of study PAFS should assess the traffic impact on the area and propose car-lite measures/initiatives, traffic demand management measures and/or feasible transport improvement plans to support the redevelopment proposal. All recommended improvement works to be carried out by the developer shall be incorporated in the development plan submissions at Design Gateway (G1) and Construction Gateway (G2) to LTA for clearance
	<p>Walking and Cycling Plan (WCP)</p> <ul style="list-style-type: none"> The rigorous process of the WCP shall be demonstrated and presented in a written report that explains the rationale for the following 5 sets of plans: <ol style="list-style-type: none"> Location and Connectivity Plan Circulation Plan Conflict Mitigating Plan Bicycle Parking and End of Trip Facility Plan Wayfinding Plan
Site Layout, Vehicular Parking	<p>Pre-Consultation on Mechanised Parking System Proposals</p> <ul style="list-style-type: none"> QPs and developers are required to submit their mechanised parking system and car lifts proposals to LTA for a pre-submission consultation before a development application is submitted to the Urban Redevelopment Authority (URA) for planning permission. This will allow architects, engineers and developers to incorporate the necessary requirements into the design of the development upfront to minimise abortive work and major revisions to development proposals later. Refer to LTA's COP for Vehicle Parking Provision in Development Proposals for the design of a proper mechanised parking system and car lifts. As there is a variety of mechanised parking systems in the market, it is possible that some of these systems do not fully comply with LTA's guidelines. For such cases, the systems will be evaluated based on its own merits during the pre-submission consultation with LTA.
	<p>Mechanised Parking System</p> <ul style="list-style-type: none"> To submit the detailed drawings and description for the type of mechanised parking system used in the proposal. Information on how the system operates, how cars are parked and retrieved from the system, average time taken for parking and retrieval, safety features, etc. shall be clearly illustrated.

➤ For LTA's External Works requirements, please refer to [Page 160](#).



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- Pre-Submission, Planning and Other Consultations (continued from previous page)

Key Words	Requirement Category
Site Layout, Vehicular Parking <i>(continued from previous page)</i>	<ul style="list-style-type: none"> The type of mechanised parking system and all relevant requirements/ dimensions of the parking system such as platform size, maximum load, headroom clearance, allowable car dimensions, safety features, etc. shall be clearly indicated and endorsed on plan. Ensure that the dimensions and information endorsed on plan correspond with the mechanised parking system specification. The cross-sectional details of the parking platform showing the inner clear width of the platform, clear platform length and clear movement space between the structural supports. To ensure that the dimension for headroom clearance of minimum 2.2m and platform size of minimum 2.4m x 5.4m are cleared of obstructions e.g. structural supports, structural cage, wire rope/hoisting cable, motorised equipment, sliding gears, etc. <p>Car Lifts</p> <ul style="list-style-type: none"> To submit the type of car lift system and all relevant requirements/ dimensions of the car lift system such as internal cage size, width of the entrance and exit door, maximum load, headroom clearance, allowable car dimensions, minimum speed, minimum discharge capacity, queuing spaces, safety features, etc. shall be clearly indicated and endorsed on plan. Information on how to operate the car lifts (e.g. call-button or loop detector), sequence on how cars enter/exit the car lift, provision of safety devices, etc. should be clearly illustrated. The proposed car lift system shall comply with the guidelines for provision of car lifts in car parking places.

G1 Design Gateway

Key Words	Requirement Category
Impact Studies, Site Layout, Rail Protection	<p>Development Proposal within Railway Protection Zone / Railway Corridor</p> <ul style="list-style-type: none"> To show the proposed plan for development works To provide an engineering evaluation report accompanied by a plan for engineering works To furnish the relevant Certified Survey Plans (for critical development within first reserve of underground RTS) <p>Note: Refer to LTA's Code of Practice for Railway Protection / Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer for more requirements / detailed description</p>
Site Layout, Street Works <div style="display: flex; justify-content: space-around;"> ROAD CULVERT </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> SPACE RAMP </div>	<p>Development Proposal</p> <ul style="list-style-type: none"> To check if project falls within LTA's exemption list and is not required to obtain a clearance from LTA DBC, i.e. LTA in-house project. To confirm if the development falls within a road structure safety zone (RSSZ). <p>Vehicular Access Points</p> <ul style="list-style-type: none"> To indicate the levels of entrance culvert and gradient of entrance approach To indicate the radius of turning road kerb To show the provision of tactile tiles and shifting of existing road elements (incl. trees, lamp post, signs, etc.) affected by proposed access <p>Proposed Pick-Up / Drop-Off Points (Within Development): PUDO Layout</p> <ul style="list-style-type: none"> To show the location of the PUDO facility within the development site To mark out the number of PUDO bays and indicate the queue length Indicate width and kerb alignment of PUDO points

➤ For LTA's External Works requirements, please refer to [Page 160](#).



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G1 Design Gateway (continued from previous page)

Key Words	Requirement Category
Site Layout, Street Works (continued from previous page)	<p>Proposed Loading / Unloading (Within Development): U/UL Layout</p> <ul style="list-style-type: none"> To show the location of the U/UL facility To mark out the number of U/UL bays
Vehicular Parking <div style="display: flex; justify-content: space-around; align-items: center;"> SPACE PARKING LOT </div>	<p>Vehicular Parking Provision</p> <ul style="list-style-type: none"> To comply fully with the prevailing Parking Places (Provision of Parking Places and Parking Lots) Rules and other relevant guidelines of the Authority To ensure that the number of parking lots provided is within the specified range defined by the lower and upper bound requirement. (The Range-based parking provision standard for the various development uses can be found in Annex A of the COP for Vehicle Parking Provision in Development Proposals) To ensure that the geometric dimensions of the parking layout complies with the standard minimum dimensions as stipulated in the COP

G1.5 Piling Gateway (Optional)

Key Words	Requirement Category
Impact Studies, Site Layout, Rail Protection	<p>Approval to Commence Piling Works within Railway Protection Zone / Railway Corridor</p> <ul style="list-style-type: none"> To submit plan for engineering works To submit the Engineering evaluation report To submit an Instrumentation Proposal and initial instrumentation readings To submit a Method Statement of work To submit a Hazard Analysis identifying all possible risks that may be posed to the rapid transit system and a description of the safety and precautionary measures to mitigate these risks. To submit the Contingency Plan and Emergency Procedure To submit the Pre-condition Survey Report To submit the Certified Survey Plans To submit the Permit application form and other relevant forms To submit the Construction schedule for the proposed development <p>Note: Refer to LTA's Code of Practice for Railway Protection / Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer / Guide to carrying out restricted activities within railway protection and safety zones for more requirements / detailed description</p>

G2 Construction Gateway

Key Words	Requirement Category
Impact Studies only	<p>Building Proposal within Railway Protection Zone/ Railway Corridor</p> <ul style="list-style-type: none"> To submit plans for building works. To submit the Engineering Evaluation Report accompanied by plan for engineering works. To submit the Construction Schedule for the proposed development. <p>Note: Refer to LTA's Code of Practice for Railway Protection / Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer for more requirements/ detailed description</p>

➤ For LTA's External Works requirements, please refer to [Page 160](#).



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G2 Construction Gateway (continued from previous page)

Key Words	Requirement Category
Impact Studies, Site Layout, Rail Protection	<p>Approval to Commence Piling Works within Railway Protection Zone / Railway Corridor</p> <ul style="list-style-type: none"> • To submit plan for engineering works • To submit the Engineering evaluation report • To submit an Instrumentation Proposal and initial instrumentation readings • To submit a Method Statement of work • To submit a Hazard Analysis identifying all possible risks that may be posed to the rapid transit system and a description of the safety and precautionary measures to mitigate these risks • To submit the Contingency Plan and Emergency Procedure • To submit the Pre-condition Survey Report • To submit the Certified Survey Plans • To submit the Permit application form and other relevant forms • To submit the Construction schedule for the proposed development <p>Note: Refer to LTA's Code of Practice for Railway Protection / Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer / Guide to carrying out restricted activities within railway protection and safety zones for more requirements / detailed description</p>
Site Layout, Street Works CULVERT RAMP ROAD	<p>Access Point Details</p> <ul style="list-style-type: none"> • Structural details of entrance culvert at access points (reinforcement, connection to entrance approach etc.) • Levels, gradient, cross-fall • Redundant access to be sealed and reinstated to match existing side-table <p>Proposed Pick-Up / Drop-Off Points (Within Development): PUDO details</p> <ul style="list-style-type: none"> • To reflect all details presented at Design Gateway (G1) stage <p>Street Works Deposit</p> <ul style="list-style-type: none"> • For private developments with proposed major road infrastructure works (e.g. new streets, major improvement of an existing street, POB, UPN), an amount to be deposited with LTA for the execution and completion of the proposed street works
Site Layout, Vehicular Parking PARKING LOT RAMP ROAD	<p>Vehicular Parking Provision</p> <ul style="list-style-type: none"> • To provide the details and critical dimensions of the parking layout such as: <ul style="list-style-type: none"> ◦ Type and size of parking lots ◦ Width of ramps and accessways ◦ Inner turning radius and width of turning paths ◦ Width of parking aisles ◦ Gradient of vehicular ramps ◦ Headroom clearance ◦ Road and traffic arrow markings ◦ Bicycle rack details ◦ EV lots & charging stations

➤ For LTA's External Works requirements, please refer to [Page 160](#).



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Independent Submissions	
Key Words	Requirement Category
Impact Studies / Site Layout, Rail Protection, Road Structure Protection	<p>Approval to commence engineering works within Railway Protection Zone / Railway Corridor</p> <ul style="list-style-type: none"> • To submit plan for engineering works • To submit the Engineering evaluation report • To submit an Instrumentation Proposal and initial instrumentation readings • To submit a Method Statement of work • To submit a Hazard Analysis identifying all possible risks that may be posed to the rapid transit system and a description of the safety and precautionary measures to mitigate these risks • To submit the Contingency Plan and Emergency Procedure • To submit the Pre-condition Survey Report • To submit the Certified Survey Plans • To submit the Permit application form and other relevant forms • To submit the Construction schedule for the proposed development <p>Note: Refer to LTA's Code of Practice for Railway Protection / Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer / Guide to carrying out restricted activities within railway protection and safety zones for more requirements / detailed description</p>
	<p>Approval to carry out restricted activities within Railway Safety Zone</p> <p>Note: Refer to LTA's Guide to carrying out restricted activities within railway protection and safety zones for detailed requirements / description</p>
	<p>Approval to commence engineering works within Road Structure Safety Zone / Notification to carry out engineering activity on land adjoining public street</p> <ul style="list-style-type: none"> • To submit plan for engineering works • To submit the Engineering evaluation report • To submit an Instrumentation Proposal and initial instrumentation readings • To submit a Method Statement of work • To submit a Hazard Analysis identifying all possible risks that may be posed to the rapid transit system and a description of the safety and precautionary measures to mitigate these risks • To submit the Contingency Plan and Emergency Procedure • To submit the Pre-condition Survey Report • To submit the Certified Survey Plans • To submit the Permit application form and other relevant forms • To submit the Construction schedule for the proposed development <p>Note: Refer to LTA's Guide to Carrying Out Engineering Works within Road Structure Safety Zone and Engineering Activity on Land adjoining Public Streets for more requirements/ detailed description</p>

G3 Completion Gateway	
Key Words	Requirement Category
-	<p>Application for clearance of certificate of statutory completion for development within Railway Protection Zone / Railway Corridor</p> <ul style="list-style-type: none"> • To submit a copy as-built topographic survey plan in true coordinates. • To submit a certificate of supervision • To submit the final condition survey report

➤ For LTA's External Works requirements, please refer to [Page 160](#).



Land Transport Authority (LTA)

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G3 Completion Gateway (*continued from previous page*)

Key Words	Requirement Category
-	<p>For proposed developments which involve modification to RTS, development to comply with <i>Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations</i></p> <p>Note: Refer to LTA's Code of Practice for Railway Protection/ Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer for more requirements / detailed description</p> <p>For Notification of Opening of New Street to Traffic, the following shall be submitted:</p> <ul style="list-style-type: none"> • Cover letter stating clearly the road opening date. • Approved traffic layout plan • Street and Building Name Board (SBNB) Approval letter of street name • Certificate of Supervisions by PE • Road Test Result • Checklist of completed Works • Photographs of completed works <p>For developments that involve only the widening and alteration of existing street fronting the development (without new street), the following shall be submitted:</p> <ul style="list-style-type: none"> • As-built topographic survey plan in true coordinates (in .dwg format) • Approved subdivision plan with WP from URA and Certified Plan (CP) for project with vesting of street reserve plot. • Photographs of completed works. <p>For handing over of new road, the following shall be submitted:</p> <ul style="list-style-type: none"> • As-built topographic survey plan in true coordinates (in .dwg format) • As-built structural and M&E plans for commuter facilities such as POB, UPN • Taking over letters from PUB, NParks and NEA • Road Declaration Plan • Approved sub-division plan • Certified plan from Chief Surveyor, SLA • Asset Master Record Input Form • Road Data Form • Audit certificate for project under Ministries or Statutory Board • Road testing results. • Documents for handing over of street lightings - as-built installation plans, electrical single line diagram, letter of supervisions, test report from SP services for new control box and underground cable insulation resistance test report • Warranties for waterproofing etc <p>For Vehicle Parking submission:</p> <ul style="list-style-type: none"> • Photos for open surface parking lots • As-built Drawings

----- End of Requirements for LTA -----

Click below for LTA's RABW Requirements for :

[External Works](#)



National Environment Agency (NEA)

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IFC COMPONENT

- Pre-Submission, Planning and Other Consultations

Key Words	Requirement Category
Impact Studies only	<p>Environmental Information (EI)</p> <ul style="list-style-type: none"> Applicants are required to apply EI from NEA directly at Pre-Submission <p>Environmental Impact Study (EIS-Pre)</p> <ul style="list-style-type: none"> Applicants are required to submit EIS (Pre) to NEA directly at Pre-Submission If Pre-Submission is not possible, the EIS (Pre) process should be concluded by Design Gateway (G1) <p>Energy Efficiency Opportunities Assessment (EEOA) for New Ventures</p> <ul style="list-style-type: none"> Applicants are required to submit EEOA to NEA directly at Pre-Submission If Pre-Submission is not possible, the EEOA process should be concluded by Design Gateway (G1) <p>Environmental Site Assessment (ESA)</p> <ul style="list-style-type: none"> Applicants should submit ESA to NEA directly and should be concluded at Pre-Submission <p>Noise Impact Assessment (NIA-Pre) for Traffic</p> <ul style="list-style-type: none"> Applicants are required to submit NIA (Pre) report to NEA directly at Pre-Submission If Pre-Submission is not possible, the NIA (Pre) process should be concluded by Design Gateway (G1) However, applicant may submit NIA (Pre) report to NEA directly at Construction Gateway (G2) if there is no Design Gateway (G1) submission for the development <p>Pollution Control Study (PCS)</p> <ul style="list-style-type: none"> Applicants are required to submit PCS report to NEA directly at Pre-Submission If Pre-Submission is not possible, the PCS process should be concluded by Design Gateway (G1) <p>Quantitative Risk Assessment (QRA)</p> <ul style="list-style-type: none"> If QRA is required, applicants are required to submit QRA report to MOM-MHD for dissemination to respective agencies (including NEA). The QRA report should be accepted by agencies before Design Gateway (G1)
Site Layout only	<p>Environmental Health (COPEH)</p> <ul style="list-style-type: none"> Refuse Truck Access Road (For Refuse Collection) – Swept Path Analysis Location and Size of the Bin Centre / Refuse Room / Bin Point, refuse chute and recycling chute, refuse chute chamber and recyclables storage & its collection system Provide total daily refuse outputs (liters/day) for the development Pneumatic waste conveyance system (PWCS) schematic plan Location of cooling tower and its setback distance (at least 5m) <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Design Gateway (G1) However, applicant may submit the above information at Pre-submission if the development does not require any Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways



National Environment Agency (NEA)

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- Pre-Submission, Planning and Other Consultations (continued from previous page)

Key Words	Requirement Category				
Site Layout only <i>(continued from previous page)</i>	<p>Pollution Control (COPPC)</p> <ul style="list-style-type: none"> Confirm the proposed development is aligned with the prevailing URA MP land use zoning (e.g. residential to residential) Building location and its surrounding development/amenities (such as expressway/major road, MRT/MRT station, place of worship, hospital, petrol station, industry premises etc.) Orientation and location of nuisance sources (e.g. cooling towers, chiller plants, air handling units, air conditioning condensers, fresh air intake, exhaust outlets (ventilation shaft), etc) 50m nuisance buffer from place of worship, petrol station, Light industry premises to the nearest residential development. 100m nuisance buffer from General industry premises to nearest residential development. 500m nuisance buffer from Special Industry premises to nearest residential development. Orientation of building: Minimum building setback (m) <table border="1" style="margin-left: 20px;"> <tr> <td>Fronting track</td> <td>35</td> </tr> <tr> <td>End-wall facing track</td> <td>25</td> </tr> </table> Setback distance within 70m from transport-related infrastructure (i.e. LTA road reserve line for expressway/major road) to the nearest residential development Lot boundary line. Location of the chimney and BHC and MCH requirements e.g. within 30m / 100m radius of existing chimney stack height Location changes for the storage inventory product / materials such as chemical, oil, fuel, etc Changes in the industrial processes or production activities location Changes of existing activity, expansion of existing activities or proposed new activity carried out on the proposed development or premises <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Design Gateway (G1) However, applicant may submit the above information at Pre-submission if the development does not require any Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. 	Fronting track	35	End-wall facing track	25
Fronting track	35				
End-wall facing track	25				

G1 Design Gateway

Key Words	Requirement Category
Impact Studies only	<p>Environmental Impact Study (EIS-Pre)</p> <p>EIS (Pre) report will be required for developments or infrastructure that would have environmental impact (air, water, land or noise) or affected by environmental impact. For example, new residential / sensitive developments located within 50m from new / existing petrol stations and/or new petrol stations located within 50m from existing residential/sensitive sites</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants are required to submit EIS (Pre) to NEA directly at Pre-Submission If Pre-Submission is not possible, the EIS (Pre) process should be concluded by Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.



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G1 Design Gateway (continued from previous page)

Key Words	Requirement Category
Impact Studies only (continued from previous page)	<p> Noise Impact Assessment (NIA-Pre) for Land Traffic Noise</p> <p>NIA (Pre) report will be required for (1) <u>New</u> residential and noise sensitive developments located within 70m of <u>existing</u> land traffic noise sources/hotspots (e.g. expressways / major arterial roads / MRT tracks) on existing residential and (2) <u>Existing</u> noise sensitive developments located within 70m of <u>new</u> transport-related developments (e.g. expressway/major arterial roads / MRT tracks / bus interchanges / bus depots), inclusive of the expansion of existing transport-related infrastructures</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants are required to submit NIA (Pre) report to NEA directly at Pre-Submission and should be concluded by Design Gateway (G1) However, applicant may submit NIA (Pre) report to NEA directly at Construction Gateway (G2) if the development does not require any Design Gateway (G1) submission Sufficient time shall be catered for NEA to process the NIA (Pre) The processing of NIA (Pre) will take 1-2 months <p> Energy Efficiency Opportunities Assessment (EEOA) for New Ventures</p> <p>EEOA will be required for new industrial facilities and major expansions of existing facilities with an estimated annual energy consumption (AEC) $\geq 54\text{ TJ}$ must review the facility design and develop economically feasible for energy efficiency opportunities</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants are required to submit EEOA to NEA directly at Pre-Submission If Pre-Submission is not possible, the EEOA process should be concluded by Design Gateway (G1) <p> Environmental Site Assessment (ESA)</p> <p>ESA should be conducted when a site that is used for polluting activities is to be redeveloped, rezoned or reused for a non-polluting activity</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should conclude the ESA at Pre-Submission <p> Pollution Control Study (PCS)</p> <p>Any proposed industrial development that could cause serious or substantial pollution of the environment, if mismanagement, is required to conduct a Pollution Control Study (PCS)</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants are required to submit PCS report to NEA directly at Pre-Submission If Pre-Submission is not possible, the PCS process should be concluded by Design Gateway (G1)
	<p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	<p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.



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G1 Design Gateway (continued from previous page)

Key Words	Requirement Category
Impact Studies only (continued from previous page)	<p>Quantitative Risk Assessment (QRA)</p> <ul style="list-style-type: none"> Anyone intending to store or use hazardous substances will have to pre-consult MOM-MHD whether a QRA assessment is required. <p>When to apply:</p> <ul style="list-style-type: none"> If QRA is required, applicants are required to submit QRA report to MOM-MHD for dissemination to respective agencies (including NEA). The QRA report should be accepted by agencies before Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
Site Layout only <div style="display: flex; justify-content: space-around;"> SITE SPACE ROAD REFUSE CHUTE DOOR </div>	<p>Environmental Information (EI)</p> <ul style="list-style-type: none"> EI information such as building height constraint, health and safety buffer, etc. shall be incorporated in the building plan design to ensure that the development is able to meet the requirement. <p>When to apply:</p> <ul style="list-style-type: none"> Applicants are required to apply EI from NEA directly at Pre-Submission and incorporate the information in building plan submission in Design Gateway (G1) However, applicant may submit the above information at Pre-Submission if the development does not require any Design Gateway (G1) <p>Environmental Health (COPEH)</p> <ul style="list-style-type: none"> Refuse Truck Access road (for refuse collection) – Swept Path Analysis Location and Size of the Bin Centre /Refuse Room / Bin Point, refuse chute and recycling chute, refuse chute chamber and recyclables storage & its collection system Provide total daily refuse outputs (liters / day) for the development Pneumatic waste conveyance system (PWCS) schematic plan Location of cooling tower and its setback distance (at least 5m) <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Design Gateway (G1) However, applicant may submit the above information at Pre-Submission if the development does not require any Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	<p>Pollution Control (COPPC)</p> <ul style="list-style-type: none"> Confirm the proposed development is aligned with the prevailing URA MP land use zoning (e.g. residential to residential) Building location and its surrounding development/amenities (such as expressway / major road, MRT / MRT station, place of worship, hospital, petrol station, industry premises etc.) Orientation and location of nuisance sources (e.g. cooling towers, chiller plants, air handling units, air conditioning condensers, fresh air intake, exhaust outlets (ventilation shaft), etc) 50m nuisance buffer from place of worship, petrol station, Light industry premises to the nearest residential development. 100m nuisance buffer from General industry premises to nearest residential development. 500m nuisance buffer from Special Industry premises to nearest residential development.



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G1 Design Gateway (continued from previous page)

Key Words	Requirement Category				
Site Layout only <i>(continued from previous page)</i>	<ul style="list-style-type: none"> Orientation of building: Minimum building setback (m) <table border="1" data-bbox="382 608 763 698"> <tr> <td>Fronting track</td> <td>35</td> </tr> <tr> <td>End-wall facing track</td> <td>25</td> </tr> </table> Setback distance within 70m from transport-related infrastructure (i.e. LTA road reserve line for expressway/major road) to the nearest residential development Lot boundary line. Location of the chimney and BHC and MCH requirements e.g. within 30m / 100m radius of existing chimney stack height Location changes for the storage inventory product / materials such as chemical, oil, fuel, etc Changes in the industrial processes or production activities location Changes of existing activity, expansion of existing activities or proposed new activity carried out on the proposed development or premises <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Design Gateway (G1) However, applicant may submit the above information at Pre-submission if the development does not require any Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. 	Fronting track	35	End-wall facing track	25
Fronting track	35				
End-wall facing track	25				

G2 Construction Gateway

Key Words	Requirement Category
Environmental Health (COPEH) <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> INTERCEPTOR PUMP SANITARY APPLIANCES GUTTER TANK SHADING DEVICE REFUSE CHUTE / RECYCLABLES CHUTE </div> <div style="text-align: center;"> SENSOR CUBICLE DISTRIBUTION CHAMBER SYSTEM SPACE CONTROL ELEMENT REFUSE HANDLING EQUIPMENT </div> </div> <p>COPEH - Section 1 : Refuse Storage and Collection</p> <p>1.1 Objective 1.2 Refuse Output 1.3 Refuse Chute 1.4 Refuse Chute Chamber 1.5 Refuse Room</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Equipment can be modelled as placeholders and supplier details can be provided in a separate document. <p>COPEH - Section 2 : Public Toilet</p> <p>2.1 Objective 2.2 Definition of Public Toilet 2.3 General Design Criteria</p> <p>2.4 Sanitary and Water Fittings Required in Public Toilet 2.5 Amenities to be Provided 2.6 Ventilation</p> <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. 	



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IFC COMPONENT

G2 Construction Gateway (*continued from previous page*)

Key Words	Requirement Category	
Environmental Health (COPEH) <i>(continued from previous page)</i>	<p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). 	<p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	<p>COPEH - Section 3 : Ventilation, Ducting and Kitchen Exhaust Systems for Food Shop</p> <p>3.1 Objective 3.2 Design Requirements</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). <i>Terminals and façade louvres are to be modelled. Ducting can be in 2D or 3D.</i> 	<p>3.3 Operations Requirements 3.4 Other Requirements and Guidelines</p> <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	<p>COPEH - Section 4 : Cooling Tower (when it is provided)</p> <p>4.1 Objective 4.2 Design Requirements</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2) 	<p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	<p>COPEH - Section 5 : Aquatic Facility</p> <p>5.1 Objective 5.2 Minimum Design Criteria</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). <i>Balancing Tank is to be modelled.</i> 	<p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>6.1 Objective 6.2 Recyclables Output</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2).
		<p>6.3 Designated Recycling Points for Recycling Receptacles 6.4 Recyclables Chute System</p> <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.



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G2 Construction Gateway (*continued from previous page*)

Key Words	Requirement Category
Environmental Health (COPEH) <i>(continued from previous page)</i>	<p>COPEH - Section 7 : Anti-Mosquito Breeding</p> <p>7.1 Objective 7.2 Roof Gutter</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2).
Pollution Control (COPPC)	<p>COPPC - Section 2 : Judicious Siting of Industries and Other Development</p> <p>4. Objective</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2).
	<p>COPPC - Section 3 : Requirements for Industries</p> <p>5. Clean Industry 6. Light Industry</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2)
	<p>COPPC - Section 4 : Requirements to Operate a Factory</p> <p>9. Use of Industrial premises 10. Trade effluent discharge into public sewer and watercourse</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2)
	<p>COPPC - Section 5 : Pollution Control Requirements</p> <ul style="list-style-type: none"> 11. Water Pollution 12. Air Pollution 13. Noise Pollution <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2)

Who to submit:

- QP appointed should submit the above information and keep other relevant QPs in the loop.
- The same QP should follow through the submissions for all gateways.

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G2 Construction Gateway (continued from previous page)

Key Words	Requirement Category
Pollution Control (COPPC) <i>(continued from previous page)</i>	<p>COPPC - Section 6 : Hazardous Substances and Toxic Industrial Waste Control Requirements</p> <ul style="list-style-type: none"> 14. Hazardous Substances 15. Toxic Industrial Waste <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.

- Independent Submissions	
Key Words	Requirement Category
Impact Studies only	<p>Noise Impact Assessment (NIA-Post) for Land Traffic Noise</p> <p>NIA (Post) report will be required for (1) <u>New</u> residential and noise sensitive developments located within 70m of <u>existing</u> land traffic noise sources/hotspots (e.g. expressways/major arterial roads/MRT tracks) on existing residential and (2) <u>Existing</u> noise sensitive developments located within 70m of <u>new</u> transport-related developments (e.g. expressway/major arterial roads/MRT tracks/bus interchanges/ bus depots), inclusive of the expansion of existing transport-related infrastructures</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicant will need to submit NIA (Post) report to NEA directly before Completion Gateway (G3) and concluded before TOP could be granted. Sufficient time shall be catered for NEA to process the NIA (Post) The processing of NIA (Post) will take 1-2 months <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>Noise Report for ACMV</p> <p>Noise report for ACMV will be required for non-industrial developments which have new air-conditioning and mechanical ventilation works, including relocations.</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicant will need to submit ACMV noise report directly to NEA before Completion Gateway (G3) and concluded before TOP could be granted. <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>Pollution Control Equipment (PCE)</p> <p>PCE submission will be required for developments involving proposed PCE/fuel burning equipment (e.g. Boiler, Thermal Oxidiser, Scrubber, Dust Collector, Spray Paint Booth, etc.)</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicant will need to submit technical details of the PCE and/or Fuel Burning Equipment to NEA directly before Completion Gateway (G3) and concluded before TOP could be granted. <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.



National Environment Agency (NEA)

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IFC COMPONENT

G3 Completion Gateway		
	Key Words	Requirement Category
Photo, video or reports of completed works	<ul style="list-style-type: none"> QP (Arch/PEs) applies for TOP/CSC and provide photo / video evidence or reports of completed works 	

----- End of Requirements for NEA -----



National Parks Board (NParks)

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IFC COMPONENT

- Pre-Submission, Planning and Other Consultations		
Key Words	Requirement Category	
Greenery	<p>Greenery Provision and Conservation of Trees</p> <ul style="list-style-type: none"> Pre-Submission consultation of requirements for greenery provision and tree conservation for developments 	
Impact Studies only	<p>Biodiversity Impact Assessment (under URA's Environmental Impact Assessment [EIA] framework)</p> <ul style="list-style-type: none"> Applicable to sites that fall within the EIA framework but were not identified at Planning Stage (Pre-DG) <ul style="list-style-type: none"> <u>Environmental Consultation</u> <ul style="list-style-type: none"> QP (Arch / PEs) or Consultant to submit the environmental consultation form (Form A) to URA and relevant Technical Agencies (i.e. NEA, NParks, MPA, SFA). Details of project entities (Developer, Qualified Person and Main Contractor) as stated in Form A are provided <u>Environmental Impact Assessment</u> <ul style="list-style-type: none"> If determined during environmental consultation that an environmental study is needed, QP (Arch / PEs) or Consultant can consult on environmental baseline study and scoping of EIA QP (Arch / PEs) or Consultant to ensure that EIA report (for projects that have cleared environmental assessment at planning stage) are submitted for acceptance If pre-submission is not possible, the environmental consultation process should be concluded by Piling Gateway (G1.5) or Construction Gateway (G2) There might be requirement for detailed EMMP / wildlife management prior to site clearance <p>Assessment and Reduction of Biodiversity Impact (under URA's Environmental Impact Assessment [EIA] framework)</p> <ul style="list-style-type: none"> Should be surfaced ahead of the submission If pre-submission is not possible, the environmental consultation process should be concluded by Design Gateway (G1) or Piling Gateway (G1.5) There might be requirement for EMMP / wildlife management prior to site clearance 	

G1 Design Gateway		
Key Words	Requirement Category	
Greenery LANDSCAPE PLANTS	<p>Conservation of Trees</p> <ul style="list-style-type: none"> To conserve trees identified: <ul style="list-style-type: none"> In Technical Conditions of Tender (TCOT) As Heritage Trees Through nature group / public / residents engagement In Environmental Impact Assessments (EIA) / Environmental Management and Monitoring Plans (EMMP) etc. <p>Supporting Document(s):</p> <ul style="list-style-type: none"> a) Arborist report (if tree(s) identified to be conserved / retained may be affected by proposed works for development) 	

➤ For NParks' External Works requirements, please refer to [Page 170](#).



National Parks Board (NParks)

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G1 Design Gateway (continued from previous page)

Key Words	Requirement Category
Impact Studies only	<p>Biodiversity Impact Assessment (under URA's Environmental Impact Assessment [EIA] framework)</p> <ul style="list-style-type: none"> Applicable to sites that fall within the EIA Framework but were not identified at Planning Stage (Pre-DG) <p><u>Environmental Consultation</u></p> <ul style="list-style-type: none"> QP (Arch / PEs) or Consultant to submit the environmental consultation form (Form A) to URA and Technical Agencies (e.g. NEA, NParks, MPA, SFA) Details of project entities (Developer, Qualified Person and Main Contractor) as stated in Form A are provided <p><u>Environmental Impact Assessment (EIA)</u></p> <ul style="list-style-type: none"> If determined during environmental consultation that an environmental study is needed, QP (Arch / PEs) or Consultant can consult on environmental baseline study and scoping of EIA QP (Arch / PEs) or Consultant to ensure that EIA report (for projects that have cleared environmental assessment at planning stage) are submitted for acceptance
Site Layout only <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> SITE BOUNDARY </div> <div style="text-align: center;"> PLANTING AREA </div> <div style="text-align: center;"> GREEN VERGE </div> </div>	<p>Provision of Planting Areas</p> <ul style="list-style-type: none"> To provide planting areas (i.e. 3.0m/5.0m-wide green buffers, 2.0m-wide peripheral planting verges, open-air parking planting areas) in compliance with NParks' Guidelines (Chapter 3) To ensure planting areas are free from any encroachment, except for allowable minor ancillary structures and landscaping structures as listed in NParks' Guidelines (Chapter 3) To locate fire engine accessways outside planting areas To recess underground structures / services at least 2.0m below planting areas, except for: <ul style="list-style-type: none"> Footings of retaining / boundary walls (may encroach up to 0.5m into planting areas) Services traversing perpendicularly across planting areas <p>New Parks/ Park Connectors/ Promenades</p> <ul style="list-style-type: none"> To ensure design is in accordance with NParks specifications (e.g., spatial provision, access points, specific features / elements imposed at planning stage based on NParks planning conditions) <p>Securing of Land for Parks / Park Connectors use and/or Impact on Neighbouring Parks (e.g., en bloc sites)</p> <ul style="list-style-type: none"> To ensure site boundary does not encroach into safeguarded / rezoned parks and park connectors

G1.5 Piling Gateway (Optional)

Key Words	Requirement Category
Impact Studies only	<p>Applicable to sites requiring Environmental Monitoring and Management Plan (EMMP) / Wildlife Management Plan prior to commencement of works:</p> <ul style="list-style-type: none"> Detailed EMMP report (provided by Main Contractor) Acceptance letter from NParks prior to site clearance (if applicable)

➤ For NParks' External Works requirements, please refer to [Page 170](#).



National Parks Board (NParks)

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G2 Construction Gateway

Key Words	Requirement Category
Greenery LANDSCAPE PLANTS	<p>Conservation of Trees</p> <ul style="list-style-type: none"> To conserve trees identified: <ul style="list-style-type: none"> In Technical Conditions of Tender (TCOT) As Heritage Trees Through public engagement In Environmental Impact Assessments (EIA) / Environmental Management and Monitoring Plans (EMMP) etc. <p>Supporting Document(s):</p> <ul style="list-style-type: none"> a) Arborist report (if tree(s) identified to be conserved / retained may be affected by proposed works for development)
Impact Studies only	<p><i>Applicable to sites not requiring Piling Gateway (G1.5) approval</i></p> <p>Applicable to sites requiring Environmental Monitoring and Management Plan (EMMP) / Wildlife Management Plan prior to commencement of works:</p> <ul style="list-style-type: none"> a) Detailed EMMP report (provided by Main Contractor) b) Acceptance letter from NParks prior to site clearance (if applicable)
Site Layout only PLANTING AREA GREEN VERGE	<p>Provision of Planting Areas</p> <ul style="list-style-type: none"> To ensure dimensions of planting areas are compliant with NParks Guidelines (Chapter 3) or as approved by NParks during Design Gateway (G1)

- Independent Submissions

Key Words	Requirement Category
Greenery	<p>Planting Scheme (within Development Boundary)</p> <ul style="list-style-type: none"> To show location, number and species of existing and proposed trees / shrubs for planting areas

----- End of Requirements for NParks -----

Click below for NParks RABW Requirements for :

[External Works](#)



Public Utilities Board (PUB)

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- Pre-Submission, Planning and Other Consultations		
Key Words	Requirement Category	
Public Drains (External) 	<p>Roadside Drain Capacity</p> <ul style="list-style-type: none"> For projects where drains need to be rebuilt / entrance culvert. PUB to provide required capacity during pre-sub consultation Size of new culvert (will be advised by PUB) Public Drains - Drain Size and Location <p>Pre-Consultation for Sewers</p> <ul style="list-style-type: none"> Sewerage Discharge Point Used water discharge volume <p>Pre-Consultation for Drainage (via email)</p> <ul style="list-style-type: none"> Drainage Discharge Point Catchment Area 	

G1 Design Gateway		
Key Words	Requirement Category	
Detention System (External) 	<p>Peak Run Off</p> <ul style="list-style-type: none"> Key Objective: To demonstrate how this is catered for, area is set aside for detention tank provision, location, OR drain widening Calculation of peak run off factor (C value) max. 0.55 (based on code and chart) e.g. area of development of greenfield site 	
Infra & Utilities (Internal)	<p>Drainage Network</p> <ul style="list-style-type: none"> To show conceptual plan – location, proposed discharged point, connection to existing drainage network 	
Platform & Crest Level, Earthworks / Topography 	<p>Minimum Platform Level and Crest Level</p> <ul style="list-style-type: none"> SHD <p>Earthworks</p> <ul style="list-style-type: none"> Minimum Platform Level / Changes to Topography <p>Flood Protection Measures</p> <ul style="list-style-type: none"> If crest level is not provided – location and height of protection measure 	
Public Drains (Internal) 	<p>Common Drain</p> <p>(Drains receiving upstream run off / existing [note: more common for landed housing area])</p> <ul style="list-style-type: none"> Location, width 	

For PUB's External Works requirements, please refer to [Page 173](#).



Public Utilities Board (PUB)

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G1 Design Gateway (continued from previous page)

Key Words	Requirement Category
Public Sewerage System (External) 	<p>Sewer Connection</p> <ul style="list-style-type: none"> Connection Point – where the proposed location is
	<p>Sewerage System</p> <ul style="list-style-type: none"> Alignment of Sewers, Dimensions, Gradient
Sanitary (Internal) 	<p>Indicative Location(s) of Drain-line and Inspection Chamber</p> <ul style="list-style-type: none"> Details (e.g. alignment) and Invert Level to be provided by M&E in Construction Gateway (G2) <p>Used Water Flow Rate</p> <ul style="list-style-type: none"> Key Objective: To check that sewer can contain this flow Quantity & flow rate expected to be discharged from development, where it is to be discharged (based on no. of toilets, shower head, etc. - in relation to no. of DUs)
Site Layout, Drainage Reserve	<p>Drainage Reserve</p> <ul style="list-style-type: none"> Location (align to DIP), width <p>Note: Coordinated by the Architect, with inputs from C&S</p>

G2 Construction Gateway

Key Words	Requirement Category
Infra & Utilities (Internal) 	<p>Sanitary Network</p> <ul style="list-style-type: none"> Drain-lines, Inspection Chamber, Discharge Lines, etc. Sanitary Stack System
	<p>Basement Pumped System</p> <ul style="list-style-type: none"> May model a box as a placement holder. Details is to be drawn by Specialised PE Retention Tank RC Trench
	<p>Sewer Network</p> <ul style="list-style-type: none"> Minor Sewer (when applicable)
	<p>Drainage Network</p> <ul style="list-style-type: none"> C&S: Effective tank capacity and other hydraulic details associated with the tank M&E: For pumped detention tank, M&E to provide pump details
	<p>Proposed Treatment of Common Drain</p> <ul style="list-style-type: none"> Longitudinal / sectional profile Side gates

For PUB's External Works requirements, please refer to [Page 173](#).



Public Utilities Board (PUB)

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- Independent Submissions		
	Key Words	Requirement Category
	Water Supply	<ul style="list-style-type: none"> Site plans, water reticulation schematic / layout drawing of WSI design works and water requirements Specified activities within water pipe corridor
	Public Drains (External)	<ul style="list-style-type: none"> Earth Control Measures (ECM) Plan Details of temporary works affecting drainage / within drainage reserve
	Public Sewerage System (External)	<ul style="list-style-type: none"> Details and scope of works on manholes and sewers Specified activities within sewer corridor
	Rainwater Harvesting	<p>Rainwater Collection System</p> <ul style="list-style-type: none"> Proposal plan which include location, site plan, relevant floor plans, catchment plan, tank details and water reticulation schematic drawing

----- End of Requirements for PUB -----

Click below for PUB's RABW Requirements for :

[External Works](#)



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G1 Design Gateway

Key Words	Requirement Category
Fire Engine Accessway / Access Road <div style="display: flex; justify-content: space-around; margin-top: 10px;"> ROAD SITE BOUNDARY </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> SPACE </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> WINDOW </div>	<u>Indication of Fire Engine Accessways / Access Road</u> <ul style="list-style-type: none"> To design upfront and not added as an afterthought Compliance of provision of fire engine accessway / access road does not affect the requisite planting areas and roadside green verges Indication of all the fire engine access road and accessway within project boundary Clearly indicate if public road is used as fire engine accessway / access road Compliance of distance between fire engine accessway and fire access opening Compliance of no obstruction between fire engine accessway and fire access opening
Fire Lift <div style="display: flex; justify-content: center; margin-top: 10px;"> LIFT </div>	<u>Provision of Fire Lift</u> <ul style="list-style-type: none"> Compliance of buildings (other than PG 1 & 2) provided with at least two fire lifts on every storey <ul style="list-style-type: none"> When habitable height exceeds 24m When basement exceeds 9m Compliance of two fire lifts for super high-rise (above 40 storeys) residential building

G2 Construction Gateway

Key Words	Requirement Category
Emergency Voice Communication System <div style="display: flex; justify-content: center; margin-top: 10px;"> SPACE </div>	<u>Emergency Voice Communication System and Fire Command Centre</u> <ul style="list-style-type: none"> QP to declare one-way / two-way emergency voice communication system is provided for the functional space
Exit <div style="display: flex; justify-content: space-around; margin-top: 10px;"> STAIRCASE SPACE </div>	<u>Means of Escape</u> <ul style="list-style-type: none"> Compliance of adequate means of escape are provided: <ul style="list-style-type: none"> Adequate number of exits Capacity of exits and occupant load Remoteness of exit Travel distance Smoke-free approach to exit staircase Discharge of exit staircase Ventilation of exit Staircase re-entry Compliance of special requirements for Person With Disabilities (PWDs) are provided: <ul style="list-style-type: none"> Provision of PWD holding point unless otherwise exempted Siting of PWD holding point Protection of PWD holding point
Exit sign and Emergency Lighting <div style="display: flex; justify-content: space-around; margin-top: 10px;"> SECURITY LIGHTING SIGNAGE </div>	<u>Exit Sign (incl. low level signs), Emergency Lighting, Photoluminescent Lighting</u> <ul style="list-style-type: none"> (Archi) Type of buildings / areas, and locations requiring exit sign, photoluminescent lighting (M&E) Type of buildings / areas, and locations of requiring emergency lighting
Fire Alarm System <div style="display: flex; justify-content: space-around; margin-top: 10px;"> FIRE ALARM BREECHING INLET </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> LANDING VALVE SYSTEM </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> SPACE </div>	<u>Automatic Fire Alarm (Heat / Smoke Detector)</u> <ul style="list-style-type: none"> Types of building / usage exempted from provision of automatic fire alarm QP to declare automatic fire alarm system is provided for the functional space <u>Components to be indicated:</u> <ul style="list-style-type: none"> Fire Alarm Panel



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G2 Construction Gateway		
	Key Words	Requirement Category
Fire Alarm System		<p>Combined Sprinkler and Wet Riser System</p> <ul style="list-style-type: none"> Types of buildings / areas requiring combined sprinkler and wet riser system Provision of sprinklers for basement and aboveground QP to declare combined sprinkler and wet riser system is provided for the functional space
<i>(continued from previous page)</i>		<p><u>Components to be modelled:</u></p> <ul style="list-style-type: none"> Location of Sprinkler Control Valve Breeching Inlet Landing Valve
	FIRE ALARM	<u>Components to be indicated:</u>
	BREECHING INLET	
	LANDING VALVE	
	SYSTEM	
	SPACE	
		<p>Home Fire Alarm Device (HFAD)</p> <ul style="list-style-type: none"> Types of building requiring HFAD QP to declare Home Fire Alarm Device is provided for the functional space Location and Number of HFAD points
		<p><u>Components to be modelled:</u></p> <ul style="list-style-type: none"> Manual Alarm Call Points Fire Alarm Sounder Visual Alarm
		<u>Components to be indicated:</u>
		<p>Sprinkler System</p> <ul style="list-style-type: none"> Types of buildings / areas requiring sprinkler system Provision of sprinklers for basement and aboveground buildings Exemption of sprinkler system
		<p><u>Components to be modelled:</u></p> <ul style="list-style-type: none"> Location of Sprinkler Control Valve Breeching Inlet
		<u>Components to be indicated:</u>
		<p>Video Image Fire Detection System (VIFDS)</p> <ul style="list-style-type: none"> Types of buildings requiring VIFDS
		<p><u>Components to be modelled:</u></p> <ul style="list-style-type: none"> Location of Sprinkler Control Valve Breeching Inlet
		<u>Components to be indicated:</u>
		<p>Water Mist System</p> <ul style="list-style-type: none"> Requirements of water mist system as a substitute of sprinkler system
Firefighting System		<p>Evacuation Lift</p> <ul style="list-style-type: none"> Evacuation lift for evacuation of occupants to be modelled: <ul style="list-style-type: none"> Exceeding 24m (except PG 1 & 2) Can double-up as PWD evacuation lift One of fire lift can be used as evacuation lift Opening into protected lobby such as smoke-free lobby, external exit passageway or external corridor
		<ul style="list-style-type: none"> Evacuation lift for evacuation of PWD to be modelled: <ul style="list-style-type: none"> At least one lift required when building is more than 4 storey, passenger lift can be used as evacuation lift Provision of protected lobby Opening into protected lobby such as smoke-free lobby, external exit passageway or external corridor for building exceeding four storey



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G2 Construction Gateway

Key Words	Requirement Category
<p>Firefighting System <i>(continued from previous page)</i></p> <p>LIFT FIRE HYDRANT HOSEREEL BREECHING INLET LANDING VALVE FIRE EXTINGUISHER SYSTEM SPACE</p>	<p>Fire Lift</p> <ul style="list-style-type: none"> Fire resistance rating of lift shaft Serving continuous throughout the building, including basements Provision of 2 fire lift (except PG 1 & 2 not exceeding 40 storey) Distance between fire lift landing door and exit staircase not exceeding 5m & 10m (applicable to PG 2 discharge floor only) Accessibility to any part of the storey 60m coverage for fire lift (except PG 1 & 2) <p>Fire Hydrant System</p> <ul style="list-style-type: none"> Hydrant coverage not more than 50m from the fire engine accessway / access road <p>Hose Reel System</p> <ul style="list-style-type: none"> Compliance of provision of hose reel Number of hose reel Coverage of hose reel (30m+6m) Types of buildings / areas exempted from provision of hose reel Siting of hose reel <p>Portable Extinguisher</p> <ul style="list-style-type: none"> Types of buildings / areas requiring portable extinguisher Siting of portable extinguisher <p>Rising Mains and System</p> <ul style="list-style-type: none"> Type of rising main provided (Dry or Wet) Number of rising main Location and coverage of landing valve <p><u>Components to be modelled for Dry and Wet Riser:</u></p> <ul style="list-style-type: none"> Breeching inlet Landing valve <p><u>Provision of Standby Fire Hose:</u></p> <ul style="list-style-type: none"> Types of buildings requiring standby fire hose Number of standby hose Located not more than 2m from landing valve <p><u>Provision of Breeching Inlet:</u></p> <ul style="list-style-type: none"> Location Number
<p>Mechanical Ventilation & Smoke Control System</p> <p>SPACE</p>	<p>QP to declare at those functional space which are provided with the following Ventilation System(s):</p> <ul style="list-style-type: none"> Natural ventilation (NV) Mechanical ventilation (MV) Pressurisation Cross-ventilation Cross-ventilation with intermediate - ventilation opening Vapour extraction system (spray painting booth) <p>Note: Details to be provided and submitted by M&E in Mechanical Ventilation (MV) Plan under Independent Submissions</p> <p>QP to declare at those functional space which are provided with the following Smoke Control System(s):</p> <ul style="list-style-type: none"> Ductless Jet Fan System Engineered Smoke Control System Smoke Purging System Smoke vent



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G2 Construction Gateway

Key Words	Requirement Category
Site Planning & External Firefighting Provisions WINDOW ROAD SPACE SIGNAGE	<p>Fire Access Opening</p> <ul style="list-style-type: none"> Compliance of provision of fire access opening Location, signage & size Number and position of access opening Exemption of fire access opening for PG 1 & 2 buildings <p>Fire Command Centre (FCC)</p> <ul style="list-style-type: none"> Types of buildings require provision of FCC Size and Location of FCC Secondary power supply for FCC with air-conditioning and/or mechanical ventilation FCC shall be provided if building requires: <ul style="list-style-type: none"> Fire lift Emergency voice communication system Engineered smoke control system <p>Fire Engine Accessway / Access Road</p> <ul style="list-style-type: none"> Indicate if public road is used as fire engine accessway / access road Fire engine accessway / access road requirement for basement Marking of fire engine accessway / access road Compliance of fire engine access road requirements of PG I to VIII buildings: <ul style="list-style-type: none"> Indicate road serving as fire engine access road within the project boundary Compliance of width, turning radii / facilities, design load capacity, gradient, overhead clearance Marking and signpost along fire engine access road No obstruction along fire engine access road Compliance of fire engine accessway requirements for PG II to VIII buildings: <ul style="list-style-type: none"> Indicate road serving as fire engine accessway within the project boundary Compliance of length of fire engine accessway Compliance of turning radii / facilities, design load capacity, gradient, overhead clearance Marking and signpost along fire engine access road No obstruction along fire engine access road
Structural Fire Precautions DOOR SLAB WALL LIFT STAIRCASE SPACE DAMPER	<p>Compartmentation</p> <ul style="list-style-type: none"> Compliance of compartmentation requirements: <ul style="list-style-type: none"> Area and cubical extent to comply with Table 3.2A (for buildings not protected with sprinkler system) Maximum of 3 storeys per compartment when habitable height is not exceeding 24m Maximum of 1 storey per compartment when habitable height exceeds 24m Compliance of requirements for Atrium space Compliance of requirements for High hazard occupancy Exemption of size limitation of compartment for car park Compliance of area / room / usage requires compartmentation Location of fire damper <p>Compartmentation Walls and Compartmentation Floors</p> <ul style="list-style-type: none"> Compliance of requirements for compartment walls or compartment floors: <ul style="list-style-type: none"> Fire resistance rating Non-combustible Use of fire shutter as compartment wall Room / space allows the use of fire rated roller shutter



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G2 Construction Gateway

Key Words	Requirement Category
Structural Fire Precautions <i>(continued from previous page)</i>	<p>External Wall</p> <ul style="list-style-type: none"> Compliance of requirements for external walls <ul style="list-style-type: none"> Fire resistance rating Non-combustible Compliance of setback distance for unprotected opening Compliance of external wall finishes Compliance of vertical fire spread requirements <p>Element of Structure</p> <ul style="list-style-type: none"> Compliance of element of structure requirements Minimum periods of fire resistance Exemption of fire resistance rating Non-load-bearing external wall Single storey buildings <p>Protected Shafts</p> <ul style="list-style-type: none"> Compliance of services running inside and/or passing through fire lift lobby and smoke-free lobby Compliance of gas pipe running inside an internal corridor / lobby Compliance of roof construction requirements: <ul style="list-style-type: none"> Surface spread of flame rating Composite panel as roofing covering Roof covering containing plastic Exemption of roof construction material Compliance of requirements for protected shaft: <ul style="list-style-type: none"> Fire resistance rating Non-combustible Material of construction Opening in protected shaft Ventilation Fire resistance rating of doors in protected shaft Compliance of protected shaft containing exit staircase: <ul style="list-style-type: none"> Compartmentation of exit staircase with masonry or drywall construction Fire resistance of door opening into exit staircase Finishes within exit staircase shall be non-combustible Types of services allowed in exit staircase Compliance of protected shaft containing other services installations: <ul style="list-style-type: none"> Electrical conduits / cable tray Compliance of requirements for lift shaft: <ul style="list-style-type: none"> Material of construction Exemption of enclosure in protected shaft located at edge of atrium Provision of protected lobby when lift is at basement Compliance of requirements for private lift for exclusive use of occupants in residential under PG 2 <p>Separating Walls</p> <ul style="list-style-type: none"> Exemption of separating wall requirements for PG 1 & 2 buildings Compliance of Openings in separating wall requirements Compliance of requirements for separating walls <ul style="list-style-type: none"> Fire resistance rating Non-combustible <p>Use of other fire rated material</p> <ul style="list-style-type: none"> Compliance of requirements on use of Fire rated board
DOOR	
SLAB	
WALL	
LIFT	
STAIRCASE	
SPACE	
DAMPER	



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- Independent Submissions	
Key Words	Requirement Category
Mechanical Ventilation & Smoke Control System	<p>Fire Protection (FP) and Mechanical Ventilation (MV) Plans</p> <ul style="list-style-type: none"> Detailed layout and floor plan showing Fire Protection and Mechanical Ventilation system of development Schematic diagram for the proposed system Calculations and reports (where applicable) <p>Air-Conditioning, Mechanical Ventilation and Fire Protection Plan (MV & FP)</p> <ul style="list-style-type: none"> Key features of the building in which the system is to be installed Schematic diagram of the overall system showing clearly the key features and their functions, relative locations in the building, lots, sizes, capacities and other essential information incl. the air distribution design arrangement in the case of air-conditioning and mechanical ventilation systems Layout of the system on every floor plan showing clearly the various parts and their functions, locations, arrangements, sizes, capacities and other essential information Necessary cross-sectional views as superimposed on the building or part thereof to fully describe the details and configurations of the system A colour scheme to clearly distinguish the various distinct parts of the system and the different systems from one another Volumetric rate of flow of air at each point of inlet and outlet of each system including those serving protected staircases, exit passageways, lobbies, areas of refuge, the Fire Command Centre, fire pump rooms, generator rooms, rooms used for the storage of flammable liquids or gas or other areas of special risk; Location of: <ul style="list-style-type: none"> Fire compartment walls, floors, air shafts, fire dampers, smoke detectors and other fire precautionary features Automatic Fire Alarm System Automatic Fire Extinguishing System Emergency Voice Communication System Smoke Control System Calculations and reports (where applicable)

G3 Completion Gateway	
Item for TOP / CSC	Requirement Category
-	<p>QP(s) shall certify that the fire safety works have been completed in accordance with the Code of Practice for Fire Precautions in Buildings, Fire Safety Act and its Regulations and relevant Codes of Practice and submit the following documents.</p> <ul style="list-style-type: none"> Certification of Fire Safety Works RI Engagement Form Registered Inspector's Inspection Certificate (RI Form 1 or 2) RI Inspection Report RI Cessation form, where applicable Declaration of Regulated Fire Safety Products, where applicable CoC for Regulated Fire Safety Products, where applicable Delivery Orders for Regulated Fire Safety Products, where applicable FSC02 - Certification for Regulated Fire Safety Products, where applicable FSC03 - Certification for Lift Installation & Operation, where applicable FSC04 - Certification for Fire Engine Access Road And Accessway, where applicable



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- Pre-Submission, Planning and Other Consultations		
Key Words	Requirement Category	
Conservation		Refer to URA Conservation Requirements here
Impact Studies only	<p></p> <p>Environmental Impact Assessment (where required)</p> <ul style="list-style-type: none"> The QP (Arch / PEs) or Consultant is to submit the environmental consultation form to URA and relevant Technical Agencies (e.g. NEA, NParks, MPA, SFA) Details of project entities as stated in Environmental Consultation Form are provided (Developer, Qualified Person and Main Contractor) If determined during environmental consultation that an environmental study is needed, QP (Arch / PEs) or Consultant to ensure that the reports (for projects that have cleared environmental assessment at planning stage) are submitted for acceptance 	
Site Layout only	<p></p> <p>Outline Application / Rezoning</p> <p>Where there are deviations to Master Plan parameters (e.g. land use, GPR, height, etc), the project team should submit an outline application prior to making the Design Gateway submission, with the following details/information:</p> <ul style="list-style-type: none"> Planning proposal data (e.g. site area, GFA and use breakdown, numbers of units/rooms, etc.) Site layout plan and form/massing schemes, where necessary Any other studies or reports to illustrate the feasibility of the proposal, where necessary <p></p> <p>Pre-Application Consultation Service</p> <ul style="list-style-type: none"> Details of proposals to clarify or seek deviation from specific guidelines 	
Others	<p></p> <p>Built Environment Transformation Bonus GFA Incentive</p> <ul style="list-style-type: none"> Submission of incentive scheme application and supporting documents <p>Pre-DG Submission: Stage 1 Design Advisory Panel – for selected projects</p> <ul style="list-style-type: none"> The DAP materials submitted are to consist of: <ul style="list-style-type: none"> Technical drawings (including a full set of plans, elevations and sections) Digital and hardcopy DAP booklets (including 2 hardcopies in A3), which should not exceed 50 pages, including appendices, attached drawings and plans, with a minimum font size of 12. Presentation slides. The number of presentation slides should be comfortable for a 20-minute presentation without lengthy text, highlighting the key points with further elaboration provided in the DAP booklet. Digital models Where necessary, a physical model of the proposed development will be required, at scale of 1:400 or smaller (to be advised by the officer in charge), showing context of site] will have to be submitted. Additional reports, such as Conservation Reports, are to be included as Appendices to the A3 booklets. The following aspects of the proposal will be assessed at this stage of the DAP: <ul style="list-style-type: none"> Stage 1 (Pre-DG DAP) <ul style="list-style-type: none"> Design Philosophy / Concept Form and Massing General architectural treatment (roofscape, façade in relation to context) Pedestrian Network and Vehicular Access Public Spaces and Landscape Replacement Areas / landscaping concepts 	



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G1 Design Gateway

Key Words	Requirement Category
Access to Site ROAD SLAB	<p>Site Layout</p> <ul style="list-style-type: none"> Indicative locations of Pedestrian, Cycling, Vehicular and Service Access
Building Massing BUILDING STOREY SPACE	<p>Building Form and Massing</p> <ul style="list-style-type: none"> Development Statement of Intent (DSI) – Response to site context Façade articulation and urban veranda (Orchard Road only) Party wall (indicate no openings, adjacent development, depth and height comply with guidelines) <p>Building Height</p> <ul style="list-style-type: none"> Floor-to-Floor Height & Aggregate Building Height <ul style="list-style-type: none"> Number of Storeys Additional Height for Predominant Sky Terrace Storey Overall Building Height Control (incl. building crown and M&E floor, if any) <p>Building Edge</p> <ul style="list-style-type: none"> Alignment of building edge and percentage of building form articulation Height of building edge Depth of building edge
Connectivity SPACE RAMP PARKING LOT SITE BOUNDARY	<p>Pedestrian Network</p> <p>Through Block Link (TBL), Underground Pedestrian Link(UPL), Elevated Pedestrian Link (EPL), Covered Walkways (CW), Open Walkways (OW), Covered Linkways (CL), High Covered Linkways (HCL)</p> <ul style="list-style-type: none"> Layout and connections to existing / future developments Alignment to adjacent pedestrian connections Proposed levels and mitigation of level differences (if any) Soffit height, overall width and clear width Vehicular ramps to start after these Pedestrian Networks <p>Additional requirements for the following:</p> <ul style="list-style-type: none"> (UPL, EPL) Detailed layout of vertical circulation point – location within development, and dimensions (UPL, EPL) Knock Out Panels (KOP) details (e.g. alignment, size) where relevant <p>Walking and Cycling Plan</p> <ul style="list-style-type: none"> Connectivity to transport node Provision of measures to prevent conflict between pedestrian, cyclists and motor vehicles Provision of bicycle parking and supporting amenities (i.e. shower facilities and lockers)
Conservation	Refer to URA Conservation Requirements here
Earthworks / Topography WALL EARTHWORKS	<p>Earthworks, Retaining Walls and Boundary Walls</p> <ul style="list-style-type: none"> Height of retaining wall(s), extent of earth-fill and impact on surroundings where relevant <p>Earthworks, Platform Level</p> <ul style="list-style-type: none"> Minimum Platform Level / Changes to site topography

Section 3: Specific Requirements by Regulatory Agencies

Urban Redevelopment Authority (URA)

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

• KEY GATEWAYS •

• OTHER BUILDING WORKS •

BIM DATA REPRESENTATION



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G1 Design Gateway (continued from previous page)

Key Words	Requirement Category
External Works 	<p>Linkway Connection to Commuter Facilities</p> <ul style="list-style-type: none"> Indicative alignment Connection through existing / future development Soffit height, overall width and clear width Proposed levels and mitigation of level differences (if any) <p>Cycling Path</p> <ul style="list-style-type: none"> Provision according to safeguarded cycling plan <p>Promenade Guidelines (UD requirements for Singapore River)</p> <ul style="list-style-type: none"> Location of walkways and landscaping
Greenery 	<ul style="list-style-type: none"> Landscape Replacement Area (LRA) requirements Landscape Provision: Indicative Extent
Infra & Utilities (Internal) only	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> Integration of Utilities (e.g. MRT pop-up, substation, water bulk meter) into building envelope
Loading / Development Loading 	<p>Loading Provisions</p> <ul style="list-style-type: none"> Alignment and locations of loading columns Structural system and integration with future structures (e.g. location / orientation / size of vents) Loading calculations (EPL) Loading provision to receive future linkways / walkways (if any) <p>Supporting Documents:</p> <ul style="list-style-type: none"> Draft Development Interface Report for future developer Clearance from technical agencies
Night Lighting	<p>Night Lighting Report</p> <ul style="list-style-type: none"> UD Areas with night lighting requirement Concept and renders, Location and Extent
ORA / ODA / Kiosks	<ul style="list-style-type: none"> Location and extent, key parameters (e.g. structure, height, transparency)
Public Space 	<p>Privately-Owned Public Spaces (POPS)</p> <ul style="list-style-type: none"> Indicate location, design and dimensions: <ul style="list-style-type: none"> Location Size / height Layout / configuration Shadow Studies Seating provision Activity Generating Uses: <ul style="list-style-type: none"> Indicate location on plan and provide details on specific nature of use



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G1 Design Gateway (continued from previous page)

Key Words	Requirement Category
Rapid Transit System (RTS) Station    	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> Lines of Road Reserve / Site boundary of adjacent land parcels Location of station box and its associated tunnels & structures Land take required (footprint to be optimized to minimize the land-take) Details of Loading Provision (e.g. Loading grid plan) Design of pop-up & ancillary structures (within approved railway, setback, mitigation of platform levels, interfacing with neighbouring developments, CW provision) Annotation for at-grade servicing areas (e.g. bin centre, loading / unloading bays, required to serve the retail uses within the station) Integration approach with existing / future structures (e.g. location / orientation / size of vents) Connectivity with other transport infra structure facilities and key pedestrian routes Taxi stand / Vehicular drop-off KOP details (e.g. exact alignment, size) Retail quantum (capped at 2000 sqm) <p> Supporting Documents:</p> <ol style="list-style-type: none"> Submission of RTS Checklist Method of construction (cut and cover , tunnel boring) Details of Loading Provision (Draft DIR - WIP) Copy of the relevant approvals for the proposed retail quantum <p>Note: Coordinated by the Architect, with inputs from respective engineers</p> <p> Draft Development Interface Report</p> <ul style="list-style-type: none"> For works interfacing with existing / future connection Architectural information for future developer (e.g. fire safety requirements; Knock Out Panels (KOP)) Structural information for future developer (e.g. Loading requirements) Mechanical and Electrical (M&E) information for future developer (e.g. ventilation shaft location and throw) <p>Note: Coordinated by the Architect, with inputs from respective engineers</p> <p>Roofscape</p> <ul style="list-style-type: none"> Location and extent of M&E equipment Location and extent of Outdoor Refreshment Area (ORA) <p>Service and Vehicular Access to Site</p> <p> </p> <ul style="list-style-type: none"> Location of vehicular, pedestrian and cyclist access points, and layout of internal driveways Integration with Building Envelope <p>Service Areas</p> <ul style="list-style-type: none"> Location and integration with building envelope Visual screening, where required <p>Site Layout only</p> <p>   </p> <p>Building Setback from Boundary</p> <ul style="list-style-type: none"> Road Buffer Common Boundary Setback / Party wall & Planting Strip Building Setback for Multi-Storey Car Parks (MSCP) Boundary Setback for Ancillary Structures Setback requirement for Urban Design areas



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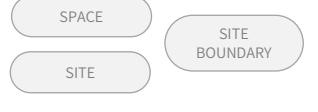
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IFC COMPONENT

G1 Design Gateway (continued from previous page)

Key Words	Requirement Category
Site Layout only <i>(continued from previous page)</i>	<p>Site Layout</p> <ul style="list-style-type: none"> Location of Buildings Location and scale / size of Communal Facilities (e.g. bin centre, pavilions, BBQ areas) <p>Site Coverage</p> <ul style="list-style-type: none"> Site coverage computation
Site Layout, Landscape Deck 	<p>Landscape Deck</p> <ul style="list-style-type: none"> Height of Deck in Relation to Existing Ground Levels Location and General Layout of Deck
Use & Intensity 	<ul style="list-style-type: none"> Land Use / Building Uses - Provide breakdown by use quantum Gross Plot Ratio / Gross Floor Area computation <p>Bonus GFA Incentive Schemes:</p> <ul style="list-style-type: none"> Balcony / Recreational / Built Environment Transformation / Others – GFA quantum and % Documentation to support proposed scheme (if required) <p>Site Boundary</p> <ul style="list-style-type: none"> Site Area Land to be Vested for Public Schemes (Drain, Road, Open Space, Park, Cycling Paths) Land to be Amalgamated / Alienated <p>Dwelling Units</p> <ul style="list-style-type: none"> Maximum Number Pre-Application Feasibility Study (together with LTA)
Vehicular Parking 	<p>Parking</p> <ul style="list-style-type: none"> Show location within site Declare total number and breakdown of types
Others	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> Submission of DA Checklist <p>Supplementary Documents</p> <ul style="list-style-type: none"> Topo Survey Plan Previous approved plans (where requested by URA) <p>Public Communications Plan (if applicable)</p> <ul style="list-style-type: none"> Distribution of flyers and submission of forms <p>Development Statement of Intent</p> <ul style="list-style-type: none"> Description of proposal (for relevant development types) <p>RTS Checklist</p> <ul style="list-style-type: none"> Submission of checklist for evaluation

Section 3: Specific Requirements by Regulatory Agencies

Urban Redevelopment Authority (URA)

INTRODUCTION TO CX

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• KEY GATEWAYS •

• OTHER BUILDING WORKS •

BIM DATA REPRESENTATION



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IFC COMPONENT

G1 Design Gateway (continued from previous page)

Key Words	Requirement Category
Others <i>(continued from previous page)</i>	<p>Environmental Impact Assessment (where required)</p> <ul style="list-style-type: none"> The QP (Arch / PEs) or Consultants is to submit the environmental consultation form to URA and relevant Technical Agencies (e.g. NEA, NParks, MPA, SFA). Details of project entities as stated in Environmental Consultation Form are provided (Developer, Qualified Person and Main Contractor) If determined during environmental consultation that an environmental study is needed, QP (Arch / PEs) or Consultant to ensure that the reports (for projects that have cleared environmental assessment at planning stage) are submitted for acceptance

G2 Construction Gateway - All Design Gateway requirements will apply, in addition to the following :-

Key Words	Requirement Category
Access to Site ROAD SPACE	<p>Site Layout</p> <ul style="list-style-type: none"> Detailed location of Pedestrian, Cycling, Vehicular and Service Access
Access within Building only SPACE	<ul style="list-style-type: none"> Corridor width
Attic SPACE	<ul style="list-style-type: none"> Design of attic Location of attic in relation to strata unit
Balcony SPACE	<p>Balconies, Private Enclosed Spaces, Private Roof Terraces and Indoor Recreation Spaces</p> <ul style="list-style-type: none"> Balcony screening design illustrating openness and porosity for natural ventilation <p>Bonus Balcony GFA</p> <ul style="list-style-type: none"> Letter of Declaration from Developer on Balcony Screen Design and Provision
Building / Unit Layout BUILDING STOREY	<p>Unit / Floor Layout (All)</p> <ul style="list-style-type: none"> Floor layout and unit size Strata areas and boundaries / voids <p>Dwelling Units (Residential)</p> <ul style="list-style-type: none"> Breakdown of units by type / size Unit layouts with breakdown of respective internal areas including balconies and air-con ledges
Building Facade	<p>Design Treatment for Building Facade</p> <ul style="list-style-type: none"> Illustrate design using perspectives Screening details of M&E equipment / multi-storey carpark, where required
Connectivity WATER METER DISTRIBUTION CHAMBER PARKING LOT SPACE FOOTPATH	<p>Pedestrian Network</p> <p>Through Block Link (TBL), Underground Pedestrian Link(UPL), Elevated Pedestrian Link (EPL), Covered Walkways (CW), Open Walkways (OW), Covered Linkways (CL), High Covered Linkways (HCL)</p> <ul style="list-style-type: none"> Loading provision to receive future walkways / linkways (if any) Notional scheme for future link to justify the loading (recipient)



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G2 Construction Gateway - All Design Gateway requirements will apply, in addition to the following :-

Key Words	Requirement Category
Connectivity <i>(continued from previous page)</i>	Additional requirements for the following: <ul style="list-style-type: none"> • (CW) Soffit height, overall width and clear width • (OW/CW) Paving material (where required in UD guidelines) • (OW/CW) Level of bulk water meter chamber / inspection chamber • (TBL) Location and Size of Signage • (HCL) Flashing to prevent wind driven rain <p>Walking and Cycling Plan</p> <ul style="list-style-type: none"> • Connectivity between buildings – show layout on plans, indicate width and levels • Segregation between vehicular and pedestrian / cyclist traffic • Provision of biking lots and end-of-trip facilities – show location and GFA exemption
Conservation	Refer to URA Conservation Requirements here
Earthworks / Topography  	<p>Earthworks, Retaining Walls, and Boundary Walls</p> <ul style="list-style-type: none"> • Proposed site and platform levels • Earthworks • Boundary wall • Retaining wall
External Works 	<ul style="list-style-type: none"> • Design treatment for public street lighting, bollards, tactile tiles (UD requirement for CBD / Marina Bay) • Promenade Guidelines (UD requirements for Singapore River) • Paving Guideline for Orchard, Downtown Core and the Civic District (OW) Paving material
Greenery    	<ul style="list-style-type: none"> • Landscape Replacement Area – Provide Green Plot Ratio and total % of landscape replacement, with breakdown of hardscape and softscape • Declare Location of Sky Terrace / Planter Boxes / Covered Communal Ground Garden / Communal Pavilions <p>Supplementary Documents</p> <ul style="list-style-type: none"> a) Landscape plan / species and perspectives b) Plant details of sky terrace / planter boxes / covered communal ground garden / communal pavilions
Night Lighting	 <p>Night Lighting Report</p> <ul style="list-style-type: none"> • Detailed concept and renders • Specifications • Fixture installation
ORA / ODA / Kiosks	<ul style="list-style-type: none"> • Location and extent, detailed design
Public Space 	<p>Privately-Owned Public Spaces (POPS):</p> <ul style="list-style-type: none"> • Area verging of POPS • Seating (design, no., location) • Amenities (type, location) • Signage (design, location) • Outdoor Refreshment Areas (ORA) (if provided, location / extent)



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G2 Construction Gateway - All Design Gateway requirements will apply, in addition to the following :-

Key Words	Requirement Category
Roofscape	<ul style="list-style-type: none"> Screening details of M&E equipment, where required Use of RC Flat Roofs – Indicate whether roof is accessible, and if so, for what purpose Structures (If any)
Rapid Transit System (RTS) Station <div style="display: flex; justify-content: space-around; width: 100%;"> ACCESSIBLE ROUTE SITE BOUNDARY </div> <div style="display: flex; justify-content: space-around; width: 100%;"> SPACE SITE </div>	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> Design and location of at-grade bicycle parking <p>Supplementary Documents</p> <ul style="list-style-type: none"> a) Night lighting report <p>Development Interface Report</p> <ul style="list-style-type: none"> a) For works interfacing with existing / future connection b) Architectural information for future developer (e.g. fire safety requirements; Knock Out Panels (KOP)) c) Structural information for future developer (e.g. Loading requirements) d) Mechanical and Electrical (M&E) information for future developer (e.g. ventilation shaft location and throw) e) Details of Loading Provision <p><i>Note: Coordinated by the Architect, with inputs from respective engineers</i></p>
Signage	<p>Privately-Owned Public Spaces (POPS), Through Block Link (TBL) Signage</p> <ul style="list-style-type: none"> Location and size of signages
Site Layout only <div style="display: flex; justify-content: space-around; width: 100%;"> SITE SITE BOUNDARY </div>	<p>Building Setback from Boundary</p> <ul style="list-style-type: none"> Setback for Building Appendages – Location and width Treatment for non-compliant Multi-Storey Car Parks and Ancillary Structures
Site Layout, Basement <div style="display: flex; justify-content: space-around; width: 100%;"> SITE </div>	<p>Basements</p> <ul style="list-style-type: none"> Basement protrusion (if any) and location within site Screening of basement opening
Site Layout, Landscape Deck <div style="display: flex; justify-content: space-around; width: 100%;"> PLANTING AREA PLANTER BOX </div> <div style="display: flex; justify-content: space-around; width: 100%;"> SPACE LANSCAPE PLANTS </div>	<p>Landscape Deck</p> <ul style="list-style-type: none"> Exposure of Basement Wall & Proposed Treatment (Berm / Vertical Greenery) Site Coverage on Landscape Deck – declare % Provision of Greenery on Deck – Location and % Boundary Wall Porosity – declare % and show design
Site Layout, Security Screening	<p>Special and Detailed Control Plans</p> <ul style="list-style-type: none"> Security Screening (where required)
Strata Area	<ul style="list-style-type: none"> To demarcate the strata areas on the floor plans
Structures in Building Setback, Green Buffer	<ul style="list-style-type: none"> Location (e.g. integrated with building envelope) Finish material of manhole to match paving if located within covered / open walkway
Use & Intensity	<ul style="list-style-type: none"> Gross Plot Ratio / Gross Floor Area Land Use / Building Uses – detailed breakdown by use and GFA quantum
	<p>Bonus GFA Incentive Schemes:</p> <ul style="list-style-type: none"> Balcony / Recreational / Transformation / Others – GFA quantum and %



Urban Redevelopment Authority (URA)

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IFC COMPONENT

G2 Construction Gateway - All Design Gateway requirements will apply, in addition to the following :-

Key Words	Requirement Category
Vehicular Parking <div style="display: flex; justify-content: space-around; align-items: center;"> PARKING LOT SPACE </div>	<ul style="list-style-type: none"> Total number of parking lots (including motorcycle parking) Residual area within car park floors to be demarcated Screening details for vehicular parking and service areas
Others	<p><u>Environmental Impact Assessment (where required)</u></p> <ul style="list-style-type: none"> Submission of any other documents required <p><u>Supplementary Documents</u></p> <ul style="list-style-type: none"> Previous approved plans (where requested by URA) <p><u>Public Communications Plans</u></p> <ul style="list-style-type: none"> Distribution of flyers and submission of forms, where required <p><u>Design Advisory Panel (DAP) Report</u></p> <ul style="list-style-type: none"> Urban design and architectural information for DAP to assess (e.g. renders; diagrams showing sheltered pedestrian route)
	<p><u>Pre-CG Submission: Stage 2 Design Advisory Panel – for selected projects</u></p> <ul style="list-style-type: none"> The DAP materials submitted are to consist of : <ul style="list-style-type: none"> Technical drawings (including a full set of plans, elevations and sections) Digital and hardcopy DAP booklets (including 2 hardcopies in A3), which should not exceed 50 pages, including appendices, attached drawings and plans, with a minimum font size of 12. Presentation slides. The number of presentation slides should be comfortable for a 20-minute presentation without lengthy text, highlighting the key points with further elaboration provided in the DAP booklet. Digital models Where necessary, a physical model of the proposed development will be required, at scale of 1:400 or smaller (to be advised by the officer in charge), showing context of site] will have to be submitted. Additional reports, such as Conservation Reports, are to be included as Appendices to the A3 booklets The following aspects of the proposal will be assessed at this stage of the DAP: <ul style="list-style-type: none"> Detailed building layout Detailed architectural treatment including appropriate use of building materials and finishes Night lighting design concept, including method statement and detailed drawings on how the night lighting intention would be achieved Detailed landscaping design including planting palette Detailed Design of Public Spaces Scaled elevations and sections of the relevant details (preferably 1:50 in hardcopy), digital architectural model of part(s) of the building (if necessary), as well as material samples of the façade and roof materials are required to be submitted to show the architectural design of the development

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IFC COMPONENT

- Independent Submission	
Key Words	Requirement Category
Conservation	Refer to URA Conservation Requirements here
Land / Strata Subdivision and Amalgamation	Land / Strata Subdivision and Amalgamation <ul style="list-style-type: none"> Proposed Subdivision and/or Amalgamation plan(s) / model by Registered Surveyor

G3 Completion Gateway		
	Item for TOP / CSC	Requirement Category
	Development Interface Report (DIR) (Final)	<ul style="list-style-type: none"> Information for future developer (e.g. loading requirements, knock out panels alignment / width) As-built plan
	TOP / CSC	<ul style="list-style-type: none"> Declaration that completed works have been supervised and built in accordance to approved plans (via EDAForm) Photographs of completed works or rectifications (where requested) Phasing Plan (for Partial TOP) Inspections (where necessary)
	Record Plan (for non-conserved buildings and monuments)	<ul style="list-style-type: none"> As-built plan incorporating approved amendments and as-built works that QPs declared to not have material impact to planning controls

----- End of Requirements for URA -----

SECTION 3

Specific Requirements by:
Key Gateways

3**Specific Requirements by****Page** **Regulatory Agencies**

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 **Other Building Works**

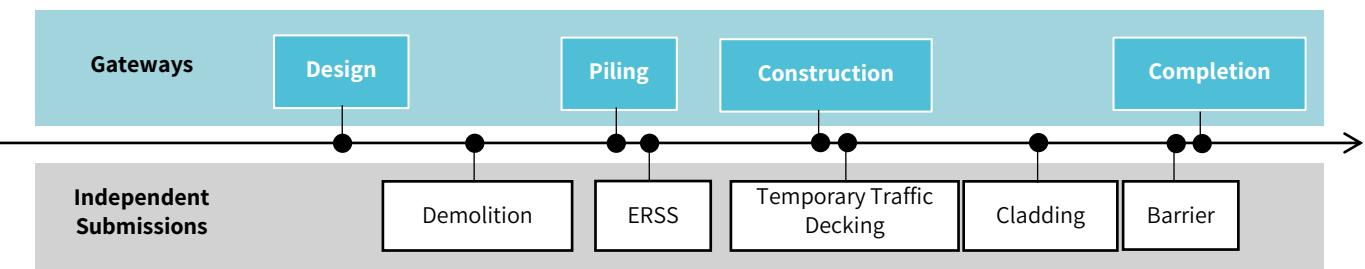
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About the Gateways



G	Gateways	Objectives	Key Approvals
-	Pre-Submission, Planning and Other Consultations	To seek one or more agencies' guidance and/or waivers on a project's submission requirements before making a formal submission	-
G1	Design Gateway (DG) For Design Parameters	To resolve multi-agency key parameters which have impact on design parameters and client's brief, before proceeding to detailed design.	<ul style="list-style-type: none"> URA PP LTA, NEA and PUB DC Clearances NParks DC Approval
G1.5	Piling Gateway (PG) *optional	To resolve requirements pertaining to piling and foundation works (e.g. pile caps, raft foundation, earth retaining and stabilising structures), excluding superstructural works.	<ul style="list-style-type: none"> BCA ST Approvals for Permanent Piling Works LTA RPZ AIP for Pile Design and Pile Layout Plan
G2	Construction Gateway (CG)	To resolve multi-agency requirements concerning design details that need to be coordinated before commencement of main structural works and launch of Sales.	<ul style="list-style-type: none"> URA WP BCA BP and ST Approvals LTA Street Plan Clearance, BP (Parking), BP (Rails) NEA and PUB BP Clearance Certificate SCDF BP Approval
-	Independent Submissions (IDP) *if applicable	To clear agency-specific requirements with no cross-agency dependencies (i.e. typically affecting only one relevant agency). E.g. structural submission of ancillary structures such as barriers/claddings to BCA	<ul style="list-style-type: none"> NParks Tree Felling Approval PUB Earth Control Measures Approval
G3	Completion Gateway (TOP) Application for TOP/CSC	To document "As-Built" plans and obtain Occupancy Permit/Statutory Completion	-
For simpler projects, please refer to the Direct Submission Process (DSP) here .			

Example of a project making regulatory submissions across CORENET X Gateways



Common Gateway Key Words

Key Words in alphabetical order		-	G1	G1.5	G2	-
		Pre-Submission & Planning Consultation	Design Gateway	Piling Gateway	Construction Gateway	Independent Submissions
A	Access to Site		URA		BCA, URA	
	Access within Building only				BCA, URA	
	Attic				URA	
B	Balcony				URA	
	Barrier				BCA	BCA
	Buildability				BCA	BCA
	Building / Unit Layout				URA	
	Building Envelope				BCA	
	Building Facade				URA	
	Building Massing		URA		URA	
C	Connectivity		URA		URA	BCA
	*Conservation	URA	URA		URA	URA
D	Detention System (External)		PUB			
	Dwelling Unit				BCA	
E	Earthworks / Topography		PUB, URA		URA	
	Emergency Voice Communication System				SCDF	
	Environmental Sustainability				BCA	BCA
	Environmental Health (COPEH)		NEA		NEA	
	Exit				SCDF	
	Exit Sign and Emergency Lighting				SCDF	
	External Works		URA		URA	
F	Façade					BCA
	Fire Alarm System				SCDF	
	Firefighting System				SCDF	
	Fire Engine Accessway / Access Road		SCDF			
	Fire Lift		SCDF			
G	Greenery	NParks	NParks, URA		NParks, URA	NParks
H	Household / Storey Shelter	BCA			BCA	
I	Impact Studies only	LTA, NEA, NParks, URA	NEA, NParks	NParks	LTA, NParks	NEA
	Impact Studies, Site Layout, Rail Protection, Road Structure Protection		LTA	LTA	LTA	LTA
	*Infra & Utilities (External)		External Works Requirements are in a separate chapter here .			
	Infra & Utilities (Internal)		PUB, URA		PUB	

* Conservation Requirements are in a separate chapter [here](#).* External Works Requirements are in a separate chapter [here](#).

Common Gateway Key Words

Key Words in alphabetical order <i>continued from previous page</i>		-	G1	G1.5	G2	-
		Pre-Submission & Planning Consultation	Design Gateway	Piling Gateway	Construction Gateway	Independent Submissions
L	Land/Strata Subdivision & Amalgamation					URA
	Lifts and Escalators				BCA	
	Lightning Protection			BCA	BCA	BCA
	Loading / Development Loading		URA			
M	Materials				BCA	
	Mechanical Ventilation & Smoke Control System				SCDF	SCDF
N	Night Lighting		URA		URA	
O	ORA / ODA / Kiosks		URA		URA	
P	Platform & Crest Level only		PUB			
	Pollution Control (COPPC)				NEA	
	Public Drains (Internal)		PUB			
	*Public Drains (External)	PUB				PUB
	*Public Sewerage System (External)			PUB		PUB
	Public Space		URA		URA	
R	Rainwater Harvesting					PUB
	Rapid Transit System (RTS) Station		URA		URA	
	Roofscape		URA		URA	
S	Sanitary (Internal)		PUB			
	Service & Vehicular Access to Site		URA			
	Signage				URA	BCA
	Site Layout only	NEA, URA	NEA, NParks, URA		URA	
	Site Layout, Basement				URA	
	Site Layout, Drainage Reserve		PUB			
	Site Layout, Landscape Deck		URA		URA	
	Site Layout, Security Screening				URA	
	Site Layout, Street Works		LTA		LTA	
	Site Layout, Vehicular Parking	LTA			LTA	
	Site Planning & External Firefighting Provisions				SCDF	
	Staircase				BCA	
	Strata Area				URA	
	Structural Design			BCA	BCA	BCA

* Conservation Requirements are in a separate chapter [here](#).* External Works Requirements are in a separate chapter [here](#).

Common Gateway Key Words

Key Words in alphabetical order <i>continued from previous page</i>		-	G1	G1.5	G2	-
		Pre-Submission & Planning Consultation	Design Gateway	Piling Gateway	Construction Gateway	Independent Submissions
S	Structural Fire Precautions				SCDF	
	Structures in Building Setback, Green Buffer				URA	
U	Use & Intensity		URA		URA	
V	Vehicular Parking		LTA, URA		BCA, URA	
	Ventilation				BCA	
W	Washroom				BCA	
	Water Supply					PUB
-	<i>Others</i>	BCA, URA	BCA, URA		URA	

* Conservation Requirements are in a separate chapter [here](#).

* External Works Requirements are in a separate chapter [here](#).

- Pre-Submission, Planning and Other Consultations

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IFC COMPONENT

Household / Storey Shelter

Agency	Requirement Category
BCA	<ul style="list-style-type: none"> Pre-consultation on CD / TS shelter on architectural, structural or commissioning issues Can occur at any stage prior to TOP, for landed and non-landed residential projects

Greeneries

Agency	Requirement Category
NParks	<p>Greeneries Provision and Conservation of Trees / Plants</p> <ul style="list-style-type: none"> Pre-Submission consultation of requirements for greenery provision and tree conservation for developments

Impact Studies only

Agency	Requirement Category
LTA	<p>Transport Impact Assessment (TIA)</p> <ul style="list-style-type: none"> Generally, a TIA submission is required if the type and size of the proposed development meets one or more of the criteria stipulated in LTA's guidelines. The traffic consultant shall arrange scoping meeting with LTA to discuss the scope of study, TIA classifications and confirm if Walking and Cycling Plan (WCP) is required. The TIA report is to be set out logically with clear analyses, conclusions and recommendations. All assumptions and sources of information are to be clearly documented. Executive Summary shall be included to provide concise and clear information on the study purpose, major findings, conclusions and recommendations. Improvements recommended in the TIA are to be illustrated using appropriate plan(s) with sufficient detail to substantiate their feasibility. All the analysis files and data related to the study are to be submitted as appendices to the Report for LTA's records. All recommended improvement works to be carried out by the developer shall be incorporated in the development plan submissions at Design Gateway (G1) and Construction Gateway (G2) to LTA for clearance.
	<p>Pre-Application Feasibility Study & Recommendations</p> <ul style="list-style-type: none"> LTA should be consulted to confirm whether a PAFS is needed for the proposed residential site if they are undergoing redevelopment arising from a collective or en-bloc sales. The traffic consultant shall arrange scoping meeting with LTA to discuss the scope of study PAFS should assess the traffic impact on the area and propose car-lite measures/initiatives, traffic demand management measures and/or feasible transport improvement plans to support the redevelopment proposal. All recommended improvement works to be carried out by the developer shall be incorporated in the development plan submissions at Design Gateway (G1) and Construction Gateway (G2) to LTA for clearance.
	<p>Walking and Cycling Plan (WCP)</p> <ul style="list-style-type: none"> The rigorous process of the WCP shall be demonstrated and presented in a written report that explains the rationale for the following 5 sets of plans: <ol style="list-style-type: none"> Location and Connectivity Plan Circulation Plan Conflict Mitigating Plan Bicycle Parking and End of Trip Facility Plan Wayfinding Plan
NEA	<p>Environmental Information (EI)</p> <ul style="list-style-type: none"> Applicants are required to apply EI from NEA directly at Pre-Submission

- Pre-Submission, Planning and Other Consultations

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Impact Studies only (continued from previous page)

Agency	Requirement Category
NEA <i>(continued from previous page)</i>	<p>Environmental Impact Study (EIS-Pre)</p> <ul style="list-style-type: none"> Applicants are required to submit EIS (Pre) to NEA directly at Pre-Submission If Pre-Submission is not possible, the EIS (Pre) process should be concluded by Design Gateway (G1) <p>Energy Efficiency Opportunities Assessment (EEOA) for New Ventures</p> <ul style="list-style-type: none"> Applicants are required to submit EEOA to NEA directly at Pre-Submission If Pre-Submission is not possible, the EEOA process should be concluded by Design Gateway (G1) M&E QP to provide inputs where necessary <p>Environmental Site Assessment (ESA)</p> <ul style="list-style-type: none"> Applicants should submit ESA to NEA directly and should be concluded at Pre-Submission <p>Noise Impact Assessment (NIA-Pre) for Traffic</p> <ul style="list-style-type: none"> Applicants are required to submit NIA (Pre) report to NEA directly at Pre-Submission If Pre-Submission is not possible, the NIA (Pre) process should be concluded by Design Gateway (G1) However, applicant may submit NIA (Pre) report to NEA directly at Construction Gateway (G2) if there is no Design Gateway (G1) submission for the development <p>Pollution Control Study (PCS)</p> <ul style="list-style-type: none"> Applicants are required to submit PCS report to NEA directly at Pre-Submission If Pre-Submission is not possible, the PCS process should be concluded by Design Gateway (G1) <p>Quantitative Risk Assessment (QRA)</p> <ul style="list-style-type: none"> If QRA is required, applicants are required to submit QRA report to MOM-MHD for dissemination to respective agencies (including NEA). The QRA report should be accepted by agencies before Design Gateway (G1)
NParks	<p>Biodiversity Impact Assessment (under URA's EIA Framework)</p> <ul style="list-style-type: none"> Applicable to sites not identified as Planning Stage (Pre-DG) to fall within the Environmental Impact Assessment Framework: <ul style="list-style-type: none"> Environmental Consultation <ul style="list-style-type: none"> QP (Arch / PEs) or Consultant to submit the environmental consultation form (Form A) to URA and Technical Agencies (e.g. NEA, NParks, MPA, SFA) – via URA's EPACS. Details of project entities (Developer, Qualified Person and Main Contractor) as stated in Form A are provided Environmental Impact Assessment <ul style="list-style-type: none"> QP (Arch / PEs) or Consultant can consult on environmental baseline study and scoping of EIA QP (Arch / PEs) or Consultant to ensure that EIA report (for projects that have cleared environmental assessment at planning stage) are submitted for acceptance If Pre-Submission is not possible, the environmental consultation process should be concluded by Piling Gateway (G1.5) or Construction Gateway (G2) There might be requirement for detailed EMMP / wildlife management prior to site clearance

- Pre-Submission, Planning and Other Consultations

Legend:



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IFC COMPONENT

Impact Studies only (continued from previous page)

Agency	Requirement Category
NParks <i>(continued from previous page)</i>	<p><u>Assessment and Reduction of Biodiversity Impact (under URA's Environmental Impact Assessment [EIA] framework)</u></p> <ul style="list-style-type: none"> Should be surfaced ahead of the submission If pre-submission is not possible, the environmental consultation process should be concluded by Design Gateway (G1) or Piling Gateway (G1.5) There might be requirement for EMMP / wildlife management prior to site clearance
URA	<p><u>Environmental Impact Assessment (where required)</u></p> <ul style="list-style-type: none"> The QP (Arch / PEs) or Consultant is to submit the environmental consultation form to URA and relevant Technical Agencies (e.g. NEA, NParks, MPA, SFA) Details of project entities as stated in Environmental Consultation Form are provided (Developer, Qualified Person and Main Contractor) If determined during environmental consultation that an environmental study is needed, QP (Arch / PEs) or Consultant to ensure that the reports (for projects that have cleared environmental assessment at planning stage) are submitted for acceptance

Public Drains (External)

Agency	Requirement Category
PUB CULVERT	<p><u>Roadside Drain Capacity</u></p> <ul style="list-style-type: none"> For projects where drains need to be rebuilt / entrance culvert. PUB to provide required capacity during pre-submission consultation Size of new culvert (will be advised by PUB) Public Drains - Drain Size and Location <p><u>Pre-Consultation for Sewers</u></p> <ul style="list-style-type: none"> Sewerage Discharge Point Used water discharge volume <p><u>Pre-Consultation for Drainage (via email)</u></p> <ul style="list-style-type: none"> Drainage Discharge Point Catchment Area

Site Layout only

Agency	Requirement Category
NEA	<p><u>Environmental Health (COPEH)</u></p> <ul style="list-style-type: none"> Refuse Truck Access Road (For Refuse Collection) – Swept Path Analysis Location and Size of the Bin Centre / Refuse Room / Bin Point, refuse chute and recycling chute, refuse chute chamber and recyclables storage & its collection system Provide total daily refuse outputs (liters/day) for the development Pneumatic waste conveyance system (PWCS) schematic plan Location of cooling tower and its setback distance (at least 5m) <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Design Gateway (G1) However, applicant may submit the above information at Pre-submission if the development does not require any Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways



Pre-Submission, Planning and Other Consultations

Legend:



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Site Layout only (continued from previous page)

Agency	Requirement Category				
NEA <i>(continued from previous page)</i>	<p>Pollution Control (COPPC)</p> <ul style="list-style-type: none"> Confirm the proposed development is aligned with the prevailing URA MP land use zoning (e.g. residential to residential) Building location and its surrounding development/amenities (such as expressway/major road, MRT/MRT station, place of worship, hospital, petrol station, industry premises etc.) Orientation and location of nuisance sources (e.g. cooling towers, chiller plants, air handling units, air conditioning condensers, fresh air intake, exhaust outlets (ventilation shaft), etc.) 50m nuisance buffer from place of worship, petrol station, Light industry premises to the nearest residential development. 100m nuisance buffer from General industry premises to nearest residential development. 500m nuisance buffer from Special Industry premises to nearest residential development. Orientation of building: Minimum building setback (m) <table border="1" style="margin-left: 20px;"> <tr> <td>Fronting track</td> <td>35</td> </tr> <tr> <td>End-wall facing track</td> <td>25</td> </tr> </table> Setback distance within 70m from transport-related infrastructure (i.e. LTA road reserve line for expressway/major road) to the nearest residential development Lot boundary line. Location of the chimney and BHC and MCH requirements e.g. within 30m / 100m radius of existing chimney stack height Location changes for the storage inventory product / materials such as chemical, oil, fuel, etc Changes in the industrial processes or production activities location Changes of existing activity, expansion of existing activities or proposed new activity carried out on the proposed development or premises <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Design Gateway (G1) However, applicant may submit the above information at Pre-submission if the development does not require any Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. 	Fronting track	35	End-wall facing track	25
Fronting track	35				
End-wall facing track	25				
URA	<p>Outline Application / Rezoning</p> <p>Where there are deviations to Master Plan parameters (e.g. land use, GPR, height, etc), the project team should consider submitting an outline application with the following details:</p> <ul style="list-style-type: none"> Planning proposal data (e.g. site area, GFA and use breakdown, numbers of units/rooms) Site layout plan and form/massing schemes, where necessary <p>Pre-Application Consultation Service</p> <ul style="list-style-type: none"> Details of proposals to clarify or seek deviation from specific guidelines 				

- Pre-Submission, Planning and Other Consultations

Legend:



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Site Layout, Vehicular Parking

Agency	Requirement Category
LTA	<p>Pre-Consultation on Mechanised Parking System Proposals</p> <ul style="list-style-type: none"> QPs and developers are required to submit their mechanised parking system and car lifts proposals to LTA for a pre-submission consultation before a development application is submitted to the Urban Redevelopment Authority (URA) for planning permission. This will allow architects, engineers and developers to incorporate the necessary requirements into the design of the development upfront to minimise abortive work and major revisions to development proposals later. Refer to LTA's COP for Vehicle Parking Provision in Development Proposals for the design of a proper mechanised parking system and car lifts. As there is a variety of mechanised parking systems in the market, it is possible that some of these systems do not fully comply with LTA's guidelines. For such cases, the systems will be evaluated based on its own merits during the pre-submission consultation with LTA. <p>Mechanised Parking System</p> <ul style="list-style-type: none"> To submit the detailed drawings and description for the type of mechanised parking system used in the proposal. Information on how the system operates, how cars are parked and retrieved from the system, average time taken for parking and retrieval, safety features, etc. shall be clearly illustrated. The type of mechanised parking system and all relevant requirements/ dimensions of the parking system such as platform size, maximum load, headroom clearance, allowable car dimensions, safety features, etc. shall be clearly indicated and endorsed on plan. Ensure that the dimensions and information endorsed on plan correspond with the mechanised parking system specification. The cross-sectional details of the parking platform showing the inner clear width of the platform, clear platform length and clear movement space between the structural supports. To ensure that the dimension for headroom clearance of minimum 2.2m and platform size of minimum 2.4m x 5.4m are cleared of obstructions e.g. structural supports, structural cage, wire rope/hoisting cable, motorised equipment, sliding gears, etc. <p>Car Lifts</p> <ul style="list-style-type: none"> To submit the type of car lift system and all relevant requirements/ dimensions of the car lift system such as internal cage size, width of the entrance and exit door, maximum load, headroom clearance, allowable car dimensions, minimum speed, minimum discharge capacity, queuing spaces, safety features, etc. shall be clearly indicated and endorsed on plan. Information on how to operate the car lifts (e.g. call-button or loop detector), sequence on how cars enter/exit the car lift, provision of safety devices, etc. should be clearly illustrated. The proposed car lift system shall comply with the guidelines for provision of car lifts in car parking places.

Others

Agency	Requirement Category
BCA	<p>Complex Building Requirements</p> <ul style="list-style-type: none"> Pre-submission consultation of structural concept on structural works involving complex building to be carried out during / after Design Gateway (G1) but prior to Piling Gateway (G1.5) or Construction Gateway (G2)
URA	<p>Built Environment Transformation Bonus GFA Incentive</p> <ul style="list-style-type: none"> Submission of incentive scheme application and supporting documents

- Pre-Submission, Planning and Other Consultations

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Others (continued from previous page)

Agency	Requirement Category
URA <i>(continued from previous page)</i>	<p>Pre-DG Submission: Stage 1 Design Advisory Panel – for selected projects</p> <ul style="list-style-type: none"> The DAP materials submitted are to consist of: <ul style="list-style-type: none"> Technical drawings (including a full set of plans, elevations and sections) Digital and hardcopy DAP booklets (including 2 hardcopies in A3), which should not exceed 50 pages, including appendices, attached drawings and plans, with a minimum font size of 12. Presentation slides. The number of presentation slides should be comfortable for a 20-minute presentation without lengthy text, highlighting the key points with further elaboration provided in the DAP booklet. Digital models Where necessary, a physical model of the proposed development will be required, at scale of 1:400 or smaller (to be advised by the officer in charge), showing context of site] will have to be submitted. Additional reports, such as Conservation Reports, are to be included as Appendices to the A3 booklets. The following aspects of the proposal will be assessed at this stage of the DAP: <ul style="list-style-type: none"> Stage 1 (Pre-DG DAP) <ul style="list-style-type: none"> Design Philosophy / Concept Form and Massing General architectural treatment (roofscape, façade in relation to context) Pedestrian Network and Vehicular Access Public Spaces and Landscape Replacement Areas / landscaping concepts

----- End of Requirements for Pre-Submission, Planning and Other Consultations -----

G1

Design Gateway

Agency	Summary of Design Gateway Requirements	Common Gateway Key Words
BCA	<p>NIL</p> <p>Note: If building design involves complex buildings, consultation with BCA to be held before Piling Gateway (G1.5).</p>	-
LTA	<p>Compliance to traffic operations and safety requirements.</p> <p>Key Evaluation Areas include:</p> <ul style="list-style-type: none"> • Location and provision of access points, pick-up/drop-off and loading/unloading area • Parking provision and layout • Extent of frontage improvement • Improvement needed to existing traffic scheme • Adequacy of connection to commuter facilities • Vesting of road reserve plot, if any <p>For proposed new street, horizontal and vertical alignment, road typology and connection to existing road shall be established to determine the Road Reserve Line required.</p> <p>For proposed/relocation of commuter facilities, architectural layout to be evaluated to establish alignment, headroom and column positions, along with declaration to non-compliance with LTA's standards and requirements (if any).</p> <p>Railway protection details should be provided to facilitate the review of the QP's assessment of the overall impact of the development with respect to the RTS, including:</p> <ul style="list-style-type: none"> • Plan for development works • Engineering evaluation report • Certified survey plans etc. 	<ul style="list-style-type: none"> • External Works • Impact Studies • Infra & Utilities (External) • Rail Protection • Site Layout • Street Works • Vehicular Parking
NEA	<p>Compliance with pollution control and environmental health requirements, including:</p> <ul style="list-style-type: none"> • Refuse and recyclables collection, storage and removal • Analysis of how surrounding developments/amenities affect subject site • Proposed orientation and location of emission (noise, air and odour) sources and ventilation/discharge systems within and around subject site • Location for storage for materials such as chemical, oil, fuel, etc. • Industrial processes or production activities or changes to existing activities • Building Height Constraint (BHC) and Minimum Chimney Height (MCH) requirements as stated in SS593 • Energy Efficiency Opportunities Assessment (EEOA) declaration for industrial development <p>Reports for Pollution Control Study/Air Dispersion Model Study, Quantitative Risk Assessment, Noise Impact Assessment, Environmental Site Assessment etc. may be submitted separately</p>	<ul style="list-style-type: none"> • Building Massing • Impact Studies • Noise Control • Pollution Control • Public Health • Servicing (Internal Accesses) • Site Layout • Use & Intensity

See also:

[Latest CORENET X Circulars](#)

G1

Design Gateway

Agency	Summary of Design Gateway Requirements <i>(continued from previous page)</i>	Common Gateway Key Words
NParks	<p>Greenery provision and tree conservation for developments, and the impact to existing, or provision of new, park / park connector.</p> <p>Provision of:</p> <ul style="list-style-type: none"> • Details indicating spatial provision for greenery (i.e. width and depth of planting areas and green verges) • Information of trees/plants to be conserved (i.e. species, girth, height along roadside and/or within development boundary) • Entrance position(s), fire engine accessways, open air parking areas at street level and other structures (such as covered linkways and pedestrian overhead bridges) etc. <p>For provision of new park/park connector/promenade, conceptual design to be reviewed early</p>	<ul style="list-style-type: none"> • Greenery • Impact Studies only • Site Layout only
PUB	<p>Broad planning parameters of drainage, sewerage and sanitary works (e.g. Minimum Platform Level, maximum allowable peak runoff, sewer setback, connection to public sewer etc.)</p> <p>Key Evaluation Areas include:</p> <ul style="list-style-type: none"> • Storm water drainage works, erection or placement of any structures or objects in, above or across any drain or drainage reserve • Temporary structure/works/services over, across or adjacent to any drain or storm water drainage system • Proposed realignment of Drainage Reserve or Drainage Reserve to be set aside and vested to State • Works which could affect any public sewers/sewerage system or public drains including common drains directly or indirectly; • Buildings or structures to be erected over, across or adjacent to any public sewerage system; • Proposed connection of the development/premises to the public sewers/sewerage system 	<ul style="list-style-type: none"> • Detention System • Drainage Reserve • Earthworks / Topography • Infra & Utilities (External) • Infra & Utilities (Internal) • Platform & Crest Level • Public Drains (External) • Public Drains (Internal) • Public Sewerage System • Sanitary • Site Layout only
SCDF	Note: Location of fire engine accessway and hard standing area to be included	<ul style="list-style-type: none"> • Fire Engine Accessway / Access Road • Fire Lift
URA	<p>Schematic details of key planning parameters (e.g. Masterplan (MP) land use/height/intensity) pertaining to the overall building form, site layout, how development relates to surroundings e.g. connectivity provisions</p> <p>Note: Where there are deviations to MP zoning controls, applicants should submit an Outline ahead of Design Gateway, where rezoning (if supported) can be carried out prior.</p>	<ul style="list-style-type: none"> • Access to Site • Building Massing • Connectivity • Conservation • Earthworks / Topography • External Works • Greenery • Infra & Utilities (Internal) only • Landscape Deck • Platform & Crest Level • Public Space • Rapid Transit System (RTS) Station • Service and Vehicular Access to Site • Site Layout • Use & Intensity • Vehicular Parking • Others

G1

Design Gateway

Legend:



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IFC COMPONENT

Access to Site

Agency	Requirement Category
URA ROAD SLAB	<p>Site Layout</p> <ul style="list-style-type: none"> Indicative locations of Pedestrian, Cycling, Vehicular and Service Access

Building Massing

Agency	Requirement Category
URA BUILDING STOREY SPACE	<p>Building Form and Massing</p> <ul style="list-style-type: none"> Development Statement of Intent (DSI) – Response to site context Façade articulation and urban veranda (Orchard Road only) Party wall (indicate no openings, adjacent development, depth and height comply with guidelines) <p>Building Height</p> <ul style="list-style-type: none"> Floor-to-Floor Height & Aggregate Building Height <ul style="list-style-type: none"> Number of Storeys Additional Height for Predominant Sky Terrace Storey Overall Building Height Control (incl. building crown and M&E floor, if any) <p>Building Edge</p> <ul style="list-style-type: none"> Alignment of building edge and percentage of building form articulation Height of building edge Depth of building edge

Connectivity

Agency	Requirement Category
URA SITE BOUNDARY SPACE RAMP PARKING LOT	<p>Pedestrian Network</p> <p>Through Block Link (TBL), Underground Pedestrian Link(UPL), Elevated Pedestrian Link (EPL), Covered Walkways (CW), Open Walkways (OW), Covered Linkways (CL), High Covered Linkways (HCL)</p> <ul style="list-style-type: none"> Layout and connections to existing / future developments Alignment to adjacent pedestrian connections Proposed levels and mitigation of level differences (if any) Soffit height, overall width and clear width Vehicular ramps to start after these Pedestrian Networks <p>Additional requirements for the following:</p> <ul style="list-style-type: none"> (UPL, EPL) Detailed layout of vertical circulation point – location within development, and dimensions (UPL, EPL) Knock Out Panels (KOP) details (e.g. alignment, size) where relevant <p>Walking and Cycling Plan</p> <ul style="list-style-type: none"> Connectivity to transport node Provision of measures to prevent conflict between pedestrian, cyclists and motor vehicles Provision of bike parking and supporting amenities (i.e. shower facilities and lockers)

G1

Design Gateway

Legend:



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Conservation

Agency	Requirement Category
URA	Refer to URA Conservation Requirements here

Detention System (External)

Agency	Requirement Category
PUB 	<p>Peak Run Off</p> <ul style="list-style-type: none"> Key Objective: To demonstrate how this is catered for, area is set aside for detention tank provision, location, OR drain widening Calculation of peak run off factor (C value) max. 0.55 (based on code and chart) e.g. area of development of greenfield site

Earthworks / Topography

Agency	Requirement Category
PUB 	<p>Earthworks</p> <ul style="list-style-type: none"> Minimum Platform Level / Changes to Topography
URA  	<p>Earthworks, Retaining Walls and Boundary Walls</p> <ul style="list-style-type: none"> Height of retaining wall(s), extent of earth-fill and impact on surroundings where relevant <p>Earthworks, Platform Level</p> <ul style="list-style-type: none"> Minimum Platform Level / Changes to site topography

External Works

Agency	Requirement Category
URA 	<p>Linkway Connection to Commuter Facilities</p> <ul style="list-style-type: none"> Indicative alignment Connection through existing / future development Soffit height, overall width and clear width Proposed levels and mitigation of level differences (if any) <p>Cycling Path</p> <ul style="list-style-type: none"> Provision according to safeguarded cycling plan <p>Promenade Guidelines (UD requirements for Singapore River)</p> <ul style="list-style-type: none"> Location of walkways and landscaping

G1

Design Gateway

Legend:



Architecture



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Fire Engine Accessway / Access Road

Agency	Requirement Category
SCDF ROAD SPACE WINDOW	Indication of Fire Engine Accessways / Access Road <ul style="list-style-type: none"> To design upfront and not added as an afterthought Compliance of provision of fire engine accessway / access road does not affect the requisite planting areas and roadside green verges Indication of all the fire engine access road and accessway within project boundary Clearly indicate if public road is used as fire engine accessway / access road Compliance of distance between fire engine accessway and fire access opening Compliance of no obstruction between fire engine accessway and fire access opening

Fire Lift

Agency	Requirement Category
SCDF LIFT	Provision of Fire Lift <ul style="list-style-type: none"> Compliance of buildings (other than PG 1 & 2) provided with at least two fire lifts on every storey <ul style="list-style-type: none"> When habitable height exceeds 24m When basement exceeds 9m Compliance of two fire lifts for super high-rise (above 40 storeys) residential building

Greeneries

Agency	Requirement Category
NParks LANDSCAPE PLANTS	Conservation of Trees <ul style="list-style-type: none"> To conserve trees identified: <ul style="list-style-type: none"> In Technical Conditions of Tender (TCOT) As Heritage Trees Through nature group / public / residents engagement In Environmental Impact Assessments (EIA) / Environmental Management and Monitoring Plans (EMMP) etc. <p> Supporting Document(s):</p> <ul style="list-style-type: none"> a) Arborist report (if tree(s) identified to be conserved / retained may be affected by proposed works for development)
URA PLANTING AREA PLANter BOX SPACE	<ul style="list-style-type: none"> Landscape Replacement Area (LRA) requirements Landscape Provision <ul style="list-style-type: none"> Indicative extent across development

G1

Design Gateway

Legend:



Architecture



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IFC COMPONENT

Impact Studies only

Agency	Requirement Category
NEA	<p>Environmental Impact Study (EIS-Pre)</p>  <p>EIS (Pre) report will be required for developments or infrastructure that would have environmental impact (air, water, land or noise) or affected by environmental impact. For example, new residential / sensitive developments located within 50m from new / existing petrol stations and/or new petrol stations located within 50m from existing residential/sensitive sites</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants are required to submit EIS (Pre) to NEA directly at Pre-Submission If Pre-Submission is not possible, the EIS (Pre) process should be concluded by Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	<p>Noise Impact Assessment (NIA-Pre) for Land Traffic Noise</p>  <p>NIA (Pre) report will be required for (1) <u>New</u> residential and noise sensitive developments located within 70m of <u>existing</u> land traffic noise sources/hotspots (e.g. expressways / major arterial roads / MRT tracks) on existing residential and (2) <u>Existing</u> noise sensitive developments located within 70m of <u>new</u> transport-related developments (e.g. expressway/major arterial roads / MRT tracks / bus interchanges / bus depots), inclusive of the expansion of existing transport-related infrastructures</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants are required to submit NIA (Pre) report to NEA directly at Pre-Submission and should be concluded by Design Gateway (G1) However, applicant may submit NIA (Pre) report to NEA directly at Construction Gateway (G2) if the development does not require any Design Gateway (G1) submission Sufficient time shall be catered for NEA to process the NIA (Pre) The processing of NIA (Pre) will take 1-2 months <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	<p>Energy Efficiency Opportunities Assessment (EEOA) for New Ventures</p>  <p>EEOA will be required for new industrial facilities and major expansions of existing facilities with an estimated annual energy consumption (AEC) \geq 54TJ must review the facility design and develop economically feasible for energy efficiency opportunities</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants are required to submit EEOA to NEA directly at Pre-Submission If Pre-Submission is not possible, the EEOA process should be concluded by Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	<p>Environmental Site Assessment (ESA)</p>  <p>ESA should be conducted when a site that is used for polluting activities is to be redeveloped, rezoned or reused for a non-polluting activity</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should conclude the ESA at Pre-Submission <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.

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Design Gateway

Legend:



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IFC COMPONENT

Impact Studies only (continued from previous page)

Agency	Requirement Category
NEA <i>(continued from previous page)</i>	<p>Pollution Control Study (PCS)</p>  <p>Any proposed industrial development that could cause serious or substantial pollution of the environment, if mismanagement, is required to conduct a Pollution Control Study (PCS)</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants are required to submit PCS report to NEA directly at Pre-Submission If Pre-Submission is not possible, the PCS process should be concluded by Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	<p>Quantitative Risk Assessment (QRA)</p>  <ul style="list-style-type: none"> Anyone intending to store or use hazardous substances will have to pre-consult MOM-MHD whether a QRA assessment is required. <p>When to apply:</p> <ul style="list-style-type: none"> If QRA is required, applicants are required to submit QRA report to MOM-MHD for dissemination to respective agencies (including NEA). The QRA report should be accepted by agencies before Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
NParks	<p>Biodiversity Impact Assessment (under URA's Environmental Impact Assessment [EIA] framework)</p>  <ul style="list-style-type: none"> Applicable to sites that fall within the EIA Framework but were not identified at Planning Stage (Pre-DG) <p>Environmental Consultation</p> <ul style="list-style-type: none"> QP (Arch / PEs) or Consultant to submit the environmental consultation form (Form A) to URA and Technical Agencies (e.g. NEA, NParks, MPA, SFA) Details of project entities (Developer, Qualified Person and Main Contractor) as stated in Form A are provided <p>Environmental Impact Assessment (EIA)</p> <ul style="list-style-type: none"> If determined during environmental consultation that an environmental study is needed, QP (Arch / PEs) or Consultant can consult on environmental baseline study and scoping of EIA QP (Arch / PEs) or Consultant to ensure that EIA report (for projects that have cleared environmental assessment at planning stage) are submitted for acceptance

Impact Studies, Site Layout, Rail Protection

Agency	Requirement Category
LTA	<p>Development Proposal within Railway Protection Zone / Railway Corridor</p>  <ul style="list-style-type: none"> To show the proposed plan for development works To provide an engineering evaluation report accompanied by a plan for engineering works To furnish the relevant Certified Survey Plans (for critical development within first reserve of underground RTS) <p>Note: Refer to LTA's Code of Practice for Railway Protection / Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer for more requirements / detailed description</p>

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Design Gateway

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Infra & Utilities (Internal) only

Agency	Requirement Category
PUB	<u>Drainage Network</u> <ul style="list-style-type: none"> To show conceptual plan – location, proposed discharged point, connection to existing drainage network
URA	<u>Urban Design Requirements</u> <ul style="list-style-type: none"> Integration of Utilities (e.g. MRT pop-up, substation, water bulk meter) into building envelope

Loading / Development Loading

Agency	Requirement Category
URA SPACE	<u>Loading Provisions</u> <ul style="list-style-type: none"> Alignment and locations of loading columns Structural system and integration with future structures (e.g. location / orientation / size of vents) Loading calculations (EPL) Loading provision to receive future linkways / walkways (if any) <p>Supporting Documents:</p>  <ul style="list-style-type: none"> Draft Development Interface Report for future developer Clearance from technical agencies

Night Lighting

Agency	Requirement Category
URA	 <u>Night Lighting Report</u> <ul style="list-style-type: none"> UD Areas with night lighting requirement Concept and Renders, Location and Extent

ORA / ODA / Kiosks

Agency	Requirement Category
URA	<ul style="list-style-type: none"> Location and extent, key parameters (e.g. structure, height, transparency)

Platform & Crest Level only

Agency	Requirement Category
PUB SPACE	<u>Minimum Platform Level, Crest Level</u> <ul style="list-style-type: none"> SHD
	<u>Flood Protection Measures</u> <ul style="list-style-type: none"> If crest level is not provided - location and height of protection measure

G1

Design Gateway

Legend:



Architecture



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IFC COMPONENT

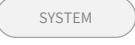
Public Drains (Internal)

Agency	Requirement Category
PUB 	<p>Common Drain</p> <ul style="list-style-type: none"> Drains receiving upstream run off / existing [note: more common for landed housing area] <ul style="list-style-type: none"> Location, Width

Public Space

Agency	Requirement Category
URA	<p>Privately-Owned Public Spaces (POPS)</p> <ul style="list-style-type: none"> Indicate location, design and dimensions: <ul style="list-style-type: none"> Location Size / height Layout / configuration Shadow Studies Seating provision Activity Generating Uses: <ul style="list-style-type: none"> Indicate location on plan and provide details on specific nature of use

Public Sewerage System (External)

Agency	Requirement Category
PUB 	<p>Sewer Connection</p> <ul style="list-style-type: none"> Connection Point – where the proposed location is <p>Sewerage System</p> <ul style="list-style-type: none"> Alignment of Sewers, Dimensions, Gradient

Rapid Transit System (RTS) Station

Agency	Requirement Category
URA    	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> Lines of Road Reserve / Site boundary of adjacent land parcels Location of station box and its associated tunnels & structures Land take required (footprint to be optimized to minimize the land-take) Details of Loading Provision (e.g. Loading grid plan) Design of pop-up & ancillary structures (within approved railway, setback, mitigation of platform levels, interfacing with neighbouring developments, CW provision) <p> Supporting Documents:</p> <ul style="list-style-type: none"> Submission of RTS Checklist Method of construction (cut and cover, tunnel boring) Details of Loading Provision (Draft DIR - WIP) Copy of the relevant approvals for the proposed retail quantum <p>Note: Coordinated by the Architect, with inputs from respective engineers</p>

G1

Design Gateway

Legend:



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Rapid Transit System (RTS) Station (continued from previous page)

Agency	Requirement Category
URA <i>(continued from previous page)</i>	<p>Draft Development Interface Report</p> <ul style="list-style-type: none"> For works interfacing with existing / future connection Architectural information for future developer (e.g. fire safety requirements; Knock Out Panels (KOP)) Structural information for future developer (e.g. Loading requirements) Mechanical and Electrical (M&E) information for future developer (e.g. ventilation shaft location and throw) <p>Note: Coordinated by the Architect, with inputs from respective engineers</p>

Roofscape

Agency	Requirement Category
URA	<ul style="list-style-type: none"> Location and extent of M&E Location and extent of Outdoor Refreshment Area (ORA)

Sanitary (Internal)

Agency	Requirement Category
PUB DISTRIBUTION CHAMBER SANITARY APPLIANCES SYSTEM	<p>Indicative Location(s) of Drain-line and Inspection Chamber</p> <ul style="list-style-type: none"> Details (e.g. alignment) and Invert Level to be provided by M&E in Construction Gateway (G2) <p>Used Water Flow Rate</p> <ul style="list-style-type: none"> Key Objective: To check that sewer can contain this flow Quantity & flow rate expected to be discharged from development, where it is to be discharged (based on no. of toilets, shower head and floor traps - in relation to no. of DUs)

Service and Vehicular Access to Site

Agency	Requirement Category
URA ROAD SPACE	<p>Vehicular Access</p> <ul style="list-style-type: none"> Location of vehicular, pedestrian and cyclist access points, and layout of internal driveways Integration with Building Envelope <p>Service Areas</p> <ul style="list-style-type: none"> Location and integration with building envelope Visual Screening

Site Layout only

Agency	Requirement Category
NEA SITE SPACE REFUSE CHUTE	<p>Environmental Information (EI)</p> <ul style="list-style-type: none"> EI information such as building height constraint, health and safety buffer, etc. shall be incorporated in the building plan design to ensure that the development is able to meet the requirement. <p>When to apply:</p> <ul style="list-style-type: none"> Applicants are required to apply EI from NEA directly at Pre-Submission and incorporate the information in building plan submission in Design Gateway (G1) However, applicant may submit the above information at Pre-Submission if the development does not require any Design Gateway (G1)

G1

Design Gateway

Legend:



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Site Layout only (continued from previous page)

Agency	Requirement Category				
NEA <i>(continued from previous page)</i>	<p>Environmental Health (COPEH)</p> <ul style="list-style-type: none"> Refuse Truck Access road (for refuse collection) – Swept Path Analysis Location and Size of the Bin Centre/Refuse Room/Bin Point, refuse chute and recycling chute, refuse chute chamber and recyclables storage & its collection system Provide total daily refuse outputs (liters/day) for the development Pneumatic waste conveyance system (PWCS) schematic plan Location of cooling tower and its setback distance (at least 5m) <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Design Gateway (G1) However, applicant may submit the above information at Pre-Submission if the development does not require any Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>Pollution Control (COPPC)</p> <ul style="list-style-type: none"> Confirm the proposed development is aligned with the prevailing URA MP land use zoning (e.g. residential to residential) Building location and its surrounding development/amenities (such as expressway/major road, MRT/MRT station, place of worship, hospital, petrol station, industry premises etc.) Orientation and location of nuisance sources (e.g. cooling towers, chiller plants, air handling units, air conditioning condensers, fresh air intake, exhaust outlets (ventilation shaft), etc) 50m nuisance buffer from place of worship, petrol station, Light industry premises to the nearest residential development. 100m nuisance buffer from General industry premises to nearest residential development. 500m nuisance buffer from Special Industry premises to nearest residential development. Orientation of building: Minimum building setback (m) <table border="1" data-bbox="366 1410 743 1500"> <tr> <td>Fronting track</td> <td>35</td> </tr> <tr> <td>End-wall facing track</td> <td>25</td> </tr> </table> Setback distance within 70m from transport-related infrastructure (i.e. LTA road reserve line for expressway/major road) to the nearest residential development Lot boundary line. Location of the chimney and BHC and MCH requirements e.g. within 30m / 100m radius of existing chimney stack height Location changes for the storage inventory product / materials such as chemical, oil, fuel, etc Changes in the industrial processes or production activities location Changes of existing activity, expansion of existing activities or proposed new activity carried out on the proposed development or premises <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Design Gateway (G1) However, applicant may submit the above information at Pre-submission if the development does not require any Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. 	Fronting track	35	End-wall facing track	25
Fronting track	35				
End-wall facing track	25				

G1

Design Gateway

Legend:



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IFC COMPONENT

Site Layout only (continued from previous page)

Agency	Requirement Category
NParks	<p>Provision of Planting Areas</p> <ul style="list-style-type: none"> To provide planting areas (i.e. 3.0m/5.0m-wide green buffers, 2.0m-wide peripheral planting verges, open-air parking planting areas) in compliance with NParks' Guidelines (Chapter 3) To ensure planting areas are free from any encroachment, except for allowable minor ancillary structures and landscaping structures as listed in NParks' Guidelines (Chapter 3) To locate fire engine accessways outside planting areas To recess underground structures / services at least 2.0m below planting areas, except for: <ul style="list-style-type: none"> Footings of retaining / boundary walls (may encroach up to 0.5m into planting areas) Services traversing perpendicularly across planting areas <p>New Parks/ Park Connectors/ Promenades</p> <ul style="list-style-type: none"> To ensure design is in accordance with NParks specifications (e.g., spatial provision, access points, specific features / elements imposed at planning stage based on NParks planning conditions) <p>Securing of Land for Parks / Park Connectors use and/or Impact on Neighbouring Parks (e.g., en bloc sites)</p> <ul style="list-style-type: none"> To ensure site boundary does not encroach into safeguarded / rezoned parks and park connectors
URA	<p>Building Setback from Boundary</p> <ul style="list-style-type: none"> Road Buffer Common Boundary Setback / Party wall & Planting Strip Building Setback for Multi-Storey Car Parks (MSCP) Boundary Setback for Ancillary Structures Setback requirement for Urban Design areas <p>Site Layout</p> <ul style="list-style-type: none"> Location of Buildings Location and scale / size of Communal Facilities (e.g. bin centre, pavilions, BBQ areas) <p>Site Coverage</p> <ul style="list-style-type: none"> Site coverage computation

Site Layout, Drainage Reserve

Agency	Requirement Category
PUB	<p>Drainage Reserve</p> <ul style="list-style-type: none"> Location (align to DIP), width <p>Note: Coordinated by the Architect, with inputs from C&S</p>

Site Layout, Landscape Deck

Agency	Requirement Category
URA	<p>Landscape Deck</p> <ul style="list-style-type: none"> Height of Deck in relation to Existing Ground levels Location and General Layout of Deck

G1

Design Gateway

Legend:



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Site Layout, Street Works

Agency	Requirement Category
LTA ROAD SPACE CULVERT RAMP	<p>Development Proposal</p> <ul style="list-style-type: none"> To check if project falls within LTA's exemption list and is not required to obtain a clearance from LTA DBC, i.e. LTA in-house project. To confirm if the development falls within a road structure safety zone (RSSZ). <p>Vehicular Access Points</p> <ul style="list-style-type: none"> To indicate the levels of entrance culvert and gradient of entrance approach To indicate the radius of turning road kerb To show the provision of tactile tiles and shifting of existing road elements (incl. trees, lamp post, signs, etc.) affected by proposed access <p>Proposed Pick-Up / Drop-Off Points (Within Development): PUDO Layout</p> <ul style="list-style-type: none"> To show the location of the PUDO facility within the development site To mark out the number of PUDO bays and indicate the queue length Indicate width and kerb alignment of PUDO points <p>Proposed Loading / Unloading (Within Development): U/UL Layout</p> <ul style="list-style-type: none"> To show the location of the U/UL facility To mark out the number of U/UL bays

Use & Intensity

Agency	Requirement Category
URA SPACE SITE SITE BOUNDARY	<ul style="list-style-type: none"> Land Use / Building Uses - Provide breakdown by use quantum Gross Plot Ratio / Gross Floor Area computation <p>Bonus GFA Incentive Schemes:</p> <ul style="list-style-type: none"> Balcony / Recreational / Built Environment Transformation / Others – GFA quantum and % Documentation to support proposed scheme (if required) <p>Site Boundary</p> <ul style="list-style-type: none"> Site Area Land to be Vested for Public Schemes (Drain, Road, Open Space, Park, Cycling Paths) Land to be Amalgamated / Alienated <p>Dwelling Units</p> <ul style="list-style-type: none"> Maximum Number Pre-Application Feasibility Study (together with LTA)

G1

Design Gateway

Legend:



Architecture



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IFC COMPONENT

Vehicular Parking

Agency	Requirement Category
LTA 	<p>Vehicular Parking Provision</p> <ul style="list-style-type: none"> To comply fully with the prevailing Parking Places (Provision of Parking Places and Parking Lots) Rules and other relevant guidelines of the Authority To ensure that the number of parking lots provided is within the specified range defined by the lower and upper bound requirement. (The Range-based parking provision standard for the various development uses can be found in Annex A of the COP for Vehicle Parking Provision in Development Proposals) To ensure that the geometric dimensions of the parking layout complies with the standard minimum dimensions as stipulated in the COP
URA 	<p>Parking</p> <ul style="list-style-type: none"> Show location within site Declare total number and breakdown of types

Others

Agency	Requirement Category
BCA	<p>Complex Building Requirements</p> <ul style="list-style-type: none"> Pre-submission consultation of structural concept on structural works involving complex building to be carried out during/after Design Gateway (G1) but prior to Piling Gateway (G1.5) or Construction Gateway (G2)
URA	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> Submission of DA Checklist <p>Supplementary Documents</p> <ul style="list-style-type: none"> Topo Survey Plan Previous approved plans (where requested by URA) <p>Public Communications Plan (if applicable)</p> <ul style="list-style-type: none"> Distribution of flyers and submission of forms <p>Development Statement of Intent</p> <ul style="list-style-type: none"> Description of proposal (for relevant development types) <p>RTS Checklist</p> <ul style="list-style-type: none"> Submission of checklist for evaluation <p>Environmental Impact Assessment (where required)</p> <ul style="list-style-type: none"> The QP (Arch / PEs) or Consultants is to submit the environmental consultation form to URA and relevant Technical Agencies (e.g. NEA, NParks, MPA, SFA). Details of project entities as stated in Environmental Consultation Form are provided (Developer, Qualified Person and Main Contractor) If determined during environmental consultation that an environmental study is needed, QP (Arch / PEs) or Consultant to ensure that the reports (for projects that have cleared environmental assessment at planning stage) are submitted for acceptance

End of Requirements for Design Gateway (G1)

G1.5

Piling Gateway

Agency	Summary of Piling Gateway Requirements	Common Gateway Key Words
* Piling Gateway is optional		
BCA	<ul style="list-style-type: none"> Piling & Foundation Works IFC-SG model 2D drawings limited to the categories below: <ul style="list-style-type: none"> General notes Design calculation reports from QP, AC, [QP(Geo) & AC (Geo), if needed] Additional supporting documents: <ul style="list-style-type: none"> Site investigation report in pdf & AGS format Impact assessment report Topography Complete set of structural framing plan for reference Complete set of building plan for reference Completion letter of pre-consultation [for complex structure only] 	<ul style="list-style-type: none"> Lightning Protection Structural Design
LTA	<p>Railway Protection Details (if applicable):</p> <ul style="list-style-type: none"> Plan for engineering works Engineering evaluation report Instrumentation proposal Method statement of work Emergency procedure Pre-condition survey report Certified survey plan, relevant forms etc. 	<ul style="list-style-type: none"> Impact Studies Rail Protection Site Layout
NEA	NIL	NIL
NParks	Applicable to sites requiring Environmental Monitoring and Management Plan (EMMP) / wildlife management plan prior to commencement of works: <ul style="list-style-type: none"> No objection/acceptance prior to site clearance 	NIL
PUB	<p>To apply separately for relevant works where applicable prior to commencement of works:</p> <ul style="list-style-type: none"> Specified activities near water and sewer pipes Temporary works affect drainage/within drainage reserve etc. 	<ul style="list-style-type: none"> Public Sewerage System (External)
SCDF	NIL	NIL
URA	NIL	NIL

Piling Gateway Clearances

Works affecting Permanent Structures

- BCA's ST Approvals for Piling & Relevant Substructure Works
- LTA's Approval in-principle (AIP) for Pile Design and Pile Layout Plan (only within the Railway Protection Zone)

Parallel Processes
(Other clearances to be obtained before commencement of respective works)

Site Clearance

- PUB's Approval to Commence Works Requiring Earth Control Measures
- NParks' no objection for specific sites with environmental mitigation and monitoring plan (EMMP) / wildlife management, prior to site clearance

Commencement of Works

- BCA's Permit to Commence Piling & relevant Substructure Works
- LTA's Rail Engineering Works Permit / Restricted Activity Approval
- PUB's Approval for Works Within Public Sewer / Water Pipe Corridor

G1.5

Piling Gateway

Legend:



Architecture



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IFC COMPONENT

Impact Studies only

Agency	Requirement Category
NParks	<p>Applicable to sites requiring Environmental Monitoring and Management Plan (EMMP) / Wildlife Management Plan prior to commencement of works:</p> <ul style="list-style-type: none"> a) Detailed EMMP report (provided by Main Contractor) b) Acceptance letter from NParks prior to site clearance (if applicable)

Impact Studies, Site Layout, Rail Protection

Agency	Requirement Category
LTA	<p>Approval to Commence Piling Works within Railway Protection Zone / Railway Corridor</p> <ul style="list-style-type: none"> • To submit plan for engineering works • To submit the Engineering evaluation report • To submit an Instrumentation Proposal and initial instrumentation readings • To submit a Method Statement of work • To submit a Hazard Analysis identifying all possible risks that may be posed to the rapid transit system and a description of the safety and precautionary measures to mitigate these risks. • To submit the Contingency Plan and Emergency Procedure • To submit the Pre-condition Survey Report • To submit the Certified Survey Plans • To submit the Permit application form and other relevant forms • To submit the Construction schedule for the proposed development <p>Note: Refer to LTA's Code of Practice for Railway Protection / Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer / Guide to carrying out restricted activities within railway protection and safety zones for more requirements / detailed description</p>

Lightning Protection

Agency	Requirement Category
BCA	<ul style="list-style-type: none"> • For big projects adopting piles or rough foundation as natural earth-termination system. Provision of rebars for connection to the down-conductor system shall be provided during the piling stage. <p><u>Notes:</u></p> <ul style="list-style-type: none"> • QP (Electrical) to provide inputs for submission by C&S • Developer or Builder is required to appoint a QP (Electrical, Supervision) to supervise the LPS works, before LPS Plan submission is carried out at the Construction Gateway (G2).

G1.5

Piling Gateway

Legend:



Architecture



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IFC COMPONENT

Structural Design

Agency	Requirement Category
BCA BEAM BOREHOLE FOOTING / PILECAP PILE SLAB	<p>Structural Design (Piling and Foundation Works)</p> <p><i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i></p> <ul style="list-style-type: none"> • Piling & Foundation Works IFC-SG model • Ground Investigation: <ul style="list-style-type: none"> ○ Compliance with minimum number of borehole required as stipulated in Circular APPBCA-2016-08 • 2D Drawings limited to: <ul style="list-style-type: none"> ○ General notes ○ Irregular Pilecap / Footing Details <div style="display: flex; justify-content: space-between;"> <div style="flex: 1;"> </div> <div style="flex: 1;"> <p>Design Calculation reports:</p> <ul style="list-style-type: none"> • From QP, AC, [QP(Geo) & AC (Geo), if needed]) <p>Additional Supporting Documents:</p> <ul style="list-style-type: none"> a) Site investigation report in PDF & AGS format b) Impact assessment report c) Topography d) Complete set of structural framing plan for reference e) Complete set of building plan for reference f) Completion letter of pre-consultation (for complex structure only) </div> </div>

----- End of Requirements for Piling Gateway (G1.5) -----

G2

Construction Gateway

Agency	Summary of Construction Gateway Requirements	Common Gateway Key Words
BCA	<p>Detailed layout and design of development, consisting of:</p> <ul style="list-style-type: none"> Structural design for superstructure with design calculations Accredited checker design calculations (if applicable) Building design with provision and design of: <ul style="list-style-type: none"> Headroom and ceiling height Accessible route and facilities Staircases and barriers for safety Household / Storey shelter Materials (e.g. use of glass at height, daylight reflectance) Natural lighting Ventilation scheme Location of fixed installation (e.g. lift, escalator) Lightning protection system Energy efficiency, environmental sustainability and buildable design calculations 	<ul style="list-style-type: none"> Access to Site Access within Building Barrier Buildability Connectivity Dwelling Unit Equipment Environmental Sustainability Household / Storey Shelter Lifts & Escalators Lightning Protection Materials Staircase Structural Vehicular Parking Ventilation Washroom
LTA	<p>Detailed street plan showing:</p> <ul style="list-style-type: none"> Proposed street works Details of access points Street lightings Signposts Other street related facilities (if any) <p>For proposed new street and commuter facilities, to provide the following:</p> <ul style="list-style-type: none"> Structural details of commuter facilities, retaining structures, flyovers M&E provision and design Traffic layout plan <p>Railway protection details for the review of overall impact to development with respect to RTS</p> <ul style="list-style-type: none"> Plan for building works Engineering evaluation report etc 	<ul style="list-style-type: none"> Impact Studies Infra & Utilities (External) Rail Protection Site Layout Street Works Vehicular Parking
NEA	<p>Building plans of the development and related building services to be developed in greater detail to comply with requirements for Pollution control and environmental health. These include further development of the Design Gateway (G1) elements, as well as:</p> <ul style="list-style-type: none"> Refuse Storage and Collection Sanitary facilities change to Public Toilet Ventilation, Ducting and Kitchen Exhaust Systems for Food Shop Cooling Tower Aquatic Facility Storage and Collection System for Recyclables at Strata-Titled properties with Residential Units Anti-Mosquito Breeding Technical Guidelines for Air Conditioning and Mechanical Ventilation system SS593: COPPC SS649: COPWCS 	<ul style="list-style-type: none"> Dwelling Unit Equipment Pollution Control Public Health

See also:

[Latest CORENET X Circulars](#)

G2

Construction Gateway

Agency	Summary of Construction Gateway Requirements <i>(continued from previous page)</i>	Common Gateway Key Words
NParks	<ul style="list-style-type: none"> Dimensions of planting areas and green verges compliant with standard requirements Review of allowable structures within planting areas and possibly alternative configuration of planting areas Detailed design of facilities and furniture for new Park/Park Connector/Promenade Planting requirements/specifications for covered linkways/pedestrian overhead bridges 	<ul style="list-style-type: none"> Greenery Site Layout
PUB	<p>Detailed plans of proposed drainage / sewerage / sanitary works including:</p> <ul style="list-style-type: none"> Works affecting sanitary (e.g. sanitary drainage and plumbing work including last IC connection to public sewer) Works affecting Sanitary M&E (used water pumping system, sewerage ejector) Works affecting Sewer (e.g. proposed sewer/manhole, pump sumps/pumping main, abandon sewers/manhole) RC Trench for housing the public sewer Works affecting Drainage (e.g. common drain, basement pump drainage system, detention tank, entrance culvert/roadside drain, flood protection measures, slab over drain for meter compartment) 	<ul style="list-style-type: none"> Infra & Utilities (Internal)
SCDF	<p>Building Plan (BP)</p> <p>Detailed layout and floor plan of the development and building showing:</p> <ul style="list-style-type: none"> Fire safety provisions Means of escape Structural precautions Building's setback distances (with detailed calculations) Fire engine accessibility Rising mains & hydrants Type of fire protection systems Type of smoke control systems Emergency voice communication system 	<ul style="list-style-type: none"> Access within Building Equipment Fire Compartmentation Fire Fighting Household / Storey Shelter Lifts & Escalators Materials Staircase Ventilation
URA	<p>Detailed layout and floor plan of development including:</p> <ul style="list-style-type: none"> Strata boundaries (for strata-titled developments) Elevation details Exact floor area quantum of various uses and facilities GFA details e.g. proposed exemptions <p>Depending on the location and special schemes that may apply to the site, the model will have to cater to details relevant to urban design and/or conservation requirements</p>	<ul style="list-style-type: none"> Access to Site Access within Building Attic Balcony Basement Building / Unit Layout Building Massing Connectivity Conservation Dwelling Unit Earthworks / Topography External Works Greenery Landscape Deck Night Lighting <ul style="list-style-type: none"> ORA / ODA / Kiosks Public Communications Plan Public Space Rapid Transit System (RTS) Station Roofscape Screening Signage Site Layout Structures in Building Setback Use & Intensity Vehicular Parking Others

See also:

[Latest CORENET X Circulars](#)

G2

Construction Gateway

Legend:



Architecture



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IFC COMPONENT

Access to Site

Agency	Requirement Category
BCA ACCESSED ROUTE SLAB RAMP STAIRCASE	<ul style="list-style-type: none"> Passenger Alighting and Boarding Point Accessible Route (to the ingress / egress of the development entrance)
URA ROAD SPACE	<p>Site Layout</p> <ul style="list-style-type: none"> Detailed location of Pedestrian, Cycling, Vehicular and Service Access

Access within Building only

Agency	Requirement Category
BCA ACCESSED ROUTE SLAB RAMP STAIRCASE	<ul style="list-style-type: none"> Headroom and Ceiling Height Accessible Route and Maneuvering Space (within the development)
URA SPACE	<ul style="list-style-type: none"> Corridor Width

Attic

Agency	Requirement Category
URA SPACE	<ul style="list-style-type: none"> Design of attic Location of attic in relation to strata unit

Balcony

Agency	Requirement Category
URA SPACE	<p>Balconies, Private Enclosed Spaces, Private Roof Terraces and Indoor Recreation Spaces</p> <ul style="list-style-type: none"> Balcony screening design illustrating openness and porosity for natural ventilation
	<p>Bonus Balcony GFA</p> <ul style="list-style-type: none"> Letter of Declaration from Developer on Balcony Screen Design and Provision

Barrier

Agency	Requirement Category
BCA RAILING	<ul style="list-style-type: none"> Safety from falling Protection from injury by vehicles in building (e.g. provision of bollards)

G2

Construction Gateway

Legend:



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Buildability

Agency	Requirement Category
BCA	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p>Buildable Design Score (B-Score)</p> <p>a) BS01 Form (in Excel format) to be submitted</p>

Building / Unit Layout

Agency	Requirement Category
URA BUILDING STOREY	<p>Unit / Floor Layout (All)</p> <ul style="list-style-type: none"> Floor layout and unit size Strata areas and boundaries / voids <p>Dwelling Units (Residential)</p> <ul style="list-style-type: none"> Breakdown of units by type / size Unit layouts with breakdown of respective internal areas including balconies and air-con ledges

Building Facade

Agency	Requirement Category
URA	<p>Design Treatment for Building Facade</p> <ul style="list-style-type: none"> Illustrate design using perspectives Screening details of M&E equipment / multi-storey carpark, where required

Building Envelope

Agency	Requirement Category
BCA	<p>ETTV</p> <ul style="list-style-type: none"> ETTV computation & tabulation of design parameters in the prescribed forms & formats; Architectural elevation drawings showing the composition of the different façade or wall systems that are relevant for the computation of the ETTV; and Architectural plan layouts & elevations showing the mode of ventilation & location for various spaces incl. air-conditioning areas. <p>RTTV</p> <ul style="list-style-type: none"> RTTV computation for roofs with skylight in prescribed forms and formats, where relevant; Architectural plan layout and sectional details of different roof types as well as the roof composition and respective U-values; and Technical material or product information and relevant calculation of U-value of the roof <p><i>ETTV / RETTV Calculation Format in respect of an Air-conditioned Building (BPD_BP04):</i> https://www1.bca.gov.sg/docs/default-source/docs-corp-form/bp04.doc?sfvrsn=c3a0dcf4_2</p>

G2

Construction Gateway

Legend:



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IFC COMPONENT

Connectivity

Agency	Requirement Category
URA 	<p>Pedestrian Network</p> <p>Through Block Link (TBL), Underground Pedestrian Link(UPL), Elevated Pedestrian Link (EPL), Covered Walkways (CW), Open Walkways (OW), Covered Linkways (CL), High Covered Linkways (HCL)</p> <ul style="list-style-type: none"> • Loading provision to receive future walkways / linkways (if any) • Notional scheme for future link to justify the loading (recipient) <p>Additional requirements for the following:</p> <ul style="list-style-type: none"> • (CW) Soffit height, overall width and clear width • (OW/CW) Paving material (where required in UD guidelines) • (OW/CW) Level of bulk water meter chamber / inspection chamber • (TBL) Location and Size of Signage • (HCL) Flashing to prevent wind driven rain <p>Walking and Cycling Plan</p> <ul style="list-style-type: none"> • Connectivity between buildings – show layout on plans, indicate width and levels • Segregation between vehicular and pedestrian / cyclist traffic • Provision of biking lots and end-of-trip facilities – show location and GFA exemption

Conservation

Agency	Requirement Category
URA	Refer to URA Conservation Requirements here

Dwelling Units

Agency	Requirement Category
BCA	<ul style="list-style-type: none"> • Bathrooms for future retrofitting • Design of unit entrance for wheelchair users

Earthworks / Topography

Agency	Requirement Category
URA 	<p>Earthworks, Retaining Walls, and Boundary Walls</p> <ul style="list-style-type: none"> • Proposed site and platform levels • Earthworks • Boundary wall • Retaining wall

Emergency Voice Communication System

Agency	Requirement Category
SCDF 	<p>Emergency Voice Communication System and Fire Command Centre</p> <ul style="list-style-type: none"> • QP to declare one-way / two-way emergency voice communication system is provided for the functional space

G2

Construction Gateway

Legend:



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IFC COMPONENT

Environmental Sustainability

Agency	Requirement Category
BCA	<p>Submit GM01 Main Submission from (BPD_GM01 + BPD_GM01 Appendix)</p> <ul style="list-style-type: none"> o Please refer to the Guidance Notes and Documentation Requirements under Code for Environmental Sustainability of Buildings: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-new-buildings-existing-buildings-undergoing-major-aanda o For Government Land Sales (GLS) programme requirement, please refer to the following link: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-new-buildings-existing-buildings-undergoing-major-aanda/mandatory-higher-green-mark-standard

Environmental Health

Agency	Requirement Category
NEA	<p>COPEH - Section 1 : Refuse Storage and Collection</p> <p>1.1 Objective 1.2 Refuse Output 1.3 Refuse Chute 1.4 Refuse Chute Chamber 1.5 Refuse Room</p> <p>When to apply:</p> <ul style="list-style-type: none"> • Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Equipment can be modelled as placeholders and supplier details can be provided in a separate document. <p>COPEH - Section 2 : Public Toilet</p> <p>2.1 Objective 2.2 Definition of Public Toilet 2.3 General Design Criteria</p> <p>When to apply:</p> <ul style="list-style-type: none"> • Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). <p>COPEH - Section 3 : Ventilation, Ducting and Kitchen Exhaust Systems for Food Shop</p> <p>3.1 Objective 3.2 Design Requirements</p> <p>When to apply:</p> <ul style="list-style-type: none"> • Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Terminals and façade louvres are to be modelled. Ducting can be in 2D or 3D.
INTERCEPTOR PUMP SANITARY APPLIANCES GUTTER TANK SYSTEM SPACE REFUSE HANDLING EQUIPMENT SENSOR SHADING DEVICE CONTROL ELEMENT REFUSE CHUTE / RECYCLABLES CHUTE DISTRIBUTION CHAMBER	<p>1.6 Refuse Bin Point and Refuse Bin Centre 1.7 Pneumatic Waste Conveyance System (PWCS) 1.8 Mandatory Waste Reporting Scheme 1.9 Location of Grease Trap 1.10 On-Site Food Waste Treatment System</p> <p>Who to submit:</p> <ul style="list-style-type: none"> • QP appointed should submit the above information and keep other relevant QPs in the loop. • The same QP should follow through the submissions for all gateways. <p>2.4 Sanitary and Water Fittings Required in Public Toilet 2.5 Amenities to be Provided 2.6 Ventilation</p> <p>Who to submit:</p> <ul style="list-style-type: none"> • QP appointed should submit the above information and keep other relevant QPs in the loop. • The same QP should follow through the submissions for all gateways. <p>3.3 Operations Requirements 3.4 Other Requirements and Guidelines</p> <p>Who to submit:</p> <ul style="list-style-type: none"> • QP appointed should submit the above information and keep other relevant QPs in the loop. • The same QP should follow through the submissions for all gateways.

G2

Construction Gateway

Legend:



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Environmental Health (continued from previous page)

Agency	Requirement Category
NEA <i>(continued from previous page)</i>	<p>COPEH - Section 4 : Cooling Tower (<i>when it is provided</i>)</p> <p>4.1 Objective 4.2 Design Requirements</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>COPEH - Section 5 : Aquatic Facility</p> <p>5.1 Objective 5.2 Minimum Design Criteria</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Balancing Tank is to be modelled. <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>COPEH - Section 6 : Storage and Collection System for Recyclables at Strata-Titled properties with Residential Units</p> <p>6.1 Objective 6.2 Recyclables Output</p> <p>6.3 Designated Recycling Points for Recycling Receptacles 6.4 Recyclables Chute System</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>COPEH - Section 7 : Anti-Mosquito Breeding</p> <p>7.1 Objective 7.2 Roof Gutter</p> <p>7.3 Air-Conditioning Tray 7.4 Floor Trap</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.

G2

Construction Gateway

Legend:



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IFC COMPONENT

Exit

Agency	Requirement Category
SCDF STAIRCASE SPACE	<p>Means of Escape</p> <ul style="list-style-type: none"> Compliance of adequate means of escape are provided: <ul style="list-style-type: none"> Adequate number of exits Capacity of exits and occupant load Remoteness of exit Travel distance Smoke-free approach to exit staircase Discharge of exit staircase Ventilation of exit Staircase re-entry Compliance of special requirements for Person With Disabilities (PWDs) are provided: <ul style="list-style-type: none"> Provision of PWD holding point unless otherwise exempted Siting of PWD holding point Protection of PWD holding point

Exit Sign and Emergency Lighting

Agency	Requirement Category
SCDF SECURITY LIGHTING SIGNAGE	<p>Exit Sign (incl. low level signs), Emergency Lighting, Photoluminescent Lighting</p> <ul style="list-style-type: none"> (Archi) Type of buildings / areas, and locations requiring exit sign, photoluminescent lighting (M&E) Type of buildings / areas, and locations of requiring emergency lighting

External Works

Agency	Requirement Category
URA FOOTPATH	<ul style="list-style-type: none"> Design treatment for public street lighting, bollards, tactile tiles (UD requirement for CBD / Marina Bay) Promenade Guidelines (UD requirements for Singapore River) Paving Guideline for Orchard, Downtown Core and the Civic District (OW) Paving material

Fire Alarm System

Agency	Requirement Category
SCDF FIRE ALARM BREECHING INLET SPRINKLER WATER TANK VALVE SYSTEM SPACE	<p>Automatic Fire Alarm (Heat / Smoke Detector)</p> <ul style="list-style-type: none"> Types of building / usage exempted from provision of automatic fire alarm QP to declare automatic fire alarm system is provided for the functional space <p><u>Components to be indicated:</u></p> <ul style="list-style-type: none"> Fire Alarm Panel <p>Combined Sprinkler and Wet Riser System</p> <ul style="list-style-type: none"> Types of buildings / areas requiring combined sprinkler and wet riser system Provision of sprinklers for basement and aboveground QP to declare combined sprinkler and wet riser system is provided for the functional space <p><u>Components to be modelled:</u></p> <ul style="list-style-type: none"> Location of Sprinkler Control Valve Breeching Inlet Landing Valve <p><u>Components to be indicated:</u></p> <ul style="list-style-type: none"> Fire Alarm Panel

G2

Construction Gateway

Legend:



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IFC COMPONENT

Fire Alarm System (continued from previous page)

Agency	Requirement Category
SCDF <i>(continued from previous page)</i>	<p>Home Fire Alarm Device (HFAD)</p> <ul style="list-style-type: none"> Types of building requiring HFAD QP to declare Home Fire Alarm Device is provided for the functional space Location and Number of HFAD points <p>Manual Alarm System</p> <ul style="list-style-type: none"> Type of building / usage exempted from manual call points <p><u>Components to be modelled:</u></p> <ul style="list-style-type: none"> Manual Alarm Call Points Fire Alarm Sounder Visual Alarm <p><u>Components to be indicated:</u></p> <ul style="list-style-type: none"> Fire Alarm Panel <p>Sprinkler System</p> <ul style="list-style-type: none"> Types of buildings / areas require sprinkler system Provision of sprinklers for basement and aboveground buildings Exemption of sprinkler system <p><u>Components to be modelled by M&E:</u></p> <ul style="list-style-type: none"> Location of Sprinkler Control Valve Breeching Inlet <p><u>Components to be indicated:</u></p> <ul style="list-style-type: none"> Fire Alarm Panel <p>Video Image Fire Detection System (VIFDS)</p> <ul style="list-style-type: none"> Types of buildings requiring VIFDS <p>Water Mist System</p> <ul style="list-style-type: none"> Requirements of water mist system as a substitute of sprinkler system

Firefighting System

Agency	Requirement Category
SCDF 	<p>Evacuation Lift</p> <ul style="list-style-type: none"> Evacuation lift for evacuation of occupants to be modelled: <ul style="list-style-type: none"> Exceeding 24m (except PG 1 & 2) Can double-up as PWD evacuation lift One of fire lift can be used as evacuation lift Opening into protected lobby such as smoke-free lobby, external exit passageway or external corridor Evacuation lift for evacuation of PWD to be modelled: <ul style="list-style-type: none"> At least one lift required when building is more than 4 storey, passenger lift can be used as evacuation lift Provision of protected lobby Opening into protected lobby such as smoke-free lobby, external exit passageway or external corridor for building exceeding four storey

G2

Construction Gateway

Legend:



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IFC COMPONENT

Firefighting System (continued from previous page)

Agency	Requirement Category
SCDF <i>(continued from previous page)</i> 	<p>Fire Lift</p> <ul style="list-style-type: none"> Fire resistance rating of lift shaft Serving continuous throughout the building, including basements Provision of 2 fire lift (except PG 1 & 2 not exceeding 40 storey) Distance between fire lift landing door and exit staircase not exceeding 5m & 10m (applicable to PG 2 discharge floor only) Accessibility to any part of the storey 60m coverage for fire lift (except PG 1 & 2) <p>Fire Hydrant System</p> <ul style="list-style-type: none"> Hydrant coverage not more than 50m from the fire engine accessway / access road <p>Hose Reel System</p> <ul style="list-style-type: none"> Compliance of provision of hose reel Number of hose reel Coverage of hose reel (30m+6m) Types of buildings / areas exempted from provision of hose reel Siting of hose reel <p>Portable Extinguisher</p> <ul style="list-style-type: none"> Types of buildings / areas requiring portable extinguisher Siting of portable extinguisher <p>Rising Mains and System</p> <ul style="list-style-type: none"> Type of rising main provided (Dry or Wet) Number of rising main Location and coverage of landing valve <p><u>Components to be modelled for Dry and Wet Riser:</u></p> <ul style="list-style-type: none"> Breeching inlet Landing valve <p><u>Provision of Standby Fire Hose:</u></p> <ul style="list-style-type: none"> Types of buildings requiring standby fire hose Number of standby hose Located not more than 2m from landing valve <p><u>Provision of Breeching Inlet:</u></p> <ul style="list-style-type: none"> Location Number

Greeneries

Agency	Requirement Category
NParks 	<p>Conservation of Trees</p> <ul style="list-style-type: none"> To conserve trees identified: <ul style="list-style-type: none"> In Technical Conditions of Tender (TCOT) As Heritage Trees Through public engagement In Environmental Impact Assessments (EIA) / Environmental Management and Monitoring Plans (EMMP) etc. <p>Supporting Document(s):</p> <ul style="list-style-type: none"> a) Arborist report (if tree(s) identified to be conserved / retained may be affected by proposed works for development)

G2

Construction Gateway

Legend:



Architecture



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IFC COMPONENT

Greeneries (continued from previous page)

Agency	Requirement Category
URA 	<ul style="list-style-type: none"> Landscape Replacement Area – Provide Green Plot Ratio and total % of landscape replacement, with breakdown of hardscape and softscape Declare Location of Sky Terrace / Planter Boxes / Covered Communal Ground Garden / Communal Pavilions <p>Supplementary Documents</p> <ul style="list-style-type: none"> a) Landscape plan / species and perspectives b) Plant details of sky terrace / planter boxes / covered communal ground garden / communal pavilions

Household / Storey Shelter

Agency	Requirement Category
BCA	<p>Architecture</p> <ul style="list-style-type: none"> Compliance with technical requirements on shelter position, size, setback requirements <p>C&S</p> <ul style="list-style-type: none"> Compliance to structural requirements stipulated in technical requirements on household shelters and storey shelters <p>M&E</p> <ul style="list-style-type: none"> M&E inputs required for Transit Shelter <p>Supporting Documents:</p> <ul style="list-style-type: none"> a) Submit CD Shock Calculations as supplementary non-BIM documentation

Impact Studies only

Agency	Requirement Category
LTA	<p>Building Proposal within Railway Protection Zone/ Railway Corridor</p> <ul style="list-style-type: none"> To submit plans for building works. To submit the Engineering Evaluation Report accompanied by plan for engineering works. To submit the Construction Schedule for the proposed development. <p>Note: Refer to LTA's Code of Practice for Railway Protection / Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer for more requirements/ detailed description</p>
NParks	<p><i>Applicable to sites not requiring Piling Gateway (G1.5) approval</i></p> <p>Applicable to sites requiring Environmental Monitoring and Management Plan (EMMP) / Wildlife Management Plan prior to commencement of works:</p> <ul style="list-style-type: none"> a) Detailed EMMP report (provided by Main Contractor) b) Acceptance letter from NParks prior to site clearance (if applicable)

G2

Construction Gateway

Legend:



Architecture



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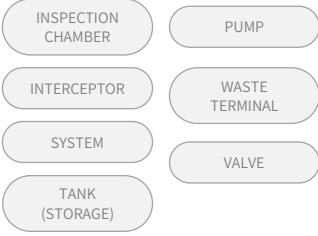
M&E

IFC COMPONENT

Impact Studies, Site Layout, Rail Protection

Agency	Requirement Category
LTA	<p>Approval to Commence Piling Works within Railway Protection Zone / Railway Corridor</p> <ul style="list-style-type: none"> • To submit plan for engineering works • To submit the Engineering evaluation report • To submit an Instrumentation Proposal and initial instrumentation readings • To submit a Method Statement of work • To submit a Hazard Analysis identifying all possible risks that may be posed to the rapid transit system and a description of the safety and precautionary measures to mitigate these risks • To submit the Contingency Plan and Emergency Procedure • To submit the Pre-condition Survey Report • To submit the Certified Survey Plans • To submit the Permit application form and other relevant forms • To submit the Construction schedule for the proposed development <p>Note: Refer to LTA's Code of Practice for Railway Protection / Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer / Guide to carrying out restricted activities within railway protection and safety zones for more requirements / detailed description</p>

Infra & Utilities (Internal)

Agency	Requirement Category
PUB 	<p>Sanitary Network</p> <ul style="list-style-type: none"> • Drain-lines, Inspection Chamber, Discharge Lines, etc. • Sanitary Stack System <p>Basement Pumped System</p> <ul style="list-style-type: none"> • May model a box as a placement holder. Details is to be drawn by Specialised PE. • Retention Tank • RC Trench <p>Sewer Network</p> <ul style="list-style-type: none"> • Minor Sewer (when applicable) <p>Drainage Network</p> <ul style="list-style-type: none"> • C&S: Effective tank capacity and other hydraulic details associated with the tank • M&E: For pumped detention tank, M&E to provide pump details <p>Proposed Treatment of Common Drain</p> <ul style="list-style-type: none"> • Longitudinal / sectional profile • Side gates

G2

Construction Gateway

Legend:



Architecture



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M&E

IFC COMPONENT

Lifts and Escalators

Agency	Requirement Category
BCA	<ul style="list-style-type: none"> Lift and Escalator Provision (Number) Location of Accessible Lift <p>2D Drawings limited to:</p> <ul style="list-style-type: none"> Buttons, Handrail, Marking of Manoeuvring Space

Lightning Protection

Agency	Requirement Category
BCA	<p>2D Drawings</p> <ul style="list-style-type: none"> Location of air-termination system, down conductors, earth electrodes Zone of lightning protection provided by the air-termination network for open roof spaces and the sides of the building Location of the points where there is equipotential bonding between the air-termination system, down-conductor system and earthed termination system; and Location of the points where there is equipotential bonding of the lightning protection system to electrically conductive parts of the building except M&E services. <p>Supporting Documents:</p> <ul style="list-style-type: none"> a) Material specification, photo, ppt, excel, words, etc. should be submitted

Materials

Agency	Requirement Category
BCA	<ul style="list-style-type: none"> Use of Glass at height Daylight Reflectance

Mechanical Ventilation & Smoke Control System

Agency	Requirement Category
SCDF SPACE	<p>QP to declare at those functional space which are provided with the following Ventilation System(s):</p> <ul style="list-style-type: none"> Natural ventilation (NV) Mechanical ventilation (MV) Pressurisation Cross-ventilation Cross-ventilation with intermediate - ventilation opening Vapour extraction system (spray painting booth) <p>Note: Details to be provided and submitted by M&E in Mechanical Ventilation (MV) Plan under Independent Submissions</p> <p>QP to declare at those functional space which are provided with the following Smoke Control System(s):</p> <ul style="list-style-type: none"> Ductless Jet Fan System Engineered Smoke Control System Smoke Purging System Smoke vent

G2

Construction Gateway

Legend:



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IFC COMPONENT

Night Lighting

Agency	Requirement Category
URA	<p><input checked="" type="checkbox"/> Night Lighting Report</p> <ul style="list-style-type: none"> Detailed concept and renders Specifications Fixture installation

ORA / ODA / Kiosks

Agency	Requirement Category
URA	<ul style="list-style-type: none"> Location and extent, detailed design

Pollution Control

Agency	Requirement Category
NEA	<p>COPPC - Section 2 : Judicious Siting of Industries and Other Development</p> <p>4. Objective</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>COPPC - Section 3 : Requirements for Industries</p> <p>5. Clean Industry 6. Light Industry</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>COPPC - Section 4 : Requirements to Operate a Factory</p> <p>9. Use of Industrial premises 10. Trade effluent discharge into public sewer and watercourse</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>COPPC - Section 5 : Pollution Control Requirements</p> <ul style="list-style-type: none"> 11. Water Pollution 12. Air Pollution 13. Noise Pollution

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Construction Gateway

Legend:



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IFC COMPONENT

Pollution Control (*continued from previous page*)

Agency	Requirement Category
NEA <i>(continued from previous page)</i>	<p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2) <p>COPPC - Section 6 : Hazardous Substances and Toxic Industrial Waste Control Requirements</p> <ul style="list-style-type: none"> 14. Hazardous Substances 15. Toxic Industrial Waste <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.

Public Space

Agency	Requirement Category
URA SPACE	<p>Privately-Owned Public Spaces (POPS):</p> <ul style="list-style-type: none"> Area verging of POPS Seating (design, no., location) Amenities (type, location) Signage (design, location) Outdoor Refreshment Areas (ORA) (if provided, location / extent)

Roofscape

Agency	Requirement Category
URA	<ul style="list-style-type: none"> Screening details of M&E equipment, where required Use of RC Flat Roofs – Indicate whether roof is accessible, and if so, for what purpose Structures (if any)

Rapid Transit System (RTS) Station

Agency	Requirement Category
URA SPACE SITE SITE BOUNDARY ACCESSIBLE ROUTE	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> Design and location of at-grade bicycle parking <p>Supplementary Documents</p> <ul style="list-style-type: none"> a) Night lighting report <p>Development Interface Report</p> <ul style="list-style-type: none"> For works interfacing with existing / future connection Architectural information for future developer (e.g. fire safety requirements; Knock Out Panels (KOP)) Structural information for future developer (e.g. Loading requirements) Mechanical and Electrical (M&E) information for future developer (e.g. ventilation shaft location and throw) Details of Loading Provision <p>Note: Coordinated by Architect, with inputs from respective engineers</p>

G2

Construction Gateway

Legend:



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IFC COMPONENT

Signage

Agency	Requirement Category
URA	Privately-Owned Public Spaces (POPS), Through Block Link (TBL) Signage <ul style="list-style-type: none"> Location and size of signages

Site Layout only

Agency	Requirement Category
NParks	Provision of Planting Areas <ul style="list-style-type: none"> To ensure dimensions of planting areas are compliant with NParks Guidelines (Chapter 3) or as approved by NParks during Design Gateway (G1)
	 
URA	Building Setback from Boundary <ul style="list-style-type: none"> Setback for Building Appendages – Location and width Treatment for non-compliant Multi-Storey Car Parks and Ancillary Structures
	 

Site Layout, Basement

Agency	Requirement Category
URA	Basements <ul style="list-style-type: none"> Basement protrusion (if any) and location within site Screening of basement opening
	

Site Layout, Landscape Deck

Agency	Requirement Category
URA	Landscape Deck <ul style="list-style-type: none"> Exposure of Basement Wall & Proposed Treatment (Berm / Vertical Greenery) Site Coverage on Landscape Deck – declare % Provision of Greenery on Deck – Location and % Boundary Wall Porosity – declare % and show design
	   

Site Layout, Security Screening

Agency	Requirement Category
URA	Special and Detailed Control Plans <ul style="list-style-type: none"> Security Screening (where required)

G2

Construction Gateway

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IFC COMPONENT

Site Layout, Street Works

Agency	Requirement Category
LTA CULVERT RAMP ROAD	<p>Access Point Details</p> <ul style="list-style-type: none"> Structural details of entrance culvert at access points (reinforcement, connection to entrance approach etc.) Levels, gradient, cross-fall Redundant access to be sealed and reinstated to match existing side-table <p>Proposed Pick-Up / Drop-Off Points (Within Development): PUDO details</p> <ul style="list-style-type: none"> All details presented at Design Gateway (G1) stage <p>Street Works Deposit</p> <ul style="list-style-type: none"> For private developments with proposed major road infrastructure works (e.g. new streets, major improvement of an existing street, POB, UPN), an amount to be deposited with LTA for the execution and completion of the proposed street works

Site Layout, Vehicular Parking

Agency	Requirement Category
LTA RAMP ROAD PARKING LOT	<p>Vehicular Parking Provision</p> <ul style="list-style-type: none"> To provide the details and critical dimensions of the parking layout such as: <ul style="list-style-type: none"> Type and size of parking lots Width of ramps and accessways Inner turning radius and width of turning paths Width of parking aisles Gradient of vehicular ramps Headroom clearance Road and traffic arrow markings Bicycle rack details EV lots & charging stations

Site Planning & External Firefighting Provisions

Agency	Requirement Category
SCDF WINDOW ROAD SPACE SIGNAGE	<p>Fire Access Opening</p> <ul style="list-style-type: none"> Compliance of provision of fire access opening Location, signage & size Number and position of access opening Exemption of fire access opening for PG 1 & 2 buildings <p>Fire Command Centre (FCC)</p> <ul style="list-style-type: none"> Types of buildings require provision of FCC Size and Location of FCC Secondary power supply for FCC with air-conditioning and/or mechanical ventilation FCC shall be provided if building requires: <ul style="list-style-type: none"> Fire lift Emergency voice communication system Engineered smoke control system

G2

Construction Gateway

Legend:



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Site Planning & External Firefighting Provisions (continued from previous page)

Agency	Requirement Category
SCDF <i>(continued from previous page)</i>	<p>Fire Engine Accessway / Access Road</p> <ul style="list-style-type: none"> Indicate if public road is used as fire engine accessway / access road Fire engine accessway / access road requirement for basement Marking of fire engine accessway / access road Compliance of fire engine access road requirements of PG I to VIII buildings: <ul style="list-style-type: none"> Indicate road serving as fire engine access road within the project boundary Compliance of width, turning radii / facilities, design load capacity, gradient, overhead clearance Marking and signpost along fire engine access road No obstruction along fire engine access road Compliance of fire engine accessway requirements for PG II to VIII buildings: <ul style="list-style-type: none"> Indicate road serving as fire engine accessway within the project boundary Compliance of length of fire engine accessway Compliance of turning radii / facilities, design load capacity, gradient, overhead clearance Marking and signpost along fire engine access road No obstruction along fire engine access road

Staircase

Agency	Requirement Category
BCA STAIRCASE RAILING	<ul style="list-style-type: none"> Minimum Width, Tread and Riser, Handrail / Railing

Structural Design

Agency	Requirement Category
BCA BOREHOLE PILE FOOTING / PILECAP SLAB BEAM COLUMN STAIRCASE WALL	<p>Structural Design (Piling and Foundation Works)</p> <p><i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i></p> <ul style="list-style-type: none"> Piling & Foundation Works IFC-SG model Ground Investigation: <ul style="list-style-type: none"> Compliance with minimum number of borehole required as stipulated in Circular APPBCA-2016-08 2D Drawings limited to: <ul style="list-style-type: none"> General notes Irregular Pilecap / Footing Details <p>Design Calculation Reports:</p> <p>a) From QP, AC, [QP(Geo) & AC (Geo), if needed)]</p> <p>Additional Supporting Documents:</p> <p>a) Site investigation report in PDF & AGS format</p> <p>b) Impact assessment report</p> <p>c) Topography</p> <p>d) Complete set of structural framing plan for reference</p> <p>e) Complete set of building plan for reference</p> <p>f) Completion letter of pre-consultation (for complex structure only)</p>



G2

Construction Gateway

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Structural Design (continued from previous page)

Agency	Requirement Category
BCA <i>(continued from previous page)</i>	<ul style="list-style-type: none"> • Complete set of IFC-SG model(s) for all structural elements & details • <u>2D Drawings limited to:</u> <ul style="list-style-type: none"> ◦ General notes ◦ Special details (e.g. slab reinforcement detailing, complex structure detailing, transfer plate detailing, irregular section detailing, precast joints, prestressed details, steel connections.) <input checked="" type="checkbox"/> Design Calculation Reports: <ul style="list-style-type: none"> • From QP, AC, [QP(Geo) & AC (Geo), if needed]) <input checked="" type="checkbox"/> Additional Supporting Documents: <ol style="list-style-type: none"> a) Site investigation report in PDF & AGS format b) Impact assessment report c) Topography d) Complete set of building plan submitted simultaneously e) Completion letter of pre-consultation (for complex structure only)

Structural Fire Precautions

Agency	Requirement Category
SCDF 	<p>Compartmentation</p> <ul style="list-style-type: none"> • Compliance of compartmentation requirements: <ul style="list-style-type: none"> ◦ Area and cubical extent to comply with Table 3.2A (for buildings not protected with sprinkler system) ◦ Maximum of 3 storeys per compartment when habitable height is not exceeding 24m ◦ Maximum of 1 storey per compartment when habitable height exceeds 24m • Compliance of requirements for Atrium space • Compliance of requirements for High hazard occupancy • Exemption of size limitation of compartment for car park • Compliance of area / room / usage requires compartmentation • Location of fire damper <p>Compartmentation Walls and Compartmentation Floors</p> <ul style="list-style-type: none"> • Compliance of requirements for compartment walls or compartment floors: <ul style="list-style-type: none"> ◦ Fire resistance rating ◦ Non-combustible • Use of fire shutter as compartment wall • Room / space allows the use of fire rated roller shutter <p>External Wall</p> <ul style="list-style-type: none"> • Compliance of requirements for external walls <ul style="list-style-type: none"> ◦ Fire resistance rating ◦ Non-combustible • Compliance of setback distance for unprotected opening • Compliance of external wall finishes • Compliance of vertical fire spread requirements <p>Element of Structure</p> <ul style="list-style-type: none"> • Compliance of element of structure requirements • Minimum periods of fire resistance • Exemption of fire resistance rating • Non-load-bearing external wall • Single storey buildings

G2

Construction Gateway

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Structural Fire Precautions (*continued from previous page*)

Agency	Requirement Category
SCDF <i>(continued from previous page)</i>	<p>Protected Shafts</p> <ul style="list-style-type: none"> Compliance of services running inside and/or passing through fire lift lobby and smoke-free lobby Compliance of gas pipe running inside an internal corridor / lobby Compliance of roof construction requirements: <ul style="list-style-type: none"> Surface spread of flame rating Composite panel as roofing covering Roof covering containing plastic Exemption of roof construction material Compliance of requirements for protected shaft: <ul style="list-style-type: none"> Fire resistance rating Non-combustible Material of construction Opening in protected shaft Ventilation Fire resistance rating of doors in protected shaft Compliance of requirements for lift shaft: <ul style="list-style-type: none"> Material of construction Exemption of enclosure in protected shaft located at edge of atrium Provision of protected lobby when lift is at basement Compliance of requirements for private lift for exclusive use of occupants in residential under PG 2 Compliance of protected shaft containing exit staircase: <ul style="list-style-type: none"> Compartmentation of exit staircase with masonry or drywall construction Fire resistance of door opening into exit staircase Finishes within exit staircase shall be non-combustible Types of services allowed in exit staircase Compliance of protected shaft containing other services installations: <ul style="list-style-type: none"> Electrical conduits / cable tray

Structures in Building Setback, Green Buffer

Agency	Requirement Category
URA	<ul style="list-style-type: none"> Location (e.g. integrated with building envelope) Finish material of manhole to match paving if located within covered / open walkway)

G2

Construction Gateway

Legend:



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Use & Intensity

Agency	Requirement Category
URA	<ul style="list-style-type: none"> Gross Plot Ratio / Gross Floor Area Land Use / Building Uses – detailed breakdown by use and GFA quantum <p>Bonus GFA Incentive Schemes: Balcony / Recreational / Transformation / Others – GFA quantum and %</p>

Vehicular Parking

Agency	Requirement Category
BCA 	<ul style="list-style-type: none"> Provision of Accessible Lot(s)
URA 	<ul style="list-style-type: none"> Total number of parking lots (including motorcycle parking) Residual area within car park floors to be demarcated Screening details for vehicular parking and service areas

Ventilation

Agency	Requirement Category
BCA  	<ul style="list-style-type: none"> Provision of Ventilation (Natural Ventilation for residential development) Minimum 5% opening for Natural Ventilation Maximum distance (12m) from Natural Ventilating opening Natural Ventilation (dimension of recess / airwell) Carpark Ventilation

Washroom

Agency	Requirement Category
BCA  	<ul style="list-style-type: none"> Sanitary Provision for wheelchair users and ambulant disabled

Others

Agency	Requirement Category
URA	<p> Environmental Impact Assessment (where required)</p> <ul style="list-style-type: none"> Submission of any other documents required
	<p> Supplementary Documents</p> <ul style="list-style-type: none"> Previous approved plans (where requested by URA)
	<p> Public Communications Plans</p> <ul style="list-style-type: none"> Distribution of flyers and submission of forms, where required

G2

Construction Gateway

Legend:



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Others		
	Agency	Requirement Category
	URA	<p><u>Design Advisory Panel (DAP) Report</u></p> <ul style="list-style-type: none"> Urban design and architectural information for DAP to assess (e.g. renders; diagrams showing sheltered pedestrian route) <p><u>Pre-CG Submission: Stage 2 Design Advisory Panel – for selected projects</u></p> <ul style="list-style-type: none"> The DAP materials submitted are to consist of : <ul style="list-style-type: none"> Technical drawings (including a full set of plans, elevations and sections) Digital and hardcopy DAP booklets (including 2 hardcopies in A3), which should not exceed 50 pages, including appendices, attached drawings and plans, with a minimum font size of 12. Presentation slides. The number of presentation slides should be comfortable for a 20-minute presentation without lengthy text, highlighting the key points with further elaboration provided in the DAP booklet. Digital models Where necessary, a physical model of the proposed development will be required, at scale of 1:400 or smaller (to be advised by the officer in charge), showing context of site] will have to be submitted. Additional reports, such as Conservation Reports, are to be included as Appendices to the A3 booklets The following aspects of the proposal will be assessed at this stage of the DAP: <ul style="list-style-type: none"> Detailed building layout Detailed architectural treatment including appropriate use of building materials and finishes Night lighting design concept, including method statement and detailed drawings on how the night lighting intention would be achieved Detailed landscaping design including planting palette Detailed Design of Public Spaces Scaled elevations and sections of the relevant details (preferably 1:50 in hardcopy), digital architectural model of part(s) of the building (if necessary), as well as material samples of the façade and roof materials are required to be submitted to show the architectural design of the development

End of Requirements for Construction Gateway (G2)

- Independent Agency Submissions

Agency	Summary of Independent Agency Submissions	Common Gateway Key Words
BCA	<ul style="list-style-type: none"> Structural design of localized works with design calculations of ancillary structures e.g. cladding, barrier Structural design of ancillary works and component such as demolition, temporary ERSS, barriers & cladding, temporary traffic decking Building design details of specialized works such as Details of lift equipment and escalators Constructability Implementation Plan Environmental Sustainability Detailed Requirements Outdoor Advertising Sign or Signboard License 	<ul style="list-style-type: none"> Buildability Connectivity Equipment Façade Environmental Sustainability Household / Storey Shelter Infra & Utilities (Internal) Lightning Protection Signage Structural Design
LTA	<p>Railway protection/Road structure protection details for engineering work/ restricted activities apart from aspects cleared in Piling Gateway / Construction Gateway:</p> <ul style="list-style-type: none"> Plan for engineering works Engineering evaluation report Instrumentation proposal Method statement of work Emergency procedure 	<ul style="list-style-type: none"> Impact Studies Rail Protection Road Structure Protection Site Layout
NEA	<ul style="list-style-type: none"> Temporary Sanitary Facilities at Construction site Detailed Plan on Pollution Control Equipment, Pollution Control Study (PCS) Noise Impact Assessment (NIA) 	<ul style="list-style-type: none"> Noise Control Pollution Control Vehicular Parking
NParks	<ul style="list-style-type: none"> Planting/Landscaping scheme of planting areas within development, including open air parking areas at street level, and of green verges along roadside (i.e. number and species of trees and plants to be planted) Details of new tree planting and reinstatement works for green verge affected by entrance culvert 	<ul style="list-style-type: none"> Greenery
PUB	<ul style="list-style-type: none"> Application for specified activities near Water and Sewer pipes Earth Control Measures (ECM) Temporary works affecting drainage/within drainage reserve (e.g. drain diversion, soil investigation works) Notification and completion of minor sewer/sanitary works Notification and CSC of Water Service Installation works Notification and CSC of Water Service Installation Works involves pumping equipment or water tank (site plans, water reticulation schematic/layout drawing of WSI design works, water requirements, SP Water Utilities Account number) <p>Separate submission may be made for Rainwater Collection System in developments for non-potable water use</p>	<ul style="list-style-type: none"> Infra & Utilities (Internal) Water Supply

See also:

[Latest CORENET X Circulars](#)

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Independent Agency Submissions

Agency	Summary of Independent Agency Submissions	Common Gateway Key Words
SCDF	<p>Fire Protection (FP) and Mechanical Ventilation (MV) Plans</p> <ul style="list-style-type: none"> Detailed layout and floor plan showing Fire Protection and Mechanical Ventilation system of development Automatic Fire Alarm System Automatic Fire Extinguishing System Emergency Voice Communication System Smoke Control System Schematic diagram for the proposed system Calculations and reports (where applicable) 	<ul style="list-style-type: none"> Equipment Fire Compartmentation Fire Fighting Materials Ventilation
URA	<ul style="list-style-type: none"> Painting (for conserved buildings) Signage (for conserved buildings) 	<ul style="list-style-type: none"> Conservation

Agency	Summary of Independent Agency Submissions	Common Gateway Key Words
SLA + URA	<p>Strata / Land Subdivision and/or Amalgamation</p> <ul style="list-style-type: none"> As-built plans and/or 3D cadastre model. More details will be released in future regarding the latter. 	-

See also:

[Latest CORENET X Circulars](#)



Independent Agency Submissions

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Buildability

Agency	Requirement Category
BCA	<p>Constructability Implementation Plan (CIP)</p> <ul style="list-style-type: none"> BIM Plans which describe and define the type, extent of use and details of the system framework <p> Supporting Documents for CIP:</p> <ul style="list-style-type: none"> a) Documents (e.g. photos, 2D plans, etc.) on the use of construction techniques, processes, plant, equipment and innovative methods <p> Constructability Score (C-Score)</p> <ul style="list-style-type: none"> a) C-Score Calculations (to be computed and submitted by Builder in PDF format)

Conservation

Agency	Requirement Category
URA	Refer to URA Conservation Requirements here

Environmental Sustainability

Agency	Requirement Category
BCA	<ul style="list-style-type: none"> Air-Tightness and Leakage Building Energy Performance (e.g. Plant efficiency, Air distribution efficiency, Total System Efficiency, Lighting system performance etc) where applicable Measurement and Verification (M&V) Instrumentation Electrical Submetering Maintenance of Building Cooling System Performance Carbon Reduction Measures, including Resource Efficiency Measures such as CUI, Embodied Carbon etc. <p>For more information, please refer to the Guidance Notes and Documentation Requirements under Code for Environmental Sustainability of Buildings: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-new-buildings-existing-buildings-undergoing-major-aanda</p>
	<p>Major Energy Use Change during Operation</p> <ul style="list-style-type: none"> Design and As-built clearance for major energy use change. For more information, please refer to Code on Environmental Sustainability Measures for Existing Building: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-existing-buildings
	<p>Periodic Energy Audit during Operation</p> <ul style="list-style-type: none"> Submission of Periodic Energy Audit For more information, please refer to: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-existing-buildings/mandatory-submission-of-periodic-energy-audits

Greenery

Agency	Requirement Category
NParks	<p>Planting Scheme (within Development Boundary)</p> <ul style="list-style-type: none"> To show location, number and species of existing and proposed trees / shrubs for planting areas

Independent Agency Submissions

Independent Agency Submissions

Legend:



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IFC COMPONENT

Impact Studies only

Agency	Requirement Category
NEA	<p>Noise Impact Assessment (NIA-Post) for Land Traffic Noise</p> <p>NIA (Post) report will be required for (1) <u>New</u> residential and noise sensitive developments located within 70m of <u>existing</u> land traffic noise sources/hotspots (e.g. expressways/major arterial roads/MRT tracks) on existing residential and (2) <u>Existing</u> noise sensitive developments located within 70m of <u>new</u> transport-related developments (e.g. expressway/major arterial roads/MRT tracks/bus interchanges/ bus depots), inclusive of the expansion of existing transport-related infrastructures</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicant will need to submit NIA (Post) report to NEA directly before Completion Gateway (G3) and concluded before TOP could be granted. Sufficient time shall be catered for NEA to process the NIA (Post) The processing of NIA (Post) will take 1-2 months <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	<p>Noise Report for ACMV</p> <p>Noise report for ACMV will be required for non-industrial developments which have new air-conditioning and mechanical ventilation works, including relocations.</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicant will need to submit ACMV noise report directly to NEA before Completion Gateway (G3) and concluded before TOP could be granted. <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	<p>Pollution Control Equipment (PCE)</p> <p>PCE submission will be required for developments involving proposed PCE/fuel burning equipment (e.g. Boiler, Thermal Oxidiser, Scrubber, Dust Collector, Spray Paint Booth, etc.)</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicant will need to submit technical details of the PCE and/or Fuel Burning Equipment to NEA directly before Completion Gateway (G3) and concluded before TOP could be granted. <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.

Impact Studies / Site Layout, Rail Protection, Road Structure Protection

Agency	Requirement Category
LTA	<p>Approval to commence engineering works within Railway Protection Zone / Railway Corridor</p> <ul style="list-style-type: none"> To submit plan for engineering works To submit the Engineering evaluation report To submit an Instrumentation Proposal and initial instrumentation readings To submit a Method Statement of work To submit a Hazard Analysis identifying all possible risks that may be posed to the rapid transit system and a description of the safety and precautionary measures to mitigate these risks To submit the Contingency Plan and Emergency Procedure To submit the Pre-condition Survey Report To submit the Certified Survey Plans To submit the Permit application form and other relevant forms To submit the Construction schedule for the proposed development

Independent Agency Submissions

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

• KEY GATEWAYS •

• OTHER BUILDING WORKS •

BIM DATA REPRESENTATION

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Independent Agency Submissions

Legend:



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Impact Studies / Site Layout, Rail Protection, Road Structure Protection (continued from previous page)

Agency	Requirement Category
LTA <i>(continued from previous page)</i>	<p>Note: Refer to LTA's Code of Practice for Railway Protection / Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer / Guide to carrying out restricted activities within railway protection and safety zones for more requirements / detailed description</p> <p><u>Approval to carry out restricted activities within Railway Safety Zone</u></p> <p>Note: Refer to LTA's Guide to carrying out restricted activities within railway protection and safety zones for detailed requirements / description</p> <p><u>Approval to commence engineering works within Road Structure Safety Zone / Notification to carry out engineering activity on land adjoining public street</u></p> <ul style="list-style-type: none"> • To submit plan for engineering works • To submit the Engineering evaluation report • To submit an Instrumentation Proposal and initial instrumentation readings • To submit a Method Statement of work • To submit a Hazard Analysis identifying all possible risks that may be posed to the rapid transit system and a description of the safety and precautionary measures to mitigate these risks • To submit the Contingency Plan and Emergency Procedure • To submit the Pre-condition Survey Report • To submit the Certified Survey Plans • To submit the Permit application form and other relevant forms • To submit the Construction schedule for the proposed development <p>Note: Refer to LTA's Guide to Carrying Out Engineering Works within Road Structure Safety Zone and Engineering Activity on Land adjoining Public Streets for more requirements/ detailed description</p>

Land / Strata Subdivision and Amalgamation

Agency	Requirement Category
URA	<p><u>Land/Strata Subdivision and Amalgamation</u></p> <ul style="list-style-type: none"> • Proposed Subdivision and/or Amalgamation plan(s) / model by Registered Surveyor

Mechanical Ventilation & Smoke Control System

Agency	Requirement Category
SCDF	<p><u>Fire Protection (FP) and Mechanical Ventilation (MV) Plans</u></p> <ul style="list-style-type: none"> • Detailed layout and floor plan showing Fire Protection and Mechanical Ventilation system of development • Schematic diagram for the proposed system • Calculations and reports (where applicable) <p><u>Air-Conditioning, Mechanical Ventilation and Fire Protection Plan (MV & FP)</u></p> <ul style="list-style-type: none"> • Key features of the building in which the system is to be installed • Schematic diagram of the overall system showing clearly the key features and their functions, relative locations in the building, lots, sizes, capacities and other essential information incl. the air distribution design arrangement in the case of air-conditioning and mechanical ventilation systems • Layout of the system on every floor plan showing clearly the various parts and their functions, locations, arrangements, sizes, capacities and other essential information



Independent Agency Submissions

Legend:



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Mechanical Ventilation & Smoke Control System (continued from previous page)

Agency	Requirement Category
SCDF <i>(continued from previous page)</i>	<p>Air-Conditioning, Mechanical Ventilation and Fire Protection Plan (MV & FP)</p> <ul style="list-style-type: none"> Necessary cross-sectional views as superimposed on the building or part thereof to fully describe the details and configurations of the system A colour scheme to clearly distinguish the various distinct parts of the system and the different systems from one another Volumetric rate of flow of air at each point of inlet and outlet of each system including those serving protected staircases, exit passageways, lobbies, areas of refuge, the Fire Command Centre, fire pump rooms, generator rooms, rooms used for the storage of flammable liquids or gas or other areas of special risk; Location of: <ul style="list-style-type: none"> Fire compartment walls, floors, air shafts, fire dampers, smoke detectors and other fire precautionary features Automatic Fire Alarm System Automatic Fire Extinguishing System Emergency Voice Communication System Smoke Control System Calculations and reports (where applicable)

Public Drains (External)

Agency	Requirement Category
PUB	<ul style="list-style-type: none"> Earth Control Measures (ECM) Plan Details of temporary works affecting drainage / within drainage reserve

Public Sewerage System (External)

Agency	Requirement Category
PUB	<ul style="list-style-type: none"> Details and scope of works on manholes and sewers Specified activities within sewer corridor

Rainwater Harvesting

Agency	Requirement Category
PUB	<p>Rainwater Collection System</p> <ul style="list-style-type: none"> Proposal plan which include location, site plan, relevant floor plans, catchment plan, tank details and water reticulation schematic drawing

Signage

Agency	Requirement Category
BCA	<ul style="list-style-type: none"> License for Outdoor Advertising Sign or Signboard



Independent Agency Submissions

Legend:



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IFC COMPONENT

Structural Design

Agency	Requirement Category
BCA	<p>Structural Design (Other Works e.g. demolition, ERSS, cladding, safety barrier, temporary traffic decking)</p> <ul style="list-style-type: none"> • 2D Drawings are acceptable for independent submissions. • Structural design of ancillary works and component such as demolition, temporary ERSS, barriers & cladding, temporary traffic decking • Structural design of localized works for ancillary structures e.g. cladding, barrier • These plans will need to make reference back to the coordinated model submitted by the Main QP at the Construction Gateway (G2). <p> Design Calculation Reports</p> <ul style="list-style-type: none"> • From QP, AC, [QP(Geo) & AC (Geo), if needed]) <p> Additional Supporting Documents:</p> <ul style="list-style-type: none"> a) Site investigation report in pdf & AGS format b) Impact assessment report c) Design consideration for Earth Retaining or Stabilising Structures (ERSS)) – ERSS_Annex A d) QP's & AC's Certification for fixings of ancillary structures

Water Supply

Agency	Requirement Category
PUB	<ul style="list-style-type: none"> • Site plans, water reticulation schematic / layout drawing of WSI design works and water requirements • Specified activities within water pipe corridor

----- End of Requirements for Independent Agency Submissions -----

G3

Completion (TOP/CSC) Gateway

Agency	Summary of Completion Gateway Requirements	
	TOP	CSC
BCA	<ul style="list-style-type: none"> • Record Plans of Building Works consists of: <ul style="list-style-type: none"> ○ Certificate of Supervision of Piling Works ○ Certificate of Supervision of Structural Works ○ Certificate of As-Built Structural Works in IFC-SG structural model & 2D drawings • Notice of Completion • Test records (if applicable) • Household / Storey Shelter commissioning • Site inspection (if applicable) • Technical agencies' clearance 	Technical agencies' clearances
LTA	NIL	<ul style="list-style-type: none"> • Declaration that completed works have been supervised and built according to the approved street plans • Site inspection (if necessary) • As-built topographic survey plans <p>Railway protection details:</p> <ul style="list-style-type: none"> • Endorsed as-built plans for foundation, structural, M&E (where applicable) • Building plans/details • Certificates of supervision • Final condition survey with reports <p>For handing over:</p> <ul style="list-style-type: none"> • Road data form • Asset master input form • Road test reports • Declaration plan • As-built M&E plans • O&T
NEA	<ul style="list-style-type: none"> • Photo evidence to demonstrate compliance in Design and Construction Gateways • Reports of completed works • Site inspection for selected projects and noise assessment report (ACMV) / Noise Impact assessment 	
NParks	NIL	<ul style="list-style-type: none"> • As-built plan • Site inspections (if applicable) – may involve soil check to ensure quality of planting mixture conforms to NParks' specifications for Approved Soil Mixture (ASM)

G3

Completion (TOP/CSC) Gateway

Agency	Summary of Completion Gateway Requirements	
	TOP	CSC
PUB	<ul style="list-style-type: none"> Declaration that completed works have been supervised and built according to approved plans Application for Compliance Certificate for Sanitary/Sewerage and TOP clearance for Drainage Site inspections (if necessary) <p>To provide the following:</p> <ul style="list-style-type: none"> As-built plans/survey plans/schematic sanitary drawing Form B1 clearance Relevant reports where applicable (hydrostatic test reports for sewer/sanitary, RC Trench reports, Pre DLP CCTV/Post-construction sewer CCTV survey report, air test report for sanitary plumbing system, design calculations etc) 	For handing over of drainage or sewerage works for PUB's maintenance, works to be satisfactorily completed and taken over by PUB prior to clearance: <ul style="list-style-type: none"> Taking over letter (issued by PUB) <p>To provide the following:</p> <ul style="list-style-type: none"> As-built plans/survey plans/schematic sanitary drawing Form B1 clearance PE endorsed handing over form for completed public drains Common drain assessment report
SCDF	Temporary Fire Permit (TFP) application	Fire Safety Certificate (FSC) application
URA	<p>To provide the following:</p> <ul style="list-style-type: none"> Declaration that completed works have been supervised and built in accordance to approved plans As-built plan incorporating approved amendments and as-built works that QPs declared to not have material impact to planning controls Photographs and/or inspections (where requested / necessary) 	

► Application for Completion of Works

A set of TOP / CSC checklists pertaining to agencies' requirements will be provided to guide the project teams on the list of requirements for TOP / CSC applications. This includes as-built plan submissions, record plans, certificate of supervision, post-construction reports e.g. hydrostatic tests, RC trench report etc.

► Site Inspections

Similar to today's practice, inspections would be carried out separately by agencies. Once agencies are notified on the project's readiness for TOP / CSC, agencies will inform the project team if an audit/inspection is required. This is to help project teams plan / prepare their site early.

► TOP/CSC application

The status of each agencies' TOP / CSC would be tracked through CORENET X where the overall TOP / CSC by BCA will only be released when all agencies' respective clearances are obtained.

See also:

[Latest CORENET X Circulars](#)

G3

Completion (TOP/CSC) Gateway

Legend:



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Builder

IFC COMPONENT

BCA

Item for TOP / CSC	Brief Description		
BP TOP / CSC	<ul style="list-style-type: none"> Record Plans 		
Buildability Score	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p> Buildable Design Score (B-Score)</p> <p>a) BS03 Form (in Excel format) to be submitted</p>		
CD Shelter Commissioning	<ul style="list-style-type: none"> Application for approval of commissioning of CD Shelter Checklist for submission with application for commissioning 		
Constructability Score	<p>Constructability Implementation Plan (CIP)</p> <ul style="list-style-type: none"> BIM Plans which describe and define the type, extent of use and details of the system framework <p> Supporting Documents for CIP:</p> <p>a) Documents (e.g. photos, 2D plans, etc.) on the use of construction techniques, processes, plant, equipment and innovative methods</p> <p> Constructability Score (C-Score)</p> <p>a) C-Score Calculations (to be computed and submitted by Builder in PDF format)</p>		
Environmental Sustainability	<p>Submit As-Built / GM02 Main Submission from (BPD_GM02 + BPD_GM02_Appendix)</p> <ul style="list-style-type: none"> For more information, please refer to the Guidance Notes and Documentation Requirements under Code for Environmental Sustainability of Buildings: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-new-buildings-existing-buildings-undergoing-major-aanda For Government Land Sales (GLS) programme requirement, please refer to the following link: https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-new-buildings-existing-buildings-undergoing-major-aanda/mandatory-higher-green-mark-standard 		
Facade	<ul style="list-style-type: none"> Submit the Certificate of Completion of works (i.e. Form D, Form SB) For more information, please refer to: Industry requirement for installation, retrofitting, replacement or reinstatement of Windows Building and Construction Authority (BCA) 		
Record Plans of Structural Works and Certificates	<ul style="list-style-type: none"> Certificate of Supervision of Piling Works Certificate of Supervision of Structural Works Certificate of As-Built Structural Works (in IFC-SG structural model & 2D Drawings) Builder Certificate 		
-	<table border="1"> <tr> <td> <ul style="list-style-type: none"> QP Declaration(s) Certificate of Supervision for Lightning Protection System (LPS) Permit to Operate (Lift & Escalator) ACMV CD shelter </td> <td> <ul style="list-style-type: none"> Environmental Sustainability Universal Design Index FormSG Acknowledgement CONQUAS / QM Photos of Rectification Phasing Plan </td> </tr> </table>	<ul style="list-style-type: none"> QP Declaration(s) Certificate of Supervision for Lightning Protection System (LPS) Permit to Operate (Lift & Escalator) ACMV CD shelter 	<ul style="list-style-type: none"> Environmental Sustainability Universal Design Index FormSG Acknowledgement CONQUAS / QM Photos of Rectification Phasing Plan
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G3

Completion (TOP/CSC) Gateway

Legend:



Architecture



C&S



M&E

IFC COMPONENT

LTA		
	Item for TOP / CSC	Brief Description
-		<p><u>Application for clearance of certificate of statutory completion for development within Railway Protection Zone / Railway Corridor</u></p> <ul style="list-style-type: none"> • To submit a copy as-built topographic survey plan in true coordinates • To submit a certificate of supervision • To submit the final condition survey report <p><u>For proposed developments which involve modification to RTS, development to comply with Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations</u></p> <p>Note: Refer to LTA's Code of Practice for Railway Protection / Guidebook for Carrying Out Modification Work to Rapid Transit System (RTS) Stations or Railway by Private Developer for more requirements / detailed description</p> <p><u>For developments that involve only the widening and alteration of existing street fronting the development (without new street), the following shall be submitted:-</u></p> <ul style="list-style-type: none"> • As-built topographic survey plan in true coordinates • To submit an approved subdivision plan with WP from URA and Certified Plan (CP) for project with vesting of street reserve plot • Photographs of completed works <p><u>For Notification of Opening of New Street to Traffic, the following shall be submitted:</u></p> <ul style="list-style-type: none"> • Cover letter clearly stating the new street opening date. • Street and Building Name Board (SBNB) Approval letter of street name • Approved traffic layout plan • Certificate of Supervisions by PE • Road Test Result • Checklist of completed works • Photographs of completed works <p><u>For handing over of new road, the following shall be submitted:</u></p> <ul style="list-style-type: none"> • As-built topographic survey plan in true coordinates (in .dwg format) • As-built structural and M&E plans for commuter facilities such as POB, UPN • Taking over letters from PUB, NParks and NEA • Road Declaration Plan • Approved sub-division plan • Certified plan from Chief Surveyor, SLA • Asset Master Record Input Form • Road Data Form • Audit certificate for project under Ministries or Statutory Board • Road testing results • Documents for handing over of street lightings - as-built installation plans, electrical single line diagram, letter of supervisions, test report from SP services for new control box and underground cable insulation resistance test report • Warranties for waterproofing etc. <p><u>For Vehicle Parking submission:</u></p> <ul style="list-style-type: none"> • Photos for open surface parking lots • As built Drawings

G3

Completion (TOP/CSC) Gateway

Legend:



Architecture



C&S



M&E

IFC COMPONENT

NEA

	Item for TOP / CSC	Brief Description
Photo, video or reports of completed works		<ul style="list-style-type: none"> QP (Arch/PEs) applies for TOP/CSC and provide photo / video evidence or reports of completed works

SCDF

	Item for TOP / CSC	Brief Description
-		<p>QP(s) shall certify that the fire safety works have been completed in accordance with the Code of Practice for Fire Precautions in Buildings, Fire Safety Act and its Regulations and relevant Codes of Practice and submit the following documents:</p> <ul style="list-style-type: none"> Certification of Fire Safety Works RI Engagement Form Registered Inspector's Inspection Certificate (RI Form 1 or 2) RI Inspection Report RI Cessation form, where applicable Declaration of Regulated Fire Safety Products, where applicable CoC for Regulated Fire Safety Products, where applicable Delivery Orders for Regulated Fire Safety Products, where applicable FSC02 - Certification for Regulated Fire Safety Products, where applicable FSC03 - Certification for Lift Installation & Operation, where applicable FSC04 - Certification for Fire Engine Access Road And Accessway, where applicable

URA

	Item for TOP / CSC	Brief Description
Development Interface Report (DIR) (Final)		<ul style="list-style-type: none"> Information for future developer (e.g. loading requirements, knock out panels alignment / width) As-built plan
TOP / CSC		<ul style="list-style-type: none"> Declaration that completed works have been supervised and built in accordance to approved plans (via EDAForm) Photographs of completed works or rectifications (where requested) Phasing Plan (for Partial TOP) Inspections (where necessary)
Record Plan (for non-conserved buildings and monuments)		<ul style="list-style-type: none"> As-built plan incorporating approved amendments and as-built works that QPs declared to not have material impact to planning controls

End of Requirements for Completion Gateway (G3)

SECTION 3

Specific Requirements by:
Other Building Works

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Section 3: Specific Requirements by Other Building Works

External Works

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

• KEY GATEWAYS •

• OTHER BUILDING WORKS •

BIM DATA REPRESENTATION



External Works

About

Note that External Works is undergoing further refinements. More updates will be released in future COP versions.

- Under CORENET X, the QP has to submit the proposed external works to the LTA, NParks and PUB for a coordinated regulatory review. To guide the industry in preparing their external works submissions at the various gateways, the agencies have worked together to map their regulatory objectives and requirements. Due care was taken to ensure that:
 - There are no direct conflicts in the rules between the agencies.
 - Various components of the road typology is holistically reviewed by the respective agencies within the same gateway.
- External works details can be submitted in the 2D CAD format.**

Sharing of Submission Templates to Standardise Details

Agency	2D Plan Representation / Templates																																															
	Description	Examples																																														
LTA	<ul style="list-style-type: none"> LTA will provide drawing templates for the various plans (e.g. traffic, alignment, site plan, profile, section / details etc.) to better guide QPs to prepare the design details to be reflected in the plans. Example, S3 – Fig 1 (right): Part of a road layout template for various common road infrastructure facilities. 																																															
NParks	<ul style="list-style-type: none"> QPs can refer to NParks' handbook (see right S3 – Fig 2) for information to be provided to facilitate assessment and approval of development applications. See right S3 – Fig 2. Guidelines on Greenery Provision and Tree Conservation for Developments 	<table border="1"> <caption>Information to Be Provided (See Information)</caption> <tr> <td>All greenery on or to be retained and reflected in the respective sections of the surrounding area to be consistent with the original plan (if applicable) throughout the entire duration of the development.</td> </tr> <tr> <td>The remaining area to be consistent with the original plan (if applicable) throughout the entire duration of the development.</td> </tr> <tr> <td>Length, pitch and height of existing trees within the site boundary and/or the neighbouring site(s) or up to 10m from the boundary should be indicated in a table.</td> </tr> <tr> <td>Existing and proposed trees within the boundaries of the development boundary and/or the neighbouring site(s) or up to 10m from the boundary should be indicated in a table.</td> </tr> <tr> <td>Any changes to the state of the existing trees approved at DC/RM stage if applicable.</td> </tr> <tr> <td>Color Guide for Existing Trees/Plants/Trees</td> </tr> <tr> <td>State of Existing Trees/Plants/Trees</td> </tr> <tr> <td>Outline in Colour</td> </tr> <tr> <td>To be retained</td> <td>Green</td> </tr> <tr> <td>Removed/reduced approved</td> <td>Yellow</td> </tr> <tr> <td>Removed/reduced unapproved</td> <td>Red</td> </tr> <tr> <td>New/added (after investigation)</td> <td>Yellow (indicate the approved date in the last scheduled)</td> </tr> <tr> <td>For trees proposed to be removed, clear photographs are to be provided. 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PUB	<ul style="list-style-type: none"> PUB has published a series of quick guides (see right S3 – Fig 3) with sample illustrations which outline the necessary information to be provided by QPs in their submissions to facilitate assessment and clearances. Quick Guide to Application for Clearance Certificate for Detailed Plan 																																															



External Works

► Delinking Clearance of Development (Internal) and External Works where feasible

Note: The submission format for proposed works within the development boundary shall follow the prevailing BIM submission requirements. Design proposals for external works can be submitted in 2D (CAD). Notwithstanding, agencies are open to reviewing infrastructure models prepared in 3D.

Development (Internal) and External Works

Under CORENET X, LTA, NParks and PUB require:

- Proposed works within the development boundary; and
- Proposed external works to be submitted a single package across the regulatory gateways to ensure that both works are well coordinated. For example, for LTA:
 - Works within the development boundary pertain to:
 - Vehicle parking layout/ Bicycle parking lots
 - Layout of pick-up/ drop-off (PUDO) points
 - Internal driveways
 - EV charging infrastructure
 - External works pertain to works within the road reserve, such as:
 - Street improvement works
 - Commuter facilities
 - Active mobility infrastructure



S3 – Fig 4 :
Example of development (internal) work – PUDO layout



S3 – Fig 5:
Example of external work – Road infra improvement

Interfacing Aspects to be cleared as part of Development (Internal) Works

- It is common for a development to propose connections (serving various users such as motorists, pedestrians, cyclist etc) from within the development leading to the surrounding road network. These connections form interfaces at the development boundary. Such interfaces have to be well co-ordinated to ensure that the development platform level ties in properly with the existing roads. For new roads proposed in conjunction with development(s), the vertical profile of the roads (designed to comply with LTA design requirements) has to be established before other development interfacing details are considered. Additionally, interfaces usually demarcate the extent of maintenance ownership between the developer and the State.
- The layout and cross-sections of interfaces between the development boundary and the road reserve shall be clearly reflected in the external works design proposal.

S/N	LTA and NParks Interfacing Aspects
1	Vehicular Access Points
2	Pedestrian Access Points
3	Cyclist accesses
4	Covered Linkway / Walkway Connections
5	Pedestrian Overhead Bridge Connections
6	Pedestrian Underpass Connections
7	Bus Stops (If directly interfacing with the development building)
8	Taxi Stands (If directly interfacing with the development building)
9	Vertical Profile of New Street (If proposal involves construction of a new street or widening of existing roads)

S/N	PUB Interfacing Aspects
1	Connection of internal drain to road drain/ drain outlet
2	MPL, adj road/ ground level, and outlet discharge point levels
3	Point of proposed sewer connection



S3 – Fig 6



LTA's Interfacing Aspects

► Interfacing Aspects to be cleared as part of Development (Internal) Works

LTA considers the following as interfacing aspects:

S/N	Interfacing Aspect	Remarks
1	<p>Vehicular Access Points</p>	<p>Vehicular accesses have a significant impact on the development layout and has to be co-ordinated with the proposed Minimum Platform Level imposed.</p> <p>--</p> <p>S3 – Fig 7 (top): Plan view of an access S3 – Fig 8 (bottom): Cross Section view of an access</p>
2	<p>Pedestrian Access Points</p>	<p>Pedestrian accesses have to be designed with respect to the internal layout and the external amenities of interest to development users</p> <p>--</p> <p>S3 – Fig 9 (top): Plan view of pedestrian access interfacing with footpath & cycling path (with sight visibility triangle)</p> <p>S3 – Fig 10 (middle): Plan view of pedestrian access interfacing with a shared path (with sight visibility triangle)</p> <p>S3 – Fig 11 (bottom): Cross section of a pedestrian access interfacing with a footpath</p>

Section 3: Specific Requirements by Other Building Works External Works (LTA)

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

• KEY GATEWAYS •

• OTHER BUILDING WORKS •

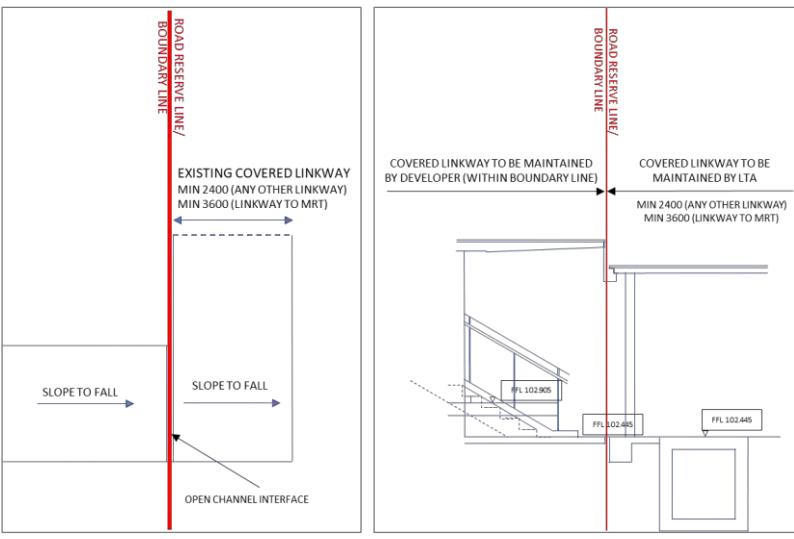
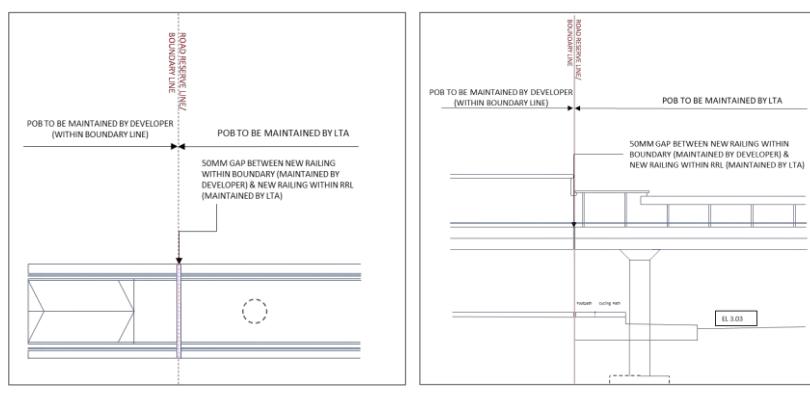
BIM DATA REPRESENTATION



LTA's Interfacing Aspects

► Interfacing Aspects to be cleared as part of Development (Internal) Works

LTA considers the following as interfacing aspects:

S/N	Interfacing Aspect	Remarks
3	Cyclist Accesses (Please refer to typical section and plan view in S/N 4.)	Cyclist accesses have to be designed with respect to internal bicycle parking facilities and the surrounding road network. One of the important design issues is the provision of adequate sight distance at the development accesses and inner radius of road bends.
4	Covered Linkways (At-grade connections between the development and road reserve) 	Covered linkways have to be designed with respect to the internal layout and the external amenities of interest to development users -- S3 – Fig 12 (left): Roof plan of a sheltered walkway interfacing with an existing covered linkway (within the road reserve) S3 – Fig 13 (right): Cross section of a sheltered walkway interfacing with an existing covered linkway (within the road reserve)
5	Pedestrian Overhead Bridges (POBs) (Elevated connections between the development and road reserve) 	Direct linkages between POBs and developments have to be designed to ensure that the levels of the POB and development can match -- S3 – Fig 14 (left): Plan view of an elevated walkway interfacing with an existing POB (within the road reserve) S3 – Fig 15 (right): Cross section of an elevated walkway interfacing with an existing POB (within the road reserve)
6	Pedestrian Underpasses (PUPs) (Subterranean connections between the development and road reserve)	Direct linkages between PUPs and developments have to be designed to ensure that the levels of the PUP and development can match
7	Bus Stops (If directly interfacing with the development)	Interfacing (if any) between bus stops and developments have to be co-ordinated



LTA's Interfacing Aspects

► Interfacing Aspects to be cleared as part of Development (Internal) Works

LTA considers the following as interfacing aspects:

S/N	Interfacing Aspect	Remarks
8	Taxi Stands (If directly interfacing with the development)	Interfacing (if any) between taxi stands and Developments have to be co-ordinated
9	Covered Walkways	Covered walkways have to be designed in relation to the open walkways for barrier-free access
10	Vertical Profile of New Street (If the proposal involves the construction of a new street and / or widening of existing roads)	It is important to establish the vertical profile of the new street / widened street which determines all other interfacing aspects, such as development platform levels, drainage levels, access levels, as well as the levels of any existing structures (while complying to the current design requirements)

Clearances and Conditional Approvals

1. LTA will issue a **Layout Plan Clearance (Street & Parking)** at the Design Gateway (G1), as well as a **Street Plan Clearance** and **Vehicle Parking Building Plan Clearance** at the Construction Gateway (G2), when both the proposed works within the development boundary and external works are designed in accordance with the prevailing standards.
2. In a scenario where the proposed works within the development boundary are in order, whereas the external works are still under review, **LTA may issue separate Layout Plan and Street Plan Approvals**, for internal and external works. For LTA to issue a conditional approval, all interfacing aspects shown within the external works proposal must be designed in accordance with the prevailing standards.
3. The approvals for internal works granted by LTA once the interfacing aspects have been agreed, will help to expedite the clearance and completion of the projects, notwithstanding the requirement for combined submission under CORENET X. QPs are required to follow up and **obtain the agencies' full external works clearances**, before advancing to the next regulatory gateway.

Example Scenario 1

QP submits external and internal works proposal

Both external, internal works (with interfacing details) are in order by 3rd submission

Agencies will issue the complete clearances for both internal and external works.

Specifically, LTA issues a complete street layout plan/ street plan clearance

(Project parties can proceed with construction / sales at CG (G2))

Example Scenario 2

QP submits external and internal works proposal

Internal works, but not external works are in order by 3rd submission

Interfacing aspects in order

Agencies issue clearance for the internal works

(Project parties can proceed with construction / sales at CG(G2))

External works in order

Agencies issue clearances for the external works



Overview of LTA's External Works

Note that External Works is undergoing further refinements. More updates will be released in future COP versions.

Key Gateways	Objective	Road alignment details to be prepared (other details to be prepared and submitted as required)	Supporting Information required
Pre-DG (Land Use, TCOT, PAFS, TIA)	To establish RRL and development boundary	<ol style="list-style-type: none"> 1. Horizontal alignment 2. Junction layout 3. Commuter facilities 4. Cycling path 5. Road typology 6. Development access 7. RRL / ADR 	<ol style="list-style-type: none"> 1. Topo survey 2. Traffic study / TIA
Pre-Submission, Planning and Other Consultations	To seek clarifications for details to be submitted at DG stage	As required by Agency / QP to seek clarification from LTA	<ol style="list-style-type: none"> 1. Traffic study / TIA
Design Gateway (G1)	To establish development platform level and development access that will properly interface with the proposed carriageway	<ol style="list-style-type: none"> 1. All details as per Pre-DG Stage 2. Development access levels to tie in with development platform level * 3. Road vertical profile * (applicable to new streets and widening of existing carriageways) 4. Cross-section and details plan 5. Tree affected plan. 6. Layout of retaining wall. 7. Extent of proposed cut / fill slopes with existing ground level including impact on existing trees 8. Layout of drains, sumps and box culvert including drain top level and invert level 9. Layout of major structural works that will affect the road vertical and horizontal alignment. 10. Layout for Commuter Facilities (e.g. bus stop, covered linkways, POB) * 11. Layout of Active Mobility Infrastructure (i.e. cycling path) 12. Layout of street elements (e.g. lamppost, traffic schemes) that needs to be modified. (Applicable for existing streets) 	<ol style="list-style-type: none"> 1. Topo survey 2. Utilities / services plan
Piling Gateway (G1.5) (Optional)	Piling gateway also includes earth retaining structures (slope, retaining wall, CBP etc.) within the road reserve	-	-
Construction Gateway (G2)	To finalise all other details necessary for construction of the road and related infrastructure works	<ol style="list-style-type: none"> 1. All details as per DG stage 2. Details for access points * 3. Geotechnical details for foundation works, retaining wall, slope etc. 4. Structural details for road structures and roadside features e.g. POB, drain, box culvert, sump etc. 5. Architectural & Engineering details for Commuter Facilities (structural and foundation details) * 	-
Independent Submissions	To finalise individual agency requirements after construction gateway that do not have any impact on other agencies requirements	Approval to commence engineering works/ restricted activities within the Railway Protection Zone	-

* These aspects include (the necessary) interfacing works with the internal layout. Proposed interfacing works should be submitted as part of the external works design proposal and cleared in tandem with internal layout.



LTA's External Works Requirements

Legend: Architecture C&S M&E

G1 Design Gateway

Objective:

- ✓ To establish development platform level and development access that will properly interface with the proposed carriageway

Requirements for Road Infrastructure and Vehicle Access

Vehicular Access Points

Connections and Interfaces at Development Boundary

- To indicate the road level, entrance culvert level, and the proposed development platform level.
- For new roads proposed in conjunction with development(s), to develop the development platform level and proposed levels of the development access points based on the vertical alignment of the proposed carriageway (before QP confirms on the development platform level for the design of the foundation / structural works).
- To show the gradient of entrance approach.
- To indicate the configuration of the proposed access.
- To indicate the width and turning radius of the proposed access.
- To indicate the provision of tactile tiles.
- To indicate any proposed relocation of existing road elements, such as trees, lamp post, signs etc, which may be affected by proposed access.

Layout of Proposed Frontage Improvement Works

- To determine the extent of improvement works required along the road sidetable, such as conversion of open drain to covered drain cum footpath, setting back of drain for development affected by RRL
- To indicate the proposed footpath width, level, and its gradient
- To determine the extent of improvement works required along the road carriageway, such as localised road widening etc.
- To relocate any existing Manholes located on the future carriageway
- To check if additional street lightings are required
- To vest the Street Reserve Plot in State (except for A&A proposal)

Design of New Street (incl. Modifications to Existing Streets)

- To indicate all details determined during the planning consultation stage, and clearly list down the design changes from TCOT / land use stage.
- To identify and declare all non-compliances to design standards.
- To submit the road alignment and junction layout plan.
- To develop and submit the horizontal alignment and vertical profile of the proposed carriageway (new or widening / realignment of existing carriageway) connecting to the existing junction / carriageway. The horizontal alignment includes the superelevation along the road bends.
- To show the drainage layout plan (drain, box culvert and sump) and the drainage vertical profile, drain top level and invert level in the profile / longitudinal section drawing.
- To show the extent of cut / fill slopes with existing ground level and indicate the impact on existing trees (identify to trees to be fell, retained etc.).
- To show the location and layout of commuter facilities and major structural works that will affect the road vertical and horizontal alignment in the plan view, longitudinal section drawing and cross-section drawing.
- To show the extent of retaining wall to be provided (within or abutting the RRL) in the layout plan, and the layout and height of the retaining wall in the longitudinal section plan and cross-section drawings.
- To show the tree affected plan (trees to be fell, retained etc).
- To show cross-section details of the proposed typology of road sidetable and roadside features and structures (POB, linkway, bus-stop, drain, box-culvert etc).
- To relocate any existing Manholes located on the future carriageway.
- To seek waiver for retention of existing manhole on future road carriageway, cycling path and footpath, if any.



LTA's External Works Requirements

Legend: Architecture C&S M&E

G1 Design Gateway

Objective:

- ✓ To establish development platform level and development access that will properly interface with the proposed carriageway

✓ Requirements for Road Infrastructure and Vehicle Access

Connections and Interfaces at Development Boundary

- To develop the development platform level and proposed levels of the development access points based on the vertical alignment of the proposed carriageway (before developer confirms on the development platform level for the design of the foundation / structural works).
- To show the extent of retaining wall to be provided (within or abutting the RRL) in the layout plan, and the layout and height of the retaining wall in the longitudinal section plan and cross-section drawings.

✓ Requirements for Commuter Facilities

Layout of Covered Linkway / High Covered Linkway

- To show the proposed layout i.e. alignment, width, and headroom of the covered linkway / high covered linkway.
- To show the location where the covered linkway connects with the existing bus shelter, and identify any existing bus features such as noticeboards, seats affected by the linkway connection, which would have an impact on the layout of the covered linkway.

Connections and Interfaces at Development Boundary

- For covered linkways connecting to within the development site, to submit layout plans and section details at the interface, showing the RRL, alignment, floor levels, and headroom.
- To delineate the portion of linkway to be maintained by developer. Handed over to LTA for management.

POB Layout

- To show the proposed alignment, width, and headroom (min 5.7m), of the POB.
- To establish the column size and position within / outside the road reserve. Min. lateral clearance from the road shall be provided.

Connections and Interfaces at Development Boundary

- Where the POB connects to within the development site, to submit layout plans and section details at the interface, showing the RRL, alignment, floor levels and headroom.
- To delineate the portion of POB to be maintained by developer / handed over to LTA for management.

Pedestrian Underpass Layout

- To submit cross section details showing the overburden i.e. depth of UPN from road levels.
- To show the proposed alignment, width, ceiling height / headroom, of the UPN.
- To ensure that the provision of lifts / escalators / staircase is adequate.

Connections and Interfaces at Development Boundary

- To submit layout plans and section details at the interface, where the UPN connects to within the development site.
- To delineate the portion of UPN to be maintained by developer. handed over to LTA for management.

Layout of Bus Stop

- To show the location of the bus stop.
- To show the position, and dimensions of the bus bay/ bus box.
- To show the proposed location, alignment, and dimensions of the bus shelter.
- To indicate the location of the bus pole.
- To relocate existing Manhole located on the future bus bay, if any.

Connections and Interfaces at Development Boundary

- For bus stops directly integrating with the development infrastructure, to submit layout plans and sectional details of the bus shelter and bus bay/ bus box.



LTA's External Works Requirements

Legend: Architecture C&S M&E

G1 Design Gateway

Objective:

- ✓ To establish development platform level and development access that will properly interface with the proposed carriageway

✓ Requirements for Commuter Facilities

Layout of Taxi Shelter

- To show the proposed layout of the taxi stand indicating the location of the taxi shelter, width and length of the taxi bay.
- To relocate existing Manhole located on the future taxi bay, if any.

Connections and Interfaces at Development Boundary

- For taxi shelters directly integrating with the development infrastructure, to submit layout plans and sectional details of the taxi shelter.

✓ Requirements for Active Mobility Infrastructure

Cycling Path Layout

- To show the proposed layout, width, and alignment of the cycling path.
- To indicate the gradient of cycling path if it is steeper than 1:25.
- To determine if widening of existing pedestrian crossing is required.
- To determine if additional lightings are required.



LTA's External Works Requirements

Legend: Architecture C&S M&E

G2 Construction Gateway

Objective:

- ✓ To finalise all other details necessary for construction of the road and related infrastructure works

Requirements for Road Infrastructure and Vehicle Access

Vehicular Access Point Details

Connections and Interfaces at Development Boundary

- To reflect the details presented at Design Gateway (G1) Stage.
- To show the structural details of entrance culvert at access points i.e., reinforcement, connection to entrance approach etc.
- To indicate the position of the 'Stop' line and 'Stop' sign (if required)
- To indicate the position of the '1-way' arrow (if required)
- To show that any redundant accesses are sealed and reinstated to match the existing side-table.

Details of External Works (Frontage Improvement Works)

- To reflect all details presented at Design Gateway (G1) stage.
- To submit the Traffic Plan.
- To submit the street plan and cross section details showing the proposed levels, width and cross-fall of carriageway, planting verge and footpath.
- To clearly specify the size of proposed cross-culverts, and establish maintenance agreements with the relevant agencies (for cross-culverts less than 2m wide, to seek concurrent clearance with PUB Drainage)
- To submit the streetlighting plan (if applicable).

Details of Side Table Modifications for Addition of Auxillary Lanes, u-turns etc

- To incorporate all details presented at Design Gateway (G1) stage.
- To submit the Traffic Plan
- To submit the street plan, clearly indicating the layout plan, longitudinal section and cross section details, such as the proposed levels, width and cross-fall of carriageway, planting verge and footpath.
- To clearly specify the size of proposed cross-culverts, and establish maintenance agreements with the relevant agencies (for cross-culverts less than 2m wide, to seek concurrent clearance with PUB Drainage)
- To submit the streetlighting plan (if applicable).

Details of New Street (incl. modifications to existing streets)

- To incorporate all details presented at Design Gateway (G1) stage.
- To submit the Traffic Plan
- To submit the street plans, clearly indicating the layout plan, longitudinal section, and cross section details.
- To submit geotechnical details for foundation, retaining wall, slope (if any)
- To submit structural and M&E details for road structures and associated commuter facilities.
- To submit the street lighting plan.

Street Works Deposit

- For private developments with proposed major road infrastructure works (e.g. new streets, major improvement of an existing street, POB, UPN), to determine, and furnish the amount to be deposited with LTA for the execution and completion of the proposed street works.



LTA's External Works Requirements

Legend: Architecture C&S M&E

G2 Construction Gateway

Objective:

- ✓ To finalise all other details necessary for construction of the road and related infrastructure works

✓ Requirements for Commuter Facilities

Detailed Architectural / Structural Layout, and M&E provisions of Covered Linkways

- To reflect all details presented at Design Gateway (G1) stage.

Architectural Details

- To submit the 'Architectural Checklist for Covered Linkways'.
- To ensure that the proposed architectural design complies with the architectural requirements listed within the checklist.
- For covered linkways connecting/ interfacing with bus stops, to provide details of connection/bus stops, e.g. relocation of bus shelter elements.

Structural Details

- To provide structural details (i.e. column width, footing), materials.
- To establish the column size and position within the road reserve.
- To determine if column footing will impact the top slab of the box drain, and coordinate (with PUB).

M&E Details

- To submit the 'M&E Checklist for Bus Shelter, Taxi/ Passenger Pick-Up Shelter, Pedestrian Overhead Bridge (POB) and Covered Linkway'
- To ensure that the proposed design complies with the M&E requirements listed in the checklist.

Connections and Interfaces at Development Boundary

- For covered linkways connecting to within the development site, to provide details of connection/interfaces with development.

Note: Refer to LTA's infrastructure Design Criteria, M&W Specification, Architectural Design Checklist for Covered Linkways, and M&E Checklist for a full list of requirements/ detailed description

Detailed Structural Layout, and M&E provisions of Pedestrian Overhead Bridges

- To reflect all details presented at Design Gateway (G1) stage.

Architectural & Structural Details

- To submit the architectural checklist for the Pedestrian Overhead Bridge.
- To ensure that the proposed architectural design complies with the architectural requirements listed within the checklist.
- To provide structural details of POB (i.e. column width, footing).

M&E Details

- To submit the 'M&E Checklist for Bus Shelter, Taxi / Passenger Pick-Up Shelter, Pedestrian Overhead Bridge (POB) and Covered Linkway'
- To ensure that the proposed M&E lighting design complies with the M&E requirements listed in the checklist.

Connections and Interfaces at Development Boundary

- For POBs connecting to within the development site, to provide details of connection/interfaces with development, in accordance to the guidelines listed in the checklist.
- To determine and advise possible road closure due to hoisting of link bridges.

Note: refer to LTA's infrastructure Design Criteria, M&W Specification, Architectural Design Checklist for Pedestrian Overhead Bridge (POB), and M&E Checklist for a full list of requirements/ detailed description



LTA's External Works Requirements

Legend: Architecture C&S M&E

G2 Construction Gateway

Objective:

- ✓ To finalise all other details necessary for construction of the road and related infrastructure works

Requirements for Commuter Facilities

Detailed Structural Layout, and M&E Provisions of Bus Shelters

Architectural & Structural Details

- To submit architectural checklist for pedestrian underpass
- To ensure that the proposed architectural design complies with the architectural requirements listed within the checklist.
- To provide structural details of bus shelter, seating arrangement, bus info panels etc.
- To provide bollard and flooring details
- For covered linkways connecting/ interfacing with bus stops, to provide details of connection/bus stops, e.g., relocation of bus shelter elements

M&E Details

- To submit the 'M&E Checklist for Bus Shelter, Taxi / Passenger Pick-Up Shelter, Pedestrian Overhead Bridge (POB) and Covered Linkway'
- To ensure that the proposed M&E lighting design complies with the M&E requirements listed in the checklist

Connections and Interfaces at Development Boundary

- For bus stops directly integrating with the development infrastructure, to submit layout plans and sectional details of the bus shelter and bus bay / bus box

Other Requirements

- To submit the Traffic Plan
- To confirm the need of temporary bus stop provision and its position.
- To confirm the relocation date and commissioning of the new bus stop.

Detailed Layout of Taxi Shelter

Architectural & Structural Details

- To submit Traffic Plan
- To submit architectural plans and section details for the taxi shelter
- To submit architectural checklist for the taxi shelter
- To provide structural details of taxi shelter, seating arrangement, etc.
- To provide bollard and flooring details
- To provide details of lighting provisions and M&E provisions (if any)
- Taxi pole

M&E Details

- To submit the 'M&E Checklist for Bus Shelter, Taxi / Passenger Pick-Up Shelter, Pedestrian Overhead Bridge (POB) and Covered Linkway'
- To ensure that the proposed M&E lighting design complies with the M&E requirements listed in the checklist

Connections and Interfaces at Development Boundary

- For taxi stands directly integrating with the development infrastructure, to submit layout plans and sectional details of the taxi stand and bay.
- To confirm the need of temporary taxi provision and its position.

End of External Works Requirements for LTA

For the rest of LTA's requirements, please refer to [Page 56](#).



Overview of NParks' External Works

Note that External Works is undergoing further refinements. More updates will be released in future COP versions.

Key Gateways	Objective	Details to be prepared (other details to be prepared and submitted as required)	Supporting Information required
Pre-DG (Land Use, TCOT, PAFS, TIA)	<ul style="list-style-type: none"> To ensure RRL can accommodate standard roadside tables and additional commuter infrastructure To conserve specific roadside trees To ensure existing / proposed park / park connector is safeguarded 	<ul style="list-style-type: none"> Width of Road Reserve (incl. planting verge within side table) Proposed road alignment Proposed cycling path alignment as safeguarded on SDCP under MP19 If applicable: <ul style="list-style-type: none"> URA/MND's conveyance on Form B EIA report EMMP Wildlife management plan 	<ul style="list-style-type: none"> Topo Survey (if applicable)
Pre-Submission, Planning and Other Consultations	<ul style="list-style-type: none"> To clarify how proposal may affect roadside verges and trees, and/or existing / proposed parks / park connectors To advise on greenery provisions and tree conservation 	<ul style="list-style-type: none"> Proposal with safeguarded RRL and indicative entrance position and road alignment Proposal with Walking & Cycling Plan If applicable: <ul style="list-style-type: none"> URA/MND's conveyance on Form B EIA report EMMP Wildlife management plan 	<ul style="list-style-type: none"> Topo Survey Plan
Design Gateway (G1)	<ul style="list-style-type: none"> To secure greenery provisions and to comment on conservation of trees (may require Certified Arborist report, e.g. recommendations pertaining to works near to, but may not be directly impacting trees) To assess impact to existing, or safeguard provision of new, park / park connector 	<ul style="list-style-type: none"> Standard roadside greenery provision (especially new roads), i.e. gradient, width and depth of green verge (incl. tree planting verge) according to road category including interfacing with internal works Spatial provision (width and depth) for greenery at Covered Linkways / Pedestrian Overhead Bridge Conservation of trees / plants (identification, e.g. trees within road reserve, heritage trees, trees identified in TCOT) Entrance(s) position and access point (s) location (e.g. for FEA, maintenance and pedestrians, to ensure sufficient clearance secured for the retention of mature roadside trees) New Parks / Park connector / Promenade 	<ul style="list-style-type: none"> Topo survey plan Arborist report (e.g. recommendations pertaining to works near to, but may not be directly impacting trees) Services detection plan Photos of existing trees (if not in Arborist report)
Piling Gateway (G1.5) (Optional)	-	-	-
Construction Gateway (G2)	To ensure dimensions of green verges are compliant with standard requirements / accepted by NParks at Design Gateway (G1)	<ul style="list-style-type: none"> Dimensions of green verges compliant with standard requirements / as approved by NParks at Design Gateway (G1) Landscaping scheme for roadside greenery by Applicant 	-
Independent Submissions	To finalise details on roadside tree planting and landscaping works, as well as transplanting works	<ul style="list-style-type: none"> Reinstatement works for green verge (without tree planting) Landscaping scheme for roadside greenery undertaken by NParks Planting Requirements for Covered Linkways / Pedestrian Overhead Bridge 	<ul style="list-style-type: none"> Dimensions (length, width) of green verges to aid cost estimate for landscaping works (only if NParks were to undertake works) Specifications for trellis planting, green roof, planter boxes for covered linkways / POB (where applicable).

Useful Link(s):

[NParks' Guidelines](#)

[NParks Flora and Fauna Web](#)



NParks' External Works Requirements

G1 Design Gateway

Objective:

- ✓ To secure greenery provisions and to comment on conservation of trees (may require Certified Arborist report, e.g. recommendations pertaining to works near to, but may not be directly impacting trees)
- ✓ To assess impact to existing, or safeguard provision of new, park / park connector

Requirements	Supporting Documents
<u>Conservation of Trees</u> <ul style="list-style-type: none"> • To conserve trees identified: <ul style="list-style-type: none"> • In Technical Conditions of Tender (TCOT) • As Heritage Trees • Through nature group / public / residents engagement • In Environmental Impact Assessment (EIA)/ Environmental Management and Monitoring Plan (EMMP) etc. 	Arborist report (if tree(s) identified to be conserved /retained may be affected by proposed works for development)
<u>Green Verges</u> <ul style="list-style-type: none"> • To provide green verges (consisting of tree planting and service verges) for street work proposals relating to development works and for new road services according to the road category • To locate fire engine accessways outside green verges • <u>Road and Commuter Infrastructure</u> <ul style="list-style-type: none"> ○ To comply with greenery provision for covered linkways, bus shelters, pedestrian overhead bridges, depressed road portals, road viaducts/flyovers and retaining walls etc. according to NParks' Guidelines (Chapter 4) • <u>Entrance Culvert Position (at Vehicular Access Points)</u> <ul style="list-style-type: none"> ○ To ensure splay corners do not affect green verge provision and roadside trees 	-
<u>Biodiversity Impact Assessment (under URA's Environmental Impact Assessment [EIA] framework)</u> <ul style="list-style-type: none"> • Applicable to sites that fall within the EIA Framework but were not identified at Planning Stage (Pre-DG) • <u>Environmental Consultation</u> <ul style="list-style-type: none"> ○ QP (Arch / PEs) or Consultant to submit the environmental consultation form (Form A) to URA and Technical Agencies (e.g. NEA, NParks, MPA, SFA) ○ Details of project entities (Developer, Qualified Person and Main Contractor) as stated in Form A are provided • <u>Environmental Impact Assessment (EIA)</u> <ul style="list-style-type: none"> ○ If determined during environmental consultation that an environmental study is needed, QP (Arch / PEs) or Consultant can consult on environmental baseline study and scoping of EIA ○ QP (Arch / PEs) or Consultant to ensure that EIA report (for projects that have cleared environmental assessment at planning stage) are submitted for acceptance 	-

Useful Link(s):

[NParks' Guidelines](#)

[NParks Flora and Fauna Web](#)



NParks' External Works Requirements

G2 Construction Gateway

Objective:

- ✓ To ensure dimensions of green verges are compliant with standard requirements / accepted by NParks at Design Gateway (G1)

Requirements	Supporting Documents
<u>Conservation of Trees</u> <ul style="list-style-type: none"> • To conserve trees identified: <ul style="list-style-type: none"> • In Technical Conditions of Tender (TCOT) • As Heritage Trees • Through nature group / public / residents engagement • In Environmental Impact Assessment (EIA)/ Environmental Management and Monitoring Plan (EMMP) etc. 	Arborist report (if tree(s) identified to be conserved /retained may be affected by proposed works for development)
<u>Provision of Green Verges</u> <ul style="list-style-type: none"> • To ensure dimensions of green verges are compliant with NParks' Guidelines (Chapter 3) or as approved by NParks during Design Gateway (G1) 	-
<u>Interfacing Aspects (from within Development Boundary)</u> <ul style="list-style-type: none"> • To show layouts and cross-sections of interfaces in external works design proposal 	-
<i>Applicable to sites not requiring Piling Gateway (G1.5) approval</i>	-
Applicable to sites requiring Environmental Monitoring and Management Plan (EMMP) / Wildlife Management Plan prior to commencement of works: <ul style="list-style-type: none"> a) Detailed EMMP report (provided by Main Contractor) b) Acceptance letter from NParks prior to site clearance (if applicable) 	

- Independent Submissions

Objective:

- ✓ To finalise details on roadside tree planting and landscaping works, as well as transplanting works

Requirements	Supporting Documents
<u>Planting Scheme (Outside Development Boundary)</u> <ul style="list-style-type: none"> • To show location, number and species of existing and proposed trees/shrubs for green verges and planter troughs along pedestrian overhead bridges/ road viaducts/ flyovers 	-

End of External Works Requirements for NParks

[For the rest of NParks requirements, please refer to Page 71.](#)



Overview of PUB's External Works

Note that External Works is undergoing further refinements. More updates will be released in future COP versions.

Key Gateways	Objective	Details to be prepared (other details to be prepared and submitted as required)	Supporting Information required
Pre-DG (Land Use, TCOT, PAFS, TIA)	To establish development boundary, any Drainage Reserve (DR), drain size for affected / proposed public drain and sewer connection, water pipe diversion requirements	Site plan overlay with PUB Services Plans (Drainage Interpretation Plan, Sewerage Information Plan and Water Service Plan) showing the drainage reserves or land reserved for future drainage schemes, common drain, location and alignment of public sewers or pumping mains, and approximate position of the water mains and raw water mains in the vicinity of the development.	<ul style="list-style-type: none"> Site plan with drainage, sewerage and water main information Sewer discharge quantity Water demand
Pre-Submission, Planning and Other Consultations	To seek clarifications for details to be submitted at Design Gateway (G1) stage	<u>Key evaluation areas include:</u> <ul style="list-style-type: none"> Any storm water drainage works, erection or placement of any structures or object in, above or across any drain or drainage reserve Any temporary structure / works / services over, across or adjacent to any drain or storm water drainage system Any proposed realignment of Drainage Reserve or Drainage Reserve to be set aside and vested to State; Any works which could affect any public sewers / sewerage system or public drains including common drains directly or indirectly; Any buildings or structures to be erected over, across or adjacent to any public sewerage system; and Proposed connection of the development / premises to the public sewers / sewerage system 	<ul style="list-style-type: none"> Architectural / Engineering drawings Topo Survey Plan
Design Gateway (G1)	<ul style="list-style-type: none"> To establish MPL requirements To assess proposed works affecting drainage (e.g. management of maximum allowable peak runoff, discharge point of internal drains) and linkages to underground Special Facilities (e.g. Rapid Transit System) To assess proposed works affecting sewer (e.g., capacity, setback, sewer connection, alignment and size for diversions) 	<u>Key evaluation areas include:</u> <ul style="list-style-type: none"> Any storm water drainage works, erection or placement of any structures or object in, above or across any drain or drainage reserve Any temporary structure / works / services over, across or adjacent to any drain or storm water drainage system Any proposed realignment of Drainage Reserve or Drainage Reserve to be set aside and vested to State; Any works which could affect any public sewers / sewerage system or public drains including common drains directly or indirectly; Any buildings or structures to be erected over, across or adjacent to any public sewerage system; and Proposed connection of the development / premises to the public sewers / sewerage system 	<ul style="list-style-type: none"> Architectural / Engineering drawings Topo Survey Plan
Piling Gateway (G1.5) (Optional)	Prior to commencement of piling works, QP / PE shall obtain approval for relevant works (works requiring Earth Control Measures, specified activities within water and sewer pipe corridor)	Details of specified activities within water and sewer pipe corridor, temporary works affecting drains, within drainage reserve etc. where applicable as listed under “Independent Submissions”	<ul style="list-style-type: none"> Engineering drawings Topo Survey Plan Method Statement Engineering calculations PE endorsed reports



Overview of PUB's External Works

Note that External Works is undergoing further refinements. More updates will be released in future COP versions.

Key Gateways	Objective	Details to be prepared (other details to be prepared and submitted as required)	Supporting Information required
Construction Gateway (G2)	To evaluate the detailed plans showing the proposed drainage (e.g. upgrading, new construction) and sewerage works (e.g. sewer diversion)	<ul style="list-style-type: none"> • Works affecting Sewer (e.g. proposed sewers / manhole, pump sumps / pumping main, abandon sewers/manhole, RC Trench for housing the public sewer) • Works affecting Drainage (e.g. common drain, Drainage Reserve entrance culvert / roadside drain, slab over drain for meter compartment) 	<ul style="list-style-type: none"> • Engineering drawings • Engineering calculations • PE endorsed reports
Independent Submissions	To obtain PUB's approval for works / site activities within RRL affecting drainage, sewerage or water services (where applicable)	<p><u>Drainage</u></p> <ul style="list-style-type: none"> ○ Earth Control Measures (ECM) Plan ○ Details of temporary works affecting drainage/within drainage reserve <p><u>Sewerage / Sanitary</u></p> <ul style="list-style-type: none"> ○ Details and scope of works on manholes and sewers ○ Specified activities within sewer corridor <p><u>Water</u></p> <ul style="list-style-type: none"> ○ Site plans, water reticulation schematic / layout drawing of WSI design works and water requirements ○ Specified activities within water pipe corridor 	<ul style="list-style-type: none"> • Engineering drawings • Topo Survey Plan • Method Statement • Engineering Calculations • PE endorsed reports



PUB's External Works Requirements

G1 Design Gateway

Objective:

- ✓ To assess whether the proposed drainage and sewerage works are in compliance with broad planning parameters (e.g. maximum allowable peak runoff, sewer setback, connection to public sewer etc.)

Requirements	Supporting Documents
<u>Peak Run Off</u> <ul style="list-style-type: none"> Key Objective: To demonstrate how this is catered for, area is set aside for detention tank provision, location, OR drain widening Calculation of peak run off factor (C value) max. 0.55 (based on code and chart) e.g. area of development of greenfield site 	-
<u>Roadside Drain Capacity</u> <ul style="list-style-type: none"> For projects where drains need to be rebuilt / entrance culvert. PUB to provide required capacity during Pre-Submission consultation Size of new culvert (will be advised by PUB) Public Drains - Drain Size and Location 	-
<u>Sewer Connection</u> <ul style="list-style-type: none"> Connection Point – where the proposed location is 	-
<u>Sewerage System</u> <ul style="list-style-type: none"> Alignment of Sewers, Dimensions, Gradient 	-
<u>Drainage Reserve</u> <ul style="list-style-type: none"> Location (align to DIP), width 	-

G1.5 Piling Gateway (Optional)

Objective:

- ✓ Prior to commencement of piling works, QP / PE shall obtain approval for relevant works (works requiring Earth Control Measures, specified activities within water and sewer pipe corridor)

Requirements	Supporting Documents
 Pre-Condition CCTV of Sewers (advisable) <i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i> <ul style="list-style-type: none"> Condition to be checked at TOP stage Project team to rectify if cracks / damage are identified 	-



PUB's External Works Requirements

G2 Construction Gateway

Objective:

- ✓ To evaluate the detailed plans showing the proposed drainage (e.g. upgrading, new construction) and sewerage works (e.g. sewer diversion)

Requirements	Supporting Documents
<u>Public Drains (External)</u> <ul style="list-style-type: none"> • Details of Roadside Drains based on PUB's requirements 	-
<u>Public Sewerage System (External)</u> <ul style="list-style-type: none"> • Details of Sewerage System based on PUB's requirements 	

- Independent Submissions

Objective:

- ✓ To evaluate the detailed plans showing the proposed drainage (e.g. upgrading, new construction) and sewerage works (e.g. sewer diversion)

Requirements	Supporting Documents
<ul style="list-style-type: none"> • Site plans, water reticulation schematic / layout drawing of WSI design works and water requirements • Specified activities within water pipe corridor 	-
<ul style="list-style-type: none"> • Earth Control Measures (ECM) Plan • Details of temporary works affecting drainage / within drainage reserve 	-
<ul style="list-style-type: none"> • Details and scope of works on manholes and sewers • Specified activities within sewer corridor 	-

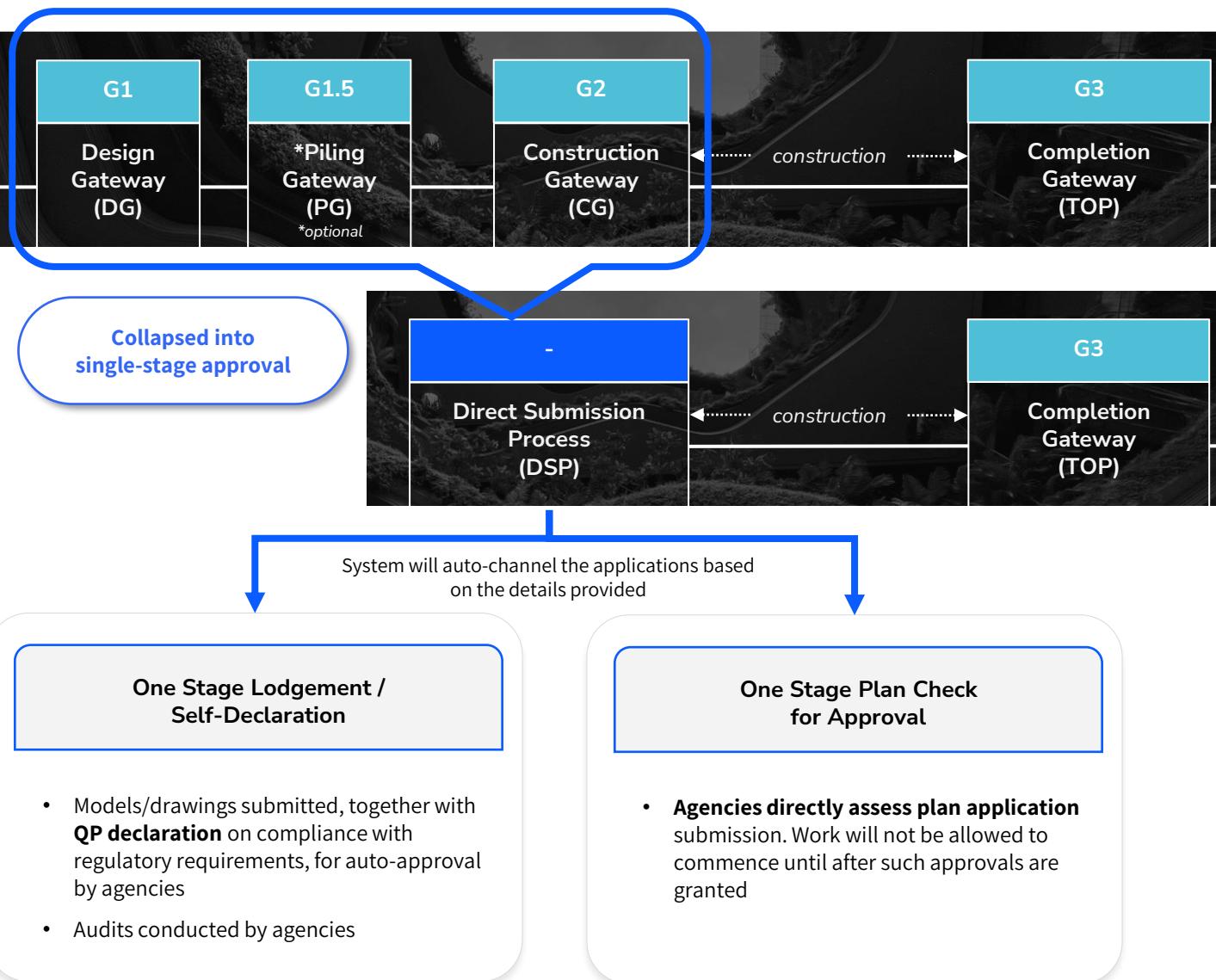
----- End of External Works Requirements for PUB -----

For the rest of PUB's requirements, please refer to [Page 74](#).

Direct Submission Process (DSP)

► About

- While the multi-gateway RABW will be the default regulatory process for most applications, simpler development typologies (e.g. single-unit residential development, standalone pavilion / linkway, racking system, etc.) need not be subjected to the typical RABW 3-Gateway Process, and can be approved through a more direct process.
- Instead of multiple touchpoints at Design Gateway, Piling Gateway (optional) and Construction Gateway, the Direct Submission Process (DSP) is developed as a **single-stage approval** prior to TOP/CSC.
- Industry can carry out pre-submission consultations with Agencies before proceeding with DSP with greater certainty
- Eligible projects will be put under DSP. Through the guided submission process, projects will also be put through lodgement / self-declaration / simplified submission scheme if eligible.



Section 3: Specific Requirements by Other Building Works

Conservation

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

• KEY GATEWAYS •

• OTHER BUILDING WORKS •

BIM DATA REPRESENTATION



Conservation

Legend:



Architecture



C&S



M&E

IFC COMPONENT

Note that Conservation projects are in the exploratory phase of CORENET X submissions and do not need to be submitted in IFC-SG. More updates will be released in future COP versions.

- Pre-Submission, Planning and Other Consultations

Key Words	Requirement Category
Conservation	<p>Monument</p> <p>Applicant is to obtain Preservation of Sites and Monuments (PSM)'s endorsement of the proposal prior to making the Design Gateway submission.</p>

G1 Design Gateway

Key Words	Requirement Category
<p>Conservation</p> <ul style="list-style-type: none"> <input type="button" value="SITE BOUNDARY"/> <input type="button" value="SLAB"/> <input type="button" value="BUILDING STOREY"/> <input type="button" value="WALL"/> <input type="button" value="SPACE"/> <input type="button" value="SITE"/> 	<p>Building Form</p> <ul style="list-style-type: none"> Building height Building profile and extent of conserved building and/or monument Building profile of new extension and new envelop control developments Setback of new extension from conserved building and/or monument Interfacing zone and linkage to conserved building and/or monument <p>Levels</p> <ul style="list-style-type: none"> Five-footway and internal building finished floor levels Existing and proposed levels of surrounding open walkway or compound <p>Party-wall Developments</p> <ul style="list-style-type: none"> Height levels (i.e. Roof ridge and eave, covered and open walkways) of immediately adjacent party wall developments <p>Roof</p> <ul style="list-style-type: none"> Profile, pitch and height Rooftop structure on existing flat roof, if any Mono-pitched link for Secondary Settlement <p>Site Layout</p> <ul style="list-style-type: none"> Location of conserved extent of building <p>Supplementary Documents:</p> <ul style="list-style-type: none"> a) Business concept and furniture layout of proposed use for change of use in Historic Conservation Area (HCA) b) (For non-BIM submission) Measured survey drawing (for unrestored building) c) (For BIM submissions) BIM model of existing building for unrestored building or BIM model of approved plan for restored building * d) Façade and interior photographs e) Development Statement of Intent (DSI) f) Design Advisory Panel (Conservation) (DAPC) presentation material, if required g) Documentation of existing buildings, if required <p>Note: Extent of proposals to the above should be clearly indicated e.g. repair of existing, retention of existing, reinstatement of missing elements, 1-for-1 replacements or proposed removal.</p> <p>* A restored building is a conserved building which has been restored according to the conservation guidelines and has been issued a Certificate of Statutory Completion (CSC) clearance.</p>

Section 3: Specific Requirements by Other Building Works

Conservation

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

• KEY GATEWAYS •

• OTHER BUILDING WORKS •

BIM DATA REPRESENTATION



Conservation

Legend:



Architecture



C&S



M&E

IFC COMPONENT

Note that Conservation projects are in the exploratory phase of CORENET X submissions and do not need to be submitted in IFC-SG. More updates will be released in future COP versions.

G2 Construction Gateway - All Design Gateway requirements will apply, in addition to the following :-

Key Words	Requirement Category
Conservation 	<ul style="list-style-type: none"> Architectural features (e.g. windows, doors, plaster moulding, roof and floor finishes) New Structural works (e.g. strengthening) Interventions (e.g. new roof mezzanine, lift, openings) M&E installations (e.g. A/C units, flue) <p>Note: Extent of proposals to the above should be clearly indicated e.g. repair of existing, retention of existing, reinstatement of missing elements, 1-for-1 replacements or deletions.</p> <p>Documents to be part of Approved Plan (Conservation)</p> <ul style="list-style-type: none"> a) Drawing or model of architectural details (e.g. decorative ornaments, doors, windows) <p>Supplementary Documents</p> <ul style="list-style-type: none"> a) Structural report, method statement, protective measure, PE's endorsement (for new structural works) b) Structural drawing (for new structural works) c) Design Advisory Panel (Conservation) (DAPC) presentation material, if required d) (For non-BIM submission) Measured survey drawing (for unrestored building) (if not already submitted in full in Design Gateway (G1)) e) (For BIM submissions) BIM model of existing building for unrestored building or BIM model of approved plan for restored building (if not already submitted in full in Design Gateway (G1)) f) Heritage interpretation plan, if required

Independent Submission

Key Words	Requirement Category
Conservation	<p>Conserved Building (remaining works to be checked)</p> <ul style="list-style-type: none"> Painting Signage

End of Conservation Requirements for URA

For the rest of URA's RABW requirements, please refer to [Page 83](#).

SECTION 4

BIM Data Representation (IFC-SG) and Modelling Good Practice

4**BIM Data Representation (IFC-SG) and Modelling Good Practice****BIM Data Representation (IFC-SG)**

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| • Glossary of “Identified Components” | 182 |
| • Modelling IFC-SG for BCA Structural Submission | 184 |
| • Modelling IFC-SG for SCDF Submission | 185 |

Glossary of “Identified Components”

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A		Fire Hydrant	226
Accessible Route	186	Foam Inlet / Outlet	227
		Footpath	228
B		Footing / Pilecap	229
Beam	188	G	
Borehole	197	Grating	235
Breeching Inlet	199	Green Verge	236
Building Storey	201	Gutter	237
C		H	
Ceiling	203	Hose Reel	238
Column	204	Household Shelter	239
Control Element	209	I	
Culvert	210	Interceptor	241
D		L	
Damper	212	Landscape Plants	243
* Distribution Chamber	213	Lift	245
Door	215	P	
E		Parking Lot	248
Earthworks	218	Pile	251
Electrical Fixture for Household / Storey Shelter	219	Pipes / Drains	257
Escalator	220	Planter Box	259
F		Planting Area	260
Family-Friendly Furniture	221	Pollution Control	262
Finishes	222	Prefabricated Building Systems and MEP Components	264
Fire Access Opening	223	Pump	266
Fire Alarm	224		
Fire Extinguisher	225		
		R	
		Railing	268
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		Refuse Handling Equipment	274
		Road	276
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		• Sink	
		• Urinal	
		• Wash Basin	
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		Seating	285
		Security Lighting	286
		Sensor	287
		Shading Device	288
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		Site	290
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		Soffit	344
		Sprinkler (Non-Fire) (For NEA)	345
		Staircase	346
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Glossary of “Identified Components”

Pg

T

<u>Tank</u>	354
<u>Type Bedding for Pipe</u>	357

V

<u>Valve</u>	358
------------------------------	-----

W

<u>Wall</u>	360
<u>Waste Terminal</u>	368
<u>Water Meter</u>	369
<u>Window</u>	370

X, Y, Z**Notes**

* Distribution Chamber includes Inspection Chambers, Manholes, Meter Chambers, Sampling Sumps and Sumps.

** As ‘IfcSpace’ is the most common component across all agencies, it is broken down into 2 sub-sections for ease of understanding. ‘IfcSpace’ consists of:

- Space (Area Schemes)
- Space (Usage)



Modelling IFC-SG for Structural Submission

► List of inputs for IFC-SG Structural Parameters

Structural Parameters	
IFC-SG Property	List
BeamSpanType	<ul style="list-style-type: none"> Single End Interior Cantilever
ConnectionTypeBottom, ConnectionTypeTop, LeftConnectionType, or RightConnectionType	<ul style="list-style-type: none"> Pinned Fixed Free
ConstructionMethod	<ul style="list-style-type: none"> CIS PC PT (Pre) PT (Post) PF PPVC Spun [for pile element only]
MaterialGrade	<ul style="list-style-type: none"> C12/15 C20/25 C30/37 C32/40 C35/45 C40/50 C50/60 C55/67 C60/75 C70/85 C80/95 S235 S275 S355 S460 High Strength Concrete
PileType	<ul style="list-style-type: none"> Driven Bored Jacked in

Structural Parameters	
IFC-SG Property	List
ReinforcementLength	<ul style="list-style-type: none"> Fully reinforced Unreinforced Any numerical value [up to 1 decimal place]
ReinforcementSteelGrade	<ul style="list-style-type: none"> 500A 500B 500C 600A 600B 600C
SectionFabricationMethod	<ul style="list-style-type: none"> Hot rolled Cold formed
SlabType	<ul style="list-style-type: none"> One way Two way Cantilever Flat slab Flat slab with drop panel Transfer Slab
StirrupsType, StirrupsTypeLeft, StirrupsTypeMiddle, or StirrupsTypeRight	<ul style="list-style-type: none"> Normal U C CL [for civil defence shelter] Torsion

Abbreviation List:

CIS	- Cast in situ
PC	- Precast works
PT (Pre)	- Pre-tensioning works
PT (Post)	- Post-tensioning works
PF	- Prefabrication (e.g. steel, MET, etc.)
PPVC	- Precast-Prefabricate-Volumetric Component

Link:

[IFC-SG Resource Kit](#)

See also:

[Preparing models for submission](#)



Modelling IFC-SG for SCDF Submission

The following fire safety equipment / provision need not be shown in the model.

- Equipment, furniture, fixture (e.g. lighting, fans)
- Wiring connecting various system in building
- Netting with more than 50% opening
- Intumescent paint
- Flame retardant chemical
- Detailed composition of composite panel

The following fire safety equipment / provision need not be modelled in full.

They can be represented by suitable objects.

If the equipment / provision is applicable only to Independent Submission, they can be represented in 2D.

<ul style="list-style-type: none"> • Signage (exit staircase numbering, evacuation lift, re-entry floor, etc) • Signage for “PWD Holding Point” • Mean of communication between PWD holding point and FCC/24 hourly manned station. • Override device • Fire stopping material (for filling gap) • Composite panel • Hose reel drum (excluding cabinet/enclosure) • Breathing apparatus cabinet/enclosure (for Total flooding fire extinguishing system) • Generator/emergency generator/standby generator • transformer • Fire extinguisher • Housing cabinet/enclosure • Main fire alarm panel/cabinet • Sub fire alarm panel/cabinet • Manual call point • Standby hose cabinet/enclosure • Bell for manual alarm • Vision alarm – strobe light • Smoke/heat detector • Home Fire Alarm Device (HFAD) • Video Image Fire Detection System (VIFDS) • Sprinkler head • Sprinkler control valve 	<ul style="list-style-type: none"> • Fire pump & control panel • Fire water tank • Compressed cylinders & discharge nozzle for Water mist system • Compressed cylinders & discharge nozzle for fixed automatic fire extinguishing systems (e.g kitchen suppression system, GM200, etc) • Fire lift switch • Evacuation switch • Intercom system in fire lift • CCTV camera • Lift control panel • Lift car • Standby fans/ multiple fans • Fire damper • Smoke damper • Air-handling unit • Air conditioner compressor + unit • Exit/directional exit sign (high level and low level) <ul style="list-style-type: none"> • Need to provide arrow if for directional exit sign • Emergency lighting • Photoluminescent marking • Equipment/services in Fire Command Centre mentioned in Cl. 8.2.4b. • Speakers for public address system/emergency voice communication system • Handset/cabinet/enclosure (for emergency voice communication system)
--	--

Link:

[IFC-SG Resource Kit](#)

See also:

[Preparing models for submission](#)

Accessible Route

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
Key Words	Agency	Requirement Category	
Rapid Transit System (RTS) Station	URA	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> • Lines of Road Reserve / Site boundary of adjacent land parcels • Location of station box and its associated tunnels & structures • Land take required (footprint to be optimized to minimize the land-take) • Details of Loading Provision (e.g. Loading grid plan) • Design of pop-up & ancillary structures (within approved railway, setback, mitigation of platform levels, interfacing with neighbouring developments, CW provision) • Annotation for at-grade servicing areas (e.g. bin centre, loading / unloading bays, required to serve the retail uses within the station) • Integration approach with existing / future structures (e.g. location / orientation / size of vents) • Connectivity with other transport infra structure facilities and key pedestrian routes • Taxi stand / Vehicular drop-off • KOP details (e.g. exact alignment, size) • Retail quantum (capped at 2000 sqm) <p> Supporting Documents:</p> <ol style="list-style-type: none"> a) Submission of RTS Checklist b) Method of construction (cut and cover , tunnel boring) c) Details of Loading Provision (Draft DIR - WIP) d) Copy of the relevant approvals for the proposed retail quantum <p><i>Note: Coordinated by the Architect, with inputs from respective engineers</i></p>	

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Access to Site	BCA	<ul style="list-style-type: none"> • Passenger Alighting and Boarding Point • Accessible Route (to the ingress / egress of the development entrance) 	
Access within Building only		<ul style="list-style-type: none"> • Headroom and Ceiling Height • Accessible Route and Maneuvering Space (within the development) 	
Vehicular Parking		<ul style="list-style-type: none"> • Provision of Accessible Lot(s) 	
Rapid Transit System (RTS) Station	URA	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> • Design and location of at-grade bicycle parking <p> Supplementary Documents</p> <ol style="list-style-type: none"> a) Night lighting report 	

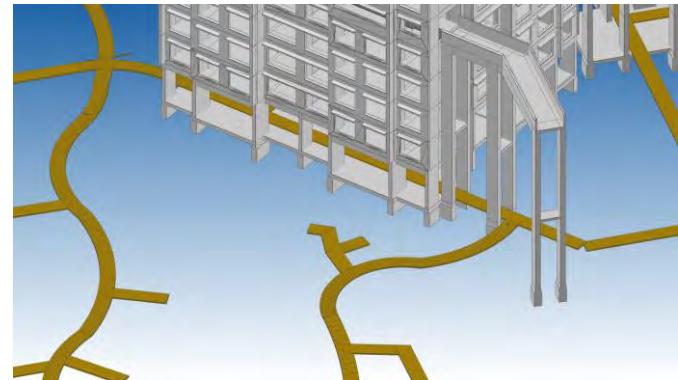
► Modelling Accessible Route in IFC-SG

- This component can be modelled with Generic Models (Revit), Model Element (ArchiCAD), or Object (OpenBuildings) functions in the respective Native BIM software
- Other components that could be viewed with Accessible Route may include: Lift, Ramp, Slab, Space, Vehicular Parking, if they contain a positive BarrierFreeAccessibility property

Accessible Route



S4 – Fig 1: Accessible Route within BIM model



S4 – Fig 2: Accessible Route with BIM model hidden

► By IFC Representation

IFC Entity: [IfcBuildingElementProxy](#), [IfcSlab](#), [IfcCivilElement](#), [IfcRamp](#), [IfcSpace](#)

IFC SubType: ACCESSIBLEROUTE

S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	BarrierFreeAccessibility	Boolean	-	-	Yes	TRUE / FALSE
2	Width	Length	-	mm	No	1200

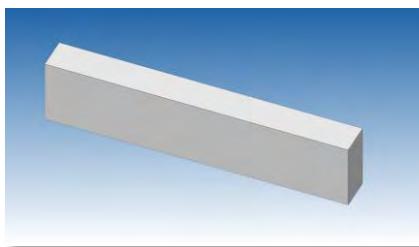
Beam

Legend: Architecture C&S M&E

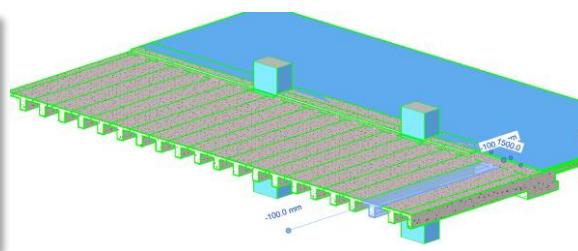
► By Key Gateways

G1.5 Piling Gateway (Optional)			
	Key Words	Agency	Requirement Category
	Structural Design	BCA	<p>Structural Design</p> <ul style="list-style-type: none"> • Complete set of IFC-SG model(s) for all structural elements (e.g. ground beam, tie beam) & details • 2D drawings limited to: <ul style="list-style-type: none"> ◦ General Notes ◦ Complex Beam Detailing

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Buildability	BCA	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> • BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems • Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p>Buildable Design Score (B-Score)</p> <ul style="list-style-type: none"> a) BS01 Form (in Excel format) to be submitted
	Structural Design		<p>Structural Design (Main Structural Elements of Building)</p> <ul style="list-style-type: none"> • Complete set of IFC-SG model(s) for all structural elements & details • 2D drawings limited to: <ul style="list-style-type: none"> ◦ General notes ◦ Special details (e.g. slab reinforcement detailing, complex structure detailing, transfer plate detailing, irregular section detailing, precast joints, prestressed details, steel connections.)



S4 – Fig 3 : Beam



S4 – Fig 4 : Concrete Rectangular Beam

► Modelling Beam in IFC-SG

- All the beam elements shall be modelled in IFC-SG model with the necessary information required as stipulated in the tables below.
 - Typical beams are allowed to have same marks and design information. All marks and design information have to be embedded in every beam element.
 - Multiple beams elements shall be modelled from support to support for beams with continuous spans.
- 2D detail drawings are allowed for any irregular or complex beam design (e.g. transfer beams, precast beams, prestressed beams, cold-form steel beams, etc.) with the indication of drawing number in the IFC-SG parameter “ReferTo2DDetail”.

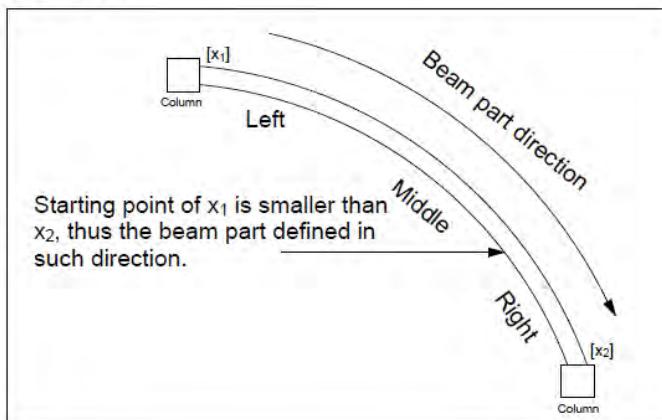
Beam

► Beam Property Definition

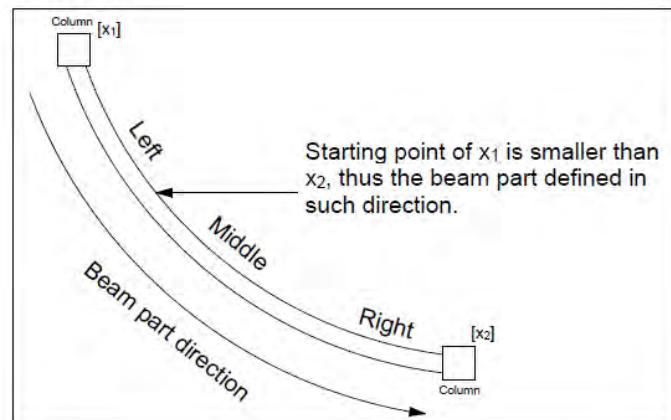
Beam Property Definition

1	Every beam will be detailed based on 3 parts (left, middle & right) in accordance to its local building axis orientation (refer to Figure 5 below).
2	Starting point of a beam should be the smallest x coordinate of local building axis orientation in a span and denoted as leftpart of a beam.
3	Behaviour of the beam (single, end, interior & cantilever span) shall be indicated in the parameters called “BeamSpanType”. Limitation of inputs for this parameter is applied. Please refer to List of input.

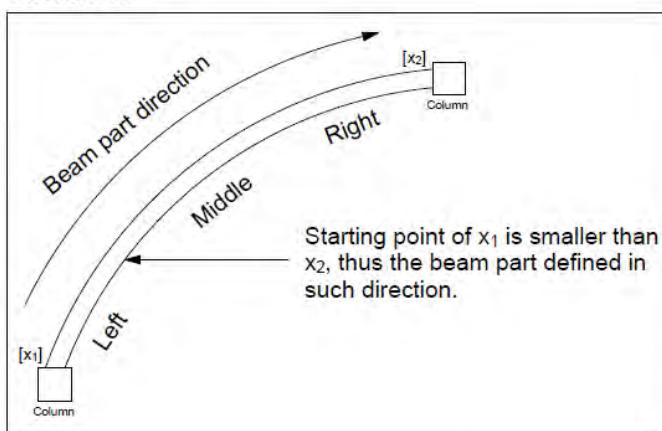
Scenario 1



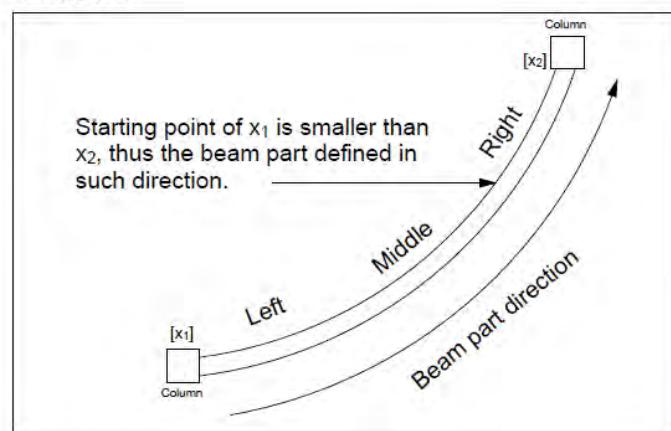
Scenario 2



Scenario 3



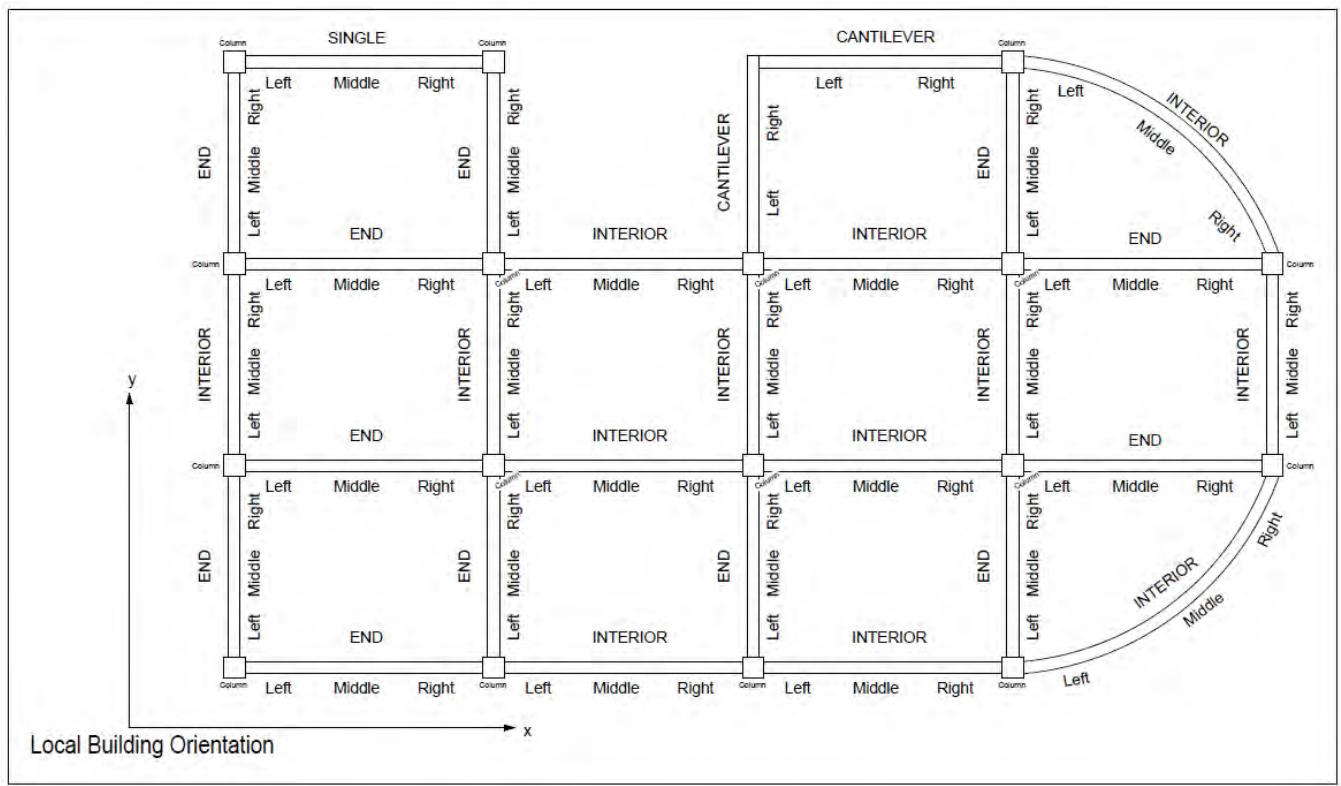
Scenario 4



S4 – Fig 5 : Beam Part Definition

Beam

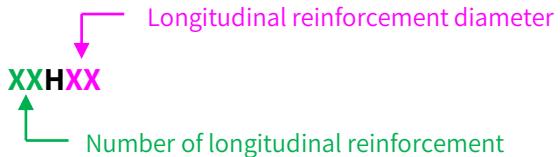
► Beam Property Definition (continued from previous page)



S4 – Fig 6 : Beam Sequencing and Span Definition

► Beam Reinforcement Definition

Beam Reinforcement Definition

1	A set of typical beam reinforcement annotation is provided for reference.
2	QP may provide a set of 2D typical drawings to present typical beam reinforcement annotation based on the standardised IFC-SG parameter names.
3	<p>The input for TopLeft, TopMiddle, TopRight, BottomLeft, BottomMiddle & BottomRight shall be "XXHXX" while "H" is a must, 1st XX is number of longitudinal reinforcement & 2nd XX is the reinforcement diameter</p> <ul style="list-style-type: none"> Use '+' for more than 1 layer of reinforcement (e.g. 12H32+6H20) <p style="text-align: center;">  XXHXX Longitudinal reinforcement diameter → H Number of longitudinal reinforcement → XX </p>

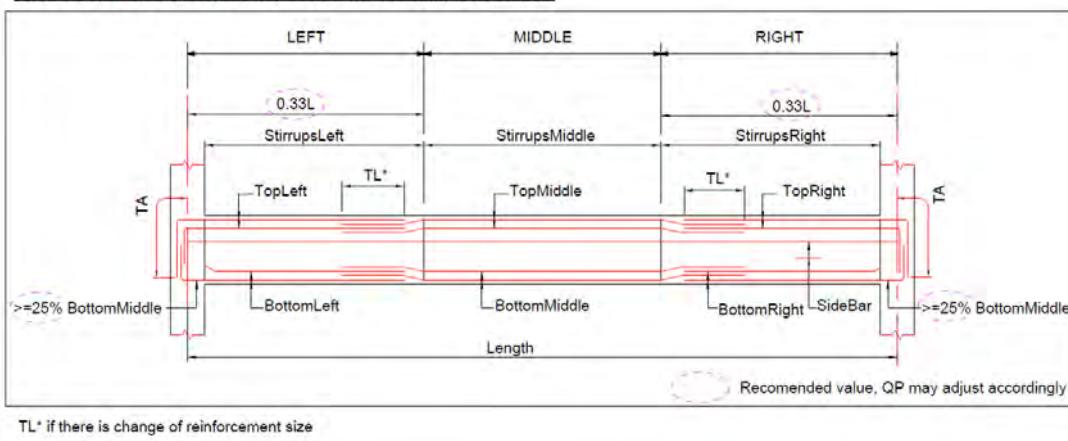
Beam

► Beam Reinforcement Definition (continued from previous page)

Beam Reinforcement Definition

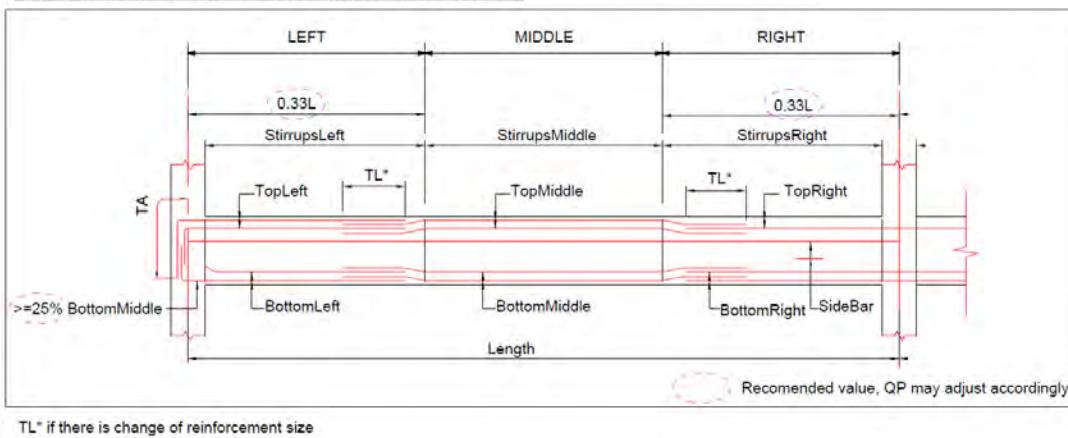
4	<p>The input for StirrupsLeft, StirrupsMiddle & StirrupsRight shall be “XXHXX-XXX” while “H” is a must, 1st XX is number of legs for transverse reinforcement, 2nd XX is the reinforcement diameters and XXX is the spacing of transverse reinforcement</p> <ul style="list-style-type: none"> Use ‘+’ for more than 1 layer of reinforcement (e.g. 4H10-100 : [4 denotes 4 legs]) 
5	<p>Type of the beam stirrups (Normal link, U-link, C-link or torsion link) shall be indicated in the parameters called “StirrupType” based on beam part. Limitation of inputs for this parameter is applied. Please refer to list of input. This parameter is optional for input.</p>

SINGLE SPAN BEAM REINFORCEMENT ANNOTATION



S4 – Fig 7: Beam Annotation Single Span

END SPAN BEAM REINFORCEMENT ANNOTATION

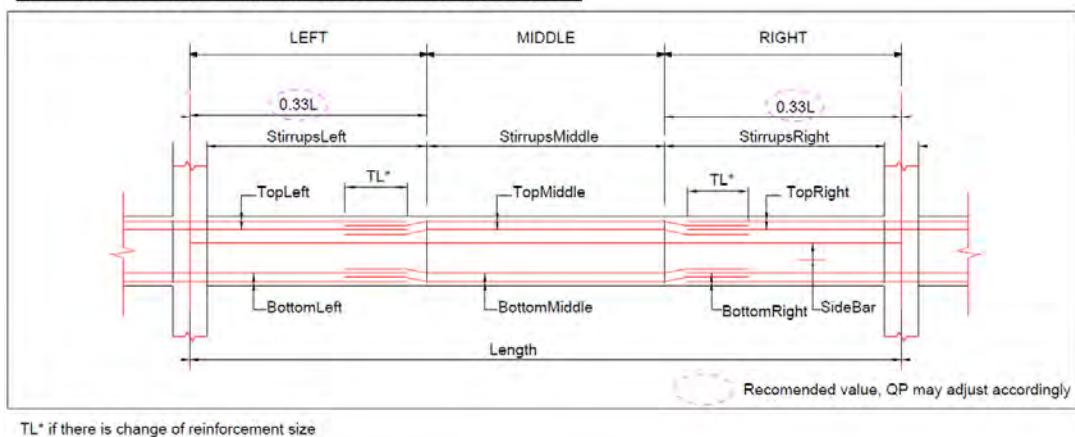


S4 – Fig 8 : Beam Annotation End Span

Beam

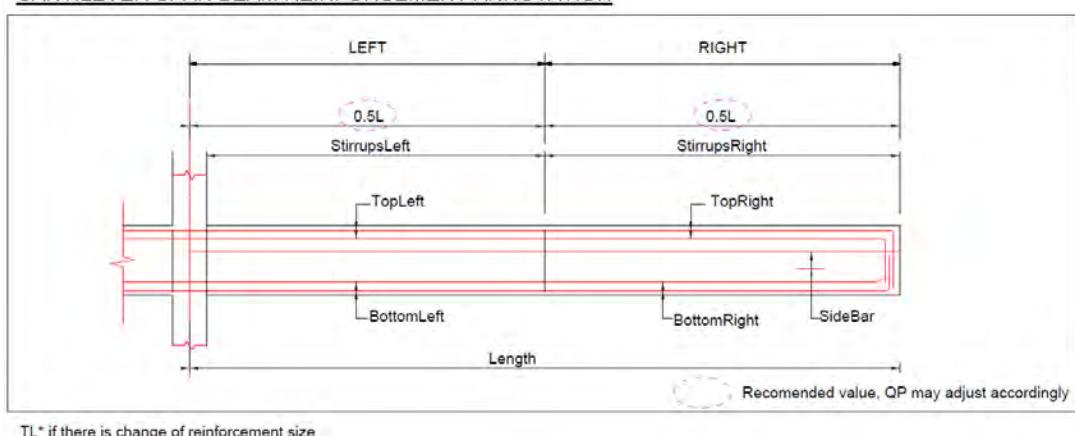
► Beam Reinforcement Definition (continued from previous page)

INTERIOR SPAN BEAM REINFORCEMENT ANNOTATION



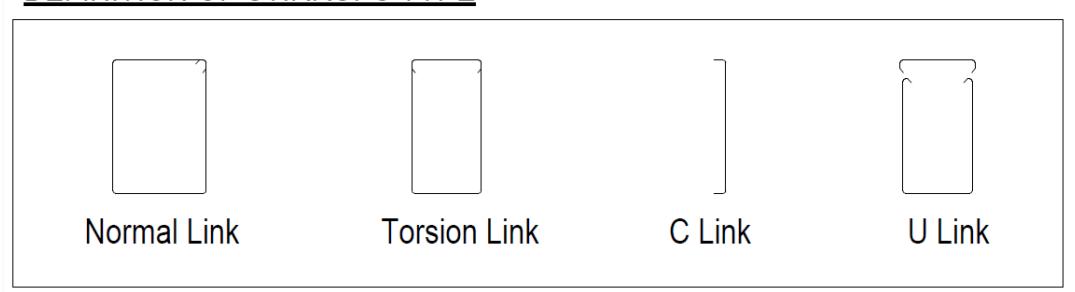
S4 – Fig 9 : Beam Annotation Interior Span

CANTILEVER SPAN BEAM REINFORCEMENT ANNOTATION



S4 – Fig 10 : Beam Annotation Cantilever Span

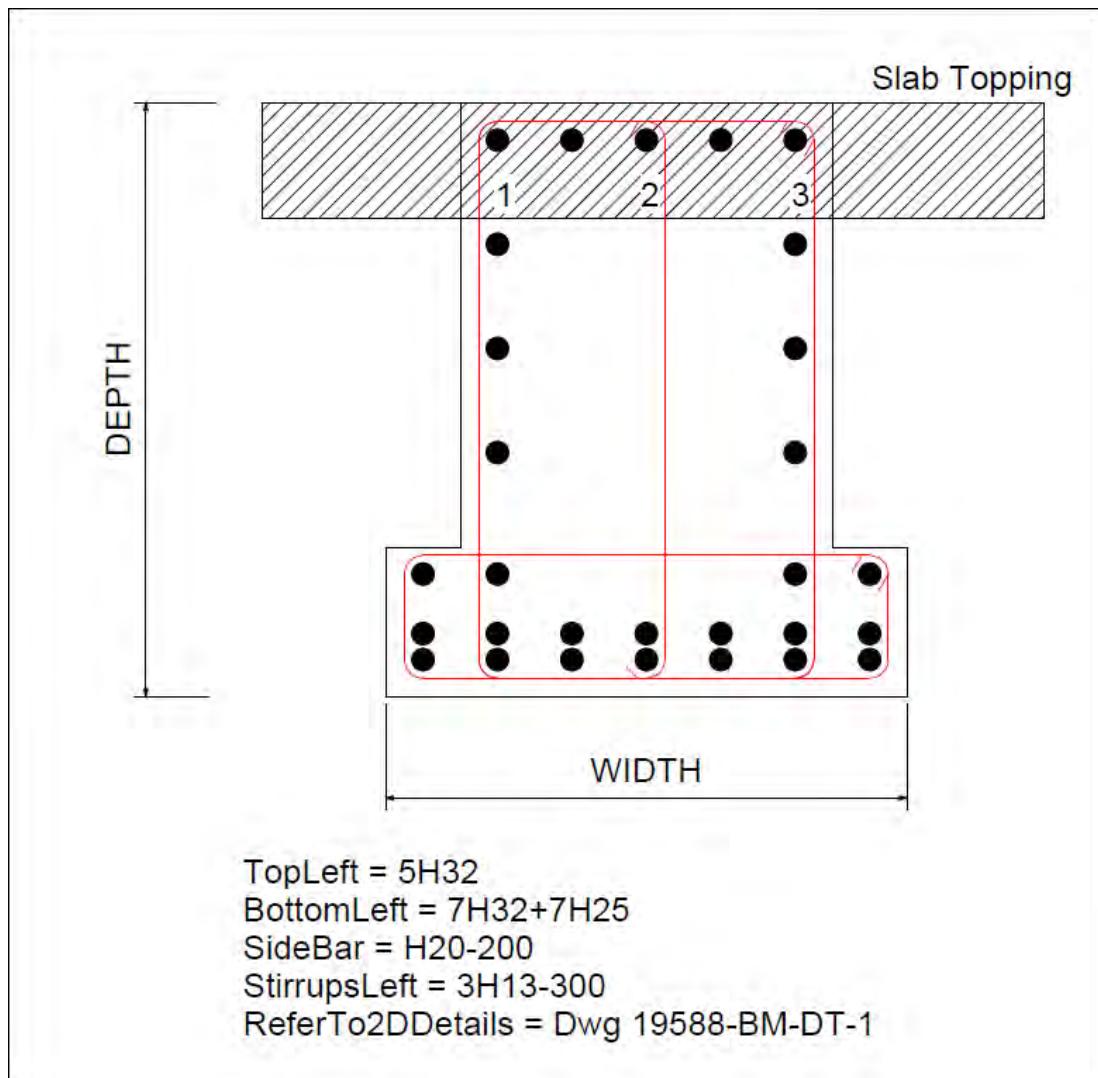
DEFINITION OF STIRRUPS TYPE



S4 – Fig 11 : Beam Annotation Stirrups

Beam

► Example of Irregular Beam Section



IRREGULAR BEAM SECTION

[S4 – Fig 12 : Irregular Beam Section](#)

Beam

► By IFC Representation

IFC Entity: IfcBeam						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	BeamSpanType	Text	All beams	-	Yes	Refer to list^
2	ConstructionMethod	Text	RC beam	-	Yes	Refer to list^
3	ReferTo2DDetail	Text	When required / relevant	-	No	Dwg Number
4	ReinforcementSteelGrade	Text	RC beam	-	Yes	Refer to list^
5	SectionFabricationMethod	Text	Steel beam	-	Yes	Refer to list^
6	Depth	Length	RC beam	mm	No*	600
7	Mark	Text	All beams	-	No	HB1, VB1, B1
8	MemberSection	Text	Steel beam	-	No	RHS600x30x4, CHS500x3.0, 254x254x63kg/m
9	Width	Length	RC beam	mm	No*	300
10	BottomLeft	Text	RC beam	-	Yes	3H25
11	BottomMiddle	Text	RC beam	-	Yes	3H32+3H25+3H20
12	BottomRight	Text	RC beam	-	Yes	3H25
13	SideBar	Text	When required / relevant	-	Yes	H13-250
14	StirrupsLeft	Text	RC beam	-	Yes	4H13-300
15	StirrupsMiddle	Text	RC beam	-	Yes	4H13-300
16	StirrupsRight	Text	Optional	-	Yes	4H13-300
17	StirrupsTypeLeft	Text	Optional	-	Yes	Refer to list^
18	StirrupsTypeMiddle	Text	Optional	-	Yes	Refer to list^
19	StirrupsTypeRight	Text	Optional	-	Yes	Refer to list^
20	TopLeft	Text	RC beam	-	Yes	3H32+3H25
21	TopMiddle	Text	RC beam	-	Yes	3H25
22	TopRight	Text	RC beam	-	Yes	3H32+3H25
23	MaterialGrade	Text	All beams	-	Yes	Refer to list^
24	LeftConnectionDetail	Text	Steel beam	-	No	Detail 1
25	LeftConnectionType	Text	Steel beam	-	Yes	Refer to list^

* Parameter is populated from the dimensions of BIM elements modelled.

^ List can be found [here](#).

Beam

► By IFC Representation (continued from previous page)

IFC Entity: IfcBeam						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
26	RightConnectionDetail	Text	Steel beam	-	No	Detail 1
27	RightConnectionType	Text	Steel beam	-	Yes	Refer to list^
28	SpliceConnection	Text	When required / relevant	-	No	Detail 3
29	Accreditation_PAS	Boolean	-	-	Yes	TRUE / FALSE
30	BeamCage	Boolean	-	-	Yes	TRUE / FALSE
31	PrefabricatedReinforcementCage	Boolean	-	-	Yes	TRUE / FALSE
32	MechanicalConnectionType	Text	-	-	No	Telescopic Beam Connector

* Parameter is populated from the dimensions of BIM elements modelled.

^ List can be found [here](#).

► Example of Beam (RC Beam) Structural Element Input

RC Beam (600x1200mm RC Precast Beam)	IFC Entity: IfcBeam		
	IFC SubType: N.A.		
<ul style="list-style-type: none"> • Mark – 4HB52 • Concrete grade C32/40 • Interior span • Top Rebar at support 6H32 • Bottom Rebar at support 6H20 • Top rebar at midspan 6H20 • Bottom Rebar at midspan 6H32+6H20 • Stirrups at support 3 leg H10-150 • Stirrups at midspan 3 leg H10-300 • Sidebar H16-200 	S/N	IFC-SG Property	Examples
	1	BeamSpanType	Interior
	2	ConstructionMethod	PC
	3	ReinforcementSteelGrade	500B
	4	Depth	1200
	5	Mark	4HB52
	6	Width	600
	7	BottomLeft	6H20
	8	BottomMiddle	6H32+6H20
	9	BottomRight	6H20
	10	SideBar	H16-200

Beam

► Example of Beam (RC Beam) Structural Element Input

continued from previous page

RC Beam (600x1200mm RC Precast Beam)	IFC Entity: IfcBeam		
	IFC SubType: N.A.		
S/N	IFC-SG Property	Examples	
11	StirrupsLeft	3H10-150	
12	StirrupsMiddle	3H10-300	
13	StirrupsRight	3H10-150	
14	StirrupsTypeLeft	Normal+C	
15	StirrupsTypeMiddle	Normal+C	
16	StirrupsTypeRight	Interior	
17	TopLeft	6H32	
18	TopMiddle	6H20	
19	TopRight	6H32	
20	MaterialGrade	C32/40	

► Example of Beam (Steel Beam) Structural Element Input

Steel Beam (UC254x254x63kg/m Steel Beam)	IFC Entity: IfcBeam		
	IFC SubType: N.A.		
S/N	IFC-SG Property	Examples	
1	BeamSpanType	Cantilever	
2	ConstructionMethod	PF	
3	SectionFabricationMethod	Hot Rolled	
4	Mark	SB1	
5	MemberSection	UC254x254x63kg/m	
6	MaterialGrade	S355	
7	LeftConnectionDetail	-	
8	LeftConnectionType	Free	
9	RightConnectionDetail	Typical connection of SB1 to C1 on dwg 19588-ST-DT-3	
10	RightConnectionType	Fixed	

Borehole

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1.5 or G2 Piling Gateway (Optional) or Construction Gateway			
Key Words	Agency	Requirement Category	
Structural Design	BCA	<p>Structural Design (Piling and Foundation Works)</p> <p><i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i></p> <ul style="list-style-type: none"> • Piling & Foundation Works IFC-SG model • Ground Investigation: <ul style="list-style-type: none"> ○ Compliance with minimum number of borehole required as stipulated in Circular APPBCA-2016-08 • 2D Drawings limited to: <ul style="list-style-type: none"> ○ General notes ○ Irregular Pilecap / Footing Details <p> Design Calculation reports:</p> <ul style="list-style-type: none"> • From QP, AC, [QP(Geo) & AC (Geo), if needed]) <p> Additional Supporting Documents:</p> <ol style="list-style-type: none"> a) Site investigation report in PDF & AGS format b) Impact assessment report c) Topography d) Complete set of structural framing plan for reference e) Complete set of building plan for reference f) Completion letter of pre-consultation (for complex structure only) 	

► Modelling Borehole in IFC-SG

- All the boreholes shall be modelled as per true coordinates in the IFC-SG structural model with the necessary information required as stipulated in the tables below.
 - The borehole elements shall be modelled with reasonable visibility for its location.
- The SI report for all boreholes shall be included and submitted in PDF & AGS format.

► By IFC Representation

IFC Entity: IfcBuildingElementProxy						
IFC SubType: BOREHOLE						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Depth	Length	All boreholes	mm	No*	14560
2	Mark	Text	All boreholes	-	No	BH1
3	SHDLevel_SPT_MoreThan_100N	Real	All boreholes	SHD Level	No	-27.5
4	SHDLevel_SPT_MoreThan_60N	Real	All boreholes	SHD Level	No	-15.0
5	TerminationLevel	Real	All boreholes	SHD Level	No	-50.5
6	TopLevel	Real	All boreholes	SHD Level	No	1.8

* Parameter is populated from the dimensions of BIM elements modelled.

Borehole

► Example of Borehole Structural Element Input

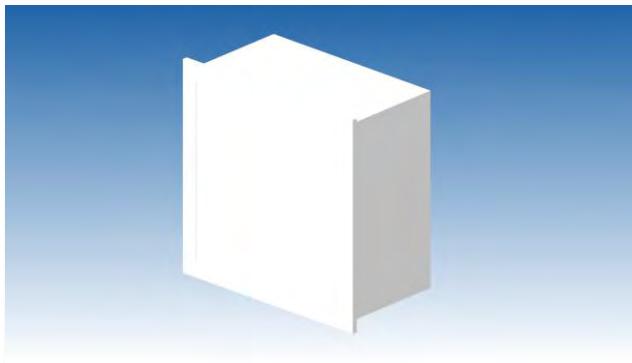
Borehole			IFC Entity: IfcBuildingElementProxy		
			IFC SubType: BOREHOLE		
			S/N	IFC-SG Property	Examples
<ul style="list-style-type: none"> • Mark – BH1 • Starting level SHD 1.50 • Termination level SHD -45.80 • Starting of soil layer with SPT>60N at SHD -16.80 • Starting of soil layer with SPT>100N at SHD -35.60 	1	Depth		47300	
	2	Mark		BH1	
	3	SHDLevel_SPT_MoreThan_100N		-35.6	
	4	SHDLevel_SPT_MoreThan_60N		-16.8	
	5	TerminationLevel		-45.8	

Breeching Inlet

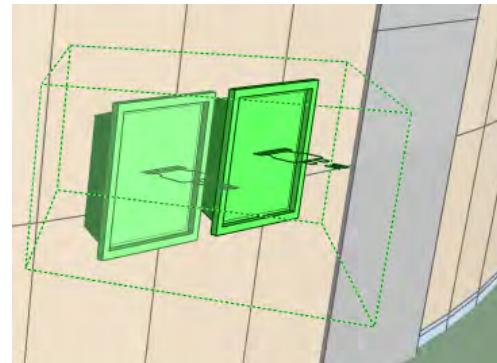
Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Fire Alarm System	SCDF	<p>Combined Sprinkler and Wet Riser System</p> <ul style="list-style-type: none"> Types of buildings / areas requiring combined sprinkler and wet riser system Provision of sprinklers for basement and aboveground QP to declare combined sprinkler and wet riser system is provided for the functional space <p><u>Components to be modelled:</u></p> <ul style="list-style-type: none"> Location of Sprinkler Control Valve Breeching Inlet Landing Valve <p><u>Components to be indicated:</u></p> <ul style="list-style-type: none"> Fire Alarm Panel
			<p>Sprinkler System</p> <ul style="list-style-type: none"> Types of buildings / areas requiring sprinkler system Provision of sprinklers for basement and aboveground buildings Exemption of sprinkler system <p><u>Components to be modelled:</u></p> <ul style="list-style-type: none"> Location of Sprinkler Control Valve Breeching Inlet <p><u>Components to be indicated:</u></p> <ul style="list-style-type: none"> Fire Alarm Panel
	Firefighting System		<p>Rising Mains and System</p> <ul style="list-style-type: none"> Type of rising main provided (Dry or Wet) Number rising main Location and coverage of landing valve <p><u>Components to be modelled for Dry and Wet Riser:</u></p> <ul style="list-style-type: none"> Breeching inlet Landing valve <p><u>Provision of Standby Fire Hose:</u></p> <ul style="list-style-type: none"> Types of buildings require standby fire hose Number of standby hose Located not more than 2m from landing valve <p><u>Provision of Breeching Inlet:</u></p> <ul style="list-style-type: none"> Location Number



S4 – Fig 13 : Breeching Inlet



S4 – Fig 14 : Breeching Inlet

Breeching Inlet

► By IFC Representation

IFC Entity: IfcFireSuppressionTerminal						
IFC SubType: BREECHINGINLET						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Hose_NominalDiameter	Text	-	mm	No	-
2	ID	Text	-	-	No	-

Notes

- Besides modelling the individual Breeching Inlet as an individual component, also ensure each Breeching Inlet is exported as part of the Dry Riser, Wet Riser, Foam Sprinkler or Sprinkler [System](#) respectively.

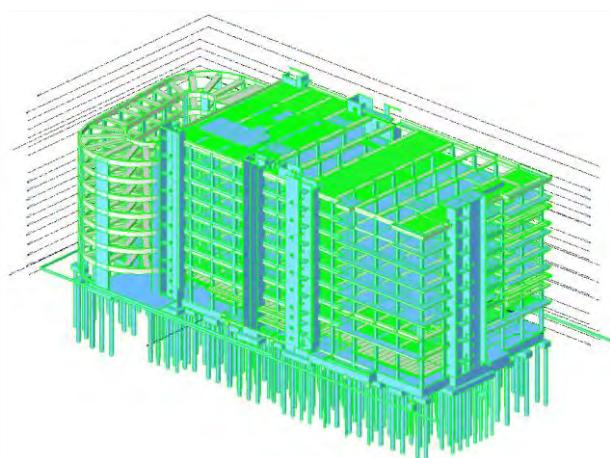
Building Storey

Legend: Architecture C&S M&E

► By Key Gateways

G1 Design Gateway			
Key Words	Agency	Requirement Category	
Building Massing	URA	Building Form and Massing <ul style="list-style-type: none"> Development Statement of Intent (DSI) – Response to site context Façade articulation and urban veranda (Orchard Road only) Party wall (indicate no openings, adjacent development, depth and height comply with guidelines) Building Height <ul style="list-style-type: none"> Floor-to-Floor Height & Aggregate Building Height <ul style="list-style-type: none"> Number of Stores Additional Height for Predominant Sky Terrace Storey Overall Building Height Control (incl. building crown and M&E floor, if any) Building Edge <ul style="list-style-type: none"> Alignment of building edge and percentage of building form articulation Height of building edge Depth of building edge 	

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Building / Unit Layout	URA	Unit / Floor Layout (All) <ul style="list-style-type: none"> Floor layout and unit size Strata areas and boundaries / voids Dwelling Units (Residential) <ul style="list-style-type: none"> Breakdown of units by type / size Unit layouts with breakdown of respective internal areas including balconies and air-con ledges 	



S4 – Fig 15 : Building Storey



S4 – Fig 16 : Building Storey with First Storey Plan selected

Building Storey

Legend:  Architecture  C&S  M&E

► Modelling Building Storey in IFC-SG

- Different levels of the building development are automatically exported to the IfcBuildingStorey entity in the IFC model.
- All disciplines must have be aligned in naming and z-value of the building storeys when geo-referencing their models for coordination
- If difficulties are encountered in the naming of a building storey due to site conditions, we encourage industry practitioners to carry out pre-consultation with relevant agencies early before modelling starts.

► By IFC Representation

IFC Entity: IfcBuildingStorey						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	AtticLevel	Boolean	-	-	Yes	TRUE / FALSE

Notes

- Different levels of the building development are automatically exported to the IFC model
- Roof level is required to be separately represented as a property to meet URA requirements

Ceiling

► By IFC Representation

IFC Entity: IfcCovering						
IFC SubType: CEILING						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	FireRating	Text	-	-	No	-
2	Material	Text	-	-	No	-

Column

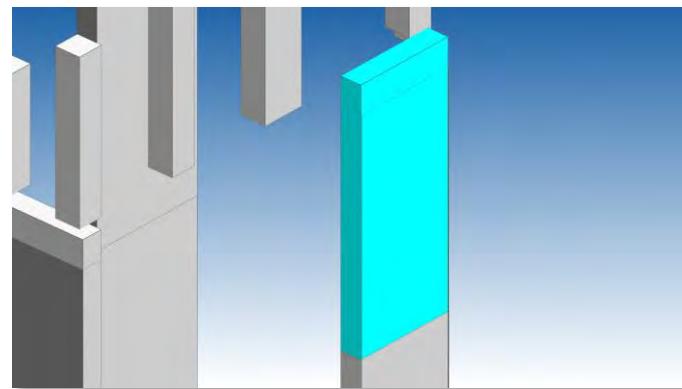
Legend: Architecture C&S M&E

► By Key Gateways

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Buildability	BCA	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> • BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems • Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p> Buildable Design Score (B-Score)</p> <p>a) BS01 Form (in Excel format) to be submitted</p>
	Structural Design		<p>Structural Design (Main Structural Elements of Building)</p> <ul style="list-style-type: none"> • Complete set of IFC-SG model(s) for all structural elements & details • 2D drawings limited to: <ul style="list-style-type: none"> ○ General notes ○ Special details (e.g. slab reinforcement detailing, complex structure detailing, transfer plate detailing, irregular section detailing, precast joints, prestressed details, steel connections.)



S4 – Fig 17: Columns in relation to the Building



S4 – Fig 18 : Column

► Modelling Column in IFC-SG

- All the column elements shall be modelled in IFC-SG model with the necessary information required as stipulated in the tables below.
 - Typical columns are allowed to have same marks and design information. The marks and design information have to be embedded in every column element.
 - Multiple columns elements shall be modelled from support to support (storey to storey) for continuous column.
 - Column working load is required for 1st storey column only.
- 2D detail drawings are allowed for any irregular or complex column section (e.g. L shape column, inclined column, composite column, cold-form steel column, etc.) with the indication of drawing number in the IFC-SG parameter “ReferTo2DDetail”.

Column

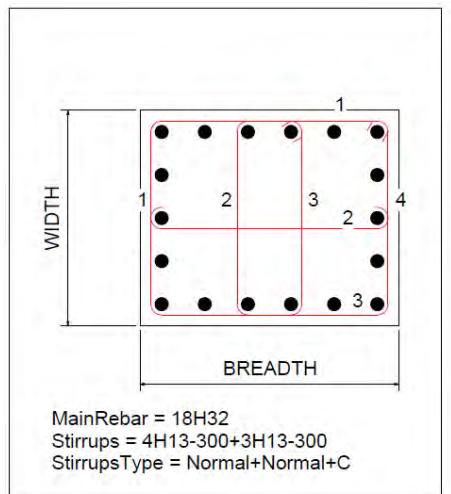
► Column Dimension and Reinforcement Definition

Column Dimension and Reinforcement Definition

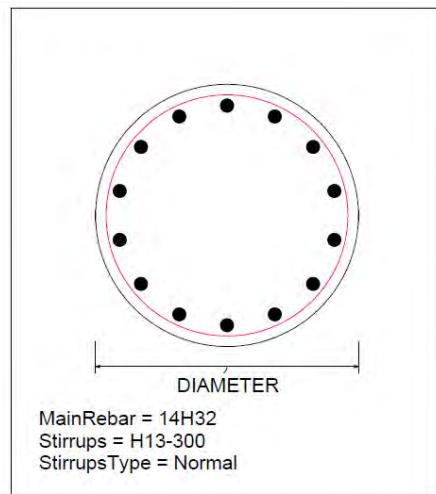
1	The breadth is referring to the longest side of a rectangular column while width is referring to the shorter side of a rectangular column, despite of the column orientation.
2	QP may substantiate a set of 2D column schedule drawings to present the orientation and arrangement of column reinforcement for illustration.
3	<p>The input for MainRebar shall be “XXHXX” while "H" is a must, 1st XX is number of longitudinal reinforcement & 2nd XX is the reinforcement diameter.</p> <ul style="list-style-type: none"> Use ‘+’ for bundle column reinforcement (e.g. 12H32+12H25) 
4	<p>The input for Stirrups shall be “XHXX-XXX” while "H" is a must, X is number of legs for transverse reinforcement, XX are the reinforcement diameter and XXX is the spacing of transverse reinforcement (e.g. 4H10-150).</p> <ul style="list-style-type: none"> Use ‘+’ for more than 1 layer of reinforcement (e.g. 4H10-100+4H8-100, [4 denotes 4 legs]) 
5	Type of the column stirrup (Normal link, U-link, C-link or torsion link) shall be indicated in the parameters called “StirrupType” based on beam part. Limitation of inputs for this parameter is applied. Please refer to <u>list</u> of input. This parameter is optional for input.

Column

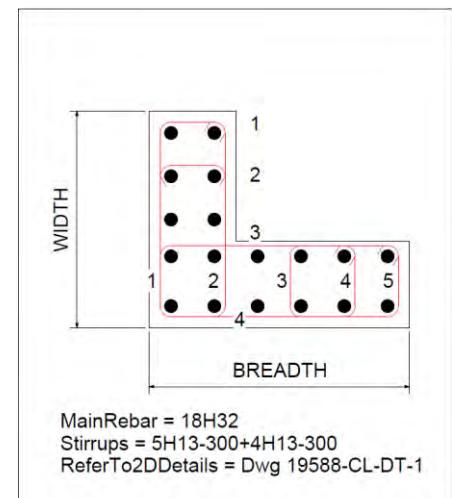
► Example of Column Sections



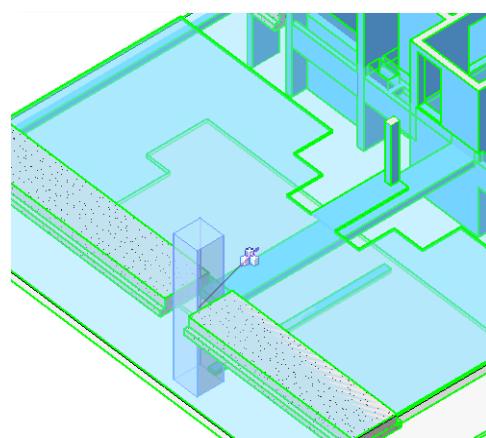
RECTANGULAR COLUMN SECTION



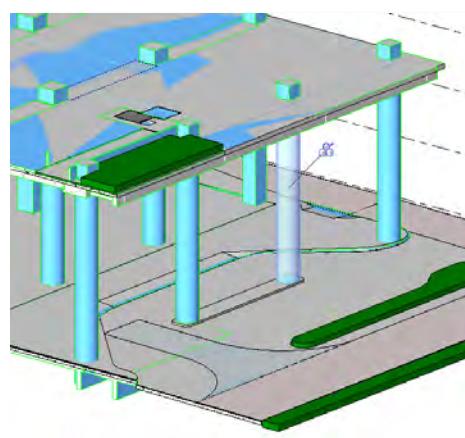
CIRCULAR COLUMN SECTION



IRREGULAR COLUMN SECTION



S4 – Fig 19: Rectangular Column



S4 – Fig 20 : Circular Column

S4 – Fig 21 : Irregular Column Section

Column

► By IFC Representation

IFC Entity: IfcColumn						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ConstructionMethod	Text	RC column	-	Yes	Refer to list^
2	ReferTo2DDetail	Text	When required / relevant	-	No	Dwg Number
3	ReinforcementSteelGrade	Text	RC column	-	Yes	Refer to list^
4	SectionFabricationMethod	Text	Steel column	-	Yes	Refer to list^
5	Breadth	Length	RC column	mm	No*	300
6	Diameter	Length	When required / relevant	mm	No*	600
7	EndStorey	Text	All columns	-	No	2 nd Storey, Roof Storey
8	Mark	Text	All columns	-	No	C1, TC1
9	MemberSection	Text	Steel column	-	No	RHS600x30x4, CHS500x3.0, 254x254x63kg/m
10	StartingStorey	Text	All columns	-	No	1 st Storey, Lower Roof Storey
11	Width	Length	RC column	mm	No*	600
12	MainRebar	Text	RC column	-	Yes	6H32+6H25
13	Stirrups	Text	RC column	-	Yes	4H13-300
14	StirrupsType	Text	Optional	-	Yes	Refer to list^
15	WorkingLoad_DA1-1	Integer	When required / relevant	kN	No	1234
16	WorkingLoad_DA1-2	Integer	When required / relevant	kN	No	1234
17	MaterialGrade	Text	All columns	-	Yes	Refer to list^
18	ConnectionDetailsBottom	Text	Steel column	-	Yes	Detail 1
19	ConnectionDetailsTop	Text	Steel column	-	Yes	Detail 1
20	ConnectionTypeBottom	Text	Steel column	-	No	Refer to list^
21	ConnectionTypeTop	Text	Steel column	-	No	Refer to list^
22	SpliceDetail	Text	When required / relevant	-	No	Detail 3
23	Accreditation_PAS	Boolean	-	-	Yes	TRUE / FALSE
24	ColumnCage	Boolean	-	-	Yes	TRUE / FALSE
25	PrefabricatedReinforcementCage	Boolean	-	-	Yes	TRUE / FALSE
26	MechanicalConnectionType	Text	-	-	No	Column Shoes
27	ArrangementType	Text	-	-	No	Multi-Tier

Column

► Example of Column (RC CIS Column) Structural Element Input

RC Column (600x600mm RC Cast-In-Situ Column)	IFC Entity: IfcColumn		
	IFC SubType: N.A.		
<ul style="list-style-type: none"> • Mark – C2 • Concrete grade C32/40 • From 1st storey to 2nd storey • Main rebar 8H20 • 2 nos H10-300 link (total 4 legs) • Load for DA1-1: 4536kN • Load for DA1-2: 3864kN 	S/N	IFC-SG Property	Examples
	1	ConstructionMethod	CIS
	2	ReinforcementSteelGrade	500B
	3	Breadth	600
	4	EndStorey	2nd storey
	5	Mark	C2
	6	StartingStorey	1st storey
	7	Width	600
	8	MainRebar	8H20
	9	Stirrups	4H10-300
	10	StirrupsType	Normal
	11	WorkingLoad_DA1-1	4536
	12	WorkingLoad_DA1-2	3864
	13	MaterialGrade	C32/40

► Example of Column (Steel Column) Structural Element Input

Steel Column (UC305x305x118kg/m Steel Column)	IFC Entity: IfcColumn		
	IFC SubType: N.A.		
<ul style="list-style-type: none"> • Mark – SC1 • Steel grade S355 hot rolled • From 6th storey to roof storey • Pinned connection to RC column at bottom part (Typical SC1 baseplate details) and support a steel frame (Typical connection of SB1 to SC1) 	S/N	IFC-SG Property	Examples
	1	ConstructionMethod	PF
	2	SectionFabricationMethod	Hot Rolled
	3	EndStorey	Roof Storey
	4	Mark	SC1
	5	MemberSection	UC305x305x118kg/m
	6	StartingStorey	6 th Storey
	7	MaterialGrade	S355
	8	ConnectionDetailsBottom	Pinned
	9	ConnectionDetailsTop	Pinned
	10	ConnectionTypeBottom	Typical SC1 baseplate details on dwg 19588-ST-DT-6
	11	ConnectionTypeTop	Typical connection of SB1 to SC1 on dwg 19588-ST-DT-6

Control Element

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
Environmental Health	NEA	<p>COPEH - Section 1: Refuse Storage and Collection</p> <p>1.1 Objective 1.2 Refuse Output 1.3 Refuse Chute 1.4 Refuse Chute Chamber 1.5 Refuse Room</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Equipment can be modelled as placeholders and supplier details can be provided in a separate document. 	<p>1.6 Refuse Bin Point and Refuse Bin Centre 1.7 Pneumatic Waste Conveyance System (PWCS) 1.8 Mandatory Waste Reporting Scheme 1.9 Location of Grease Trap 1.10 On-Site Food Waste Treatment System</p> <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.



S4 – Fig 22 : Control Panel

► By IFC Representation

IFC Entity: IfcUnitaryControlElement						
IFC SubType: CONTROLPANEL						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Purpose	Text	-	-	No	Main Panel, Sub Panel
2	PWCS_Flushing	Boolean	-	-	Yes	TRUE / FALSE

Culvert

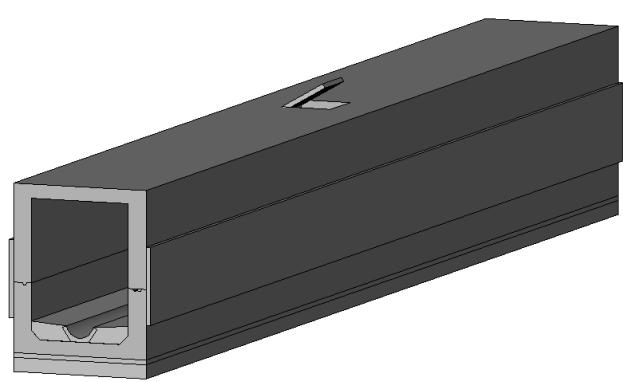
Legend:  Architecture  C&S  M&E

► By Key Gateways

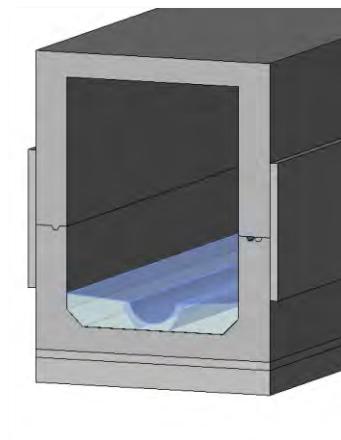
- Pre-Submission, Planning and Other Consultations			
	Key Words	Agency	Requirement Category
	Public Drains (External)	PUB	<p>Roadside Drain Capacity</p> <ul style="list-style-type: none"> For projects where drains need to be rebuilt / entrance culvert. PUB to provide required capacity during pre-submission consultation. Size of new culvert (will be advised by PUB) Public Drains – Drain Size and Location

G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Site Layout, Street Works	LTA	<p>Vehicular Access Points</p> <ul style="list-style-type: none"> To indicate the levels of entrance culvert and gradient of entrance approach To indicate the radius of turning road kerb To show the provision of tactile tiles and shifting of existing road elements (incl. trees, lamp post, signs, etc.) affected by proposed access

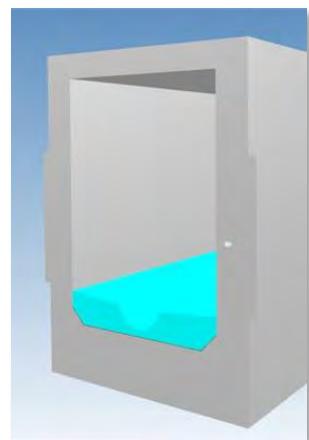
G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Site Layout, Street Works	LTA	<p>Access Point Details</p> <ul style="list-style-type: none"> Structural details of entrance culvert at access points (reinforcement, connection to entrance approach etc.) Levels, gradient, cross-fall Redundant access to be sealed and reinstated to match existing side-table



S4 – Fig 23 : Culvert



S4 – Fig 24 : Culvert



S4 – Fig 25 : Culvert

Culvert

► By IFC Representation

IFC Entity: IfcCivilElement						
IFC SubType: CULVERT, ENTRANCECULVERT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Loadbearing	Boolean	-	-	Yes	TRUE / FALSE
2	Diameter	Length	-	mm	No	-
3	Height	Length	-	mm	No	-
4	Length	Length	-	mm	No	-
5	Thickness	Length	-	mm	No	-
6	Width	Length	-	mm	No	-
7	Footpath	Boolean	-	-	No	-
8	Material	Text	-	-	No	-

Damper

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway		
Key Words	Agency	Requirement Category
Structural Fire Precautions	SCDF	<p>Compartmentation</p> <ul style="list-style-type: none"> Compliance of compartmentation requirements: <ul style="list-style-type: none"> Area and cubical extent to comply with Table 3.2A (for buildings not protected with sprinkler system) Maximum of 3 storeys per compartment when habitable height is not exceeding 24m Maximum of 1 storey per compartment when habitable height exceeds 24m Compliance of requirements for Atrium space Compliance of requirements for High hazard occupancy Exemption of size limitation of compartment for car park Compliance of area / room / usage requires compartmentation Location of fire damper
Mechanical Ventilation & Smoke Control System		<p>QP to declare at those functional space which are provided with the following Ventilation System(s):</p> <ul style="list-style-type: none"> Natural ventilation (NV) Mechanical ventilation (MV) Pressurisation Cross-ventilation Cross-ventilation with intermediate - ventilation opening Vapour extraction system (spray painting booth) <p>QP to declare at those functional space which are provided with the following Smoke Control System(s):</p> <ul style="list-style-type: none"> Ductless Jet Fan System Engineered Smoke Control System Smoke Purging System Smoke vent <p><i>Note: Details to be provided and submitted by M&E in Mechanical Ventilation (MV) Plan under Independent Submissions</i></p>

► By IFC Representation

IFC Entity: IfcDamper						
IFC SubType: FIREDAMPER, FIRESMOKE DAMPER, SMOKE DAMPER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	FireRating	Text	-	-	Yes	30min / 60min / 90min / 120min / 150min / 180min / 210min / 240min

Notes

- Modelling Damper is voluntary.
- Refer [here](#) for fire safety equipment / provisions that need not be modelled in full and can be represented by suitable modelling objects / components.

Distribution Chamber

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Sanitary (Internal)	PUB	<p>Indicative Location(s) of Drain-line and Inspection Chamber</p> <ul style="list-style-type: none"> Details (e.g. alignment) and Invert Level to be provided by M&E in Construction Gateway (G2)

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Connectivity	URA	<p>Pedestrian Network</p> <p>Through Block Link (TBL), Underground Pedestrian Link(UPL), Elevated Pedestrian Link (EPL), Covered Walkways (CW), Open Walkways (OW), Covered Linkways (CL), High Covered Linkways (HCL)</p> <ul style="list-style-type: none"> Loading provision to receive future walkways / linkways (if any) Notional scheme for future link to justify the loading (recipient) <p>Additional requirements for the following:</p> <ul style="list-style-type: none"> (CW) Soffit height, overall width and clear width (OW/CW) Paving material (where required in UD guidelines) (OW/CW) Level of bulk water meter chamber / inspection chamber (TBL) Location and Size of Signage (HCL) Flashing to prevent wind driven rain
	Environmental Health	NEA	<p>COPEH - Section 1 : Refuse Storage and Collection</p> <p>1.1 Objective 1.2 Refuse Output 1.3 Refuse Chute 1.4 Refuse Chute Chamber 1.5 Refuse Room</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Equipment can be modelled as placeholders and supplier details can be provided in a separate document. <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	Infra & Utilities (Internal)	PUB	<p>Sanitary Network</p> <ul style="list-style-type: none"> Details of Drain-lines, Inspection Chamber, Discharge Lines, etc.

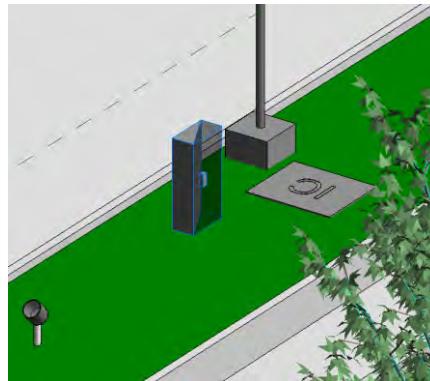
► Modelling Distribution Chamber in IFC-SG

- Distribution Chambers include Inspection Chambers, Manholes, Meter Chambers, Sampling Sumps and Sumps.
 - Refer to other Distribution Chambers in IFC SubTypes on the next page

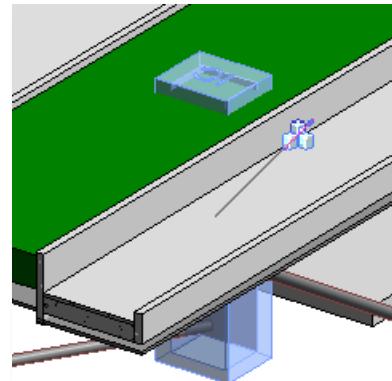
Distribution Chamber



S4 – Fig 26: Inspection Chamber



S4 – Fig 27: Inspection Chamber



S4 – Fig 28: Inspection Chamber

► By IFC Representation

IFC Entity: IfcDistributionChamberElement

IFC SubType: INSPECTIONCHAMBER, PWCSINSPECTIONCHAMBER, MANHOLE, PWCSMANHOLE, METERCHAMBER, SCREENCHAMBER, SUMP, TRENCH, SAMPLINGSUMP

S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	TopLevel	Text	-	-	No	-
2	InvertLevel	Text	-	-	No	-
3	Diameter	Length	-	mm	No	-
4	Depth	Length	-	mm	No	-
5	Height	Length	-	mm	No	-
6	Length	Length	-	mm	No	-
7	Width	Length	-	mm	No	-
8	Material	Text	-	-	No	-
9	TradeEffluent	Boolean	-	-	Yes	TRUE / FALSE

IFC Entity: IfcCovering

IFC SubType: PWCSINSPECTIONCHAMBERCOVER, PWCSMANHOLECOVER

S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Watertight	Boolean	-	-	Yes	TRUE / FALSE
2	External Reference	Text	-	-	No	SS 30 Manhole Tops and Surface-box Tops

Notes

- Sanitary drain-lines are to be submitted as schematic and/or 2D drawings. If industry would like to submit in 3D, it is optional and will also be accepted.

Door

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Site Layout only	NEA	<p>Environmental Health (COPEH)</p> <ul style="list-style-type: none"> Refuse Truck Access road (for refuse collection) – Swept Path Analysis Location and Size of the Bin Centre /Refuse Room / Bin Point, refuse chute and recycling chute, refuse chute chamber and recyclables storage & its collection system Provide total daily refuse outputs (liters / day) for the development Pneumatic waste conveyance system (PWCS) schematic plan Location of cooling tower and its setback distance (at least 5m) <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Design Gateway (G1) However, applicant may submit the above information at Pre-Submission if the development does not require any Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.

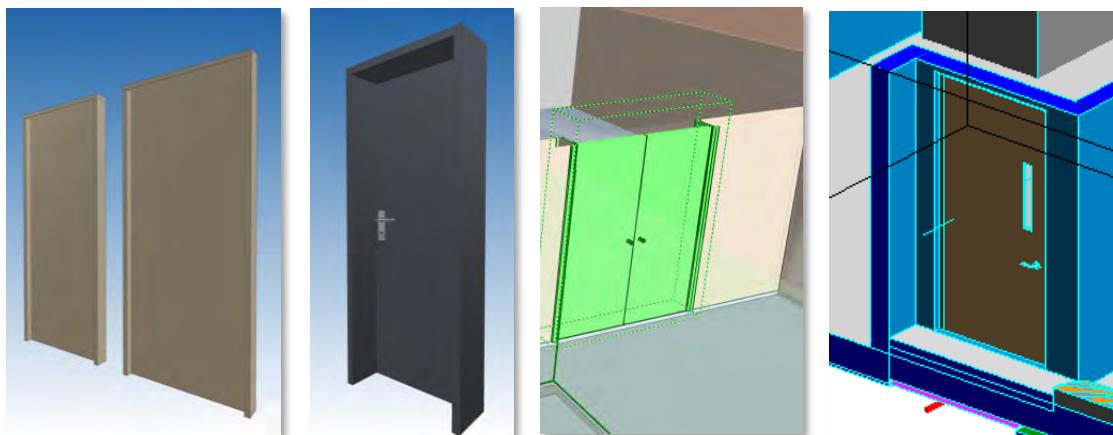
G2 Construction Gateway															
	Key Words	Agency	Requirement Category												
	Buildability	BCA	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p> Buildable Design Score (B-Score)</p> <p>a) BS01 Form (in Excel format) to be submitted</p>												
	Household / Storey Shelter		<table border="1"> <tr> <td>Architecture</td> <td>C&S</td> <td>M&E</td> </tr> <tr> <td> <ul style="list-style-type: none"> Compliance with technical requirements on shelter position, size, setback requirements </td> <td> <ul style="list-style-type: none"> Compliance to structural requirements stipulated in technical requirements on household shelters and storey shelters </td> <td> <ul style="list-style-type: none"> M&E inputs required for Transit Shelter </td> </tr> <tr> <td colspan="3"> Supporting Documents:</td> </tr> <tr> <td colspan="3">a) Submit CD Shock Calculations as supplementary non-BIM documentation</td> </tr> </table>	Architecture	C&S	M&E	<ul style="list-style-type: none"> Compliance with technical requirements on shelter position, size, setback requirements 	<ul style="list-style-type: none"> Compliance to structural requirements stipulated in technical requirements on household shelters and storey shelters 	<ul style="list-style-type: none"> M&E inputs required for Transit Shelter 	 Supporting Documents:			a) Submit CD Shock Calculations as supplementary non-BIM documentation		
Architecture	C&S	M&E													
<ul style="list-style-type: none"> Compliance with technical requirements on shelter position, size, setback requirements 	<ul style="list-style-type: none"> Compliance to structural requirements stipulated in technical requirements on household shelters and storey shelters 	<ul style="list-style-type: none"> M&E inputs required for Transit Shelter 													
 Supporting Documents:															
a) Submit CD Shock Calculations as supplementary non-BIM documentation															

Door

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Structural Fire Precautions	SCDF	Protected Shafts <ul style="list-style-type: none"> • Compliance of services running inside and/or passing through fire lift lobby and smoke-free lobby • Compliance of gas pipe running inside an internal corridor / lobby • Compliance of roof construction requirements: <ul style="list-style-type: none"> ◦ Surface spread of flame rating ◦ Composite panel as roofing covering ◦ Roof covering containing plastic ◦ Exemption of roof construction material • Compliance of requirements for protected shaft: <ul style="list-style-type: none"> ◦ Fire resistance rating ◦ Non-combustible ◦ Material of construction ◦ Opening in protected shaft ◦ Ventilation ◦ Fire resistance rating of doors in protected shaft • Compliance of requirements for lift shaft: <ul style="list-style-type: none"> ◦ Material of construction ◦ Exemption of enclosure in protected shaft located at edge of atrium ◦ Provision of protected lobby when lift is at basement ◦ Compliance of requirements for private lift for exclusive use of occupants in residential under PG 2 • Compliance of protected shaft containing exit staircase: <ul style="list-style-type: none"> ◦ Compartmentation of exit staircase with masonry or drywall construction ◦ Fire resistance of door opening into exit staircase ◦ Finishes within exit staircase shall be non-combustible ◦ Types of services allowed in exit staircase • Compliance of protected shaft containing other services installations: <ul style="list-style-type: none"> ◦ Electrical conduits / cable tray 	



S4 – Fig 29 to 32 : Doors

Door

► By IFC Representation

IFC Entity: IfcDoor						
IFC SubType: DOOR, GATE, BLASTDOOR, ROLLERSHUTTER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ClearWidth	Length	-	mm	No	1200
2	ClearHeight	Length	-	mm	No	N.A.
3	FireExit	Boolean	-	-	Yes	TRUE / FALSE
4	FireRating	Text	-	hr	No	½-hr , 1-hr etc.
5	Hardware	Boolean	-	-	Yes	TRUE / FALSE
6	MainEntrance	Boolean	-	-	Yes	TRUE / FALSE
7	OneWayLockingDevice	Boolean	-	-	Yes	TRUE / FALSE
8	OpeningHeight	Length	-	mm	No	N.A.
9	OpeningWidth	Length	-	mm	No	N.A.
10	OperationType	Text	-	-	No	For Roller Shutter Door. (OperationType = ROLLINGUP)
11	OverallWidth	Length	-	mm	No	-
12	PanelDepth	Length	-	mm	No	-
13	PanelWidth	Length	-	mm	No	-
14	PowerOperated	Boolean	-	-	Yes	TRUE / FALSE
15	SelfClosing	Boolean	-	-	Yes	TRUE / FALSE
16	Thickness	Length	-	mm	No	N.A.
17	VisionPanel	Boolean	-	-	Yes	TRUE / FALSE
18	Material	Text	-	-	No	-
19	StructuralWidth	Length	-	mm	No	N.A.
20	StructuralHeight	Length	-	mm	No	N.A.
21	FireAccessOpening	Boolean	-	-	Yes	TRUE / FALSE

Earthworks

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
 Earthworks / Topography	URA		Earthworks, Retaining Walls and Boundary Walls
			<ul style="list-style-type: none"> Height of retaining wall(s), extent of earth-fill and impact on surroundings where relevant
			Earthworks, Platform Level
			<ul style="list-style-type: none"> Minimum Platform Level / Change to site topography

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
 	Earthworks / Topography	URA	Earthworks, Retaining Walls, and Boundary Walls <ul style="list-style-type: none"> Proposed site and platform levels Earthworks Boundary wall Retaining wall

► By IFC Representation

IFC Entity: IfcGeographicElement						
IFC SubType: EXISTINGEARTHWORKS, PROPOSEDEARTHWORKS						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Area	Area	-	m ²	No	-

Electrical Fixture for Household / Storey Shelter

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway					
Key Words	Agency	Requirement Category			
Household / Storey Shelter	BCA	Architecture <ul style="list-style-type: none"> Compliance with technical requirements on shelter position, size, setback requirements 	C&S <ul style="list-style-type: none"> Compliance to structural requirements stipulated in technical requirements on household shelters and storey shelters 	M&E <ul style="list-style-type: none"> M&E inputs required for Transit Shelter 	
Supporting Documents:  <ul style="list-style-type: none"> a) Submit CD Shock Calculations as supplementary non-BIM documentation 					

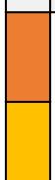
► By IFC Representation

IFC Entity: IfcSwitchingDevice						
IFC SubType: POWEROUTLET						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	OutletSocketType	Text	-	-	-	-
2	OutletType	Text	-	-	-	-

Escalator

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
 	Lifts & Escalators, Equipment	BCA	<ul style="list-style-type: none"> • Lift and Escalator Provision (Number) • Location of Accessible Lift <p><u>2D Drawings limited to:</u></p> <ul style="list-style-type: none"> • Buttons, Handrail, Marking of Maneuvering Space

► By IFC Representation

IFC Entity: IfcTransportElement							
IFC SubType: ESCALATOR							
S/N	IFC-SG Property	IFC-SG PropertySet	Property Type	Type of Elements	Unit	Input Limitation	Examples
-	-	-	-	-	-	-	-

Family-Friendly Furniture

► By IFC Representation

IFC Entity: IfcFurniture						
IFC SubType: CHANGINGBED, CHILDPROTECTIONSEAT, DIAPERCHANGINGTABLE						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
-	-	-	-	-	-	-

Finishes

► By IFC Representation

IFC Entity: IfcCovering						
IFC SubType: CLADDING, FIRECURTAIN, FLOORING, PIPESLEEVE, SOFFIT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	FireRating	Text	-	-	No	-
2	Material	Text	-	-	No	-

Fire Access Opening

► By IFC Representation

IFC Entity: IfcOpeningElement , IfcDoor , IfcWindow						
IFC SubType: -						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	FireAccessOpening	Boolean	-	-	Yes	TRUE / FALSE

► Modelling Fire Access Opening in IFC-SG

- This component can be modelled using IfcOpeningElement, IfcDoor or IfcWindow, where relevant.

Fire Alarm

Legend: Architecture C&S M&E

► By Key Gateways

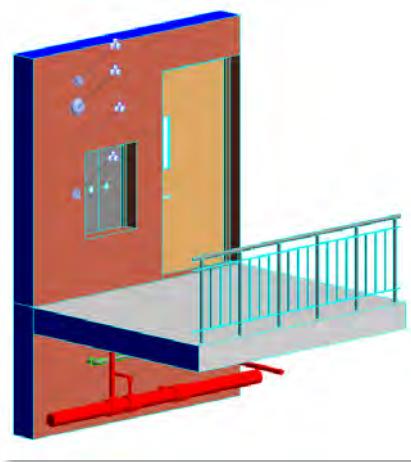
G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Fire Alarm System	SCDF	Home Fire Alarm Device (HFAD) <ul style="list-style-type: none"> Types of building requiring HFAD QP to declare Home Fire Alarm Device is provided for the functional space Location and Number of HFAD points 	
		Manual Alarm System <ul style="list-style-type: none"> Type of building / usage exempted from manual call points <u>Components to be modelled:</u> <ul style="list-style-type: none"> Manual Alarm Call Points Fire Alarm Sounder Visual Alarm <u>Components to be indicated:</u> <ul style="list-style-type: none"> Fire Alarm Panel 	

► Modelling Fire Alarm in IFC-SG

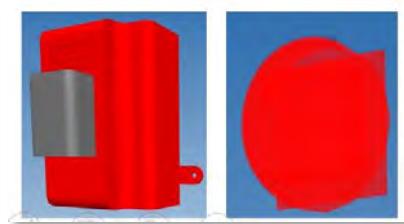
- For 3D Manual Alarms in Construction Gateway (G2), detects should be shown for alarm bells extending to the residential floor.
- For Manual Fire Alarm, it will be together with BP at Construction Gateway (G2) as it is under the purview of the Architect.
- For Automatic Fire Alarm , it will be in Independent Gateway as it is submitted by the Professional Engineer (optional in 3D).



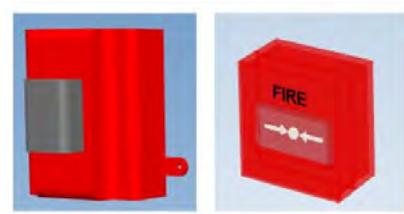
S4 – Fig 33 : Fire Alarm



S4 – Fig 34 : Fire Alarm



S4 – Fig 35 : Fire Alarm



► By IFC Representation

IFC Entity: IfcAlarm						
IFC SubType: FIREALARMPANEL, MANUALALARMCALLPOINT, VISUALALARM, SOUNDER, HOMEFIREALARMDEVICE						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
-	-	-	-	-	-	-

Fire Extinguisher

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Firefighting System	SCDF	<u>Portable Extinguisher</u> <ul style="list-style-type: none"> Types of buildings / areas requiring portable extinguisher Siting of portable extinguisher

► By IFC Representation

IFC Entity: IfcBuildingElementProxy						
IFC SubType: PORTABLEFIREEXTINGUISHER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	FireExtinguisherRating	Text	-	-	No	-

Fire Hydrant

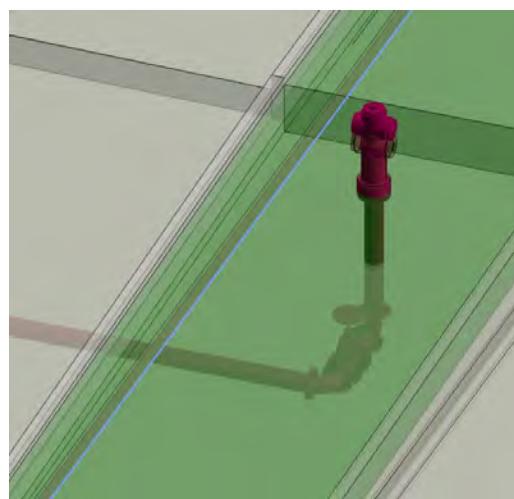
Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Firefighting System	SCDF	Fire Hydrant System <ul style="list-style-type: none"> Hydrant coverage not more than 50m from the fire engine accessway / access road



S4 – Fig 36 : Fire Hydrant



S4 – Fig 37 : Fire Hydrant

► Modelling Fire Hydrant in IFC-SG

- Details for technical clearance is not part of Gateway approval and is to be submitted as individual SCDF clearance in 2D. 3D is optional.

► By IFC Representation

IFC Entity: IfcFireSuppressionTerminal						
IFC SubType: FIREHYDRANT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ID	Text	-	-	-	N.A.
2	Private	Boolean	-	-	Yes	TRUE / FALSE
3	Public	Boolean	-	-	Yes	TRUE / FALSE

Foam Inlet / Outlet

Legend:  Architecture  C&S  M&E

► By IFC Representation

IFC Entity: IfcFireSuppressionTerminal							
IFC SubType: FOAMINLET, FOAMOUTLET							
S/N	IFC-SG Property	IFC-SG PropertySet	Property Type	Type of Elements	Unit	Input Limitation	Examples
-	-	-	-	-	-	-	-

Footpath

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Connectivity	URA	<p>Pedestrian Network</p> <p>Through Block Link (TBL), Underground Pedestrian Link(UPL), Elevated Pedestrian Link (EPL), Covered Walkways (CW), Open Walkways (OW), Covered Linkways (CL), High Covered Linkways (HCL)</p> <ul style="list-style-type: none"> • Loading provision to receive future walkways / linkways (if any) • Notional scheme for future link to justify the loading (recipient) <p>Additional requirements for the following:</p> <ul style="list-style-type: none"> • (CW) Soffit height, overall width and clear width • (OW/CW) Paving material (where required in UD guidelines) • (OW/CW) Level of bulk water meter chamber / inspection chamber • (TBL) Location and Size of Signage • (HCL) Flashing to prevent wind driven rain
			<ul style="list-style-type: none"> • Design treatment for public street lighting, bollards, tactile tiles (UD requirement for CBD / Marina Bay)
			<ul style="list-style-type: none"> • Promenade Guidelines (UD requirements for Singapore River)
			<ul style="list-style-type: none"> • Paving Guideline for Orchard, Downtown Core and the Civic District (OW) Paving material

► By IFC Representation

IFC Entity: IfcCivilElement						
IFC SubType: FOOTPATH						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Material	Text	-	-	-	-

Footing / Pilecap

Legend:  Architecture  C&S  M&E

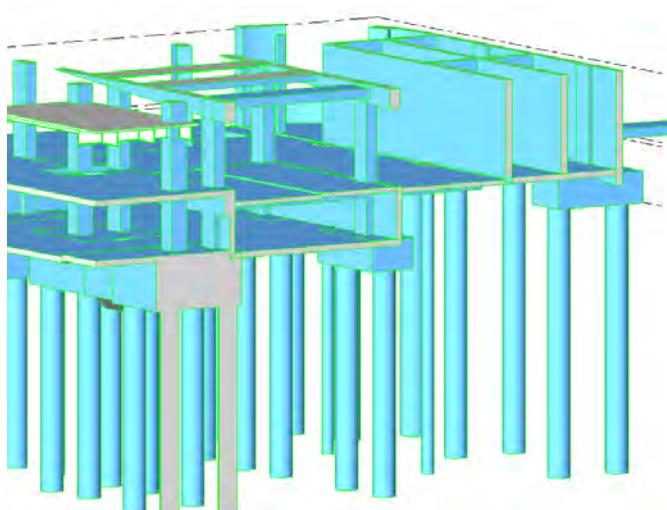
► By Key Gateways

G1.5 Piling Gateway (Optional)

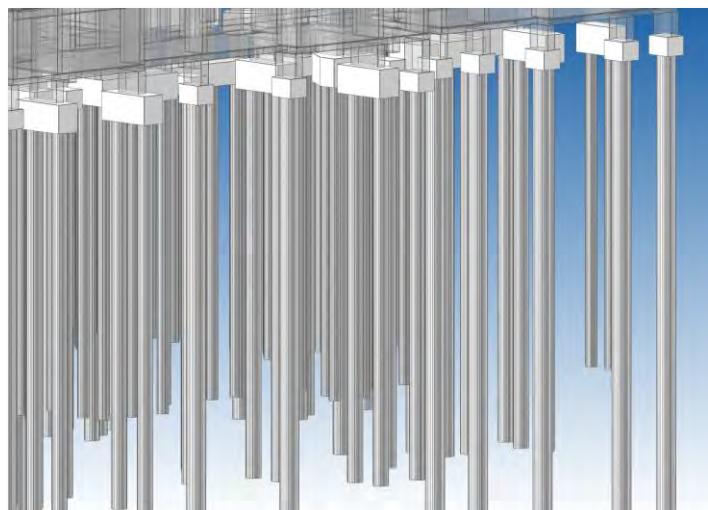
Key Words	Agency	Requirement Category
Structural Design	BCA	<p>Structural Design (Piling and Foundation Works)</p> <p><i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i></p> <ul style="list-style-type: none"> • Complete set of IFC-SG model(s) for all structural foundation system & details • 2D drawings limited to: <ul style="list-style-type: none"> ◦ General notes ◦ Special details (e.g. irregular footing / pilecap detailing, raft detailing)

G2 Construction Gateway

Key Words	Agency	Requirement Category
Structural Design	BCA	<p>Structural Design (Piling and Foundation Works)</p> <p><i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i></p> <ul style="list-style-type: none"> • Complete set of IFC-SG model(s) for all structural foundation system & details • 2D drawings limited to: <ul style="list-style-type: none"> ◦ General notes ◦ Special details (e.g. irregular footing / pilecap detailing, raft detailing)



S4 – Fig 38 : Footing / Pilecap



S4 – Fig 39 : Footing / Pilecap

Footing / Pilecap

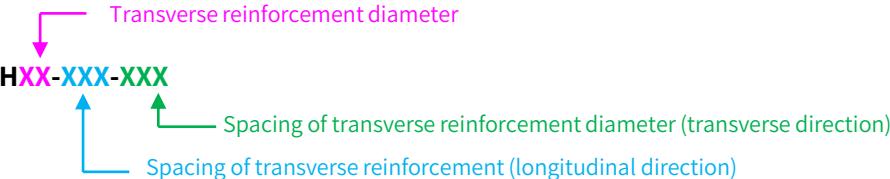
► Modelling Footing / Pilecap in IFC-SG

- All the footing / pilecap elements shall be modelled as independent elements* in IFC-SG model with the necessary information required as stipulated in the tables below.
 - For footing and pilecap with the same foundation design, they are allowed to have same marks and design information. All marks and design information have to be embedded in every footing / pilecap element.
- 2D detail drawings are allowed for any irregular or complex footing/pilecap design (e.g. 3 pile group, stair core pile group, etc.) with the indication of drawing number in the IFC-SG parameter “ReferTo2DDetail”.
- The following pile-related parameters do not need to be provided for individual piles. Instead, they are to be provided in general (refer to the “Project Information” component in Section 4)
 - Pile Model Factor, Shaft R4 Design Factor, End Bearing R4 Design Factor
 - Number of ULT Tests, Number of Working Load Tests – Maintained Load Tests and Rapid Load Tests, Number of Non Destructive Test Piles

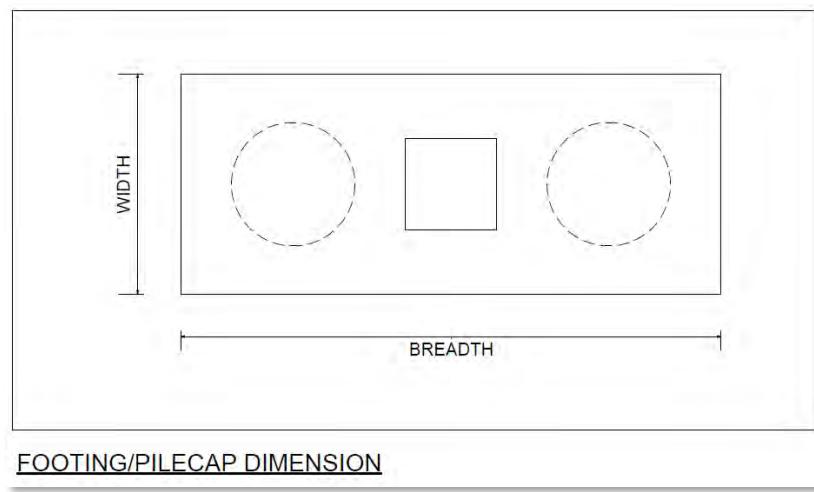
*Independent elements refers to elements with no combining or grouping of piles, pilecaps, footings or columns as one family type or generic element

► Footing / Pilecap Dimension and Reinforcement Definition

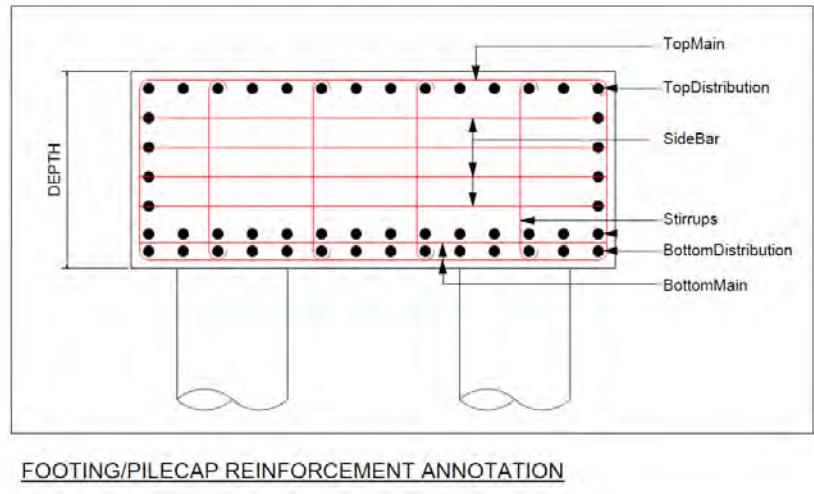
Footing / Pilecap Dimension and Reinforcement Definition

1	The breadth is referring to the longest side of a footing / pilecap while width is referring to the shorter side of a footing / pilecap, despite of its element orientation.
2	<p>The input for TopMain, TopDistribution, BottomMain & BottomDistributions shall be "HXX-XXX" while "H" is a must, XX is the longitudinal reinforcement diameter and XXX is the spacing of longitudinal reinforcement.</p> <ul style="list-style-type: none"> • Use '+' for more than 1 layer of reinforcement (e.g. H32-150+H25-150) 
3	<p>The input for Stirrups shall be "HXX-XXX-XXX" while "H" is a must, XX are the transverse reinforcement diameter and XXX is the spacing of transverse reinforcement.</p> <ul style="list-style-type: none"> • Indicate the longitudinal spacing (main direction) and follow with transverse spacing (distribution direction) (e.g. H8-100-100) 

Footing / Pilecap



S4 – Fig 40 : Dimension Definitions for Footing / Pilecap



S4 – Fig 41 : Dimension Definitions for Footing / Pilecap

► By IFC Representation

IFC Entity: IfcFooting						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	DA1-1_BearingCapacity	Integer	All footings	kN/m ²	No	150
2	DA1-2_BearingCapacity	Integer	All footings	kN/m ²	No	120
3	ReferTo2DDetail	Text	When required / relevant	-	No	Dwg Number
4	ReinforcementSteelGrade	Text	All footings & pilecap	-	Yes	Refer to list^
5	SoilVerificationTest	Text	When required / relevant	-	No	2 nos Plate load Test

^ List can be found [here](#).

Footing / Pilecap

► **By IFC Representation** (continued from previous page)

IFC Entity: IfcFooting						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
6	Breadth	Length	All footings & pilecap	mm	No*	6200
7	Depth	Length	All footings & pilecap	mm	No*	300
8	Mark	Text	All footings & pilecap	-	No	F1, F2, PC1, PC2, PC4_1
9	Width	Length	All footings & pilecap	mm	No*	300
10	BottomDistribution	Text	All footings & pilecap	-	Yes	H16-150
11	BottomMain	Text	All footings & pilecap	-	Yes	H25-150
12	SideBar	Text	All footings & pilecap	-	Yes	H13-250
13	Stirrups	Text	When required / relevant	-	Yes	H13-200-300
14	StirrupsType	Text	Optional	-	Yes	Refer to list^
15	TopDistribution	Text	All footings & pilecap	-	Yes	H16-150
16	TopMain	Text	All footings & pilecap	-	Yes	H25-150
17	WorkingLoad_DA1-1	Integer	All footings	kN	No	4321
18	WorkingLoad_DA1-2	Integer	All footings	kN	No	4321
19	MaterialGrade	Text	All footings & pilecap	-	Yes	Refer to list^

* Parameter is populated from the dimensions of BIM elements modelled.

^ List can be found [here](#).

Footing / Pilecap

► Example of Footing / Pilecap (RC Pile Cap) Structural Element Input

5900 x 1900 x 1250mm Depth Pilecap	IFC Entity: IfcFooting IFC SubType: N.A.																																						
<ul style="list-style-type: none"> • Mark – 2PC1600A • Concrete grade C32/40 • Top Rebar (main) H32-200 • Top Rebar (distribution) H20-200 • Bottom Rebar (main) H32-200+H16-200 • Bottom Rebar (distribution) H20-200 • Binder bar H16-150 		<table border="1"> <thead> <tr> <th>S/N</th><th>IFC-SG Property</th><th>Examples</th></tr> </thead> <tbody> <tr> <td>1</td><td>ReinforcementSteelGrade</td><td>500B</td></tr> <tr> <td>2</td><td>Breadth</td><td>5900</td></tr> <tr> <td>3</td><td>Depth</td><td>1250</td></tr> <tr> <td>4</td><td>Mark</td><td>2PC1600A</td></tr> <tr> <td>5</td><td>Width</td><td>1900</td></tr> <tr> <td>6</td><td>BottomDistribution</td><td>H20-200</td></tr> <tr> <td>7</td><td>BottomMain</td><td>H32-200+H16-200</td></tr> <tr> <td>8</td><td>SideBar</td><td>H16-150</td></tr> <tr> <td>9</td><td>TopDistribution</td><td>H20-200</td></tr> <tr> <td>10</td><td>TopMain</td><td>H32-200</td></tr> <tr> <td>11</td><td>MaterialGrade</td><td>C32/40</td></tr> </tbody> </table>		S/N	IFC-SG Property	Examples	1	ReinforcementSteelGrade	500B	2	Breadth	5900	3	Depth	1250	4	Mark	2PC1600A	5	Width	1900	6	BottomDistribution	H20-200	7	BottomMain	H32-200+H16-200	8	SideBar	H16-150	9	TopDistribution	H20-200	10	TopMain	H32-200	11	MaterialGrade	C32/40
S/N	IFC-SG Property	Examples																																					
1	ReinforcementSteelGrade	500B																																					
2	Breadth	5900																																					
3	Depth	1250																																					
4	Mark	2PC1600A																																					
5	Width	1900																																					
6	BottomDistribution	H20-200																																					
7	BottomMain	H32-200+H16-200																																					
8	SideBar	H16-150																																					
9	TopDistribution	H20-200																																					
10	TopMain	H32-200																																					
11	MaterialGrade	C32/40																																					

Footing / Pilecap

► Example of Footing / Pilecap (RC Footing) Element Input

1250 x 800 x 450mm Depth Footing		IFC Entity: IfcFooting		
		IFC SubType: N.A.		
S/N	IFC-SG Property	Examples		
1	DA1-1_BearingCapacity	150		
2	DA1-2_BearingCapacity	120		
3	ReinforcementSteelGrade	500B		
4	SoilVerificationTest	1 no of plate load test		
5	Breadth	1250		
6	Depth	450		
7	Mark	F2		
8	Width	800		
9	BottomDistribution	H10-200		
10	BottomMain	H16-200		
11	SideBar	H10-200		
12	TopDistribution	H10-200		
13	TopMain	H13-200		
14	WorkingLoad_DA1-1	1286		
15	WorkingLoad_DA1-2	1025		
16	MaterialGrade	C32/40		

Grating

► By IFC Representation

IFC Entity: IfcDiscreteAccessory						
IFC SubType: GRATING						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
-	-	-	-	-	-	-

Green Verge

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Site Layout only	NParks	<p>Provision of Planting Areas</p> <ul style="list-style-type: none"> To provide planting areas (i.e. 3.0m/5.0m-wide green buffers, 2.0m-wide peripheral planting verges, open-air parking planting areas) in compliance with NParks' Guidelines (Chapter 3) To ensure planting areas are free from any encroachment, except for allowable minor ancillary structures and landscaping structures as listed in NParks' Guidelines (Chapter 3) To locate fire engine accessways outside planting areas To recess underground structures / services at least 2.0m below planting areas, except for: <ul style="list-style-type: none"> Footings of retaining / boundary walls (may encroach up to 0.5m into planting areas) Services traversing perpendicularly across planting areas

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Site Layout only	NParks	<p>Provision of Planting Areas</p> <ul style="list-style-type: none"> To ensure dimensions of planting areas are compliant with NParks Guidelines (Chapter 3) or as approved by NParks during Design Gateway (G1)

► By IFC Representation

IFC Entity: IfcGeographicElement						
IFC SubType: GREENVERGE						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Area	Area	-	mm	No	-
2	ApprovedSoilMixture	Boolean	-	-	Yes	TRUE / FALSE
3	Shrubs	Text	-	-	-	-
4	ShrubSpecies	Text	-	-	-	-
5	ApprovedTurfSpecies	Text	-	-	-	-

Gutter

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Environmental Health (COPEH)	NEA	<p>COPEH - Section 7 : Anti-Mosquito Breeding</p> <p>7.1 Objective 7.2 Roof Gutter</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). <p>7.3 Air-Conditioning Tray 7.4 Floor Trap</p> <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.

► By IFC Representation

IFC Entity: IfcPipeSegment						
IFC SubType: GUTTER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
-	-	-	-	-	-	-

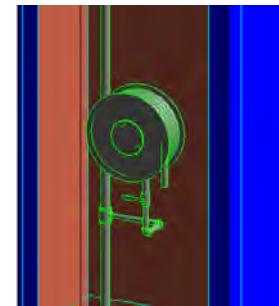
IFC Entity: IfcCivilElement						
IFC SubType: GUTTER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ConstructionMethod	Text	-	-	-	-
2	Height	Length	-	mm	-	-
3	Length	Length	-	mm	-	-
4	Thickness	Length	-	mm	-	-
5	Width	Length	-	mm	-	-
6	Public	Boolean	-	-	Yes	TRUE / FALSE

Hose Reel

Legend: Architecture C&S M&E

► By Key Gateways

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Firefighting System	SCDF	<p>Hose Reel System</p> <ul style="list-style-type: none"> Compliance of provision of hose reel Number of hose reel Coverage of hose reel (30m+6m) <p>Rising Mains and System</p> <ul style="list-style-type: none"> Type of rising main provided (Dry or Wet) Number of rising main Location and coverage of landing valve <p>Components to be modelled for Dry and Wet Riser</p> <ul style="list-style-type: none"> Breeching inlet Landing valve 	<ul style="list-style-type: none"> Types of buildings / areas exempted from provision of hose reel Siting of hose reel <p>Provision of Standby Fire Hose:</p> <ul style="list-style-type: none"> Types of buildings requiring standby fire hose Number of standby hose Located not more than 2m from landing valve <p>Provision of Breeching Inlet:</p> <ul style="list-style-type: none"> Location Number



S4 – Fig 42 to 45: Hose Reel

► By IFC Representation

IFC Entity: IfcFireSuppressionTerminal						
IFC SubType: HOSEREEL, STANDBYFIREHOSE						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Hose_NominalDiameter	Label	-	mm	No	-

Household Shelter

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Buildability	BCA	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> • BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems • Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p> Buildable Design Score (B-Score)</p> <p>a) BS01 Form (in Excel format) to be submitted</p>
	Household / Storey Shelter		<p>Architecture</p> <ul style="list-style-type: none"> • Compliance with technical requirements on shelter position, size, setback requirements <p>C&S</p> <ul style="list-style-type: none"> • Compliance to structural requirements stipulated in technical requirements on household shelters and storey shelters <p>M&E</p> <ul style="list-style-type: none"> • M&E inputs required for Transit Shelter
			<p> Supporting Documents:</p> <p>a) Submit CD Shock Calculations as supplementary non-BIM documentation</p>

► By IFC Representation

► Parameters below are added by the C&S engineer

IFC Entity: IfcWall, IfcSlab						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ConstructionMethod	Text	-	-	Yes	Refer to list^
2	Accreditation_PAS	Boolean	-	-	Yes	TRUE / FALSE
3	Thickness	Length	-	mm	No*	300
4	ShelterUsage	Boolean	-	-	Yes	TRUE / FALSE

Household Shelter

Legend:  Architecture  C&S  M&E

► By IFC Representation

➤ Parameters below are added by the Architect, with inputs from Engineers

IFC Entity: IfcBuildingSystem						
IFC SubType: HOUSEHOLDSHELTER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ConstructionMethod	Text	-	-	Yes	Precast
2	Accreditation_PAS	Boolean	-	-	Yes	TRUE / FALSE
3	InnerDimensions	Length	-	mm	-	-
4	Area	Length	-	mm	-	-
5	Height	Length	-	mm	-	-
6	WallThickness	Length	-	mm	-	-
7	SlabThickness	Length	-	mm	-	-

Interceptor

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Environmental Health (COPEH)	NEA	COPEH - Section 1 : Refuse Storage and Collection <ul style="list-style-type: none"> 1.1 Objective 1.2 Refuse Output 1.3 Refuse Chute 1.4 Refuse Chute Chamber 1.5 Refuse Room When to apply: <ul style="list-style-type: none"> • Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Equipment can be modelled as placeholders and supplier details can be provided in separate document. 	
		COPEH – Section 3: Ventilation, Ducting and Kitchen Exhaust Systems for Food Shop <ul style="list-style-type: none"> 3.1 Objective 3.2 Design Requirements When to apply: <ul style="list-style-type: none"> • Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Terminals and façade louvres are to be modelled. Ducting can be in 2D or 3D. 	
Infra & Utilities (Internal)	PUB	Sanitary Network <ul style="list-style-type: none"> • Drain-lines, Inspection Chamber, Discharge Lines, etc. • Sanitary Stack System Basement Pumped System <ul style="list-style-type: none"> • May model a box as a placement holder. Details is to be drawn by Specialised PE. • Retention Tank • RC Trench Sewer Network <ul style="list-style-type: none"> • Minor Sewer (when applicable) Drainage Network <ul style="list-style-type: none"> • C&S: Effective tank capacity and other hydraulic details associated with the tank • M&E: For pumped detention tank, M&E to provide pump details Proposed Treatment of Common Drain <ul style="list-style-type: none"> • Longitudinal / sectional profile • Side gates 	

Interceptor

Legend:  Architecture  C&S  M&E



S4 – Fig 46 : Interceptor (Grease)

► By IFC Representation

IFC Entity: IfcInterceptor						
IFC SubType: GREASE, OIL						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ComplyToPUBStandardDrawing	Boolean	-	-	Yes	TRUE / FALSE
2	ReferToDrawingNumber	Text	-	-	No	-
3	InvertLevel	Text	-	-	No	-
4	TopLevel	Text	-	-	No	-
5	Diameter	Length	-	mm	No	-
6	Height	Length	-	mm	No	-
7	Length	Length	-	mm	No	-
8	Width	Length	-	mm	No	-
9	TradeEffluent	Boolean	-	-	Yes	TRUE / FALSE

Landscape Plants

Legend:  Architecture  C&S  M&E

► By Key Gateways

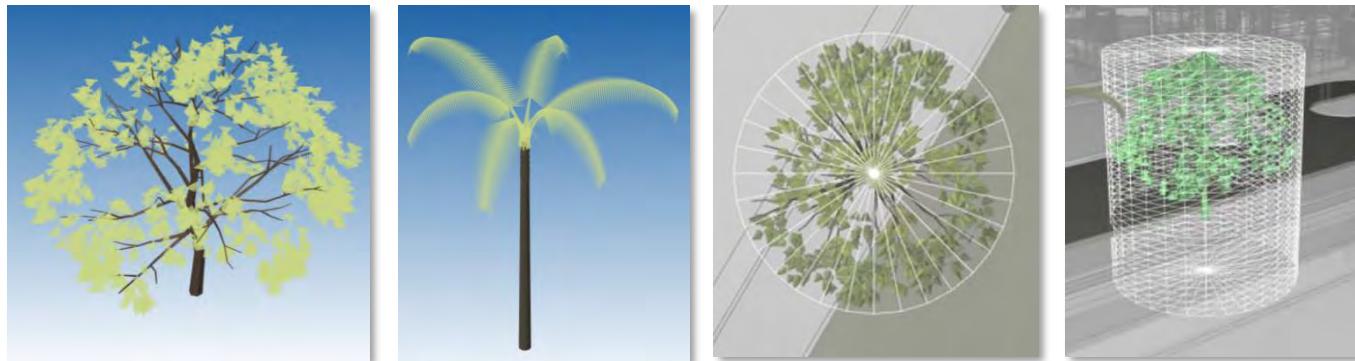
G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Greenery	NParks	<p><u>Conservation of Trees</u></p> <ul style="list-style-type: none"> To conserve trees identified: <ul style="list-style-type: none"> In Technical Conditions of Tender (TCOT) As Heritage Trees Through nature group / public / residents engagement In Environmental Impact Assessments (EIA) / Environmental Management and Monitoring Plans (EMMP) etc. <p> <u>Supporting Document(s):</u></p> <p>a) Arborist report (if tree(s) identified to be conserved / retained may be affected by proposed works for development)</p>

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Greenery	NParks	<p><u>Conservation of Trees</u></p> <ul style="list-style-type: none"> To conserve trees identified: <ul style="list-style-type: none"> In Technical Conditions of Tender (TCOT) As Heritage Trees Through nature group / public / residents engagement In Environmental Impact Assessments (EIA) / Environmental Management and Monitoring Plans (EMMP) etc. <p> <u>Supporting Document(s):</u></p> <p>a) Arborist report (if tree(s) identified to be conserved / retained may be affected by proposed works for development)</p>
			<p>• Landscape Replacement Area – Provide Green Plot Ratio and total % of landscape replacement, with breakdown of hardscape and softscape</p> <p>• Declare Location of Sky Terrace / Planter Boxes / Covered Communal Ground Garden / Communal Pavilions</p> <p> <u>Supplementary Documents</u></p> <p>a) Landscape plan / species and perspectives</p> <p>b) Plant details of sky terrace / planter boxes / covered communal ground garden / communal pavilions</p>
	Site Layout, Landscape Deck	URA	<p><u>Landscape Deck</u></p> <ul style="list-style-type: none"> Exposure of Basement Wall & Proposed Treatment (Berm / Vertical Greenery) Site Coverage on Landscape Deck – declare % Provision of Greenery on Deck – Location and % Boundary Wall Porosity – declare % and show design

Landscape Plants

► Modelling Landscape Plants in IFC-SG

- As long as relevant IFC-SG requirements are embedded in the tree object, trees may be modelled as simplified lollipop BIM components. We are mindful that more elaborate tree models can increase the file size of the BIM model.



S4 – Fig 47 to 50 : Trees

► By IFC Representation

IFC Entity: IfcGeographicElement						
IFC SubType: LANDSCAPE_TREE, LANDSCAPE_PALM, LANDSCAPE_SHRUBS						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ReasonForRemoval	Text	-	-	-	-
2	Species	Text	-	-	-	Samanea saman, Cyrtostachys renda, Gardenia tubifera
3	Status	Text	-	-	-	Proposed, To be conserved, To be retained, To be cut
4	TreeNumber	Text	-	-	-	1, 2, 3
5	Girth	Length	-	m	-	0.1, 0.3, 1.0
6	Height	Length	-	m	-	2.5, 10.0
7	SingleStem	Boolean	-	-	Yes	TRUE / FALSE
8	TreeSize	Text	-	-	-	Palm, Small to medium, Large
9	Turf	Boolean	-	-	Yes	TRUE / FALSE
10	Roadside	Boolean	-	-	Yes	TRUE / FALSE

IFC Entity: IfcGeographicElement						
IFC SubType: LANDSCAPE_EXTERNALPLANTING						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ApprovedSoilMixture	Boolean	-	-	Yes	TRUE / FALSE

Lift

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Fire Lift	SCDF	<p>Provision of Fire Lift</p> <ul style="list-style-type: none"> Compliance of buildings (other PG 1 & 2) provided with at least two fire lifts on every storey <ul style="list-style-type: none"> When habitable height exceeds 24m When basement exceeds 9m Compliance of two fire lifts for super high-rise (above 40 storeys) residential building

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Firefighting System	SCDF	<p>Evacuation Lift</p> <ul style="list-style-type: none"> Evacuation lift for evacuation of occupants to be modelled: <ul style="list-style-type: none"> Exceeding 24m (except PG 1 & 2) Can double-up as PWD evacuation lift One of fire lift can be used as evacuation lift Opening into protected lobby such as smoke-free lobby, external exit passageway or external corridor Evacuation lift for evacuation of PWD to be modelled: <ul style="list-style-type: none"> At least one lift required when building is more than 4 storey, passenger lift can be used as evacuation lift Provision of protected lobby Opening into protected lobby such as smoke-free lobby, external exit passageway or external corridor for building exceeding four storey <p>Fire Lift</p> <ul style="list-style-type: none"> Fire resistance rating of lift shaft Serving continuous throughout the building, including basements Provision of 2 fire lift (except PG 1 & 2 not exceeding 40 storey) Distance between fire lift landing door and exit staircase not exceeding 5m & 10m (applicable to PG 2 discharge floor only) Accessibility to any part of the storey 60m coverage for fire lift (except PG 1 & 2)
	Lifts & Escalators, Equipment	BCA	<ul style="list-style-type: none"> Lift and Escalator Provision (Number) Location of Accessible Lift <p>2D Drawings limited to:</p> <ul style="list-style-type: none"> Buttons, Handrail, Marking of Maneuvering Space

Lift

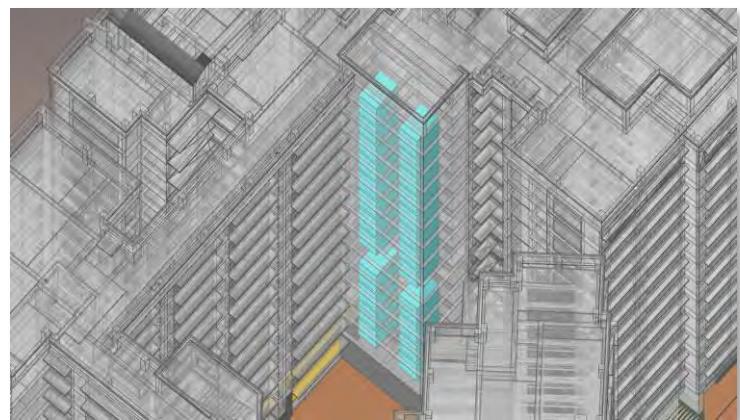
Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway (<i>continued from previous page</i>)			
Key Words	Agency	Requirement Category	
Structural Fire Precaution	SCDF	<p>Protected Shafts</p> <ul style="list-style-type: none"> • Compliance of services running inside and/or passing through fire lift lobby and smoke-free lobby • Compliance of gas pipe running inside an internal corridor / lobby • Compliance of roof construction requirements: <ul style="list-style-type: none"> ◦ Surface spread of flame rating ◦ Composite panel as roofing covering ◦ Roof covering containing plastic ◦ Exemption of roof construction material • Compliance of requirements for protected shaft: <ul style="list-style-type: none"> ◦ Fire resistance rating ◦ Non-combustible ◦ Material of construction ◦ Opening in protected shaft ◦ Ventilation ◦ Fire resistance rating of doors in protected shaft • Compliance of requirements for lift shaft: <ul style="list-style-type: none"> ◦ Material of construction ◦ Exemption of enclosure in protected shaft located at edge of atrium ◦ Provision of protected lobby when lift is at basement ◦ Compliance of requirements for private lift for exclusive use of occupants in residential under PG 2 • Compliance of protected shaft containing exit staircase: <ul style="list-style-type: none"> ◦ Compartmentation of exit staircase with masonry or drywall construction ◦ Fire resistance of door opening into exit staircase ◦ Finishes within exit staircase shall be non-combustible ◦ Types of services allowed in exit staircase • Compliance of protected shaft containing other services installations: <ul style="list-style-type: none"> ◦ Electrical conduits / cable tray 	



S4 – Fig 51 : Lift



S4 – Fig 52 : Lift Stack in relation to Building

Lift

► By IFC Representation

IFC Entity: IfcTransportElement						
IFC SubType: LIFT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	BarrierFreeAccessibility	Boolean	-	-	Yes	TRUE / FALSE
2	Length	Length	-	mm	No	-
3	Width	Length	-	mm	No	-
4	ClearDepth	Length	-	mm	No	-
5	ClearHeight	Length	-	mm	No	-
6	ClearWidth	Length	-	mm	No	-
7	FireFightingLift	Boolean	-	-	Yes	TRUE / FALSE
8	LiftType	Text	-	-	No	Goods Lift, Platform Lift, Bin Lifter

Parking Lot

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
Connectivity	URA		<p><u>Walking and Cycling Plan</u></p> <ul style="list-style-type: none"> • Connectivity to transport node • Provision of measures to prevent conflict between pedestrian, cyclists and motor vehicles • Provision of bike parking and supporting amenities (i.e. shower facilities and lockers)
Vehicular Parking	LTA		<p><u>Vehicular Parking Provision</u></p> <ul style="list-style-type: none"> • To comply fully with the prevailing Parking Places (Provision of Parking Places and Parking Lots) Rules and other relevant guidelines of the Authority • To ensure that the number of parking lots provided is within the specified range defined by the lower and upper bound requirement. (The Range-based parking provision standard for the various development uses can be found in Annex A of the COP for Vehicle Parking Provision in Development Proposals) • To ensure that the geometric dimensions of the parking layout complies with the standard minimum dimensions as stipulated in the COP
	URA		<p><u>Parking</u></p> <ul style="list-style-type: none"> • Show location within site • Declare total number and breakdown of types

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
Connectivity	URA		<p><u>Walking and Cycling Plan</u></p> <ul style="list-style-type: none"> • Connectivity between buildings – show layout on plans, indicate width and levels • Segregation between vehicular and pedestrian / cyclist traffic • Provision of biking lots and end-of-trip facilities – show location and GFA exemption
Rapid Transit System (RTS) Station	URA		<p><u>Urban Design Requirements</u></p> <ul style="list-style-type: none"> • Design and location of at-grade bicycle parking <p> <u>Supplementary Documents</u></p> <p>a) Night lighting report</p>
Site Layout, Vehicular Parking	LTA		<p><u>Vehicular Parking Provision</u></p> <ul style="list-style-type: none"> • To provide the details and critical dimensions of the parking layout such as: <ul style="list-style-type: none"> ○ Type and size of parking lots ○ Width of ramps and accessways ○ Inner turning radius and width of turning paths ○ Width of parking aisles ○ Gradient of vehicular ramps
Vehicular Parking	BCA		<ul style="list-style-type: none"> • Provision of Accessible Lots(s)
	URA		<ul style="list-style-type: none"> • Total number of parking lots (including motorcycle parking) • Residual area within car park floors to be demarcated • Screening details for vehicular parking and service areas

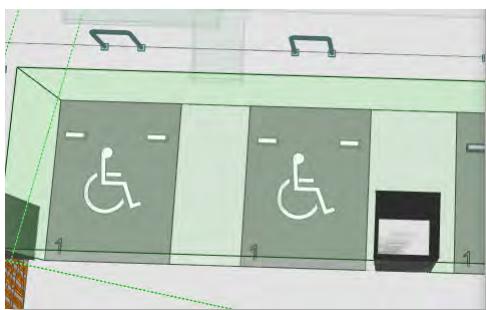
Parking Lot

Legend:  Architecture  C&S  M&E

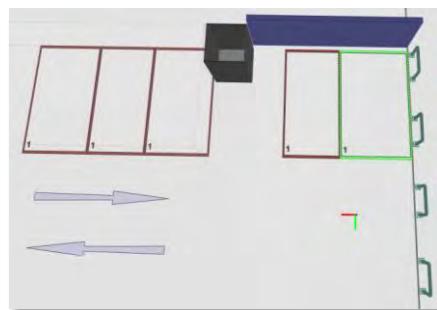
► By Key Gateways

G1 Construction Gateway (*continued from previous page*)

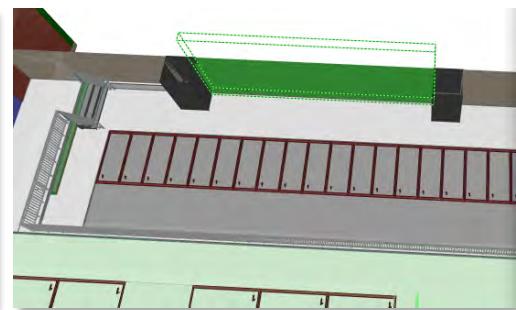
Key Words	Agency	Requirement Category
Ventilation	BCA	<ul style="list-style-type: none"> Provision of Ventilation (Natural Ventilation for residential development) Minimum 5% opening for Natural Ventilation Maximum distance (12m) from Natural Ventilating opening Natural Ventilation (dimension of recess / airwell) Carpark Ventilation



S4 – Fig 53 : Accessible Parking Lots



S4 – Fig 54 : Vehicular Parking Lots



S4 – Fig 55 : Vehicular Parking Lots

3 Examples of Bicycle Racks

Single Tier P Rack	Single Tier U Bar	Double Tier
 Source: LTA	 Source: LTA	 Source: LTA
Width : 600 mm Length : 1800 mm BicycleLotCount : 1 BicycleRack_Type : Single Tier P Rack	Width : 650 mm Length : 1800 mm BicycleLotCount : 2 BicycleRack_Type : Single Tier U Bar	Width : 650 mm Length : 2000 mm BicycleLotCount : 2 BicycleRack_Type : Double Tier

Parking Lot

► By IFC Representation

IFC Entity: IfcBuildingElementProxy						
IFC SubType: CARLOT, MOTORCYCLELOT, LORRYLOT, COACHLOT, BUSLOT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	BarrierFreeAccessibility	Boolean	-	-	Yes	TRUE / FALSE
2	FamilyLot	Boolean	-	-	Yes	TRUE / FALSE
3	Length	Length	-	mm	No	N.A.
4	Width	Length	-	mm	No	N.A.
5	EVLot	Boolean	-	-	Yes	TRUE / FALSE
6	CarParking_ServedByCarLift	Boolean	-	-	Yes	TRUE / FALSE
7	ParkingUse	Text	-	-	No	Electric Vehicle, Oil Tanker, Buggy, Vacuum Truck, Mobile Tanker
8	Perforated	Boolean	-	-	Yes	TRUE / FALSE
9	OpenAtGrade	Boolean	-	-	Yes	TRUE / FALSE
10	VehicleType	Text	-	N.A.	No	Rigid-framed vehicle

IFC Entity: IfcBuildingElementProxy						
IFC SubType: BICYCLELOT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Width	Length	-	mm	No	600mm, 650mm
2	Length	Length	-	mm	No	1800mm, 2000mm
3	BicycleLotCount	Integer	-	-	No	Limited to 1 or 2 only
4	BicycleRack_Type	Text	-	-	No	Single Tier P Rack, Single Tier U Bar, Double Tier

IFC Entity: IfcSpace						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	VentilationMode	Text	-	-	Yes	Natural Ventilation, Air Conditioning Mechanical Ventilation, Mechanical Ventilation
2	Area	Length	-	m ²	No	-

Pile

Legend: Architecture C&S M&E

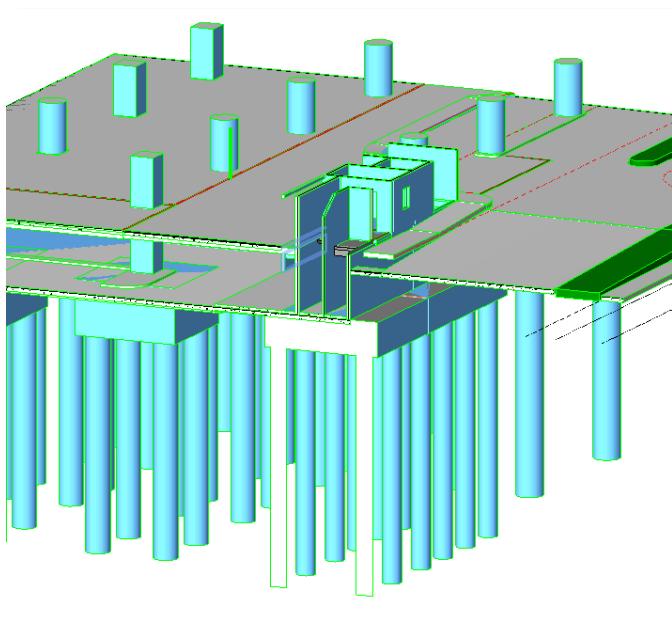
► By Key Gateways

G1.5 Piling Gateway (Optional)

Key Words	Agency	Requirement Category
Structural Design	BCA	<p>Structural Design (Piling and Foundation Works)</p> <p><i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i></p> <ul style="list-style-type: none"> • Complete set of IFC-SG model(s) for all structural foundation system & details • 2D drawings limited to: <ul style="list-style-type: none"> ◦ General notes ◦ Special details (e.g. irregular footing / pilecap detailing, raft detailing)

G2 Construction Gateway

Key Words	Agency	Requirement Category
Structural Design	BCA	<p>Structural Design (Piling and Foundation Works)</p> <p><i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i></p> <ul style="list-style-type: none"> • Complete set of IFC-SG model(s) for all structural foundation system & details • 2D drawings limited to: <ul style="list-style-type: none"> ◦ General notes ◦ Special details (e.g. irregular footing / pilecap detailing, raft detailing)



S4 – Fig 56 : Pile

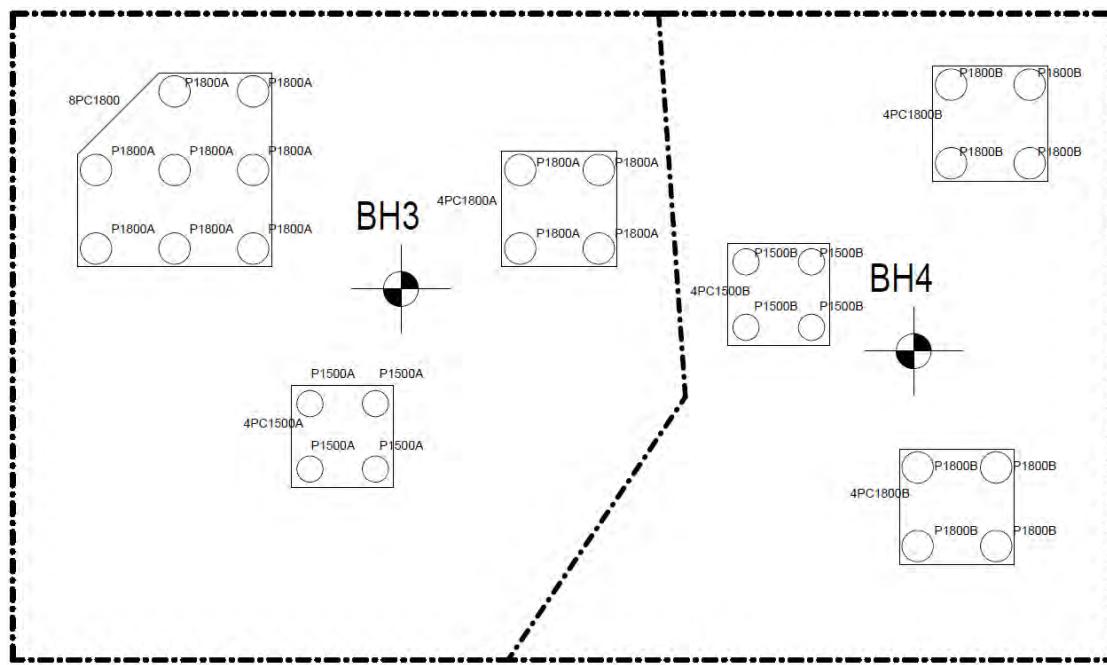


S4 – Fig 57 : Pile in relation to Building

Pile

► Modelling Pile in IFC-SG

- All the pile elements shall be modelled as per true coordinates in the IFC-SG model with the necessary information required as stipulated in the tables below.
 - Piles with same foundation design are allowed to have same pile marks and design information. All the pile marks and design information have to be embedded in every pile element.
- The following pile-related parameters do not need to be provided for individual piles. Instead, they are to be provided in general.
 - Pile Model Factor, Shaft R4 Design Factor, End Bearing R4 Design Factor
 - Number of ULT Tests, Number of Working Load Tests – Maintained Load Tests and Rapid Load Tests, Number of Non Destructive Test Piles
- Piles with same foundation design are allowed to have same pile marks and design information. All the pile marks and design information have to be embedded in every pile element.



S4 – Fig 58 : Pile Grouping

Mark	Diameter	BoreholeRef	MaterialGrade	Reinforcement SteelGrade	Construction Method	PileType	Length	CutOffLevel _SHD	SHDLevel_SPT_MoreThan_100N	MainRebar	Stirrups
P1500A	1500	BH3	C32/40	500B	CIS	Bored	35450	-2.75	6.5	12H25	H10-300
P1500B	1500	BH4	C32/40	500B	CIS	Bored	43650	-2.75	7.6	12H25	H10-300
P1800A	1800	BH3	C32/40	500B	CIS	Bored	38650	-2.75	5.5	18H20	H10-300
P1800B	1800	BH4	C32/40	500B	CIS	Bored	42450	-2.75	7.1	18H20	H10-300

Mark	Reinforcement Length	NegativeSkin Friction	DA1-1_Compression DesignLoad	DA1-2_Compression DesignLoad	DA1-1_Compression Capacity	DA1-2_Compression Capacity	StructuralCompression Capacity	No of piles
P1500A	24	437	6593	6124	6897	6537	7250	4
P1500B	24	635	6872	6539	7153	6872	7250	4
P1800A	24	513	8326	7934	8652	8257	8932	12
P1800B	24	670	8436	7964	8594	8136	8932	8

Pile

► By IFC Representation

- Individual Pile

IFC Entity: IfcPile						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	MaterialGrade	Text	All piles	-	Yes	Refer to list^
2	BoreholeRef	Text	All piles	-	No	BH2, BH3, BH12-2
3	ConstructionMethod	Text	All piles	-	Yes	Refer to list^
4	DA1-1_CompressionCapacity	Integer	All piles	kN	No	5683
5	DA1-1_TensionCapacity	Integer	When required / relevant	kN	No	3655
6	DA1-2_CompressionCapacity	Integer	All piles	kN	No	4823
7	DA1-2_TensionCapacity	Integer	When required / relevant	kN	No	3025
8	MinEmbedmentIntoBearingLayer_SPT_MoreThan_100N	Real	When required / relevant	m	No	16.5
9	MinEmbedmentIntoBearingLayer_SPT_MoreThan_60N	Real	When required / relevant	m	No	23.2
10	MinRockSocketingLength	Real	When required / relevant	m	No	16.5
11	ReinforcementSteelGrade	Text	RC piles#	N/mm ²	Yes	500B
12	StructuralCompressionCapacity	Integer	All piles	kN	No	6525
13	StructuralTensionCapacity	Integer	When required / relevant	kN	No	3825
14	Breadth	Length	RC non-circular piles	mm	No*	300
15	CutOffLevel_SHD	Real	All piles	SHD Level	No	-1.35
16	Diameter	Length	RC circular piles	mm	No*	600
17	Length	Length	All piles	mm	No*	40500
18	Mark	Text	All piles	-	No	P156
19	MemberSection	Text	Steel piles	-	No	CHS500x3.0, 254x254x63 kg/m
20	ToeLevel_SHD	Real	All piles	SHD Level	No	-63.35
21	Width	Length	RC non-circular piles	mm	No*	600
22	MainRebar	Text	RC piles#	-	Yes	10H32+10H16
23	PileType	Text	RC piles#	-	Yes	Refer to list^
24	ReinforcementLength	Text	RC piles#	m	Yes	Refer to list^
25	Stirrups	Text	RC piles#	-	Yes	H16-250

* Parameter is populated from the dimensions of BIM elements modelled.

^ List can be found [here](#).

RC piles denotes to RC precast pile, cast-in situ bored pile or spun pile

Pile

► By IFC Representation (continued from previous page)

IFC Entity: IfcPile						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
25	Stirrups	Text	RC piles [#]	-	Yes	H16-250
26	DA1-1_CompressionDesignLoad	Integer	All piles	kN	No	5515
27	DA1-1_TensionDesignLoad	Integer	When required / relevant	kN	No	3255
28	DA1-2_CompressionDesignLoad	Integer	All piles	kN	No	4650
29	DA1-2_TensionDesignLoad	Integer	When required / relevant	kN	No	2850
30	NegativeSkinFriction	Integer	When required / relevant	kN	No	135

➤ Parameters below can be added as project information for piles in general. It is not necessary to input them in individual piles

IFC Entity: IfcBuilding						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	PileModelFactor	Real	when required / relevant	-	No	1.35 / 1.55
2	ShaftR4DesignFactor	Real	when required / relevant	-	No	
3	EndBearingR4DesignFactor	Real	when required / relevant	-	No	
4	NoOfULTTest	Integer	when required / relevant	-	No	2
5	NoOfWorkingLoadTest_MaintainedLoadTest	Integer	when required / relevant	-	No	3
6	NoOfWorkingLoadTest_RapidLoadTest	Integer	when required / relevant	-	No	3
7	NoOfNonDestructiveTestPile	Integer	when required / relevant	-	No	8

* Parameter is populated from the dimensions of BIM elements modelled.

^ List can be found [here](#).

RC piles denotes to RC precast pile, cast-in situ bored pile or spun pile

Pile

► Example of Pile (RC Bored Pile) Structural Element Input

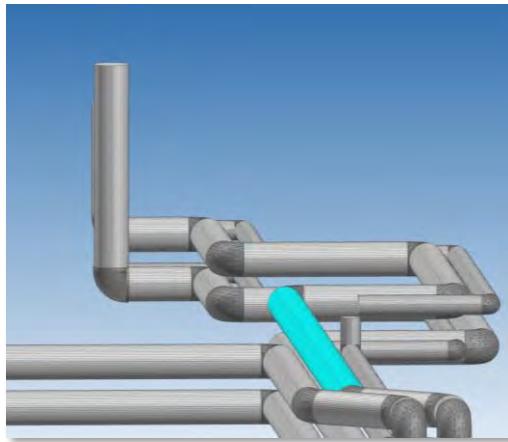
1600mm Diameter Bored Piles		IFC Entity: IfcPile	
		IFC SubType: N.A.	
S/N	IFC-SG Property	Examples	
1	ReinforcementSteelGrade	500B	
2	MaterialGrade	C35/45	
3	BoreholeRef	BH3	
4	ConstructionMethod	CIS	
5	DA1-1_CompressionCapacity	5683	
6	DA1-2_CompressionCapacity	4823	
7	MinEmbedmentIntoBearingLayer_SPT_MoreThan_100N	6.5	
8	StructuralCompressionCapacity	6525	
9	CutOffLevel_SHD	-1.55	
10	Diameter	1600	
11	Length	35450	
12	Mark	P-1600	
13	ToeLevel_SHD	-37	
14	MainRebar	8H16	
15	PileType	Bored	
16	ReinforcementLength	24	
17	Stirrups	H10-300	
18	DA1-1_CompressionDesignLoad	5515	
19	DA1-2_CompressionDesignLoad	4650	

Pile

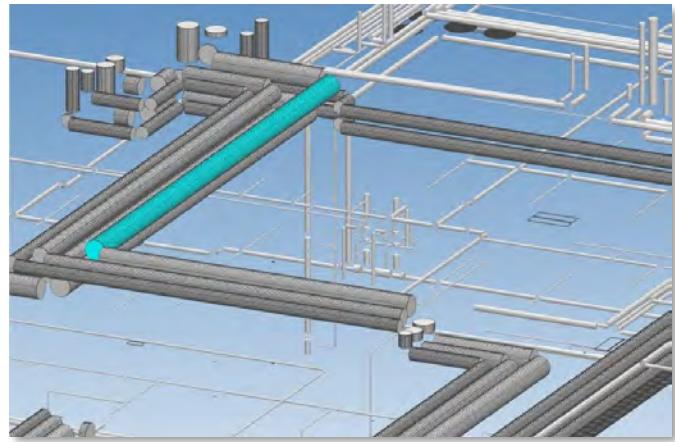
► Example of Pile (RC Jacked In Pile) Structural Element Input

250mm x 250mm Jacked In Piles		IFC Entity: IfcPile	
		IFC SubType: N.A.	
S/N	IFC-SG Property	Examples	
1	ReinforcementSteelGrade	500B	
2	MaterialGrade	C35/45	
3	BoreholeRef	BH1	
4	ConstructionMethod	PC	
5	DA1-1_CompressionCapacity	1315	
6	DA1-2_CompressionCapacity	1153	
7	MinEmbedmentIntoBearingLayer_SPT_MoreThan_60N	3.3	
8	StructuralCompressionCapacity	2085	
9	Breadth	250	
10	CutOffLevel_SHD	-0.8	
11	Length	18000	
12	Mark	250x250	
13	ToeLevel_SHD	-18.8	
14	Width	250	
15	MainRebar	4H13	
16	PileType	Jacked in	
17	ReinforcementLength	12	
18	Stirrups	H10-300	
19	DA1-1_CompressionDesignLoad	1207	
20	DA1-2_CompressionDesignLoad	1058	

Pipes / Drains



S4 – Fig 59 : Pipes



S4 – Fig 60 : Pipes

► By IFC Representation

IFC Entity: IfcPipeSegment						
IFC SubType: RIGIDSEGMENT, FLEXIBLESEGMENT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	PreInsulated	Boolean	-	-	Yes	TRUE / FALSE
2	ConstructionMethod	Text	-	-	-	-
3	Perforated	Boolean	-	-	Yes	TRUE / FALSE
4	Diameter	Length	-	mm	No	-
5	Material	Text	-	-	-	-
6	Gradient	Text	-	-	-	-
7	Length	Length	-	mm	No	-
8	Thickness	Length	-	mm	No	-
9	TradeEffluent	Boolean	-	-	Yes	TRUE / FALSE

► By IFC Representation

IFC Entity: IfcDuctSegment, IfcDuctFitting						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	PreInsulated	Boolean	-	-	Yes	TRUE / FALSE
2	ConstructionMethod	Text	-	-	-	-
3	TradeEffluent	Boolean	-	-	Yes	TRUE / FALSE

Pipes / Drains

► By IFC Representation (continued from previous page)

IFC Entity: IfcPipeSegment

IFC SubType: SCUPPERDRAIN, SPOOL, FLARESTACK, RAINWATEROUTLET

S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	-	-	-	-	-	-

IFC Entity: IfcPipeFitting

IFC SubType: BEND, DRAINCHANNELBEND, ENTRY, EXIT, FLANGEADAPTOR, FLEXIBLECOUPLING, JUNCTION, OBSTRUCTION, PIPESILENCER, SHORTPIECE

S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	InnerDiameter	Length	-	mm	No	-
2	NominalDiameter	Length	-	mm	No	-
3	OuterDiameter	Length	-	mm	No	-
4	Thickness	Length	-	mm	No	-

Notes

- Sanitary drain-lines are to be submitted as schematic and/or 2D drawings. If industry would like to submit in 3D, it is optional and will also be accepted.
- Under the Covering component, Pipe Sleeves should be indicated where relevant

Planter Box

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Greenery	URA	<ul style="list-style-type: none"> • Landscape Replacement Area (LRA) requirements • Landscape Provision: Indicative Extent
	Site Layout, Landscape Deck		<p>Landscape Deck</p> <ul style="list-style-type: none"> • Height of Deck in relation to existing Ground Levels • Location and General Layout of Deck

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Greenery	URA	<ul style="list-style-type: none"> • Landscape Replacement Area – Provide Green Plot Ratio and total % of landscape replacement, with breakdown of hardscape and softscape • Declare Location of Sky Terrace / Planter Boxes / Covered Communal Ground Garden / Communal Pavilions <p> Supplementary Documents</p> <ol style="list-style-type: none"> a) Landscape plan / species and perspectives b) Plant details of sky terrace / planter boxes / covered communal ground garden / communal pavilions
	Site Layout, Landscape Deck		<p>Landscape Deck</p> <ul style="list-style-type: none"> • Exposure of Basement Wall & Proposed Treatment (Berm / Vertical Greenery) • Site Coverage on Landscape Deck – declare % • Provision of Greenery on Deck – Location and % • Boundary Wall Porosity – declare % and show design

► By IFC Representation

IFC Entity: IfcFurniture						
IFC SubType: PLANTERBOX						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
-	-	-	-	-	-	-

Planting Area

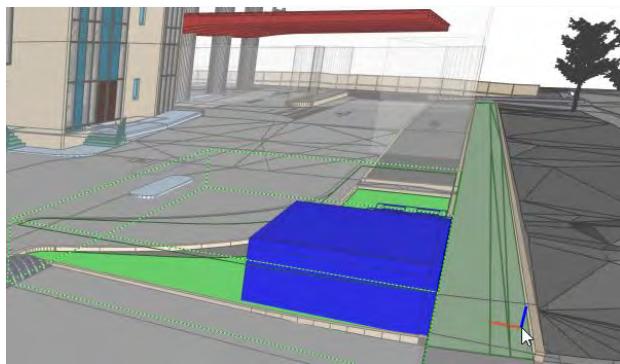
Legend:  Architecture  C&S  M&E

► By Key Gateways

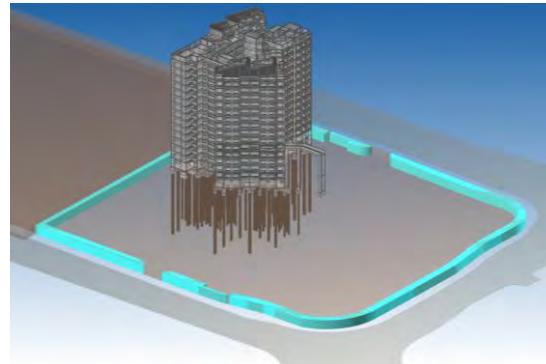
G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Greenery	URA	<ul style="list-style-type: none"> • Landscape Replacement Area (LRA) requirements • Landscape Provision: Indicative Extent
	Site Layout only	NParks	<p>Provision of Planting Areas</p> <ul style="list-style-type: none"> • To provide planting areas (i.e. 3.0m/5.0m-wide green buffers, 2.0m-wide peripheral planting verges, open-air parking planting areas) in compliance with NParks' Guidelines (Chapter 3) • To ensure planting areas are free from any encroachment, except for allowable minor ancillary structures and landscaping structures as listed in NParks' Guidelines (Chapter 3) • To locate fire engine accessways outside planting areas • To recess underground structures / services at least 2.0m below planting areas, except for: <ul style="list-style-type: none"> ◦ Footings of retaining / boundary walls (may encroach up to 0.5m into planting areas) ◦ Services traversing perpendicularly across planting areas <p>New Parks/ Park Connectors/ Promenades</p> <ul style="list-style-type: none"> • To ensure design is in accordance with NParks specifications (e.g., spatial provision, access points, specific features / elements imposed at planning stage based on NParks planning conditions) <p>Securing of Land for Parks / Park Connectors use and/or Impact on Neighbouring Parks (e.g., en bloc sites)</p> <ul style="list-style-type: none"> • To ensure site boundary does not encroach into safeguarded / rezoned parks and park connectors
	Site Layout, Landscape Deck	URA	<p>Landscape Deck</p> <ul style="list-style-type: none"> • Height of Deck in relation to Existing Ground Levels • Location and General Layout of Deck

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Greenery	URA	<ul style="list-style-type: none"> • Landscape Replacement Area – Provide Green Plot Ratio and total % of landscape replacement, with breakdown of hardscape and softscape • Declare Location of Sky Terrace / Planter Boxes / Covered Communal Ground Garden / Communal Pavilions <p> Supplementary Documents</p> <ul style="list-style-type: none"> a) Landscape plan / species and perspectives b) Plant details of sky terrace / planter boxes / covered communal ground garden / communal pavilions
	Site Layout only	NParks	<p>Provision of Planting Areas</p> <ul style="list-style-type: none"> • To ensure dimensions of planting areas are compliant with NParks Guidelines (Chapter 3) or as approved by NParks during Design Gateway (G1)
	Site Layout, Landscape Deck	URA	<p>Landscape Deck</p> <ul style="list-style-type: none"> • Exposure of Basement Wall & Proposed Treatment (Berm / Vertical Greenery) • Site Coverage on Landscape Deck – declare % • Provision of Greenery on Deck – Location and % • Boundary Wall Porosity – declare % and show design

Planting Area



S4 – Fig 61 : Planting Area highlighted in Green



S4 – Fig 62 : Planting Area

► By IFC Representation

IFC Entity: IfcGeographicElement						
IFC SubType: PLANTINGAREA						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Area	Length	-	mm ²	No	-
2	ApprovedSoilMixture	Boolean	-	-	Yes	TRUE / FALSE
3	Status	Text	-	-	Yes	Existing, Proposed / New, To be Removed
4	Turf	Boolean	-	-	Yes	TRUE / FALSE
5	TurfSpecies	Text	-	-	No	-
6	Compensated	Boolean	-	-	Yes	TRUE / FALSE
7	CarparkProvision	Boolean	-	-	Yes	TRUE / FALSE

Notes

- QPs are to separately submit calculation for compensated green buffer area.

Pollution Control

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Pollution Control (COPPC)	NEA	COPEH - Section 7 : Anti-Mosquito Breeding	<p>7.1 Objective 7.2 Roof Gutter</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). <p>7.3 Air-Conditioning Tray 7.4 Floor Trap</p> <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
		COPPC - Section 2 : Judicious Siting of Industries and Other Development	<p>4. Objective</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
		COPPC - Section 3 : Requirements for Industries	<p>5. Clean Industry 6. Light Industry</p> <p>7. General Industry 8. Special Industry</p> <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
		COPPC - Section 6 : Hazardous Substances and Toxic Industrial Waste Control Requirements	<p>• 14. Hazardous Substances • 15. Toxic Industrial Waste</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2) <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.

► Modelling Pollution Control Emissions

- Only substances and items that are analysed by the relevant equipment or device will be required in the IFC-SG properties. For example, if Chlorine is analysed, an IFC-SG value will need to be added for the Chlorine IFC-SG Property. If Chlorine is not analysed, it is not necessary to add the property.

Pollution Control

► By IFC Representation (continued from previous page)

IFC Entity: IfcBuildingElementProxy						
IFC SubType: AIRIMPURITIESSENSOR, FUELBURNINGEQUIPMENT, INCINERATOR, POLLUTIONCONTROLEQUIPMENT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1 - 58	Refer to Air Impurities and Trade Effluent Discharge List below	Text	-	-	No	76 mg/Nm ³ , 0.1, 150

► IFC-SG Properties

Air Impurities (AI)	
S/N	IFC-SG Property
1	AI_AmmoniaAndAmmonium
2	AI_Antimony
3	AI_Arsenic
4	AI_Benzene
5	AI_Cadmium
6	AI_CarbonMonoxide
7	AI_Chlorine
8	AI_Copper
9	AI_DioxinsAndFurans
10	AI_EthyleneOxide
11	AI_FlourineAndHydrofluoricAcide
12	AI_Formaldehyde
13	AI_HydrogenChloride
14	AI_HydrogenSulphide
15	AI_Lead
16	AI_Mercury
17	AI_OxidesOfNitrogen
18	AI_ParticulateSubstances
19	AI_StyreneMonomer
20	AI_SulphurDioxide
21	AI_SulphurTrioxideAndAcidGases
22	AI_SulphurTrioxideOrSulphuricAcidMist
23	AI_VinylChlorideMonomer

Air Impurities (AI)			
S/N	IFC-SG Property	S/N	IFC-SG Property
24	TED_Arsenic	47	TED_PHValue
25	TED_Barium	48	TED_PhenolicCompound
26	TED_Beryllium	49	TED_Phosphate
27	TED_BiochemicalOxygenDemand	50	TED_Selenium
28	TED_Boron	51	TED_Silver
29	TED_Cadmium	52	TED_Sulphate
30	TED_Calcium	53	TED_Sulphide
31	TED_ChemicalOxygenDemand	54	TED_TemperatureOfDischarge
32	TED_Chloride	55	TED_Tin
33	TED_Chromium	56	TED_TotalDissolvedSolid
34	TED_Colour	57	TED_TotalSuspendedSolid
35	TED_Copper	58	TED_Zinc
36	TED_Cyanide		
37	TED_Detergent		
38	TED_GreaseAndOil		
39	TED_Iron		
40	TED_Lead		
41	TED_Magnesium		
42	TED_Manganese		
43	TED_Mercury		
44	TED_MetalsInTotal		
45	TED_Nickel		
46	TED_Nitrate		

Prefabricated Building Systems and MEP Components

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway	
Key Words	Requirement Category
Buildability	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p> Buildable Design Score (B-Score)</p> <p>a) BS03 Form (in Excel format) to be submitted</p>

► By IFC Representation

IFC Entity: IfcBuildingSystem						
IFC SubType: PREFABRICATEDBATHROOMUNIT, PREFABRICATEDANDPREFINISHEDWALL, PREFABRICATEDANDPREFINISHEDFLOOR, PREFABRICATEDANDPREFINISHEDCEILING, PRECASTEXTERNALWALLWITHCAST-INWINDOWS, PREFABRICATEDPUMPSKID, PREFABRICATEDMEPVERTICALMODULE, PREFABRICATEDMEPLANTMODULE, PREFABRICATEDMEPHORIZONTALMODULE						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	MechanicalConnectionType	Text	-	-	Yes	-

IFC Entity: IfcPipeFitting , IfcPipeSegment , IfcDuctFitting , IfcDuctSegment						
IFC SubType: RIGIDSEGMENT, FLEXIBLESEGMENT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	PreInsulated	Boolean	-	-	Yes	TRUE / FALSE
2	ConstructionMethod	Text	-	-	Yes	Prefabricated

IFC Entity: IfcDiscreteAccessory						
IFC SubType: PIPESUPPORT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	IsCommon	Boolean	-	-	Yes	TRUE / FALSE

Prefabricated Building Systems and MEP Components

► By IFC Representation (continued from previous page)

IFC Entity: IfcDistributionSystem						
IFC SubType: CHILLEDWATER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	PreInsulated	Boolean	-	-	Yes	TRUE / FALSE
2	ConstructionMethod	Text	-	-	Yes	Prefabricated

Notes

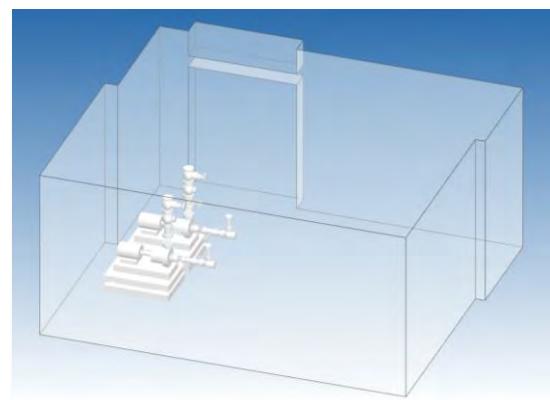
- IfcBuildingSystem components refer to APCS and Prefabricated MEP Systems
- Other components refer to Prefabricated MEP Components

Pump

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
Key Words	Agency	Requirement Category	
Infra & Utilities (Internal)	PUB	Sanitary Network <ul style="list-style-type: none"> Drain-lines, Inspection Chamber, Discharge Lines, etc. 	
		Basement Pumped System <ul style="list-style-type: none"> Sanitary Stack System 	
		Sewer Network <ul style="list-style-type: none"> May model a box as a placement holder. Details is to be drawn by Specialised PE 	
		Retention Tank <ul style="list-style-type: none"> RC Trench 	
		Drainage Network <ul style="list-style-type: none"> Minor Sewer (when applicable) 	
		Proposed Treatment of Common Drain <ul style="list-style-type: none"> C&S: Effective tank capacity and other hydraulic details associated with the tank M&E: For pumped detention tank, M&E to provide pump details 	
		Longitudinal / sectional profile <ul style="list-style-type: none"> Side gates 	



S4 – Fig 65 : Pump

S4 – Fig 63 : Pump

S4 – Fig 64 : Pump

Pump

► By IFC Representation

IFC Entity: IfcPump						
IFC SubType: SUMPPUMP						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Capacity	VolumetricFlowRate	-	L/s or m ³ /s	-	1L/s or 1m ³ /s
2	Duty	Boolean	-	N.A.	Yes	TRUE / FALSE
3	Standby	Boolean	-	N.A.	Yes	TRUE / FALSE
4	PumpHead	Text	-	m	No	1m, 2m

Railing

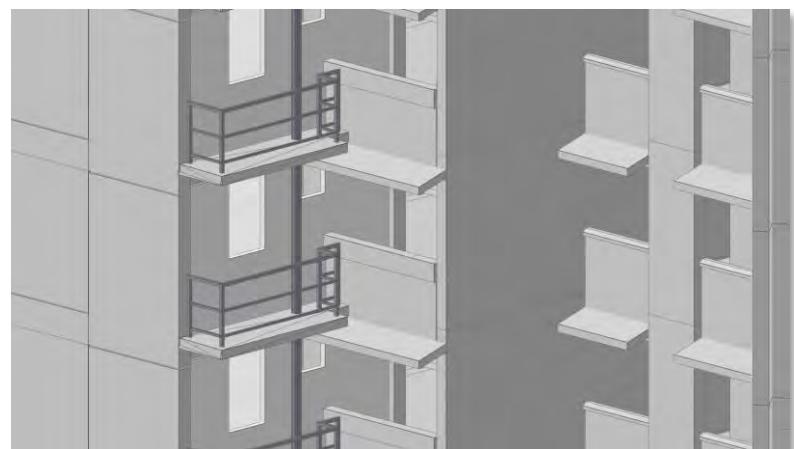
Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Barrier	BCA	<ul style="list-style-type: none"> Safety from falling Protection from injury by vehicles in building (e.g. provision of bollards)
	Staircase		<ul style="list-style-type: none"> Minimum Width Tread and Riser, Handrail / Railing



S4 – Fig 66 : Railing



S4 – Fig 67 : Railing on AC Ledge (in relation to Building)

► By IFC Representation

IFC Entity: IfcRailing						
IFC SubType: N.A., BOLLARD, BUARDRAIL						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Height	Length	-	mm	No	1000
2	Material	Text	-	-	-	-
3	SafetyBarrier	Boolean	-	-	Yes	TRUE / FALSE
4	TypeOfBarrier	Text	-	-	No	-
5	IsLaminated	Boolean	-	-	Yes	TRUE / FALSE

Ramp

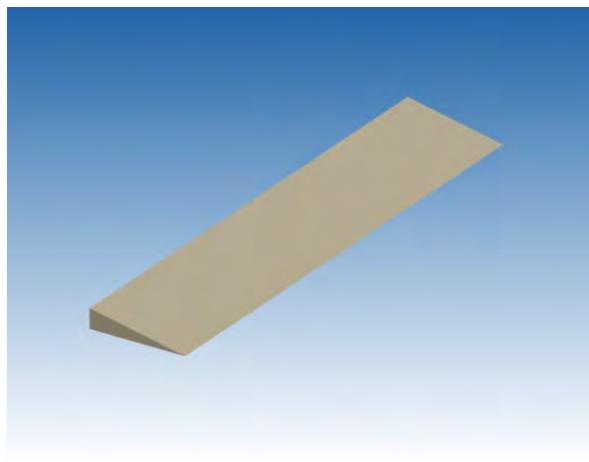
Legend:  Architecture  C&S  M&E

► By Key Gateways

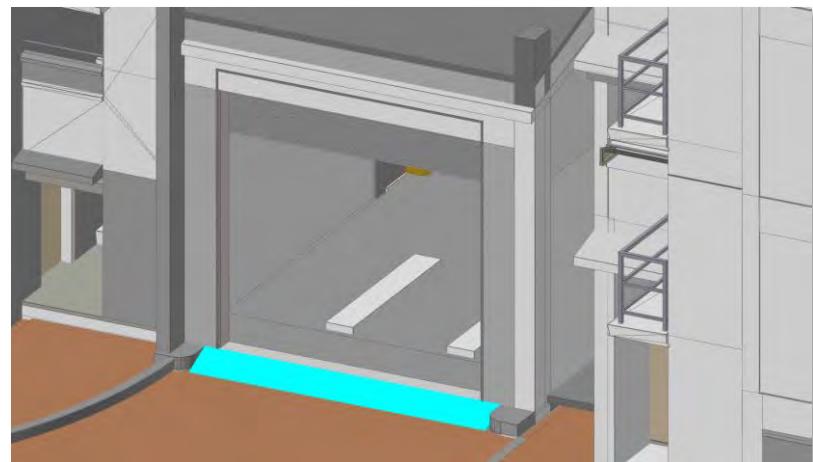
G1 Design Gateway			
Key Words	Agency	Requirement Category	
Connectivity	URA	<p>Pedestrian Network</p> <p>Through Block Link (TBL), Underground Pedestrian Link(UPL), Elevated Pedestrian Link (EPL), Covered Walkways (CW), Open Walkways (OW), Covered Linkways (CL), High Covered Linkways (HCL)</p> <ul style="list-style-type: none"> • Layout and connections to existing / future developments • Alignment to adjacent pedestrian connections • Proposed levels and mitigation of level differences (if any) • Soffit height, overall width and clear width • Vehicular ramps to start after these Pedestrian Networks <p>Additional requirements for the following:</p> <ul style="list-style-type: none"> • (UPL, EPL) Detailed layout of vertical circulation point – location within development, and dimensions • (UPL, EPL) Knock Out Panels (KOP) details (e.g. alignment, size) where relevant 	
Site Layout, Street Works	LTA	<p>Vehicular Access Points</p> <ul style="list-style-type: none"> • To indicate the levels of entrance culvert and gradient of entrance approach • To indicate the radius of turning road kerb • To show the provision of tactile tiles and shifting of existing road elements (incl. trees, lamp post, signs, etc.) affected by proposed access 	

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Access to Site	BCA	<ul style="list-style-type: none"> • Passenger Alighting and Boarding Point • Accessible Route (to the ingress / egress of the development entrance) 	
Access within Building only		<ul style="list-style-type: none"> • Headroom and Ceiling Height • Accessible Route and Maneuvering Space (within the development) 	
Site Layout, Street Works	LTA	<p>Access Point Details</p> <ul style="list-style-type: none"> • Structural details of entrance culvert at access points (reinforcement, connection to entrance approach etc.) • Levels, gradient, cross-fall • Redundant access to be sealed and reinstated to match existing side-table 	
Site Layout, Vehicular Parking		<p>Vehicular Parking Provision</p> <ul style="list-style-type: none"> • To provide the details and critical dimensions of the parking layout such as: <ul style="list-style-type: none"> ○ Type and size of parking lots ○ Width of ramps and accessways ○ Inner turning radius and width of turning paths ○ Width of parking aisles ○ Gradient of vehicular ramps ○ Headroom clearance ○ Road and traffic arrow markings ○ Bicycle rack details ○ EV lots & charging stations 	

Ramp



S4 – Fig 68 : Ramp



S4 – Fig 69 : Ramp in relation to Building

► By IFC Representation

IFC Entity: IfcRamp						
IFC SubType: CURVEDRAMP, FLAREDKERBRAMP, STRAIGHT_RUN_RAMP						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Gradient	Text	-	-	No	1:16
2	Width	Text	-	mm	No	1200
3	BarrierFreeAccessibility	Boolean	-	-	Yes	TRUE / FALSE
4	TransitionRamp	Boolean	-	-	Yes	TRUE / FALSE
5	Accessway	Boolean	-	-	Yes	TRUE / FALSE
6	Egress	Boolean	-	-	Yes	TRUE / FALSE
7	Ingress	Boolean	-	-	Yes	TRUE / FALSE
8	Vehicular	Boolean	-	-	Yes	TRUE / FALSE
9	Material	Text	-	-	No	-

Notes

- Any horizontal slab whose gradient is required for regulatory compliance purposes, including kerb ramp.
- It is possible to model the ramp in another default component in the native BIM software (e.g. SLAB or FLOOR component), and map it specially to the IfcRamp for submission purposes. Please refer to the [IFC-SG Resource Kit](#) for more info.

Refuse Chute / Recyclables Chute

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Site Layout only	NEA	<p>Environmental Health (COPEH)</p> <ul style="list-style-type: none"> • Refuse Truck Access road (for refuse collection) – Swept Path Analysis • Location and Size of the Bin Centre/Refuse Room/Bin Point, refuse chute and recycling chute, refuse chute chamber and recyclables storage & its collection system • Provide total daily refuse outputs (liters/day) for the development • Pneumatic waste conveyance system (PWCS) schematic plan • Location of cooling tower and its setback distance (at least 5m) <p>When to apply:</p> <ul style="list-style-type: none"> • Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Design Gateway (G1) • However, applicant may submit the above information at Pre-Submission if the development does not require any Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> • QP appointed should submit the above information and keep other relevant QPs in the loop. • The same QP should follow through the submissions for all gateways.

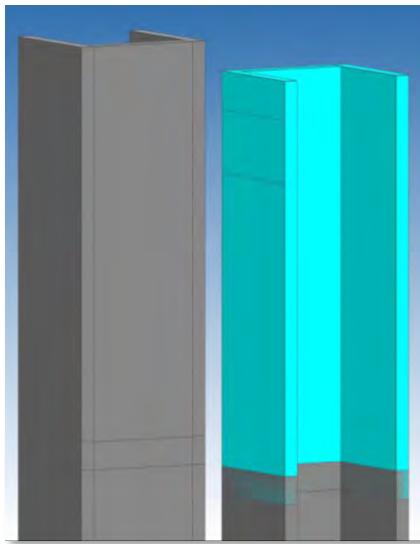
G2 Construction Gateway			
	Key Words	Agency	Requirement Category
  	Buildability	BCA	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> • BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems • Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p> Buildable Design Score (B-Score)</p> <p>a) BS03 Form (in Excel format) to be submitted</p>
	Environmental Health (COPEH)	NEA	<p>COPEH - Section 1 : Refuse Storage and Collection</p> <p>1.1 Objective 1.2 Refuse Output 1.3 Refuse Chute 1.4 Refuse Chute Chamber 1.5 Refuse Room</p> <p>When to apply:</p> <ul style="list-style-type: none"> • Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Equipment can be modelled as placeholders and supplier details can be provided in a separate document. <p>Who to submit:</p> <ul style="list-style-type: none"> • QP appointed should submit the above information and keep other relevant QPs in the loop. • The same QP should follow through the submissions for all gateways.

Refuse Chute / Recyclables Chute

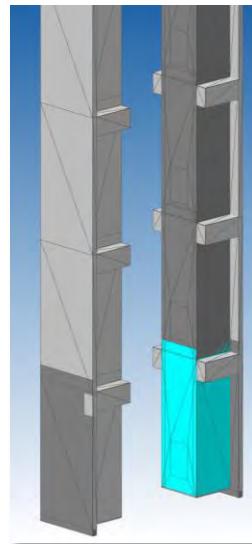
Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Environmental Health (COPEH)	NEA	<p>COPEH - Section 6 : Storage and Collection System for Recyclables at Strata-Titled properties with Residential Units</p> <p>6.1 Objective 6.2 Recyclables Output</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). 	<p>6.3 Designated Recycling Points for Recycling Receptacles 6.4 Recyclables Chute System</p> <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.



S4 – Fig 70 : Singular Refuse Chute



S4 – Fig 71 & 72 : Refuse Chute Stack in relation to Building



► By IFC Representation

IFC Entity: IfcBuildingSystem						
IFC SubType: REFUSECHUTE						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ConstructionMethod	Text	-	-	Yes	Precast
2	OuterDimensions	Length	-	mm	-	-
3	InnerDimensions	Length	-	mm	-	-
4	ChamferRadius	Length	-	mm	-	-

Refuse Chute / Recyclables Chute

► By IFC Representation (continued from previous page)

IFC Entity: IfcWall						
IFC SubType: REFUSECHUTE						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ConstructionMethod	Text	-	-	Yes	Precast

IFC Entity: IfcSpace						
IFC SubType: REFUSECHUTE						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	SpaceName	Text	-	-	Yes	Refuse Chute Chamber

IFC Entity: IfcDoor						
IFC SubType: ACCESSHATCH, RECYCLABLESCHUTEACCESSPANEL, RECYCLABLESCHUTEHOPPER, REFUSECHUTEACCESSPANEL, REFUSECHUTEHOPPER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	AirTight	Boolean	-	-	Yes	TRUE / FALSE
2	FireRating	Text	-	hr	No	½-hr , 1-hr etc.
3	SelfClosing	Boolean	-	-	Yes	TRUE / FALSE
4	VolumeControlled	Boolean	-	-	Yes	TRUE / FALSE

IFC Entity: IfcFurniture						
IFC SubType: REFUSECONTAINER, REFUSECOMPACTOR, RECYCLABLECONTAINER, RECYCLABLECOMPACTOR						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	CompactionRatio	Text	-	-	-	2:01
2	Litre	Text	-	-	-	-
3	ColourCode	Text	-	-	-	-
4	BasePlateMaterial	Text	-	-	-	Mezzanine
5	BasePlateThickness	Text	-	mm	No	6
6	TailGateOrientation	Text	-	-	-	Inward Facing
7	HookUpPoint	Text	-	-	No	Outward Facing

Refuse Handling Equipment

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Site Layout only	NEA	<p>Environmental Health (COPEH)</p> <ul style="list-style-type: none"> • Refuse Truck Access road (for refuse collection) – Swept Path Analysis • Location and Size of the Bin Centre/Refuse Room/Bin Point, refuse chute and recycling chute, refuse chute chamber and recyclables storage & its collection system • Provide total daily refuse outputs (liters/day) for the development • Pneumatic waste conveyance system (PWCS) schematic plan • Location of cooling tower and its setback distance (at least 5m) <p>When to apply:</p> <ul style="list-style-type: none"> • Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Design Gateway (G1) • However, applicant may submit the above information at Pre-Submission if the development does not require any Design Gateway (G1) <p>Who to submit:</p> <ul style="list-style-type: none"> • QP appointed should submit the above information and keep other relevant QPs in the loop. • The same QP should follow through the submissions for all gateways.

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Environmental Health (COPEH)	NEA	<p>COPEH - Section 1 : Refuse Storage and Collection</p> <p>1.1 Objective 1.2 Refuse Output 1.3 Refuse Chute 1.4 Refuse Chute Chamber 1.5 Refuse Room</p> <p>When to apply:</p> <ul style="list-style-type: none"> • Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Equipment can be modelled as placeholders and supplier details can be provided in a separate document. <p>Who to submit:</p> <ul style="list-style-type: none"> • QP appointed should submit the above information and keep other relevant QPs in the loop. • The same QP should follow through the submissions for all gateways. <p>COPEH - Section 6 : Storage and Collection System for Recyclables at Strata-Titled properties with Residential Units</p> <p>6.1 Objective 6.2 Recyclables Output</p> <p>When to apply:</p> <ul style="list-style-type: none"> • Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). <p>Who to submit:</p> <ul style="list-style-type: none"> • QP appointed should submit the above information and keep other relevant QPs in the loop. • The same QP should follow through the submissions for all gateways.

Refuse Handling Equipment

► By IFC Representation

IFC Entity: IfcTank						
IFC SubType: REFUSEHANDLINGEQUIPMENT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	NominalCapacity	Volume	-	L, m ³	-	1000 L, 40 m ³
2	CompactionRatio	Text	-	-	-	-
3	EquipmentType	Text	-	-	-	-

IFC Entity: IfcFurniture						
IFC SubType: REFUSEBIN						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	-	-	-	-	-	-

Road

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Access to Site	URA	<p><u>Site Layout</u></p> <ul style="list-style-type: none"> Indicative locations of Pedestrian, Cycling, Vehicular and Service Access
	Fire Engine Accessway / Access Road	SCDF	<p><u>Indication of Fire Engine Accessways / Access Road</u></p> <ul style="list-style-type: none"> To design upfront and not added as an afterthought Compliance of provision of fire engine accessway / access road does not affect the requisite planting areas and roadside green verges Indication of all the fire engine access road and accessway within project boundary Clearly indicate if public road is used as fire engine accessway / access road Compliance of distance between fire engine accessway and fire access opening Compliance of no obstruction between fire engine accessway and fire access opening
	Service and Vehicular Access to Site	URA	<p><u>Vehicular Access</u></p> <ul style="list-style-type: none"> Location of vehicular, pedestrian and cyclist access points, and layout of internal driveways Integration with Building Envelope
	Site Layout only	NEA	<p><u>Environmental Health (COPEH)</u></p> <ul style="list-style-type: none"> Refuse Truck Access road (for refuse collection) – Swept Path Analysis Location and Size of the Bin Centre/Refuse Room/Bin Point, refuse chute and recycling chute, refuse chute chamber and recyclables storage & its collection system Provide total daily refuse outputs (liters/day) for the development Pneumatic waste conveyance system (PWCS) schematic plan Location of cooling tower and its setback distance (at least 5m)
		URA	<p><u>Building Setback from Boundary</u></p> <ul style="list-style-type: none"> Road Buffer Common Boundary Setback / Party wall & Planting Strip Building Setback for Multi-Storey Car Parks (MSCP) Boundary Setback for Ancillary Structures Setback requirement for Urban Design areas
	Site Layout, Street Works	LTA	<p><u>Vehicular Access Points</u></p> <ul style="list-style-type: none"> To indicate the levels of entrance culvert and gradient of entrance approach To indicate the radius of turning road kerb To show the provision of tactile tiles and shifting of existing road elements (incl. trees, lamp post, signs, etc.) affected by proposed access

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Access to Site	URA	<p><u>Site Layout</u></p> <ul style="list-style-type: none"> Detailed locations of Pedestrian, Cycling, Vehicular and Service Access
	Site Layout, Street Works	LTA	<p><u>Access Point Details</u></p> <ul style="list-style-type: none"> Structural details of entrance culvert at access points (reinforcement, connection to entrance approach etc.) Levels, gradient, cross-fall Redundant access to be sealed and reinstated to match existing side-table

Road

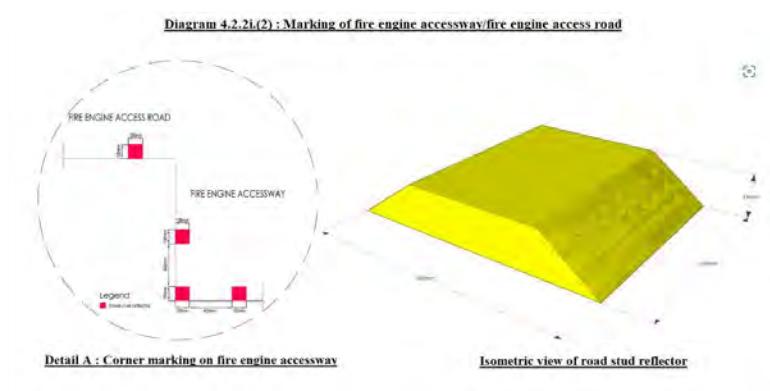
Legend: Architecture C&S M&E

► By Key Gateways

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Site Layout, Vehicular Parking	LTA	Vehicular Parking Provision <ul style="list-style-type: none"> To provide the details and critical dimensions of the parking layout such as: <ul style="list-style-type: none"> Type and size of parking lots Width of ramps and accessways Inner turning radius and width of turning paths Width of parking aisles Gradient of vehicular ramps Headroom clearance Road and traffic arrow markings Bicycle rack details EV lots & charging stations 	
Site Planning & External Firefighting Provisions	SCDF	Fire Engine Accessway / Access Road <ul style="list-style-type: none"> Indicate if public road is used as fire engine accessway / access road Fire engine accessway / access road requirement for basement Marking of fire engine accessway / access road Compliance of fire engine access road requirements of PG I to VIII buildings: <ul style="list-style-type: none"> Indicate road serving as fire engine access road within the project boundary Compliance of width, turning radii / facilities, design load capacity, gradient, overhead clearance Marking and signpost along fire engine access road No obstruction along fire engine access road Compliance of fire engine accessway requirements for PG II to VIII buildings: <ul style="list-style-type: none"> Indicate road serving as fire engine accessway within the project boundary Compliance of length of fire engine accessway Compliance of turning radii / facilities, design load capacity, gradient, overhead clearance Marking and signpost along fire engine access road No obstruction along fire engine access road 	



S4 – Fig 73 : Fire Engine Accessway



S4 – Fig 74 : Marking of Fire Engine Accessway

Road

► Modelling Roads in IFC-SG

- Refers to carriageways, driveways, fire engine accessways, fire engine access roads and vehicular service roads for refuse collection vehicles, differentiated by IFC-SG properties
 - NEA's Refuse Truck Access
 - NParks Planting Areas and Green Verges on Fire Engine Accessways
 - SCDF's Fire Engine Accessway / Access Road
- Spaces on roads, to complement LTA Roads, which are modelled under 'IfcCivilElement'
 - Spaces are used for NEA, NParks and SCDF representations on the Road to reduce difficulties in modelling the road in multiple parts for multiple agencies]
- It is optional to indicate 3D arrows on the road as Egress and Ingress properties must be accurately indicated

► By IFC Representation

IFC Entity: IfcCivilElement						
IFC SubType: DRIVEWAY						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	LoadingCapacity	Real	-	tonnes	No	30 tonnes
2	DesignedVehicleMass	Real	-	-	-	-
3	Egress	Boolean	-	-	Yes	TRUE / FALSE
4	Ingress	Boolean	-	-	Yes	TRUE / FALSE
5	Material	Text	-	-	-	-
6	RoadCategory	Text	-	-	No	-

IFC Entity: IfcSpace						
IFC SubType: ACCESSWAY, FIREENGINEACCESSROAD, FIREENGINEACCESSWAY, VEHICULARSERVICEROAD						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	LoadingCapacity	Real	-	tonnes	No	30 tonnes
2	Material	Text	-	-	-	-

IFC Entity: IfcBuildingElementProxy						
IFC SubType: ACCESSPOINT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	-	-	-	-	-	-

Road

► **By IFC Representation** (continued from previous page)

IFC Entity: IfcCivilElement						
IFC SubType: ROADKERB						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	KerbType	Text	-	-	-	K2A
2	Thickness	Length	-	mm	-	-
3	Height	Length	-	mm	-	-
4	Material	Text	-	-	-	-

Roof

Legend:  Architecture  C&S  M&E

► By IFC Representation

IFC Entity: IfcRoof						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ConstructionMethod	Text	-	-	No	-
2	Material	Text	-	-	No	-

IFC Entity: IfcSlab						
IFC SubType: ROOF						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ConstructionMethod	Text	-	-	No	-
2	Material	Text	-	-	No	-

IFC Entity: IfcCovering						
IFC SubType: ROOFING						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ConstructionMethod	Text	-	-	No	-
2	Material	Text	-	-	No	-

Sanitary Appliances

Legend: Architecture C&S M&E

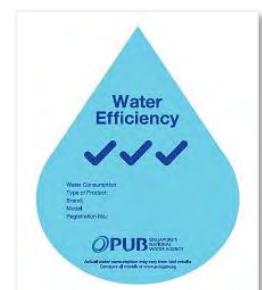
► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Sanitary (Internal)	PUB	<p>Used Water Flow Rate</p> <ul style="list-style-type: none"> Key Objective: To check that sewer can contain this flow Quantity & flow rate expected to be discharged from development, where it is to be discharged (based on no. of toilets, shower head, etc. - in relation to no. of DUs)

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Environmental Health (COPEH)	NEA	<p>COPEH - Section 2 : Public Toilet</p> <p>2.1 Objective 2.2 Definition of Public Toilet 2.3 General Design Criteria</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
	Washroom	BCA	<ul style="list-style-type: none"> Sanitary provisions for wheelchair users and ambulant disabled

► Modelling Sanitary Appliances in IFC-SG

- For WELS (True / False), it refers to a minimum of **two ticks and above**. For more information, please refer to PUB's Water Efficiency Label Rating here: <https://www.pub.gov.sg/wels/labelratings/typesoflabel>



S4 – Fig 75:
PUB WELS Rating

► By IFC Representation

- Bath**

IFC Entity: IfcSanitaryTerminal						
IFC SubType: BATH						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	WELS	Boolean	-	-	Yes	TRUE / FALSE

Sanitary Appliances

► By IFC Representation

- Bidet

IFC Entity: IfcSanitaryTerminal						
IFC SubType: BIDET						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	WELS	Boolean	-	-	Yes	TRUE / FALSE

► By IFC Representation

- Shower

IFC Entity: IfcSanitaryTerminal						
IFC SubType: SHOWER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	WELS	Boolean	-	-	Yes	TRUE / FALSE

► By IFC Representation

- Sink

IFC Entity: IfcSanitaryTerminal						
IFC SubType: SINK						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	WELS	Boolean	-	-	Yes	TRUE / FALSE

► By IFC Representation

- Urinal

IFC Entity: IfcSanitaryTerminal						
IFC SubType: URINAL						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	AmbulantDisabled	Boolean	-	-	Yes	TRUE / FALSE
2	ChildrenFriendly	Boolean	-	-	Yes	TRUE / FALSE
3	Mounting	Text	-	-	-	-
4	Waterless	Boolean	-	-	Yes	TRUE / FALSE
5	WELS	Boolean	-	-	Yes	TRUE / FALSE

Sanitary Appliances

► By IFC Representation

- Wash Basin

IFC Entity: IfcSanitaryTerminal

IFC SubType: WASH HAND BASIN

S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ChildrenFriendly	Boolean	-	-	Yes	TRUE / FALSE
2	Mounting	Text	-	-	No	-
3	WELS	Boolean	-	-	Yes	TRUE / FALSE

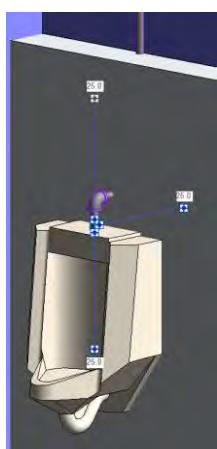
► By IFC Representation

- Water Closet

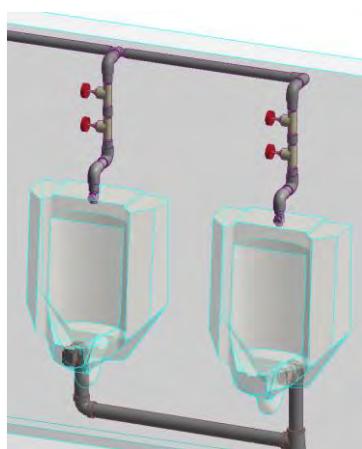
IFC Entity: IfcSanitaryTerminal

IFC SubType: URINAL

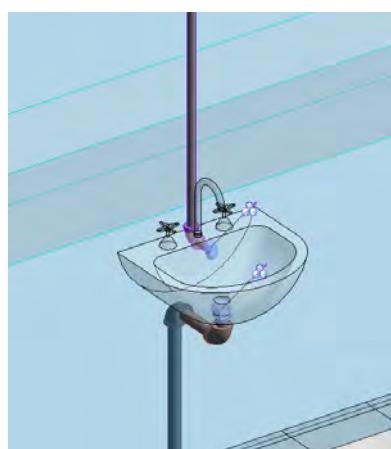
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	AmbulantDisabled	Boolean	-	-	Yes	TRUE / FALSE
2	BarrierFreeAccessibility	Boolean	-	-	Yes	TRUE / FALSE
3	ChildrenFriendly	Boolean	-	-	Yes	TRUE / FALSE
4	PanMounting	Text	-	-	-	-
5	ToiletPanType	Boolean	-	-	Yes	TRUE / FALSE
6	WELS	Boolean	-	-	Yes	TRUE / FALSE



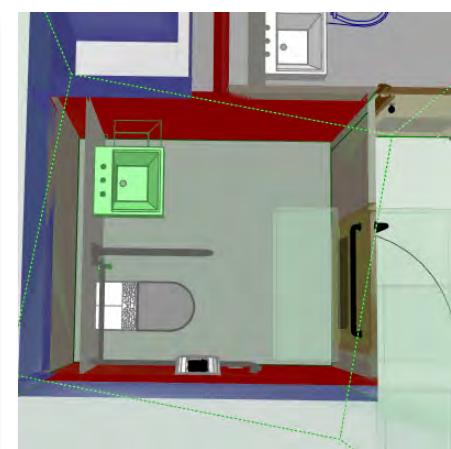
S4 – Fig 76:
Urinal



S4 – Fig 77:
Urinal

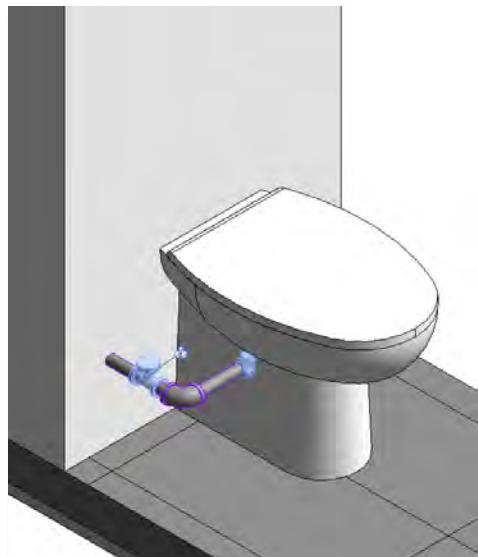


S4 – Fig 78:
Wash Basin

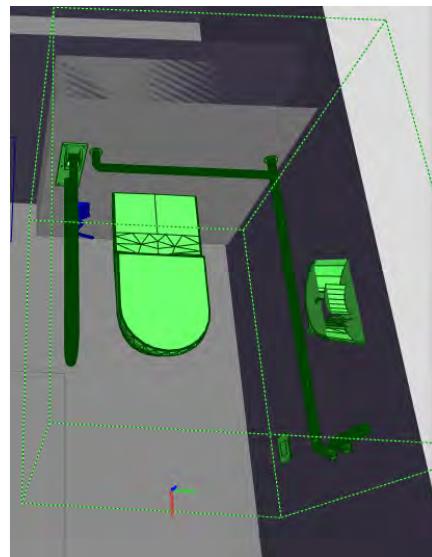


S4 – Fig 79:
Wash Basin highlighted in Green

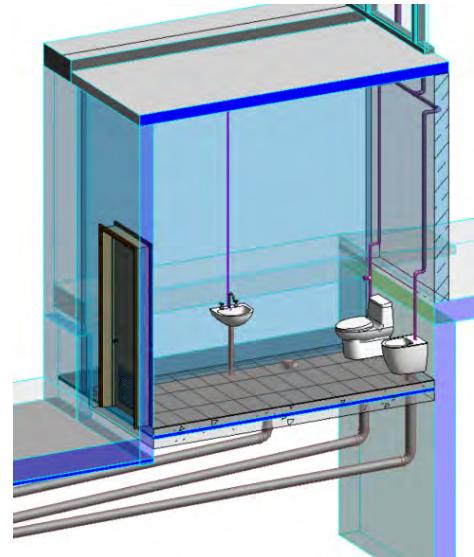
Sanitary Appliances



S4 – Fig 80 : Water Closet



S4 – Fig 81 :
Water Closet for Ambulant Disabled



S4 – Fig 82 : Water Closet

Seating

► By IFC Representation

IFC Entity: IfcFurniture						
IFC SubType: BENCH						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Capacity	Text	-	-	-	-

IFC Entity: IfcFurniture						
IFC SubType: CHAIR						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	-	-	-	-	-	-

Notes

- To determine Occupancy Load for Assembly Spaces (e.g. Auditorium, Theatre), it is necessary to indicate the type of seating

Security Lighting

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Exit sign and Emergency Lighting	SCDF	Exit Sign (incl. low level signs), Emergency Lighting, Photoluminescent Lighting <ul style="list-style-type: none"> (Archi) Type of buildings / areas, and locations requiring exit sign, photoluminescent lighting (M&E) Type of buildings / areas, and locations of requiring emergency lighting 	

► By IFC Representation

IFC Entity: IfcLightFixture						
IFC SubType: SECURITYLIGHTING						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	-	-	-	-	-	-

Notes

- Refers to emergency lighting to fulfil SCDF requirements

Sensor

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Environmental Health (COPEH)	NEA	<p>COPEH - Section 1 : Refuse Storage and Collection</p> <p>1.1 Objective 1.2 Refuse Output 1.3 Refuse Chute 1.4 Refuse Chute Chamber 1.5 Refuse Room</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Equipment can be modelled as placeholders and supplier details can be provided in a separate document. <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. 	<p>1.6 Refuse Bin Point and Refuse Bin Centre 1.7 Pneumatic Waste Conveyance System (PWCS) 1.8 Mandatory Waste Reporting Scheme 1.9 Location of Grease Trap 1.10 On-Site Food Waste Treatment System</p>

► Modelling Sensor in IFC-SG

- Level Sensor refers to sensors for monitoring refuse collected at the refuse chute.

► By IFC Representation

IFC Entity: IfcSensor						
IFC SubType: LEVELSENSOR						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	-	-	-	-	-	Point Type / Original

Notes

- Automatic sensors for fire protection (e.g. smoke detector, heat detector, flame detector etc.) do not need to be modelled. They are represented as a [Space parameter under “Automatic Fire Alarm System”](#).

Shading Device

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
Environmental Health (COPEH)	NEA	<p>COPEH - Section 3 : Ventilation, Ducting and Kitchen Exhaust Systems for Food Shop</p> <p>3.1 Objective 3.2 Design Requirements</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Terminals and façade louvres are to be modelled. Ducting can be in 2D or 3D. <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. 	<p>3.3 Operations Requirements 3.4 Other Requirements and Guidelines</p>

► By IFC Representation

IFC Entity: IfcShadingDevice						
IFC SubType: LOUVREDPANEL						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ShadingDevice	Text	-	-	No	-

Signage

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Exit sign and Emergency Lighting	SCDF	Exit Sign (incl. low level signs), Emergency Lighting, Photoluminescent Lighting <ul style="list-style-type: none"> (Archi) Type of buildings / areas, and locations requiring exit sign, photoluminescent lighting (M&E) Type of buildings / areas, and locations of requiring emergency lighting 	
Site Planning & External Firefighting Provisions		Fire Access Opening <ul style="list-style-type: none"> Compliance of provision of fire access opening Location, signage & size Number and position of access opening Exemption of fire access opening for PG 1 & 2 buildings 	

► By IFC Representation

IFC Entity: IfcBuildingElementProxy						
IFC SubType: SIGNAGE_EXIT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	MountingHeight	Length	-	mm	-	-

Site

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway							
Key Words	Agency	Requirement Category					
Rapid Transit System (RTS) Station	URA	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> • Lines of Road Reserve / Site boundary of adjacent land parcels • Location of station box and its associated tunnels & structures • Land take required (footprint to be optimized to minimize the land-take) • Details of Loading Provision (e.g. Loading grid plan) • Design of pop-up & ancillary structures (within approved railway, setback, mitigation of platform levels, interfacing with neighbouring developments, CW provision) • Annotation for at-grade servicing areas (e.g. bin centre, loading / unloading bays, required to serve the retail uses within the station) • Integration approach with existing / future structures (e.g. location / orientation / size of vents) • Connectivity with other transport infra structure facilities and key pedestrian routes • Taxi stand / Vehicular drop-off • KOP details (e.g. exact alignment, size) • Retail quantum (capped at 2000 sqm) <p>Supporting Documents:</p> <ul style="list-style-type: none"> a) Submission of RTS Checklist b) Method of construction (cut and cover , tunnel boring) c) Details of Loading Provision (Draft DIR - WIP) d) Copy of the relevant approvals for the proposed retail quantum 					
Site Layout only	NEA	<p>Environmental Health (COPEH)</p> <ul style="list-style-type: none"> • Refuse Truck Access road (for refuse collection) – Swept Path Analysis • Location and Size of the Bin Centre/Refuse Room/Bin Point, refuse chute and recycling chute, refuse chute chamber and recyclables storage & its collection system • Provide total daily refuse outputs (liters/day) for the development • Pneumatic waste conveyance system (PWCS) schematic plan • Location of cooling tower and its setback distance (at least 5m) <p>Pollution Control (COPPC)</p> <ul style="list-style-type: none"> • Confirm the proposed development is aligned with the prevailing URA MP land use zoning (e.g. residential to residential) • Building location and its surrounding development/amenities (such as expressway / major road, MRT / MRT station, place of worship, hospital, petrol station, industry premises etc.) • Orientation and location of nuisance sources (e.g. cooling towers, chiller plants, air handling units, air conditioning condensers, fresh air intake, exhaust outlets (ventilation shaft), etc) • 50m nuisance buffer from place of worship, petrol station, Light industry premises to the nearest residential development. • 100m nuisance buffer from General industry premises to nearest residential development. • 500m nuisance buffer from Special Industry premises to nearest residential development. • Orientation of building: Minimum building setback (m) <table border="1"> <tr> <td>Fronting track</td><td>35</td></tr> <tr> <td>End-wall facing track</td><td>25</td></tr> </table> <ul style="list-style-type: none"> • Setback distance within 70m from transport-related infrastructure (i.e. LTA road reserve line for expressway/major road) to the nearest residential development Lot boundary line. 		Fronting track	35	End-wall facing track	25
Fronting track	35						
End-wall facing track	25						

Site

Legend:  Architecture  C&S  M&E

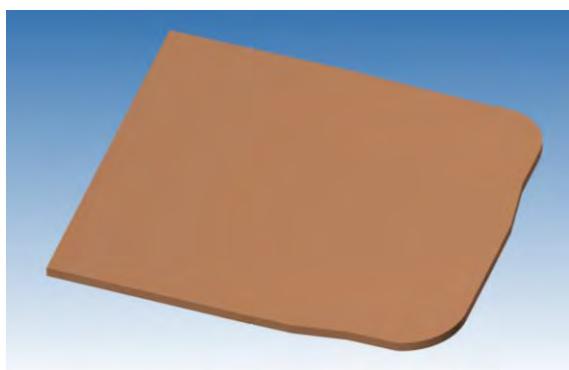
► By Key Gateways

G1 Design Gateway (continued from previous page)

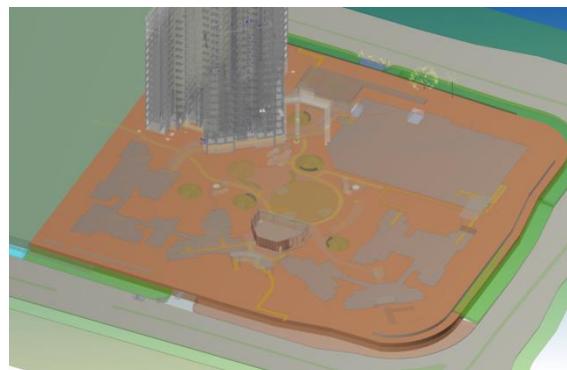
Key Words	Agency	Requirement Category
Site Layout only <i>(continued from previous page)</i>	NEA	<ul style="list-style-type: none"> Location of the chimney and BHC and MCH requirements e.g. within 30m / 100m radius of existing chimney stack height Location changes for the storage inventory product / materials such as chemical, oil, fuel, etc Changes in the industrial processes or production activities location Changes of existing activity, expansion of existing activities or proposed new activity carried out on the proposed development or premises
	URA	<p>Building Setback from Boundary</p> <ul style="list-style-type: none"> Road Buffer Common Boundary Setback / Party wall & Planting Strip Building Setback for Multi-Storey Car Parks (MSCP) Boundary Setback for Ancillary Structures Setback requirement for Urban Design areas
		<p>Site Layout</p> <ul style="list-style-type: none"> Location of Buildings Location and scale / size of Communal Facilities (e.g. bin centre, pavilions, BBQ areas)
		<p>Site Coverage</p> <ul style="list-style-type: none"> Site coverage computation

G2 Construction Gateway

Key Words	Agency	Requirement Category
Site Layout only	URA	<p>Building Setback from Boundary</p> <ul style="list-style-type: none"> Setback for Building Appendages – Location and width Treatment for non-compliant Multi-Storey Car Parks and Ancillary Structures
Site Layout, Basement		<p>Basements</p> <ul style="list-style-type: none"> Basement protrusion (if any) and location within site Screening of basement opening



S4 – Fig 83 : Site / Site Boundary



S4 – Fig 84 :
Site / Site Boundary in relation to Building

Site

► By IFC Representation

IFC Entity: IfcSite						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ProjectDevelopmentType	Text	-	-	No	-
2	NumberOfWorkers	Integer	-	-	-	-
3	TotalArea	Area	-	m ²	No	-

Site Boundary

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
Key Words	Agency	Requirement Category	
Fire Engine Accessway / Access Road	SCDF	<p>Indication of Fire Engine Accessways / Access Road</p> <ul style="list-style-type: none"> To design upfront and not added as an afterthought Compliance of provision of fire engine accessway / access road does not affect the requisite planting areas and roadside green verges Indication of all the fire engine access road and accessway within project boundary Clearly indicate if public road is used as fire engine accessway / access road Compliance of distance between fire engine accessway and fire access opening Compliance of no obstruction between fire engine accessway and fire access opening <p>[Note: To be read concurrent with NParks requirement under “Greenery”]</p>	
Rapid Transit System (RTS) Station	NEA	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> Lines of Road Reserve / Site boundary of adjacent land parcels Location of station box and its associated tunnels & structures Land take required (footprint to be optimized to minimize the land-take) Details of Loading Provision (e.g. Loading grid plan) Design of pop-up & ancillary structures (within approved railway, setback, mitigation of platform levels, interfacing with neighbouring developments, CW provision) Annotation for at-grade servicing areas (e.g. bin centre, loading / unloading bays, required to serve the retail uses within the station) Integration approach with existing / future structures (e.g. location / orientation / size of vents) Connectivity with other transport infra structure facilities and key pedestrian routes Taxi stand / Vehicular drop-off KOP details (e.g. exact alignment, size) Retail quantum (capped at 2000 sqm) <p> Supporting Documents:</p> <ol style="list-style-type: none"> Submission of RTS Checklist Method of construction (cut and cover, tunnel boring) Details of Loading Provision (Draft DIR - WIP) Copy of the relevant approvals for the proposed retail quantum 	
Site Layout only	URA	<p>Building Setback from Boundary</p> <ul style="list-style-type: none"> Road Buffer Common Boundary Setback / Party wall & Planting Strip Building Setback for Multi-Storey Car Parks (MSCP) Boundary Setback for Ancillary Structures Setback requirement for Urban Design areas <p>Site Layout</p> <ul style="list-style-type: none"> Location of Buildings Location and scale / size of Communal Facilities (e.g. bin centre, pavilions, BBQ areas) <p>Site Coverage</p> <ul style="list-style-type: none"> Declaration of Percentage 	

Site Boundary

► By Key Gateways

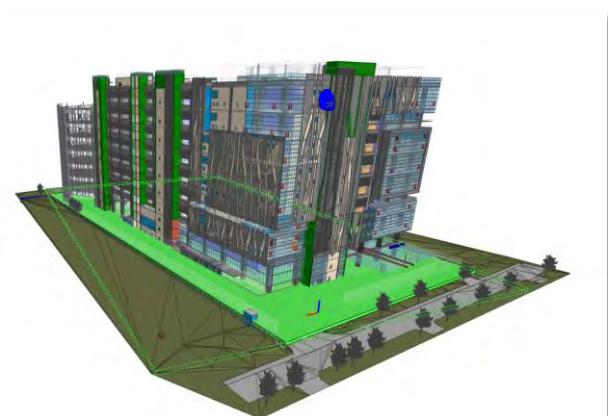
Legend:  Architecture  C&S  M&E

G1 Design Gateway (continued from previous page)

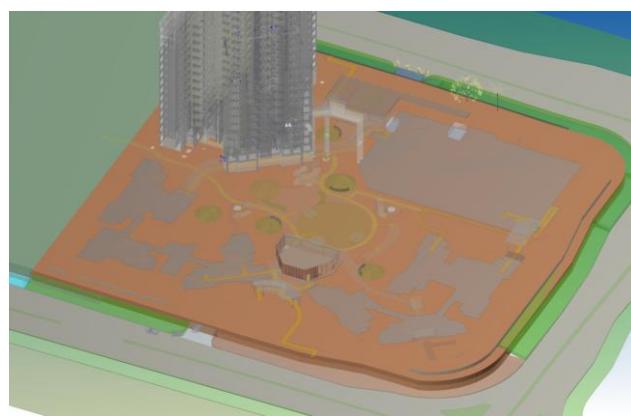
Key Words	Agency	Requirement Category
Use & Intensity	URA	<ul style="list-style-type: none"> Land Use / Building Uses Gross Plot Ratio / Gross Floor Area
<u>Site Boundary</u> <ul style="list-style-type: none"> Site Area Land to be Vested for Public Schemes (Drain, Road, Open Space, Park, Cycling Paths) Land to be Amalgamated / Alienated 		

G2 Construction Gateway

Key Words	Agency	Requirement Category
Rapid Transit System (RTS) Station	URA	<p>Urban Design Requirements</p> <ul style="list-style-type: none"> Design and location of at-grade bicycle parking <p> Supplementary Documents</p> <ul style="list-style-type: none"> Night lighting report <p> Development Interface Report</p> <ul style="list-style-type: none"> For works interfacing with existing / future connection Architectural information for future developer (e.g. fire safety requirements; Knock Out Panels (KOP)) Structural information for future developer (e.g. Loading requirements) Mechanical and Electrical (M&E) information for future developer (e.g. ventilation shaft location and throw) Details of Loading Provision
<p>Building Setback from Boundary</p> <ul style="list-style-type: none"> Setback for Building Appendages – Location and width Treatment for non-compliant Multi-Storey Car Parks and Ancillary Structures 		
Site Layout only		



S4 – Fig 85 : Site / Site Boundary highlighted in Green



S4 – Fig 86 : Site / Site Boundary in Brown

Site Boundary

► Site Boundary Dimension in IFC-SG

- The measurement of the site boundary will be extracted from the perimeter of the object.

► By IFC Representation

IFC Entity: IfcGeographicElement						
IFC SubType: SITEBOUNDARY, CADASTRALLOT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	ApprovedSoilMixture	Boolean	-	N.A.	Yes	TRUE / FALSE
2	Area	Area	-	m ²	No	N.A.

Slab

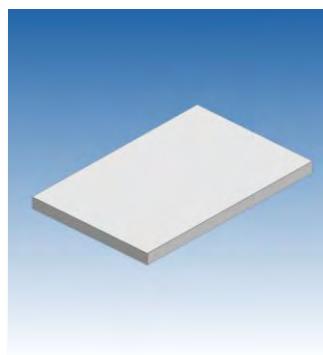
Legend:  Architecture  C&S  M&E

► By Key Gateways

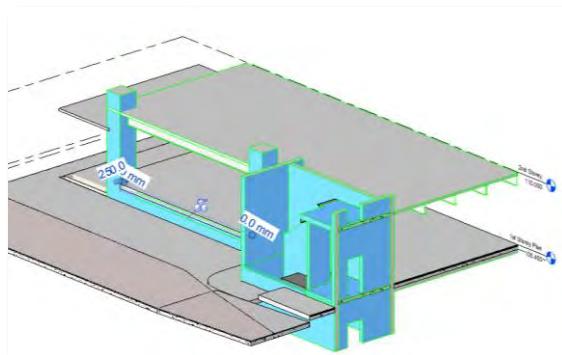
G1.5 Piling Gateway (Optional)			
Key Words	Agency	Requirement Category	
Structural Design	BCA	<p>Structural Design (Main Structural Elements of Building)</p> <p><i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i></p> <ul style="list-style-type: none"> • Complete set of IFC-SG model(s) for all structural elements & details • 2D drawings limited to: <ul style="list-style-type: none"> ○ General notes ○ Special details (e.g. slab reinforcement detailing, complex structure detailing, transfer plate detailing, irregular section detailing, precast joints, prestressed details, steel connections.) 	

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Buildability	BCA	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> • BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems • Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p> Buildable Design Score (B-Score)</p> <p>a) BS01 Form (in Excel format) to be submitted</p>	
Household / Storey Shelter		<p>Architecture</p> <ul style="list-style-type: none"> • Compliance with technical requirements on shelter position, size, setback requirements 	<p>C&S</p> <ul style="list-style-type: none"> • Compliance to structural requirements stipulated in technical requirements on household shelters and storey shelters <p>M&E</p> <ul style="list-style-type: none"> • M&E inputs required for Transit Shelter
Structural Design		<p> Supporting Documents:</p> <p>a) Submit CD Shock Calculations as supplementary non-BIM documentation</p> <p>Structural Design (Piling and Foundation Works)</p> <ul style="list-style-type: none"> • Complete set of IFC-SG model(s) for all structural slabs & details • 2D drawings limited to: <ul style="list-style-type: none"> ○ General notes ○ Special details (e.g. slab reinforcement detailing, complex structure detailing) <p>Structural Design (Main Structural Elements of Building)</p> <p><i>Can be provided at Piling Gateway (G1.5) or Construction Gateway (G2)</i></p> <ul style="list-style-type: none"> • Complete set of IFC-SG model(s) for all structural elements & details • 2D drawings limited to: <ul style="list-style-type: none"> ○ General notes ○ Special details (e.g. slab reinforcement detailing, complex structure detailing, transfer plate detailing, irregular section detailing, precast joints, prestressed details, steel connections.) 	

Slab



S4 – Fig 87 : Slab



S4 – Fig 88 : Concrete Rectangular Slab

► Modelling Slab in IFC-SG

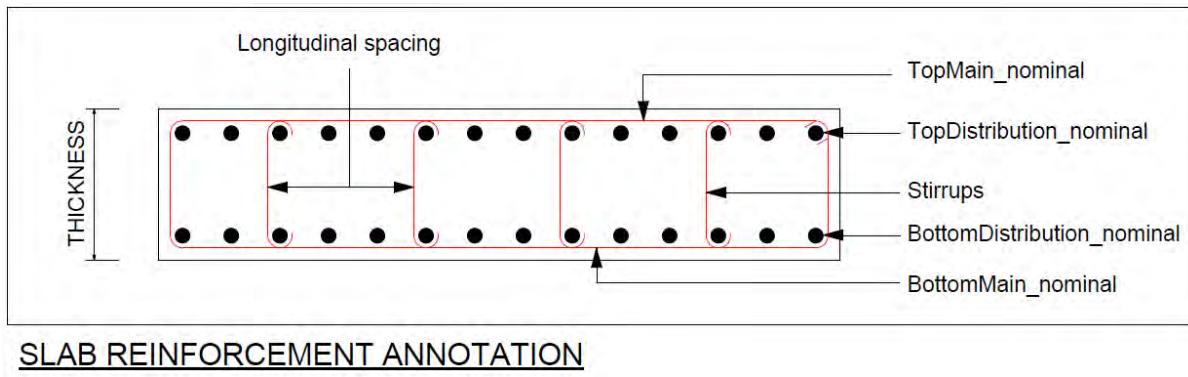
- All the slab elements shall be modelled in IFC-SG model with the necessary information required as stipulated in the tables below.
 - The nominal reinforcement for slab shall be indicated in IFC-SG parameters. Additional reinforcement to be presented in 2D drawings.
 - Civil defence shelter slab will need to be indicated as “Yes” in IFC-SG parameter “ShelterUsage” and substantiate with civil defence shelter reinforcement details in 2D drawings.
- 2D detail drawings are allowed for all slab reinforcement drawings with the indication of drawing number in the IFC-SG parameter “ReferTo2DDetail”.
- Cantilevered RC ledges should be modelled

► Slab Dimension and Reinforcement Definition

Slab Dimension and Reinforcement Definition	
1	QP can produce a set of 2D slab reinforcement drawings to present the arrangement of slab reinforcement for submission.
2	The input for TopMain_nominal, TopDistribution_nominal, BottomMain_nominal & BottomDistribution_nominal shall be "HXX-XXX" while "H" is a must, XX is the longitudinal reinforcement diameter and XXX is the spacing of longitudinal reinforcement (e.g. H32-150) <p style="text-align: center;">  HXX-XXX </p>
3	The input for Stirrups shall be “HXX-XXX-XXX” while “H” is a must, XX are the transverse reinforcement diameter, 1 st XXX is the longitudinal spacing of transverse reinforcement and 2 nd XXX is the transverse spacing of transverse reinforcement. <ul style="list-style-type: none"> • Indicate the longitudinal spacing (main direction) and follow with transverse spacing (distribution direction) (e.g.H8-100-100) <p style="text-align: center;">  HXX-XXX-XXX </p>

Slab

► Slab Dimension and Reinforcement Definition (continued from previous page)



S4 – Fig 89 : Slab Reinforcement Annotation

► By IFC Representation

IFC Entity: IfcSlab						
IFC SubType: N.A., LANDING						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	MaterialGrade	Text	All slabs	-	Yes	Refer to list^
2	ConstructionMethod	Text	All slabs	-	Yes	Refer to list^
3	ReferTo2DDetail	Text	When required / relevant	-	No	Dwg Number
4	ReinforcementSteelGrade	Text	All slabs	-	Yes	Refer to list^
5	ShelterUsage	Boolean	When required / relevant	-	Yes	TRUE / FALSE
6	SlabType	Text	All slabs	-	Yes	Refer to list^
7	Mark	Text	All slabs	-	No	S1, S01, PS01
8	Thickness	Length	All slabs	mm	No*	300
9	BottomDistribution_nominal	Text	When required / relevant	-	Yes	H25-150+H16-300
10	BottomMain_nominal	Text	When required / relevant	-	Yes	H25-150+H16-300
11	Stirrups	Text	When required / relevant	-	Yes	H10-150-300
12	StirrupsType	Text	Optional	-	Yes	Refer to list^
13	TopDistribution_nominal	Text	When required / relevant	-	Yes	H25-150+H16-300
14	TopMain_nominal	Text	When required / relevant	-	Yes	H32-150+H20-300
15	WeldedMesh	Boolean	All slabs	-	Yes	TRUE / FALSE

* Parameter is populated from the dimensions of BIM elements modelled.

^ List can be found [here](#).

Slab

► By IFC Representation (continued from previous page)

IFC Entity: IfcSlab						
IFC SubType: N.A., LANDING						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
16	Accreditation_PAS	Boolean	When required / relevant	-	Yes	TRUE / FALSE
17	LoadBearing	Boolean	When required / relevant	-	Yes	TRUE / FALSE
18	Thickness	Length	All slabs	mm	No*	300
19	MechanicalConnectionType	Text	-	-	No	Flexible Loops
20	TypeDesignator	Text	-	-	No	Double T Slab, Hollowcore
21	LatticeGirderReinforcement	Boolean	When required / relevant	-	Yes	TRUE / FALSE

* Parameter is populated from the dimensions of BIM elements modelled.

^ List can be found [here](#).

► Example of Slab (RC Household Shelter Slab) Element Input

250mm thick RC Cast-In-Situ Household Shelter Slab	IFC Entity: IfcSlab		
	IFC SubType: N.A.		
<ul style="list-style-type: none"> • Mark – HS1 • Concrete grade C32/40 • Two way slab • Top Reinforcement H10-100 bothway • Bottom Reinforcement H10-100 bothway • Shear link H8-600 	S/N	IFC-SG Property	Examples
	1	MaterialGrade	C32/40
	2	ConstructionMethod	CIS
	3	ReferTo2DDetail	Dwg 19588-HS-DT-1
	4	ReinforcementSteelGrade	500B
	5	ShelterUsage	Yes
	6	SlabType	Two way
	7	Mark	HS1
	8	Thickness	200
	9	BottomDistribution_nominal	H10-100
	10	BottomMain_nominal	H10-100
	11	Stirrups	H8-600
	12	StirrupsType	CL
	13	TopDistribution_nominal	H10-100
	14	TopMain_nominal	H10-100

Space

► About

As ‘IfcSpace’ is the most common component across all agencies, it is broken down into 2 sub-sections for ease of understanding. ‘IfcSpace’ consists of:

- Space (Area Schemes)
- Space (Usage)

Space Definition		Requirements Involved	Definition	Conceptual Illustration (Not to Scale)
1	Space (Area Schemes)	<ul style="list-style-type: none"> • URA’s GFA calculations • NEA’s refuse output • LTA’s parking provisions 	<ul style="list-style-type: none"> • For checks based on GFA only • Spaces will need to be manually verified for 5 types of ‘IfcSpace’ sub-types: <ol style="list-style-type: none"> 1) AREA_GFA 2) AREA_LANDSCAPE 3) AREA_CONNECTIVITY 4) AREA_STRATA 5) AREA_VERIFICATION <p>These IfcSpace sub-types and their related parameters shall replace the URA-related area schemes for GFA calculation, Unit Plan calculation, Site Coverage computation, Site Area computation and Communal Open Space computation.</p> <p>Properties and other information on Space (Area Schemes) can be found on Page 305</p>	<p>Residential (Non-Landed) Unit <i>See input example on subsequent pages</i></p> <p>SPACE (AREA SCHEME)</p> <p>SPACE (USAGE)</p> <p>S4 – Fig 90 : Space Conceptual Illustration</p>
2	Space (Usage)	<ul style="list-style-type: none"> • BCA’s Accessibility requirements • LTA’s Minimum Driveway Width • NEA’s Sanitary Provisions • PUB’s Minimum Platform Levels • SCDF’s Exit Requirements 	<ul style="list-style-type: none"> • For checks based on Occupancy Type, Building Typology and Space Usage • As cross-agency spaces have been harmonized and standardised, each space only require 2 ‘IfcSpace’ properties to address their usage requirements: <ol style="list-style-type: none"> 1) OccupancyType 2) SpaceName <p>Properties and other information on Space (Usage) can be found at Page 309</p>	

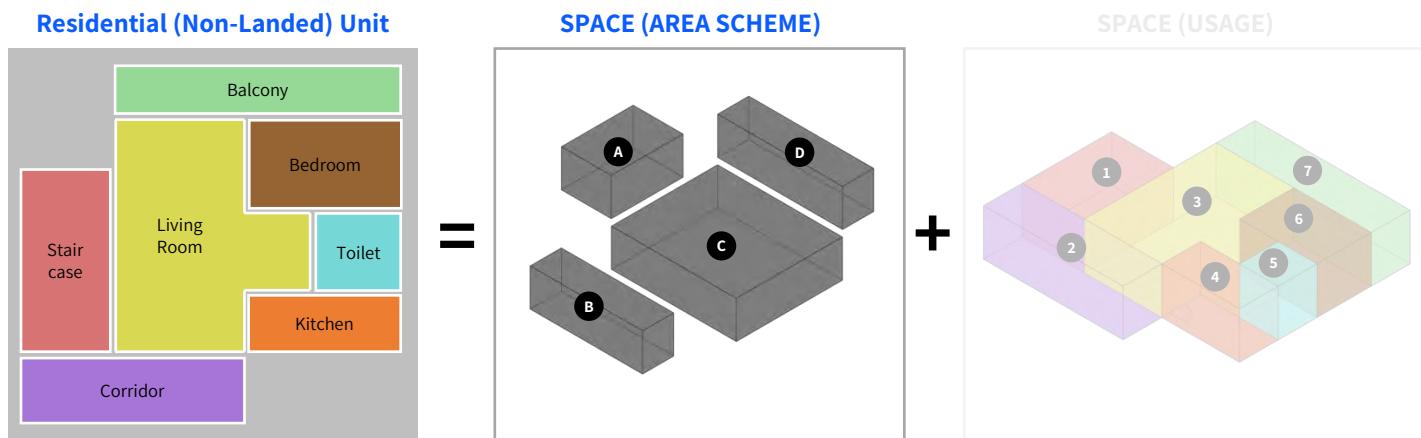
► Modelling Space in IFC-SG

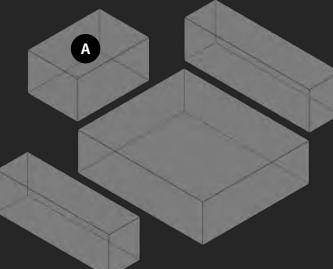
- You may refer to the IFC-SG Resource Kit for customised plug-ins to help embed Space IFC-SG data into respective BIM software

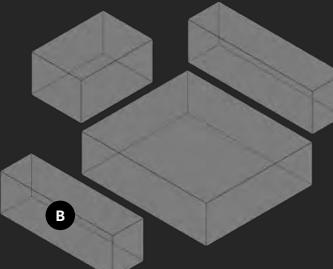
Space (Area Scheme)

► Example of Space (Area Scheme) Input

Conceptual Diagrams (Not To Scale)



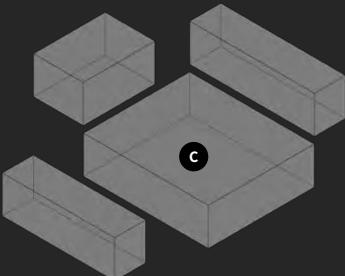
Residential (Non-Landed) Unit Space (Area Scheme) A. Staircase 	IFC Entity: IfcSpace IFC SubType: AREA_CONNECTIVITY SGPset_SpaceArea_Connectivity	
	S/N	IFC-SG Property
	1	ACN_ConnectivityType [Text]
	2	ACN_ActivityGeneratingUseType [Text]
	3	ACN_IsPavingSpecified [Boolean]
	4	ACN_PavingSpecification [Text]
	5	ACN_IsOpen24HoursToPublic [Boolean]
	6	ACN_OpenTime [Text]
	7	ACN_CloseTime [Text]

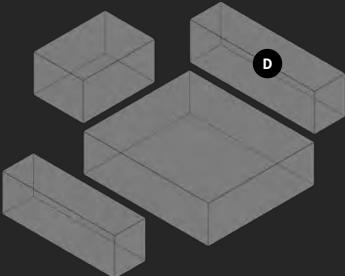
Residential (Non-Landed) Unit Space (Area Scheme) B. Corridor 	IFC Entity: IfcSpace IFC SubType: AREA_CONNECTIVITY SGPset_SpaceArea_Connectivity	
	S/N	IFC-SG Property
	1	ACN_ConnectivityType [Text]
	2	ACN_ActivityGeneratingUseType [Text]
	3	ACN_IsPavingSpecified [Boolean]
	4	ACN_PavingSpecification [Text]
	5	ACN_IsOpen24HoursToPublic [Boolean]
	6	ACN_OpenTime [Text]
	7	ACN_CloseTime [Text]

Space (Area Scheme)

► Example of Space (Area Scheme) Input

Continued from previous page

Residential (Non-Landed) Unit Space (Area Scheme) C. Living Room, Kitchen, Bedroom, Toilet 	IFC Entity: IfcSpace		
	IFC SubType: AREA_GFA		
	SGPset_SpaceArea_GFA		
	S/N	IFC-SG Property	Value
	1	AGF_DevelopmentUse [Text]	Residential (Non-Landed)
	2	AGF_DetailedUse [Text]	Residential Units
	3	AGF_Name [Text]	Private Enclosed Space
	4	AGF_UnitNumber [Text]	03-333
	5	AGF_BonusGFAType [Text]	Balcony Incentive Scheme
	6	AGF_Note [Text]	Residential Living
	7	AGF_UseQuantum [Text]	Predominant
	8	AGF_FacilityType [Text]	Condominium

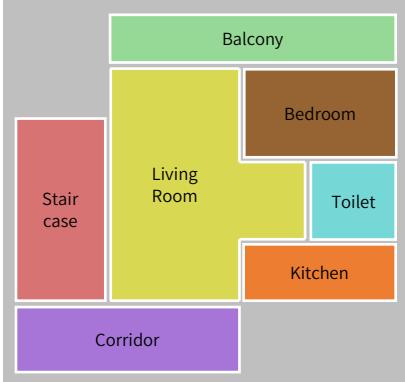
Residential (Non-Landed) Unit Space (Area Scheme) D. Balcony 	IFC Entity: IfcSpace		
	IFC SubType: AREA_GFA		
	SGPset_SpaceArea_GFA		
	S/N	IFC-SG Property	Value
	1	AGF_DevelopmentUse [Text]	Residential (Non-Landed)
	2	AGF_DetailedUse [Text]	Balcony
	3	AGF_Name [Text]	Private Enclosed Space
	4	AGF_UnitNumber [Text]	03-333
	5	AGF_BonusGFAType [Text]	Balcony Incentive Scheme
	6	AGF_Note [Text]	Private Residential Living
	7	AGF_UseQuantum [Text]	Predominant
	8	AGF_FacilityType [Text]	Condominium

Space (Usage)

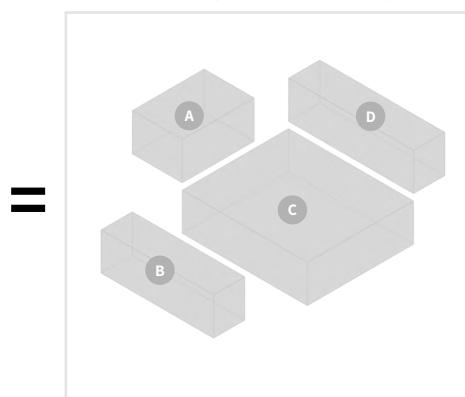
► Example of Space (Usage) Input

Conceptual Diagrams (Not To Scale)

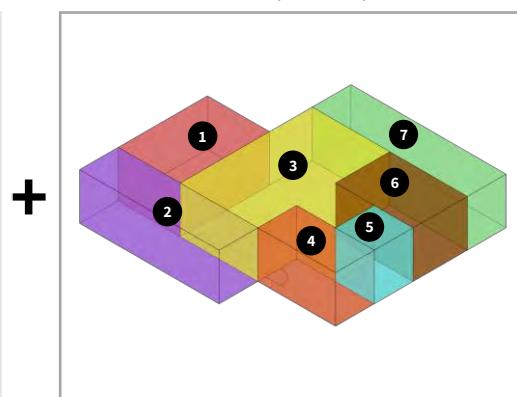
Residential (Non-Landed) Unit



SPACE (AREA SCHEME)



SPACE (USAGE)



Residential (Non-Landed) Unit

Space (Usage)

1. Staircase



IFC Entity: IfcSpace

IFC SubType: N.A.

S/N	IFC-SG Property	Value
1	SpaceName	Staircase
2	OccupancyType	Multi-Unit Residential

Residential (Non-Landed) Unit

Space (Usage)

2. Corridor



IFC Entity: IfcSpace

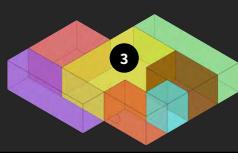
IFC SubType: N.A.

S/N	IFC-SG Property	Value
1	SpaceName	Corridor
2	OccupancyType	Multi-Unit Residential

Residential (Non-Landed) Unit

Space (Usage)

3. Living Room



IFC Entity: IfcSpace

IFC SubType: N.A.

S/N	IFC-SG Property	Value
1	SpaceName	Living Room
2	OccupancyType	Multi-Unit Residential

Residential (Non-Landed) Unit

Space (Usage)

4. Kitchen



IFC Entity: IfcSpace

IFC SubType: N.A.

S/N	IFC-SG Property	Value
1	SpaceName	Kitchen
2	OccupancyType	Multi-Unit Residential

Space (Usage)

► Example of Space (Usage) Input

Continued from previous page

Residential (Non-Landed) Unit <u>Space (Usage)</u> 5. Toilet	IFC Entity: IfcSpace		
	IFC SubType: N.A.		
		S/N	IFC-SG Property
		1	SpaceName
		2	OccupancyType
		Value	
		Toilet	
		Multi-Unit Residential	

Residential (Non-Landed) Unit <u>Space (Usage)</u> 6. Bedroom	IFC Entity: IfcSpace		
	IFC SubType: N.A.		
		S/N	IFC-SG Property
		1	SpaceName
		2	OccupancyType
		Value	
		Bedroom	
		Multi-Unit Residential	

Residential (Non-Landed) Unit <u>Space (Usage)</u> 7. Balcony	IFC Entity: IfcSpace		
	IFC SubType: N.A.		
		S/N	IFC-SG Property
		1	SpaceName
		2	OccupancyType
		Value	
		Balcony	
		Multi-Unit Residential	



Modelling IFC-SG (Space – Area Scheme)

IFC Entity: IfcSpace

IFC SubType: AREA_GFA

	IFC-SG Property	Examples		
1	AGF_DevelopmentUse [Text]	<ul style="list-style-type: none"> • Agriculture • Beach Area • Business Park • Business 1 • Business 2 • Cemetery • Civic & Community Institution • Commercial 	<ul style="list-style-type: none"> • Educational Institution • Health & Medical Care • Hotel • Open Space • Park • Place of Worship • Port/Airport • Rapid Transit 	<ul style="list-style-type: none"> • Reserve Site • Residential (Landed) • Residential (Non-landed) • Road • Special Use • Sports & Recreation • Transport Facilities
2	AGF_DetailedUse [Text]	<ul style="list-style-type: none"> • Adult Disability Homes • Amusement Centre • Ancillary / Secondary Workers' Dormitory • Ancillary Columbarium • Ancillary Embalming Facilities • Ancillary Funeral-related Uses • Ancillary Industrial Canteen • Ancillary Office • Ancillary Religious Facilities • Ancillary Religious Use • Ancillary Students' Hostel • Ancillary Workers' Quarters • Animal Shelter • Arts Centre • Association • Backpackers' Hostel • Balcony / Private Enclosed Space / Private Roof Terrace • Bank • Bar / Pub • Boarding House • Boys' / Girls' Home • Business Park 	<ul style="list-style-type: none"> • Chalet / Bungalow • Child Care Centre • Cinema • Clean Industry • Cloud Kitchens • Clubhouse • Columbarium • Commercial School • Community Club / Centre • Convention Centre / Exhibition • Core Media • Crematorium • Culture Centre / Heritage Centre • Data Centre • E-Business • Educational / Training Institutions • Embassy / Consulate / High Commission • Family Service Centre • Farm • Foot Reflexology • Function Rooms • Funeral Parlour • General Industry • Government Building / Office • Gym / Fitness Centre • Hawker Centre • Hospice • Hotel Room • Indoor Recreation Spaces • Industrial Training • Karaoke Lounge • Laundromat • Library 	<ul style="list-style-type: none"> • Light Industry • Massage Establishment • Medical Centre • Medial Clinic • MHA / Home Team Facilities • Multi-Purpose Hall (Open to Public) • Museum • Night Club • Nursing Home • Office • Other Ancillary / Non-Religious Uses • Other Ancillary Uses • Other Supporting Facilities • Others • Performing Arts Centre • Pet Boarding / Pet Day Care • Pet Crematorium • Pet Shop / Pet Grooming • Petrol Station • Polyclinic • Praying Area • Private Commercial Foreign System School • Private Hospital • Public Acute Hospital • Public Community Hospital • Quarantine Facilities • Research Facilities • Residential Units • Restaurant • Restaurant and Bar • Restaurant with Live Entertainment • School • Senior Care Centre



Modelling IFC-SG (Space – Area Scheme)

IFC Entity: IfcSpace

IFC SubType: AREA_GFA

	IFC-SG Property	Examples			
3	AGF_Name [Text]	<ul style="list-style-type: none"> AC Ledge Airwell ATM Kiosk Balcony Bicycle Parking Space Cable Chamber Car Parking Lot (Mechanised) Car Porch/Garage Conserved Bungalow Courtyard Covered Walkway / Linkages 	<ul style="list-style-type: none"> Driveways End of Trip Facilities Entrance Canopy Guardhouse and Sentry Post Household Shelter Indoor Recreation Space Letter Box Area Lift Area Lift Motor Room Loading and Unloading Area M&E Floor M&E Room (enclosed) 	<ul style="list-style-type: none"> M&E Services (non-load bearing covering above) M&E Space (unenclosed) Meter Compartment Outdoor Refreshment Area Outdoor Refreshment Kiosk Pavilion Pick-up/ Drop-off Point Private Enclosed Space Privately Owned Public Space RC Ledge Refuse Chamber 	<ul style="list-style-type: none"> Residual Area (Carpark Floor) Roof Terrace/Garden Stage Swimming Pool Façade Articulation Vending Machine Kiosk Others
4	AGF_UnitNumber [Text]	<ul style="list-style-type: none"> B3-01a B2M-120D B1M-05A 		<ul style="list-style-type: none"> 01-03A 01-03b 10-04ab 	
5	AGF_BonusGFAType [Text]	<ul style="list-style-type: none"> Balcony Incentive Scheme Conserved Bungalows Scheme 	<ul style="list-style-type: none"> Indoor Recreation Spaces Scheme Built Environment Transformation Scheme Community and Sports Facilities Scheme 	<ul style="list-style-type: none"> Rooftop ORA on Landscaped Roofs ORA within Privately-Owned Public Spaces (POPS) CBD Incentive Scheme 	<ul style="list-style-type: none"> Strategic Development Incentive (SDI) Scheme Facade Articulation Scheme
6	AGF_Note [Text]	Accompanying notes for QP to elaborate on use and purpose of spaces. If "Others" have been entered under AGF_Name, to fill in actual use of the area /space.			
7	AGF_UseQuantum [Text]	<ul style="list-style-type: none"> Predominant Ancillary 			
8	AGF_FacilityType [Text]	<ul style="list-style-type: none"> Aerospace Airbase Airport Aquaculture Farm Aquaculture Hatchery Ash-Scattering Facilities Assisted Living Facility Beansprouts Farm Biomedical Black & White Bungalow Broadcast Transmission Station Bus Depot Bus Interchange/ Terminal Cable Tunnel Shaft Camp 	<ul style="list-style-type: none"> Carpark Chemicals Chinese / Muslim / Hindu / Multi-Religious Cemetery Chinese Temple Church Condominium Construction Aggregate Stockpile Construction Aggregate Terminal Construction ICPH Open Precast Yards Construction ICPH PPVC Fit-Out Factories Construction ICPH Precast & PPVC Storage Sites Construction Integrated Construction Precast Hub 	<ul style="list-style-type: none"> Construction Ready Mixed Concrete Plant Crocodile Farm Cruise Centre Crustaceans Farm Dairy Farm Desalination Plant Detached House District Cooling Plant Drainage Detention Tank Drainage Flood / Tidal Gate Draining Pumping Station / Pump House Driving Circuit / Test Centre DTSS Facility / Odour Control Facility / Air Jumper Electrical Depot Electrical Substation – 22kV and Below Electrical Substation – 230kV Electrical Substation – 400kV 	<ul style="list-style-type: none"> Electrical Substation –66kV Energy Storage System Escape Staircase Executive Condominium Facility / Ventilation Building / Shaft Ferry Point / Terminal Fishery Port Flats / Apartment Food Factory Foreign Systems School Frog Farm Fruited Vegetable Farm Gas Facilities – Gas Depot Gas Facilities – Gas Holder



Modelling IFC-SG (Space – Area Scheme)

IFC Entity: IfcSpace

IFC SubType: AREA_GFA

	IFC-SG Property	Examples
8	AGF_FacilityType [Text] <i>continued from previous page</i>	<ul style="list-style-type: none"> • Gas Facilities – Gas Metering Station • Gas Facilities – Gas Offtake Station • Gas Facilities – Onshore Receiving Facility • Gas Facilities – Gas Station • General B1 / B2 • General BP • Goat Farm • Golf Course • Good Class Bungalow • Heavy Vehicle / Trailer Park • Hindu Temple • Holding School • HVDC Station • ICA Facility • Incineration Plant / Waste-to-Energy Plant • Indoor Sports Hall • Institute of Technical Education • Integrated Programme • Jetty • Junior College • Kindergarten • Landfill • Landing Site • Leafy Vegetable Farm • Lighthouse • Live Firing Area • LNG Terminal • LRT Station • Marina • Marine & Offshore Engineering • Memorial / Cemetery Park • MHA HQ or other MHA Facility • Mosque • MRT Station • Multi-Purpose Hall (Open to Public) • Multi-Storey Recycling Facility • Mushroom Farm • Nature Area • Nature Reserve • Newater Factory • Newater Industrial Water Factory • Newater Service Reservoir • Ornamental Bird Farm • Ornamental Fish Farm • Other Airport Facilities • Other Cemeteries • Other Open Spaces • Other Port Facilities • Other Reserve Sites • Other Special Uses • Other Tertiary Schools • Other Transport Depot • Other Transport Facilities • Other Utilities • Other Waterbodies • Outward Bound School / Outdoor Adventure Learning Centre / Campsites • Pedestrian Mall / Footpath • Petrol Station / Kiosk • Plant Nursery • Polytechnic • Pond / Lake • Port Area • Potable Water Service Reservoir • Polytechnic • Pond / Lake • Port Area • Potable Water Service Reservoir • Promenade • Public Housing – Landed • Public Housing – Rental • Public Housing – Sale • Quail Farm • Rail Depot • Rail Tracks • Raw Water Abstraction Station • Raw Water Intake Pond / Station • Raw Water Pumping Station • Religious School / Institute / College • Research and Development Lab • Reservoir • Reservoir – Nature Reserve • River / Canal / Major Drain • River / Canal / Major Drain – Nature • Satellite Earth Station • SCDF Facility • School Field • Secondary School • Semiconductors • Semi-Detached House • Service Reservoir Booster Station • Service Reservoir Water Tower • Shophouse – Private Housing • Shophouse – Public Housing • Sikh Temple • Solar PV • Special Education School • SPF / Police Coast Guard Facility • Standalone Telecom MDF Room / Building • Strata-Landed Housing • Student Hostel • Studio Apartment • Submarine Cable Landing Site / Station • Swimming Complex Wet Play Field • Synagogue • Telecom Exchange and Central Office • Terrace House • Theme Park • Training Area • Training Institute / Centre • University • Used Water Pumping Station / Pump House / Lift Station • Waste Management Recovery Facility • Waste Management Recycling Facility • Waste Management Treatment Facility • Waste Transfer Station • Waste Pipeline Corridor • Water Reclamation Plant • Water Works • Workers' Dormitory for Non-Services Sector • Workers' Dormitory for Services Sector



Modelling IFC-SG (Space – Area Scheme)

IFC Entity: IfcSpace

IFC SubType: AREA_LANDSCAPE

	IFC-SG Property	Values
1	ALS_LandscapeType [Text]	<ul style="list-style-type: none"> • Decked / Patterned Floor • Groundcovers • Landscaped Footpath <ul style="list-style-type: none"> • Shrubs • Turfing • Trees • Water Feature
2	ALS_GreeneryFeatures [Text]	<ul style="list-style-type: none"> • Communal Ground Garden • Extensive Green Roof • Green Buffer and Peripheral Planting Strip • Ground Landscaping • Landscape Deck – Surface Greenery <ul style="list-style-type: none"> • Landscape Deck – Vertical Greenery • Roof Top Landscaping • Sky Terrace • Urban Farm / Greenhouse • Vertical Greenery

IFC Entity: IfcSpace

IFC SubType: AREA_CONNECTIVITY

	IFC-SG Property	Values
1	ACN_ConnectivityType [Text]	<ul style="list-style-type: none"> • Communal Sky Bridges (Within a Single Development) • CoveredLinkway • CoveredWalkway • ElevatedPedestrianLink <ul style="list-style-type: none"> • OpenWalkway • PublicSpaceNode • ThroughBlockLink • UndergroundPedestrianLink
2	ACN_ActivityGeneratingUseType [Text]	<ul style="list-style-type: none"> • None • DoubleSide • SingleSide
3	ACN_IsPavingSpecified [Boolean]	<ul style="list-style-type: none"> • True / False
4	ACN_PavingSpecification [Text]	<p><UDAREA>PavingSpecification*</p> <p>*Provide a link to a specification document for each UD area</p>
5	ACN_IsOpen24HoursToPublic [Boolean]	<ul style="list-style-type: none"> • True / False
6	ACN_OpenTime [Text]	<ul style="list-style-type: none"> • hh:mm:ss
7	ACN_CloseTime [Text]	<ul style="list-style-type: none"> • hh:mm:ss

IFC Entity: IfcSpace

IFC SubType: AREA_STRATA

	IFC-SG Property	Values
1	AST_AreaType [Text]	<ul style="list-style-type: none"> • AccessoryLot • CommonProperty <ul style="list-style-type: none"> • SingleUser (Communal) • StrataLot (Private) • StrataLot (Communal)
2	AST_LegalArea [Number]	<ul style="list-style-type: none"> • 96
3	AST_Extg_StrataLotNumber [Text]	<ul style="list-style-type: none"> • MK02-U017646Z
4	AST_Prop_StrataLotNumber [Text]	<ul style="list-style-type: none"> • MK03-U017049L
5	AST_Associated to [Text]	<ul style="list-style-type: none"> • MK03-U017049L [note: only applicable to AccessoryLot]



Modelling IFC-SG (Space Usage)

Spaces across BCA, LTA, NEA, PUB and SCDF have been harmonized and standardized for checks into **Occupancy Types** and **Space Name** categories. All of these spaces are based on the IFC Entity “IfcSpace” and do not require any IfcSubType. Every space component should include inputs for **both Occupancy Type and Space Name parameters**. Some space components may require additional parameters listed at [here](#).

► Occupancy Types

Small Residential

- 1) Single dwelling residential

Other Residential

- 2) Multi-unit residential

Institutional

- 3) Supervisory care facility
- 4) Supervisory care facility (detention)
- 5) Nursing care facilities
- 6) Hospital with / without A&E services
- 7) Ambulatory care facility
- 8) Ambulatory care facility (standalone)
- 9) Custodian care facility
- 10) Custodian care facility (nursery)
- 11) Public education institution
- 12) Private education institution
- 13) Worker dormitory

Office

- 14) Office
- 15) Factory office

Shop

- 16) shop
- 17) Outdoor Display Area (ODA)
- 18) Outpatient clinic
- 19) Polyclinic
- 20) Market

- 21) Temporary showflat
- 22) Factory showroom

Factory

- 23) Petrol station
- 24) Factory
- 25) Food production factory
- 26) M&E area
- 27) Wafer fabrication plant
- 28) Trade effluent treatment plant
- 29) Waste management and recycling
- 30) Embalming facility
- 31) Agriculture
- 32) Animal related facility
- 33) High containment facility
- 34) Electrical and gas facility

Place of Public Resort

- 35) Body treatment place
- 36) Entertainment place
- 37) Assembly place
- 38) Cinema
- 39) Recreational place
- 40) Sky garden, terrace
- 41) F&B outlet
- 42) Fast food outlet
- 43) Outdoor Refreshment Area (ORA)
- 44) Food centre
- 45) Educational place
- 46) Serviced apartment
- 47) Hostel

- 48) Hotel

- 49) Capsule hotel

- 50) Community club

- 51) Social club

- 52) Religious place

- 53) Sports facility

- 54) Sports facility (ancillary)

- 55) Train station

- 56) Transport terminal

Storage

- 57) Transport depot
- 58) Parking
- 59) Fully Automated Mechanized Car Park Buildings (FAMCP)
- 60) Warehouse
- 61) Chemical, hazmat storage

Others

- 62) Road tunnel
- 63) Park
- 64) Airbase, live firing area, training area
- 65) Campsite, wet play field
- 66) Reservoir, river, canal, major drain, pond, lake, other waterbody
- 67) Nature reserve, nature area, school field, pedestrian mall, pedestrian footpath, promenade, quarry, marina

► Space Name Categories

- 1) Living spaces
- 2) Temporary residences
- 3) Non-residential toilet Spaces (for spaces with WC)
- 4) Resting, care, hygiene spaces (for spaces without WC)
- 5) Commercial, work, institutional spaces
- 6) F&B spaces
- 7) Medical, healthcare spaces
- 8) Assembly spaces

- 9) Supporting spaces for performing
- 10) Entertainment, recreation spaces
- 11) Open spaces and open-sided spaces
- 12) M&E spaces
- 13) Storage spaces
- 14) Commuter facilities
- 15) Circulation spaces
- 16) Other non-simultaneous spaces



Modelling IFC-SG (Space Usage)

Occupancy Type for Small Residential Spaces

► 1) Single dwelling residential

Applicable for a bungalow, detached house, semi-detached house, or terrace house:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
I	Small residential	Detached, semi-detached, terrace house	E	Exempted	-	Residential

Occupancy Type for Other Residential Spaces

► 2) Multi-unit residential

Applicable for an apartment, condominium, flat, maisonette, or studio apartment:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
II	Other residential	Block of flats, maisonettes	1	Residential	Multi-story residential building	Residential

Occupancy Types for Institutional Spaces

► 3) Supervisory care facility

Applicable for a detention centre, correction centre, dementia centre, psychiatric rehabilitation home, rehabilitation centre, home for the spastic, children's home, home for the intellectually disabled, pre/post-natal care centre, welfare home, orphanage, voluntary children home, boys'/ girls' home, adult disability home, sheltered home or assisted living facility:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
III	Institutional (supervisory care facility)	Healthcare facility (inpatient)	15	Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes	-	Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes

► 4) Supervisory care facility (detention)

Applicable for a prison holding area or police station holding area (with overnight stay):

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
III	Institutional (supervisory care facility)	Healthcare facility (inpatient)	17	Worker Dormitories	-	Special use



Modelling IFC-SG (Space Usage)

(Continued) Occupancy Type for Institutional Spaces

► 5) Nursing care facilities

Applicable for a convalescent home, home for the aged, hospice or nursing home:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
III	Institutional (nursing care facility)	Healthcare facility (inpatient)	15	Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes	- Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes

► 6) Hospital with A&E services, hospital without A&E services

Applicable for a public hospital, private hospital, community hospital or psychiatric hospital:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
III	Institutional (hospital facility)	Healthcare facility (inpatient)	15	Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes	Hospital, medical clinic, centre Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes

► 7) Ambulatory care facility

Applicable for an aesthetic clinic, endoscopy clinic, non-mental rehabilitation day centre or renal dialysis day centre located within a complex:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
III	Institutional (ambulatory care facility)	Healthcare facility (outpatient)	4	Shopping complexes and multi-purpose complexes	- Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes

► 8) Ambulatory care facility (standalone)

Applicable for a standalone building consisting of mainly ambulatory care facilities:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
III	Institutional (hospital facility)	Healthcare facility (inpatient)	15	Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes	- Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes



Modelling IFC-SG (Space Usage)

(Continued) Occupancy Type for Institutional Spaces

► 9) Custodian care facility

Applicable for a mental rehabilitation day care centre, daycare centre, mentally/ intellectually disabled day care centre, senior activity centre, senior care centre, school for the spastic or psychiatric day care centre:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
III Institutional (custodian care facility)	Healthcare facility (outpatient)	15	Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes	-	Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes

► 10) Custodian care facility (nursery)

Applicable for a childcare day centre, infant-care day centre or kindergarten for children under 6 years of age:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
III Institutional (custodian care facility)	Healthcare facility (outpatient)	13	Pre-schools, schools, colleges, universities and institutions of learning	Commercial (childcare)	Educational / institution

► 11) Public education institution

Applicable for a public school, training institution or test centre:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
III Institutional (education / training)	Schools and educational buildings	13	Pre-schools, schools, colleges, universities and institutions of learning	-	Educational / institution

► 12) Private education institution

Applicable for a tuition centre, enrichment centre, private school, commercial school or training institution:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
III Institutional (education / training)	Schools and educational buildings	13	Pre-schools, schools, colleges, universities and institutions of learning	Commercial (tuition centre)	Educational / institution

► 13) Worker dormitory

SCDF			BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)		
III Institutional (worker lodging)	Hotels, boarding houses, serviced apartments, hostels, backpacker hotel, dormitories	17	Worker dormitories	-	Worker dormitories	



Modelling IFC-SG (Space Usage)

Occupancy Type for Office Spaces

► 14) Office

Applicable for a bank, stock broker, telephone/ telegraph operator, publisher, insurance / finance / real estate / advertising / employment / marketing agency, embassy (administrative office):

SCDF		BCA			PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type			Sewerage and Sanitary Works (SSW)	
IV	Office	Offices	3	Office building	-	Office

► 15) Factory Office

Applicable for factory, utility, or warehouse buildings only:

SCDF		BCA			PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type			Sewerage and Sanitary Works (SSW)	
IV	Office	Offices	16	Factories, workshops, industrial buildings and office / showroom areas in warehouses	-	Office

Occupancy Type for Shop Spaces

► 16) Shop

Applicable for a beauty salon, hairdressing salon, book store, boutique, confectionery outlet, gift shop, jewellery shop, laundry, laundromat, pawnshop, provisional shop, ticketing agency, travel agency, drugstore, pet clinic, vet clinic, pet hospital, vet hospital, animal hospital, pet shop, pet grooming , pet boarding, pet day care, take-away food kiosk (small trade / business involving sale of goods, retail, service) or showroom not located in warehouse/ factories:

SCDF		BCA			PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type			Sewerage and Sanitary Works (SSW)	
V	Shop	Shop	4	Shopping complexes and multi-purpose complexes	Commercial (retail shops, dry shops)	Shop or shopping mall

► 17) Outdoor Display Area (ODA)

SCDF		BCA			PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type			Sewerage and Sanitary Works (SSW)	
V	Shop	Shop, healthcare facility (outpatient)	4	Shopping complexes and multi-purpose complexes	-	-

► 18) Outpatient clinic

Applicable for factory, utility, or warehouse buildings only:

SCDF		BCA			PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type			Sewerage and Sanitary Works (SSW)	
V	Shop	Shop, healthcare facility (outpatient)	4	Shopping complexes and multi-purpose complexes	-	Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes



Modelling IFC-SG (Space Usage)

(Continued) Occupancy Type for Shop Spaces

► 19) Polyclinic

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type	Sewerage and Sanitary Works (SSW)	
V	Shop	Shop, healthcare facility (outpatient)	15	Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes	-	Hospitals, healthcare centres, clinics, nursing homes, homes for the aged and welfare homes

► 20) Market

Applicable for a wet market:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type	Sewerage and Sanitary Works (SSW)	
V	Shop	Shop, healthcare facility (outpatient)	11	Markets, hawker or food centres	Market	Supermarket / wet market

► 21) Temporary showflat

Applicable for a standalone showflat:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type	Sewerage and Sanitary Works (SSW)	
V	Shop	Shop, healthcare facility (outpatient)	E	Exempted	-	Temporary showflat

► 22) Factory showroom

Applicable for factory, utility, or warehouse buildings only:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type	Sewerage and Sanitary Works (SSW)	
V	Shop	Shop, healthcare facility (outpatient)	16	Factories, workshops, industrial buildings and office / showroom areas in warehouses	-	Factory showroom

Occupancy Type for Factory Spaces

► 23) Petrol station

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type	Sewerage and Sanitary Works (SSW)	
VI	Factory	Industrial buildings (factories, workshops, godowns, warehouses)	E	Exempted	-	Petrol Station



Modelling IFC-SG (Space Usage)

(Continued) Occupancy Type for Factory Spaces

► 24) Factory

Applicable for an aircraft hangar, data centre, telecommunication exchange, vehicle repair / woodwork workshop, or factory for chemicals / consumable products / fireworks / glassware / metalwork / highly combustible substances / highly flammable products / incineration / oil refinery / pharmaceutical / rubber / ship building:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)		
VI	Factory	Industrial buildings (factories, workshops, godowns, warehouses)	16	Factories, workshops, industrial buildings and office / showroom areas in warehouses	-	Factories, workshops, industrial buildings and office / showroom areas in warehouses

► 25) Food production factory

Applicable for a central kitchen, food production facility:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)		
VI	Factory	Industrial buildings (factories, workshops, godowns, warehouses)	16	Factories, workshops, industrial buildings and office / showroom areas in warehouses	-	Food Production Factory

► 26) M&E area

Applicable for an M&E area within a building:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)		
VI	Factory	Industrial buildings (factories, workshops, godowns, warehouses)	E	Exempted	-	M&E area

► 27) Wafer fabrication plant

► 28) Trade effluent treatment plant

Applicable for a disinfection plant:

► 29) Waste management and recycling

► 30) Embalming facility

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)		
VI	Factory	Industrial buildings (factories, workshops, godowns, warehouses)	16	Factories, workshops, industrial buildings and office / showroom areas in warehouses	-	-



Modelling IFC-SG (Space Usage)

(Continued) Occupancy Type for Factory Spaces

► 31) Agriculture

Applicable for a farm or plant nursery (no visitor area):

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VI	Factory	Industrial buildings (factories, workshops, godowns, warehouses)	16	Factories, workshops, industrial buildings and office / showroom areas in warehouses	-	Agri-culture

► 32) Animal related facility

Applicable for a pet crematorium, animal shelter, quarantine facilities (no visitor area):

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VI	Factory	Industrial buildings (factories, workshops, godowns, warehouses)	16	Factories, workshops, industrial buildings and office / showroom areas in warehouses	-	Animal related facility

► 33) High containment facility

Applicable for a containment lab of biosafety level 3 and 4:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VI	Factory	Industrial buildings (factories, workshops, godowns, warehouses)	16	Factories, workshops, industrial buildings and office / showroom areas in warehouses	-	High containment facility

► 34) Electrical and gas facility

Applicable for a power generation plant, gas transmission or receiving station:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VI	Factory	Industrial buildings (factories, workshops, godowns, warehouses)	E	Exempted	-	-

► 35) Body treatment place

Applicable for a massage establishment, foot reflexology, spa, gymnasium, fitness centre:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VII	Place of public resort (body treatment)	Places of public resort and carpark	4	Shopping complexes and multi-purpose complexes	-	-



Modelling IFC-SG (Space Usage)

Occupancy Type for Place of Public Resort Spaces

► 36) Entertainment place

Applicable for an arcade, computing gaming / game machine area, karaoke lounge, night club or casino:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
VII	Place of public resort (entertainment)	Places of public resort and carpark	4	Shopping complexes and multi-purpose complexes	-

► 37) Assembly place

Applicable for an auditorium, theatre or concert hall:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
VII	Place of public resort (entertainment)	Places of public resort and carpark	4	Shopping complexes and multi-purpose complexes	- Conference hall, cinema, theatre, convention hall, exhibition hall

► 38) Cinema

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
VII	Place of public resort (entertainment)	Places of public resort and carpark	4	Shopping complexes and multi-purpose complexes	-

► 39) Recreational place

Applicable for bowling / billiard / snooker / dart (leisure sport) facilities or an indoor play park:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
VII	Place of public resort (recreational)	Places of public resort and carpark	7	Places of public resort	-

► 40) Sky garden, terrace

Applicable for garden or terrace within a building but not on-grade, roof, or mid level, excluding those in residential units:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
VII	Place of public resort (recreational)	Places of public resort and carpark	D	Follow dominant use	-



Modelling IFC-SG (Space Usage)

(Continued) Occupancy Type for Place of Public Resort Spaces

► 41) F&B outlet

Applicable for a pub, bar, restaurant, coffee shop or café:

► 42) Fast food outlet

Applicable for a fast food outlet's queuing and dining areas:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VII	Place of public resort (F&B)	Places of public resort and carpark	10	Restaurants and eating establishments	Food establishment	-

► 43) Outdoor Refreshment Area (ORA)

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VII	Place of public resort (F&B)	Places of public resort and carpark	10	Restaurants and eating establishments	-	-

► 44) Food centre

Applicable for a food court, hawker centre or canteen:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VII	Place of public resort (F&B)	Places of public resort and carpark	11	Markets, hawker or food centres	Food establishment	-

► 45) Educational place

Applicable for a museum, exhibition centre, convention centre, art centre, gallery or library:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VII	Place of public resort (educational)	Places of public resort and carpark	7	Places of public resort	-	-

► 46) Serviced apartment

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VII	Place of public resort (accommodation)	Hotels, boarding houses, serviced apartments, hostels, backpacker hotels, dormitories	6	Serviced apartments	-	-



Modelling IFC-SG (Space Usage)

(Continued) Occupancy Type for Place of Public Resort Spaces

► 47) Hostel

Applicable for a student hostel, visitor hostel or staff quarter:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
VII Place of public resort (accommodation)	Hotels, boarding houses, serviced apartments, hostels, backpacker hotels, dormitories	14	Hostels, halls of residence or dormitories	-	Residential

► 48) Hotel

Applicable for a hotel, resort, backpacker's hotel or boarding house:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
VII Place of public resort (accommodation)	Hotels, boarding houses, serviced apartments, hostels, backpacker hotels, dormitories	5	Hotel, boarding houses, chalets and backpacker hotels	-	-

► 49) Capsule hotel

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
VII Place of public resort (accommodation)	Hotels, boarding houses, serviced apartments, hostels, backpacker hotels, dormitories	5	Hotel, boarding houses, chalets and backpacker hotels	-	-

► 50) Community club

► 51) Social club

Applicable for a private club or association:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
VII Place of public resort (social)	Places of public resort and carpark	7	Places of public resort	-	-

► 52) Religious place

Applicable for a church, mosque, temple, synagogue, funeral parlour, columbarium or crematorium visitor area:

SCDF		BCA		PUB	NEA
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	
VII Place of public resort (religious)	Places of public resort and carpark	7	Places of public resort	-	-



Modelling IFC-SG (Space Usage)

(Continued) Occupancy Type for Place of Public Resort Spaces

► 53) Sports facility

Applicable for a public sport complex, public swimming complex, swimming complex, stadium, indoor sports hall:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VII	Place of public resort (recreational)	Places of public resort and carpark	9	Sports complexes and public swimming pools	-	Public swimming pool / stadium

► 54) Sports facility (ancillary)

Applicable for a sport facility within a school:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VII	Place of public resort (recreational)	Places of public resort and carpark	D	Follow dominant use	-	-

► 55) Train station

Applicable for a rapid transit system:

► 56) Transport terminal

Applicable for a bus interchange, bus terminal, airport terminal or ferry terminal:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VII	Place of public resort (transportation)	Places of public resort and carpark	12	Transport stations, interchanges, and passenger terminals	-	-

Occupancy Type for Storage Spaces

► 57) Transport depot

Applicable for a rail depot or bus depot:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VIII	Storage	Industrial buildings (factories, workshops, godowns, warehouses)	16	Factories, workshops, industrial buildings and office / showroom areas in warehouses	-	-

► 58) Parking

Applicable for non-mechanized vehicle parking:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		
VIII	Storage	Places of public resort and carpark	18	Vehicle parks	-	-



Modelling IFC-SG (Space Usage)

(Continued) Occupancy Type for Place of Storage Spaces

► 59) Fully Automated Mechanized Car Park Buildings (FAMCP)

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)
VIII	Storage	Places of public resort and carpark	18	Vehicle parks	-	-

► 60) Warehouse

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)
VIII	Storage	Industrial buildings (factories, workshops, godowns, warehouses)	16	Factories, workshops, industrial buildings and office / showroom areas in warehouses	-	-

► 61) Chemical, hazmat storage

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)
VIII	Storage	Industrial buildings (factories, workshops, godowns, warehouses)	16	Factories, workshops, industrial buildings and office / showroom areas in warehouses	-	-

Occupancy Type for Other Spaces

► 62) Road tunnel

Applicable for an underground road network:

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)
-	-	-	-	-	-	-

► 63) Park

Applicable for an on-grade park, playground, but not part of or surrounded by building(s):

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)
-	-	-	8	Parks and open spaces including zoos, civic plazas, etc	-	-

► 64) Airbase, live firing area, training area

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group		Table 2.2A Type of Occupancy		Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)
-	-	-	-	-	-	-



Modelling IFC-SG (Space Usage)

(Continued) Occupancy Type for Other Spaces

- ▶ **65) Campsite, wet play field**
- ▶ **66) Reservoir, river, canal, major drain, pond, lake, other waterbody**
- ▶ **67) Nature reserve, nature area, school field, pedestrian mall, pedestrian footpath, promenade, quarry, marina**

SCDF		BCA		PUB	NEA	
Table 1.4A Purpose Group	Table 2.2A Type of Occupancy	Accessibility Code Table 1 Building Type		Sewerage and Sanitary Works (SSW)	Residential / stay-in facilities #	All other spaces
-	-	8	Parks and open spaces	-	-	-



Modelling IFC-SG (Space Usage)

► Space Name Categories

Space Names have been standardized from spaces required across BCA, LTA, NEA, PUB and SCDF requirements, into the following categories:

- 1) Living spaces
- 2) Temporary residences
- 3) Non-residential toilet Spaces (for spaces with WC)
- 4) Resting, care, hygiene spaces (for spaces without WC)
- 5) Commercial, work, institutional spaces
- 6) F&B spaces
- 7) Medical, healthcare spaces
- 8) Assembly spaces
- 9) Supporting spaces for performing
- 10) Entertainment, recreation spaces
- 11) Open spaces and open-sided spaces
- 12) M&E spaces
- 13) Storage spaces
- 14) Commuter facilities
- 15) Circulation spaces
- 16) Other non-simultaneous spaces

There are identical Space Names duplicated across different Space Name Categories, e.g. Bedroom is listed under 1) Living spaces and 2) Temporary residences. This is because the SCDF Occupancy Load (OL) will differ depending on where the Bedroom is located.

Thus, all Spaces should be accompanied by both **Space Name** and **Occupancy Type** parameters.

► 1) Living spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
1	Balcony	•					
2	Bedroom	•					
3	Master Bedroom	•					
4	Bathroom	•				•	
5	Master Bath	•					
6	Maid Bath	•					
7	Yard Bath	•					
8	Dining Room	•					
9	Household Shelter	•					
10	Kitchen	•					
11	Living Room	•					
12	Loft	•					
13	Private Lift Lobby	•					
14	Service Yard	•				•	
15	Toilet	•				•	
16	Walk-in Wardrobe	•					

Apartment (Residential)
Maisonettes (Residential)

15



Modelling IFC-SG (Space Usage)

► 2) Temporary residences

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
1	Hotel	●				Backpacker Hotel	3
2	Serviced Apartment	●				Serviced Apartment (based on per unit)	15
3	Bedroom	●				Dormitory	4.2
4	Guestroom*	●				Guestroom, Accommodation Unit	# Min 2 persons per room or 15 sqm/person, whichever is higher
5	Guestroom*	●				Guestroom, Accommodation Unit (Capsule Hotel)	3
6	Staff Quarters	●				Staff Quarters	# Same as above
7	Student Bedroom Individual	●				Student Bedroom	# Same as above
8	Student Bedroom Multipax	●				Student Bedroom (Multipax)	3
9	Housekeeping	●				Housekeeping	10

* Note that the OL of Guestroom Space will depend on what is indicated in its Occupancy Type

► 3) Non-residential toilet spaces (for spaces with WC)

Please ensure “TRUE/FALSE” have been indicated for the following IFC-SG properties - AmbulantDisabled, BarrierFreeAccessibility and ChildrenFriendly - in these spaces.

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
1	Bathroom	●		●*		Bathroom	0
2	Toilet	●		●		Toilet	0
3	Isolation Ward Toilet	●					
4	Accessible Washroom	●				Toilet (Handicap)	0
5	Male Toilet	●		●		Toilet (Male)	0
6	Female Toilet	●		●		Toilet (Female)	0
7	Unisex Toilet	●				Toilet	0
8	Family-Friendly Washroom	●				Family-Friendly Washroom	0
9	Washroom with Shower	●		●**		Washroom with Shower	0
10	Powder Room	●		●		Powder Room	0

* NEA’s Bathroom Space refers to a Bathroom with Bench (BR) only

** NEA’s Washroom with Shower Space refers only to a Bathroom with Bench (BR) or Bench with Hanger (BH).



Modelling IFC-SG (Space Usage)

► 4) Resting, care, hygiene spaces (for spaces without WC)

Please ensure “TRUE/FALSE” have been indicated for the following IFC-SG properties - AmbulantDisabled, BarrierFreeAccessibility and ChildrenFriendly - in these spaces.

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
1	Bathroom	●				Bathroom	0
2	Changing Room	●				Changing Room	0
3	Female Changing Room	●				Changing Room (Female)	0
4	Male Changing Room	●				Changing Room (Male)	0
5	Locker Room	●				Locker Room	0
6	Restroom	●				Restroom	0
7	Lactation Room	●				Lactation Room	0
8	Sick Room	●				Sickroom	0
9	Shower Room, Shower Stall	●		●*		Shower Room, Shower Stall	0
10	Wash Area	●			●	Wash Area	0

* NEA’s Shower Room Space or Shower Stall Space refers only to a Bathroom with Bench (BR) or Bench with Hanger (BH).

► 5) Commercial, work, institutional spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
1	Archive Room (Reading)	●				Archive Room – Reading Area	5
2	Archive Room (Stack)	●				Archive Room – Stack Area	10
3	Ball Room	●				Ball Room	1.5
4	Banking Hall	●				Banking Hall	3
5	Bazaar	●				Bazaar	5
6	Business Centre, Business Office	●				Business Centre, Business Office	10
7	Classroom	●				Classroom	1.5
8	Computer Classroom	●				Computer Classroom	5
9	Common Room	●				Common Room	1.5
10	Computer Room	●				Computer Room	5
11	Conference Room	●				Conference Room	1.5
12	Consultant Room	●				Consultant Room	5
13	Crematoria	●				Crematoria	1.5



Modelling IFC-SG (Space Usage)

► *(continued)* 5) Commercial, work, institutional spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	Functional Space
							OL
14	Dance Studio	●				Dance Studio	5
15	Department Store	●				Department Store	5
16	Design Studio	●				Design Studio	5
17	Detention Room	●				Detention Room	3
18	Exposition, Trade Fair Area	●				Exposition, Trade Fair Area	1.5
19	Filing Room, Store	●				Filing Room, Store	10
20	Fire Command Centre	●				Fire Command Centre	10
21	Function Room	●				Function Room	1.5
22	Exhibits Gallery	●				Gallery – Exhibits	2.5
23	Choir Gallery	●				Gallery – Choir	1.5
24	Prayer Gallery	●				Gallery – Prayer	1.5
25	Seating Gallery	●				Gallery – Seating	1.5
26	Trading Gallery	●				Gallery – Trading	1.5
27	Viewing Gallery	●				Gallery - Viewing	1.5
28	Guard House	●				Guard House	10
29	Hobby Room	●				Hobby Room	1.5
30	Kiosk	●				Kiosk - Retail	5
31	Laboratory	●			●*	Laboratory	5
32	Laundry	●				Laundry – With Machine Operation	15
33	Library Room (Stack)	●				Library Room (Stack)	10
34	Library Room (Reading)	●				Library Room (Reading)	5
35	Lounge	●				Lounge	2.5
36	Machine Room, Printing Room	●				Machine Room, Printing Room	10
37	Mailroom	●				Mailroom	0
38	Meeting Room	●				Meeting Room	1.5
39	Music Studio	●				Music Studio	1.5
40	Night Club	●				Night Club	1.5
41	Admin Office, General Office	●				Office – Admin, General	10
42	Ancillary Office	●				Office – Ancillary	7.5

* PUB's Laboratory Space refers to the Chemical Analysis Laboratory only



Modelling IFC-SG (Space Usage)

► *(continued)* 5) Commercial, work, institutional spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
43	Director Office, Manager Office	●				Office – Director, Manager	15
44	Drafting Office	●				Office - Drafting	5
45	Outdoor Display Area	●				Outdoor Display Area	5
46	Packing Area, Distribution Area	●				Packing Area, Distribution Area	10
47	Pantry	●				Pantry	0
48	Prayer Hall	●				Prayer Hall	1.5
49	Pre-Function Room	●				Pre-Function Room	0
50	Production Area	●				Production Area	10
51	Promotion Area	●				Promotion Area	1.5
52	Reading Room	●				Reading Room	5
53	Reception Area	●				Reception Area	3
54	Seminar Room	●				Seminar Room	1.5
55	Security Room	●				Security Room	10
56	Service Area	●				Service Area	10
57	Shed	●				Shed	1.5
58	Shop	●				Shop	5
59	Showflat	●				Showflat	5
60	Showroom	●				Showroom	5
61	Society Room	●				Society Room	1.5
62	Spray Painting Room	●				Spray Painting Room	10
63	Staff Office	●				Staff Office	10
64	Staff Lounge	●				Staff Lounge	3
65	Supermarket	●			●	Supermarket	5
66	Therapy Centre	●				Therapy Centre	10
67	Ticketing Office	●				Ticketing Office	10
68	Trading Floor	●				Trading Floor	2
69	Visitors Lounge	●				Visitors Lounge	3
70	Waiting Area	●				Waiting Area	3
71	Workshop*	●				Workshop - Institutional	5
72	Workshop*	●				Workshop - Industrial	10

* Note that the OL of Workshop Space will depend on what is indicated in its Occupancy Type



Modelling IFC-SG (Space Usage)

► 6) F&B spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
1	Bar, Pub	●				Bar, Pub	1
2	Cafeteria	●				Cafeteria	1.5
3	Canteen	●			●	Canteen	1.5
4	Dining Area*	●				Dining Area – Coffee Shop, Eating House, Food Court, Hawker Centre	1.5
5	Dining Area*	●				Dining Area – Fast Food Outlet	1
6	Food Stall	●			●	Food Stall	10
7	Kiosk	●				Kiosk – Take-away F&B	5
8	Kitchen, Service Area, Service Counter	●			●	Kitchen, Service Area, Service Counter	10
9	Restaurant	●				Restaurant	1.5
10	Snack Bar	●				Snack Bar	1.5
11	Staff Canteen	●				Staff Canteen	1.5

* Note that the OL of Dining Area Space will depend on what is indicated in its Occupancy Type

► 7) Medical, healthcare spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
1	Area of Refuge*	●				Area of Refuge – Ambulatory Care Facility	1.4
2	Area of Refuge*	●				Area of Refuge – Custodian Care Facility	1.4
3	Area of Refuge*	●				Area of Refuge – Custodian Care Facility (Nursery)	0
4	Area of Refuge*	●				Area of Refuge – Hospital Space with Patient Accommodation	2.8
5	Area of Refuge*	●				Area of Refuge – Hospital Space without Patient Accommodation	0.56
6	Area of Refuge*	●				Area of Refuge – Nursing Care Facility Space with Patient Accommodation	2.8
7	Area of Refuge*	●				Area of Refuge – Nursing Care Facility Space without Patient Accommodation	0.56
8	Area of Refuge*	●				Area of Refuge – Supervisory Care Facility	0.56
9	Consultation Room	●				Clinic (Outpatient) – Consultation Room	5
10	Examination Room	●				Examination Room	5

* Note that the OL of Area of Refuge Space will depend on what is indicated in its Occupancy Type



Modelling IFC-SG (Space Usage)

► *(continued)* 7) Medical, healthcare spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	
11	Surgical Viewing Gallery	●				Gallery – Surgical Viewing	3
12	Laboratory	●				Laboratory – Healthcare Occupancy	20
13	Nursing Room	●				Nursing Room	0
14	Nursing Station	●				Nursing Station	10
15	Operation Theatre	●				Operation Theatre	7.5
16	Outpatient Waiting Area	●				Outpatient Waiting Area	1.5
17	Patient Accommodation in Intensive Care	●				Patient Accommodation – Intensive Care	20
18	Patient Accommodation in Ward	●				Patient Accommodation – Ward	10
19	Isolation Ward	●				Isolation Ward	10
20	Pharmacy Staff Area	●				Pharmacy – Staff Area	10
21	Pharmacy Waiting Area	●				Pharmacy – Public Waiting Area	2
22	Treatment Room	●				Treatment Room	5

► 8) Assembly Spaces

For OL that require indication of benches or seating in the Assembly Space, pls indicate these components in the model

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	
1	Amphitheatre	●		●		Amphitheatre with Fixed Bench Seating	0.45m of length of benches per person
2	Amphitheatre	●		●		Amphitheatre with Individual Fixed Seating	Based on number of fixed seating
3	Amphitheatre without fixed seating	●		●		Amphitheatre without Individual Fixed Seating, Bench	1.5
4	Auditorium	●		●		Auditorium – with Fixed Bench Seating	0.45m of length of benches per person
5	Auditorium	●		●		Auditorium – with Individual Fixed Seating	Based on number of fixed seating
6	Auditorium without fixed seating	●		●		Auditorium – without Individual Fixed Seating, Bench	1.5



Modelling IFC-SG (Space Usage)

► (continued) 8) Assembly Spaces

For OL that require indication of benches or seating in the Assembly Space, pls indicate these components in the model

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
7	Cinema	•		•		Cinema – with Fixed Bench Seating	0.45m of length of benches per person
8	Cinema	•		•		Cinema – with Individual Fixed Seating	Based on number of fixed seating
9	Cinema without fixed seating	•		•		Cinema – without Individual Fixed Seating, Bench	1.5
10	Grandstand	•		•*		Grandstand – with Fixed Bench Seating	0.45m of length of benches per person
11	Grandstand	•		•*		Grandstand – with Individual Fixed Seating	Based on number of fixed seating
12	Grandstand without fixed seating	•		•*		Grandstand – without Individual Fixed Seating, Bench	1.5
13	Assembly Hall	•		•		Hall – Assembly Hall with Fixed Bench Seating	0.45m of length of benches per person
14	Assembly Hall	•		•		Hall – Assembly Hall with Individual Fixed Seating	Based on number of fixed seating
15	Assembly Hall without fixed seating	•		•		Hall – Assembly Hall without Individual Fixed Seating, Bench	1.5
16	Concert Hall	•		•		Hall – Concert Hall with Fixed Bench Seating	0.45m of length of benches per person
17	Concert Hall	•		•		Hall – Concert Hall with Individual Fixed Seating	Based on number of fixed seating
18	Concert Hall without fixed seating	•		•		Hall – Concert Hall without Individual Fixed Seating, Bench	1.5
19	Exhibition Hall	•		•		Hall – Exhibition Hall with Fixed Bench Seating	0.45m of length of benches per person
20	Exhibition Hall	•		•		Hall – Exhibition Hall with Individual Fixed Seating	Based on number of fixed seating
21	Exhibition Hall without fixed seating	•		•		Hall – Exhibition Hall without Individual Fixed Seating, Bench	1.5
22	Conference Hall	•		•		Hall – Conference Hall with Fixed Bench Seating	0.45m of length of benches per person
23	Conference Hall	•		•		Hall – Conference Hall with Individual Fixed Seating	Based on number of fixed seating
24	Conference Hall without fixed seating	•		•		Hall – Conference Hall without Individual Fixed Seating, Bench	1.5

* NEA's Grandstand-related Spaces refer to Stadium Spaces only



Modelling IFC-SG (Space Usage)

► (continued) 8) Assembly Spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
25	Function Hall	•		•		Hall – Function Hall with Fixed Bench Seating	0.45m of length of benches per person
26	Function Hall	•		•		Hall – Function Hall with Individual Fixed Seating	Based on number of fixed seating
27	Function Hall without fixed seating	•		•		Hall – Function Hall without Individual Fixed Seating, Bench	1.5
28	Lecture Room	•				Lecture Room with Fixed Bench Seating	0.45m of length of benches per person
29	Lecture Room	•				Lecture Room with Individual Fixed Seating	Based on number of fixed seating
30	Lecture Room without fixed seating	•				Lecture Room without Individual Fixed Seating, Bench	1.5
31	Spectator Area	•		•		Spectator Area with Fixed Bench Seating	0.45m of length of benches per person
32	Spectator Area	•		•		Spectator Area with Individual Fixed Seating	Based on number of fixed seating
33	Spectator Area without fixed seating	•		•		Spectator Area without Individual Fixed Seating, Bench	1.5
34	Theatre	•		•		Theatre with Fixed Bench Seating	0.45m of length of benches per person
35	Theatre	•		•		Theatre with Individual Fixed Seating	Based on number of fixed seating
36	Theatre without fixed seating	•		•		Theatre without Individual Fixed Seating, Bench	1.5
37	Indoor Sports Hall*	•				Indoor Sports Hall – School With Multi-Purpose Hall	3
38	Indoor Sports Hall*	•				Indoor Sports Hall – School Without Multi-Purpose Hall	1
39	Multi-purpose Hall*, Multi-Purpose Room*	•		•**		Multi-purpose Hall, Room – School, Colleges	1
40	Multi-purpose Sports Hall*	•				Multi-purpose Sports Hall – Public Sports Complex	3
41	Multi-purpose Sports Hall*	•				Multi-purpose Sports Hall – Public Swimming Complex	3
42	Multi-purpose Sports Hall*	•		•**		Multi-purpose Sports Hall – Stadium	3

* Note that the OL of Indoor Sports Hall, Multi-purpose Hall, Multi-purpose Room, Multi-purpose Sports Hall Spaces will depend on what is indicated in each Space's Occupancy Type

** NEA's Multi-purpose Hall, Multi-purpose Room and Multi-purpose Sports Hall Spaces refer to Stadium Spaces only



Modelling IFC-SG (Space Usage)

► 9) Supporting spaces for performing

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces				
		BCA	LTA	NEA	PUB	SCDF
						Functional Space
1	Audio Visual Area	●				Audio Visual Area
2	Audio Visual Control Room	●				Audio Visual Control Room – Auditorium, Theatre, Cinema, Hall
3	Audio Visual Lighting Control Room	●				Lighting Control Room – Auditorium, Theatre, Cinema, Hall
4	Live Entertainment	●				Live Entertainment
5	Live Performance	●				Live Performance
6	Orchestral Pit	●				Orchestral Pit
7	Projection Room	●				Projection Room – Auditorium, Theatre, Cinema, Hall
8	Back Stage	●				Stage, Back
9	Front Stage	●				Stage, Front – Schools, Colleges, Tertiary Institutions
10	Front Stage	●				Stage, Front – Auditorium, Theatre, Cinema, Hall

► 10) Entertainment, recreation spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces				
		BCA	LTA	NEA	PUB	SCDF
						Functional Space
1	Amusement Park	●		●*		Amusement Park (excluding Machine Area)
2	Billiards Room	●		●*		Billiards Room
3	Body Massage	●		●*		Body Massage
4	Bowling Alley	●		●*		Bowling Alley (excluding Bowling Lane)
5	Bowling Lane	●		●*		Bowling Lane
6	Casino	●		●*		Casino
7	Children Playground	●		●*		Children Playground
8	Club Room	●		●*		Club Room
9	Discotheque Dancing Area, Discotheque Dining Area	●		●*		Discotheque
10	Hockey Field, Hockey Pitch	●		●*		Field, Pitch – Hockey Field, Hockey Pitch
11	Rugby Field, Rugby Pitch	●		●*		Field, Pitch – Rugby Field, Rugby Pitch
12	Soccer Field, Soccer Pitch	●		●*		Field, Pitch – Soccer Field, Soccer Pitch
13	Fitness Corner	●		●*		Fitness Corner, Exercise Corner, Health Corner

* NEA's Spaces refer to Shopping Mall Spaces and Stadium Spaces only



Modelling IFC-SG (Space Usage)

► 10) (continued) Entertainment, recreation spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
14	Foot Reflexology	●		●*		Foot Reflexology	5
15	Fitness Club, Fitness Centre	●		●*		Fitness Centre, Exercise Centre, Health Club, Health Centre	5
16	Gaming Centre	●		●*		Gaming Centre (excluding Machine Area)	1.5
17	Gymnasium	●		●*	●	Gymnasium	3.5
18	Health Club, Health Centre	●		●*		Health Club, Health Centre	5
19	Indoor Games Room	●		●*		Indoor Games Room	1.5
20	Karaoke Lounge	●		●*		Karaoke Lounge	1.5
21	Karaoke Dining Area	●		●*		Karaoke Dining Area	1.5
22	Recreation Room	●		●*		Recreation Room	1.5
23	Refreshment Area	●		●*		Refreshment Area	1.5
24	Skating Rink	●		●*		Skating Rink – Rink Area	3
25	Spa	●				Spa	5
26	Badminton Court	●				Sports Court – Badminton Court	4 persons per court
27	Basketball Court	●				Sports Court – Basketball Court	10 persons per court
28	Basketball Half Court	●				Sports Court – Basketball Court (Half-court)	6 persons per court
29	Futsal Court	●				Sports Court – Futsal Court	14 persons per court
30	Netball Court	●				Sports Court - Netball Court	14 persons per court
31	Netball Half Court	●				Sports Court - Netball Court (Half-court)	8 persons per court
32	Squash Court	●				Sports Court – Squash Court	2 persons per court
33	Tennis Court	●				Sports Court –Tennis Court	4 persons per court
34	Tennis Half Court	●				Sports Court – Tennis Court (Half-court)	2 persons per court
35	Volleyball Court	●				Sports Court –Volleyball Court	12 persons per court
36	Swimming Pool**	●				Swimming Pool – Condominium, Apartment	5
37	Swimming Pool**	●				Swimming Pool – Hotel	0
38	Swimming Pool**	●				Swimming Pool – Private Club	0
39	Swimming Pool**	●		●		Swimming Pool – Public Sports Complex	2.5
40	Swimming Pool**	●		●		Swimming Pool – Public Swimming Complex	2.5
41	Swimming Pool**	●				Swimming Pool – Serviced Apartment	0

* NEA’s Spaces refer to Shopping Mall Spaces and Stadium Spaces only

** Note that the OL of Swimming Pool Space will depend on what is indicated in its Occupancy Type



Modelling IFC-SG (Space Usage)

► 10) (continued) Entertainment, recreation spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces				
		BCA	LTA	NEA	PUB	SCDF
						Functional Space
42	Swimming Pool Deck*	●				Swimming Pool Deck – Condominium, Apartment 10
43	Swimming Pool Deck*	●				Swimming Pool Deck – Hotel 10
44	Swimming Pool Deck*	●				Swimming Pool Deck – Private Club 10
45	Swimming Pool Deck*	●		●		Swimming Pool Deck – Public Sports Complex 5
46	Swimming Pool Deck*	●		●		Swimming Pool Deck – Public Swimming Complex 5
47	Swimming Pool Deck*	●				Swimming Pool Deck – Serviced Apartment 10
48	Training Area	●				Training Area – Public Sports Complex 3
49	Training Area	●				Training Area – Public Swimming Complex 3
50	Training Area	●				Training Area - Stadium 3

* Note that the OL of Swimming Pool Deck Space will depend on what is indicated in its Occupancy Type

► 11) Open spaces and open-sided spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces				
		BCA	LTA	NEA	PUB	SCDF
						Functional Space
1	AC Ledge	●				- -
2	Backyard	●			●	- -
3	Courtyard	●			●	- -
4	Service Yard	●			●	Service Yard 10
5	Construction Site	●			●	Construction Site – Open To Space 0
6	Outdoor Refreshment Area	●				Outdoor Refreshment Area 1.5
7	Pavilion	●				Pavilion 1.5
8	Roof*	●				Roof (Public) 1.5
9	Roof*	●				Roof (Access for Maintenance only) 0
10	Green Roof*	●				Roof - Green Roof (Public) 1.5
11	Green Roof*	●				Roof - Green Roof (Access for Maintenance only) 0
12	Roof Garden, Roof Terrace	●				Roof Garden, Roof Terrace, Private (of Individual Residential Unit) 0
13	Jogging Track, Footpath	●				Roof Garden, Roof Terrace, Public – Jogging Track, Designated Foot Path ≤ 3m in width 3

* Note that the OL of Roof and Green Roof Spaces will depend on what is indicated in each Space’s Occupancy Type



Modelling IFC-SG (Space Usage)

► 11) (continued) Open spaces and open-sided spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	
14	Sky Garden, Sky Terrace*	●				Roof Garden, Roof Terrace, Public – Planter Box < 300mm High	1.5
15	Sky Garden, Sky Terrace*	●				Roof Garden, Roof Terrace, Public – Planter Box ≥ 300mm, ≤ 500mm High, Covered Fully with Trees or Shrubs	0
16	Sky Garden, Sky Terrace*	●				Roof Garden, Roof Terrace, Public – Planter Box ≥ 300mm, ≤ 500mm High, Not Covered Fully with Trees or Shrubs	1.5
17	Sky Garden, Sky Terrace*	●				Roof Garden, Roof Terrace, Public – Planter Box > 500mm High Without Step or Ramp Access	0
18	Sky Garden, Sky Terrace*	●				Roof Garden, Roof Terrace, Public – Planter Box > 500mm High With Step or Ramp Access	1.5
19	Sky Garden, Sky Terrace*	●				Roof Garden, Roof Terrace, Public – Water Feature < 300mm in Depth or Height	3
20	Sky Garden, Sky Terrace*	●				Roof Garden, Roof Terrace, Public – Water Feature ≥ 300mm in Depth or Height	0
21	Sunken Planting Area*	●				Roof Garden, Roof Terrace, Public – Sunken Planting Area (Fully Covered with Trees or Shrubs)	0
22	Sunken Planting Area*	●				Roof Garden, Roof Terrace, Public – Sunken Planting Area (Turf)	3
23	Sky Garden, Sky Terrace*	●				Roof Garden, Roof Terrace, Public – Other Areas	1.5

* Note that the Sky Garden and Sky Terrace Spaces must ensure the following:

- (i) Planter Boxes and Water Features are indicated if applicable
- (ii) “TRUE/FALSE” have been indicated for the following IFC-SG properties – FullyCoveredWithTreesShrub, StepRampAccess

► 12) M&E spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	
1	Battery Room	●				Battery Room	30
2	Cooling Tower	●			●	Cooling Tower	30
3	Equipment Disinfection Room	●			●	Equipment Disinfection Room	30
4	Equipment Washing Bay	●			●	Equipment Washing Bay	10
5	Lift Machine Room	●			●	Lift Machine Room	30
6	Lift Motor Room	●			●	Lift Motor Room	30
7	Lubrication Bay	●			●	Lubrication Bay	30
8	Pulley Room	●			●	Pulley Room	30
9	Mechanical Plant Room	●				Mechanical Plant Room	30
10	AC Plant Room	●				Mechanical Plant Room – AC	30



Modelling IFC-SG (Space Usage)

► 12) (continued) M&E Spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	
							OL
11	AHU Room	●				Mechanical Plant Room – AHU	30
12	Boiler Room	●			●	Mechanical Plant Room – Boiler Room (Oil Fired)	30
13	Chiller Room	●			●	Mechanical Plant Room – Chiller Room	30
14	Discharge Valve Room	●			●	Mechanical Plant Room – Discharge Valve Room	30
15	Electric Lift Motor Room	●				Mechanical Plant Room – Electric Lift Motor Room	30
16	Electrical Room	●				Mechanical Plant Room – Electrical Room	30
17	Essential Fan Room	●				Mechanical Plant Room – Essential Fan Room	30
18	Fire Pump Room	●			●	Mechanical Plant Room – Fire Pump Room	30
19	Pumped Sanitary System Room	●			●	Mechanical Plant Room – Pumped Sanitary System Room	30
20	Pumped Drainage System Room	●			●	Mechanical Plant Room – Pumped Drainage System Room	30
21	Emergency Room	●			●	Mechanical Plant Room – Emergency Generator Room	30
22	Generator Room	●				Mechanical Plant Room – Generator Room	30
23	High Voltage Switch Room	●				Mechanical Plant Room – High Voltage Switch Room	30
24	Hydraulic Lift Motor Room	●				Mechanical Plant Room – Hydraulic Lift Motor Room	30
25	Low Voltage Switch Room	●				Mechanical Plant Room – Low Voltage Switch Room	30
26	Oil Tank Room	●				Mechanical Plant Room – Oil Tank Room	30
27	Sprinkler Tank Room	●				Mechanical Plant Room – Sprinkler Tank Room	30
28	Telecommunication Room, Equipment Room	●				Mechanical Plant Room – Telecommunication Room, Non-Essential Equipment Room	30
29	Transformer Room	●				Mechanical Plant Room – Transformer Room	30
30	Wet Riser Tank Room	●				Mechanical Plant Room – Wet Riser Tank Room	30
31	Server Room	●				Server Room	30
32	Vent Room	●				Vent Room	30
33	Potable Water Tank Room	●			●	Potable Water Tank Room	30
34	NEWater Tank Room	●			●	NEWater Tank Room	30
35	Hosereel Tank Room	●			●	Hosereel Tank Room	30
36	Non-potable Water Tank Room	●			●	Non-potable Water Tank Room	30
37	Hydrant Tank Room	●			●	Hydrant Tank Room	30
38	Detention Tank	●			●	Detention Tank	0
39	Rainwater Harvesting Tank	●			●	Rainwater Harvesting Tank	0
40	Irrigation Tank	●			●	Irrigation Tank	0
41	Sprinkler Tank	●			●	Sprinkler Tank	0



Modelling IFC-SG (Space Usage)

► 13) Storage spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
1	Bin Centre	•				Bin Centre	30
2	Coldroom	•				Coldroom	30
3	Deposit Room, Strong Room	•				Deposit Room, Strong Room	30
4	Mortuary	•				Mortuary	30
5	Storage, Storeroom	•				Storage, Storeroom	30
6	Warehouse	•				Warehouse	30

► 14) Commuter facilities

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	OL
1	Driveway	•				Driveway	30
2	Garage	•			•	Garage	30
3	Parking Place*	•	•			Parking Area - Bicycle	30
4	Parking Place*	•	•			Parking Area – Car, Lorry, Bus	30
5	Parking Place*	•	•			Parking Area – Handicap	30
6	Parking Place*	•	•			Parking Area – Motorcycle	30
7	Vehicle Washing Bay	•				Parking Area – Washing	30
8	Loading Area, Unloading Area, Loading Bay, Unloading Bay, Loading Platform, Unloading Platform	•				Loading / Unloading Area / Bay / Platform	4 persons per bay
9	Alighting Point, Boarding Point	•				Alighting / Boarding Point	0
10	Drop Off Point	•				Drop Off Point	0
11	Bus Stop	•				Bus Stop	0
12	Taxi Bay	•				Taxi Bay	0
13	Taxi Shelter	•				Taxi Shelter	0

* Note that the vehicle type of Parking Place Spaces will depend on the IFC sub-type modelled for Parking Lot components. For example, a Parking Place Space for a Car should also include the IfcBuildingElementProxy > CARLOT IFC-SG component.



Modelling IFC-SG (Space Usage)

► 15) Circulation spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					Functional Space	OL
		BCA	LTA	NEA	PUB	SCDF		
1	Atrium	●				Atrium Floor		3
2	Concourse	●				Concourse		3
3	Foyer	●				Foyer – Bus / Airport / Ferry Terminal or Station		1.5
4	Passenger Arrival Area, Passenger Departure Area	●				Passenger Arrival / Departure Areas – Bus / Airport / Ferry		1.5
5	Cargo Lift Lobby, Goods Lift Lobby	●				Lobby – Cargo Lift Lobby, Goods Lift Lobby		0
6	Common Lobby	●				Lobby – Common Lobby		0
7	Evacuation Lift Lobby	●				Lobby – Evacuation Lift Lobby		0
8	Fire Lift Lobby	●				Lobby – Fire Lift Lobby		0
9	Passenger Lift Lobby	●				Lobby – Passenger Lift Lobby		0
10	Protected Lobby	●				Lobby – Protected Lobby		0
11	Smoke-Free Lobby	●				Lobby – Smoke-Free Lobby		0
12	Service Lift Lobby	●				Lobby – Service Lift Lobby		0
13	Private Lift Lobby	●				Lobby – Private Lift Lobby		0
14	Clean Room	●				Clean Room		0
15	Equipment Platform	●				Equipment Platform		0
16	Linkway	●				Linkway		0
17	Pedestrian Linkway	●				Pedestrian Linkway – with Commercial Activities		2
18	Pedestrian Linkway	●				Pedestrian Linkway – without Commercial Activities		0
19	Elevated Pedestrian Linkway*	●				Elevated Pedestrian Linkway – with Commercial Activities		2
20	Elevated Pedestrian Linkway*	●				Elevated Pedestrian Linkway – without Commercial Activities		0
21	Underground Pedestrian Linkway*	●				Underground Pedestrian Linkway – with Commercial Activities		2
22	Underground Pedestrian Linkway*	●				Underground Pedestrian Linkway – without Commercial Activities		0
23	Promenade	●				Promenade		0
24	Boardwalk	●				Boardwalk		0
25	Through-Block Link					Through-Block Link		0
26	Access Aisle	●				Access Aisle		0

* Note that the OL of Elevated and Underground Pedestrian Linkway Spaces will depend on the adjacent Spaces abutting the Linkway Spaces



Modelling IFC-SG (Space Usage)

► 15) (continued) Circulation spaces

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces					
		BCA	LTA	NEA	PUB	SCDF	
						Functional Space	
27	Corridor	●				Corridor – Common Corridor	0
28	External Corridor	●				Corridor – External Corridor	0
29	Open Walkway, Covered Walkway	●				Walkway	0
30	Footway	●				Footway	0
31	Pathway	●				Pathway	0
32	Veranda	●			●	Veranda	0
33	Void Deck	●			●	Void Deck	0
34	External Exit Staircase*	●				Exit – External Circular Staircase	0
35	External Exit Staircase*	●				Exit – External Exit Staircase	0
36	External Exit Staircase*	●				Exit – External Spiral Staircase	0
37	Internal Exit Staircase*	●				Exit – Internal Circular Staircase	0
38	Internal Exit Staircase*	●				Exit – Internal Exit Staircase	0
39	Internal Exit Staircase*	●				Exit – Internal Spiral Staircase	0
40	Staircase*	●				Staircase – Hardwood Staircase	0
41	Staircase*	●				Staircase – Access Staircase	0
42	External Scissor Exit Staircase*						
43	Internal Scissor Exit Staircase*	●				Exit – Scissor Staircase	0
44	External Exit Passageway	●				Exit – External Exit	0
45	Internal Exit Passageway	●				Exit – Internal Exit	0
46	External Exit Ramp**	●				Exit – External Exit Ramp	0
47	Internal Exit Ramp**	●				Exit – Internal Exit Ramp	0

* All Staircase Spaces must include modelling of staircase components (IfcStair). IfcStair components representing Hardwood Staircases should indicate “Hardwood” for the Material parameter.

** All Ramp Spaces must include modelling of ramp components (IfcRamp).



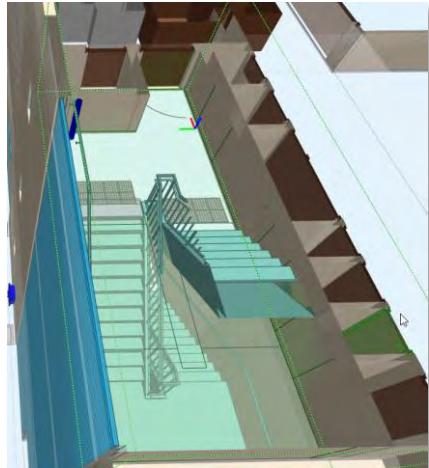
Modelling IFC-SG (Space Usage)

► 16) Other non-simultaneous spaces

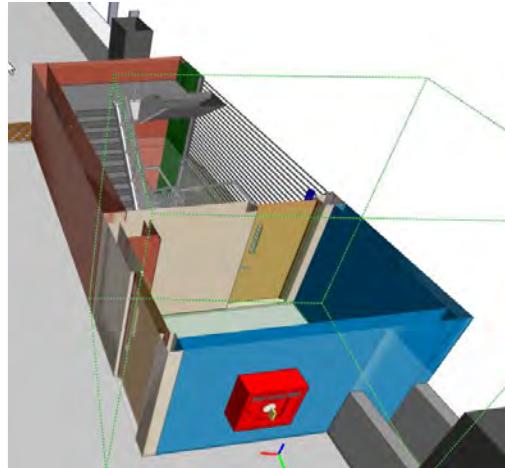
S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces				
		BCA	LTA	NEA	PUB	SCDF
						Functional Space
1	Airlock					Airlock
2	Letter Box					Letter Box
3	Dry Riser Shaft	•				Shaft – Dry Riser
4	Electrical Shaft					Shaft – Electrical
5	Gas Shaft					Shaft – Gas
6	Ventilation Shaft	•		•		Shaft – Ventilation
7	Water Shaft					Shaft – Water
8	Wet Riser Shaft					Shaft – Wet Riser
9	Lift Shaft	•				Lift Shaft
10	Non-Shelter					Non-Shelter
11	Storey Shelter	•				Storey Shelter
12	Rest Area	•				-
13	Airwell	•			•	-

Space

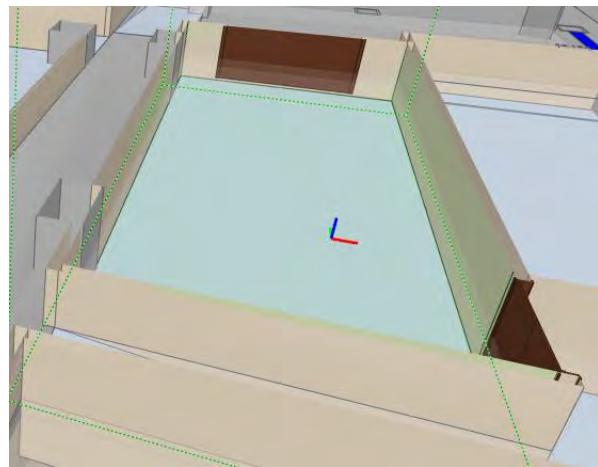
Legend:  Architecture  C&S  M&E



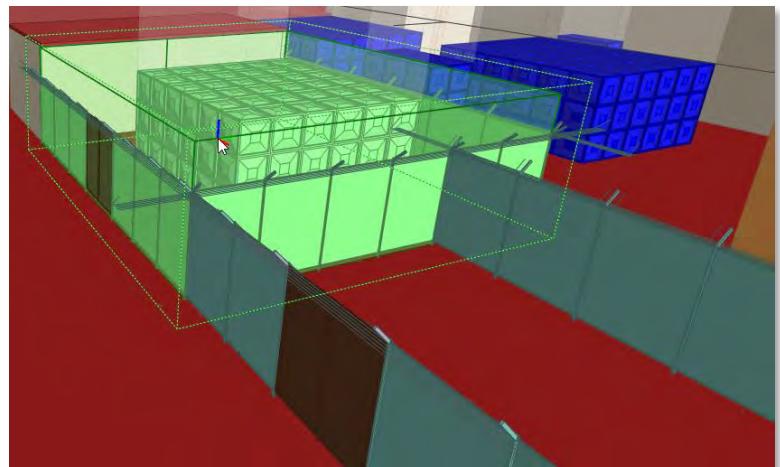
S4 – Fig 91 : Fire Exit Staircase



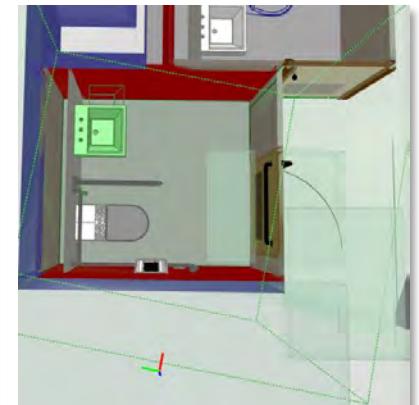
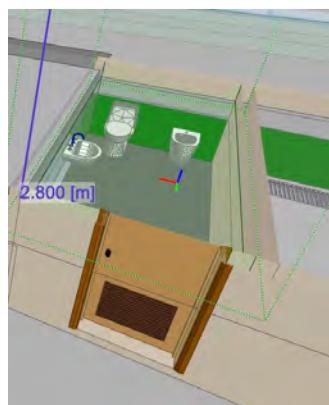
S4 – Fig 92 : Smoke Stop Lobby



S4 – Fig 93 : Bin Centre



S4 – Fig 94 : Water Pump Room



S4 – Fig 95 to 97 : Toilet

Modelling IFC-SG (Other Spaces)

► Other Space Usage IFC-SG parameters

In addition to Occupancy Type and Space Name parameters and values listed earlier, some space components may require additional parameters listed below.

IFC Entity: IfcSpace						
IFC SubType: -						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Accreditation_PAS	Boolean	-	-	Yes	TRUE / FALSE
2	Area	Area	-	m ²	-	-
3	AmbulantDisabled	Boolean	-	-	Yes	TRUE / FALSE
4	BarrierFreeAccessibility	Boolean	-	-	Yes	TRUE / FALSE
5	ChildrenFriendly	Boolean	-	-	Yes	TRUE / FALSE
6	CValue	Text	-	-	No	0.45 - 1
7	ElderlyFriendly	Boolean	-	-	Yes	TRUE / FALSE
8	EmergencyVoiceCommunicationSystem	Text	-	-	Yes	1-way EVC System, 2-way EVC System, Public Address System.
9	FireDetectionAndSuppressionSystem	Text	-	-	Yes	Automatic Fire Alarm System, Automatic Sprinkler System, Water Mist System, Video Image Fire Detector System, Kitchen Hood Fire Extinguishing System, Clean Agent Fire Extinguishing System, Automatic Foam Sprinkler System, Foam Extinguisher System
10	FireEmergencyVentilationMode	Text	-	-	Yes	Natural Ventilation, Mechanical Ventilation, Pressurisation, Cross-ventilation, Cross-ventilation with Intermediate Ventilation Opening, Vapour Extraction System (for spray painting room)
11	FireExit	Boolean	-	-	Yes	TRUE / FALSE
12	FullyCoveredWithTreesShrubs	Boolean	-	-	Yes	TRUE / FALSE
13	HearingEnhancement	Boolean	-	-	Yes	TRUE / FALSE
14	Height	Length	-	mm	-	-

Modelling IFC-SG (Space – Usage)

► Other Space Usage IFC-SG parameters (continued from previous page)

IFC Entity: IfcSpace						
IFC SubType: -						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
15	LargerAccessible	Boolean	-	-	Yes	TRUE / FALSE
16	OccupancyLoad	Real	-	-	No	-
17	OccupancyType	Text	-	-	Yes	Refer to list of Occupancy Types in Modelling IFC-SG (Space Usage) chapter
18	PurposeGroup	Text	-	-	No	I, II, III
19	RefuseOutput	Real	-	-	No	120, 200-
20	Retrofit	Boolean	-	-	Yes	TRUE / FALSE
21	SmokeControlSystem	Text	-	-	Yes	Smoke Vent, Smoke Purging System, Ductless Jet Fan System, Engineered Smoke Control System
22	SoundPowerLevel	Text	-	-	-	-
23	SoundPressureLevel	Text	-	-	-	-
24	SpaceName	Text	-	-	Yes	Refer to list of Space Names in Modelling IFC-SG (Space Usage) chapter
25	StepRampAccess	Boolean	-		Yes	TRUE / FALSE
26	TwentyFourHourMannedStation	Boolean	-		Yes	TRUE / FALSE
27	UnitNumber	Text	-	-	-	-
28	VentilationMode	Text	-	-	Yes	Natural Ventilation, Air Conditioning, Mechanical Ventilation, Mechanical Ventilation
29	VentilationType	Text	-	-	-	Cross Ventilation
30	Volume	Length	-	-	-	-

Soffit

Legend:  Architecture  C&S  M&E

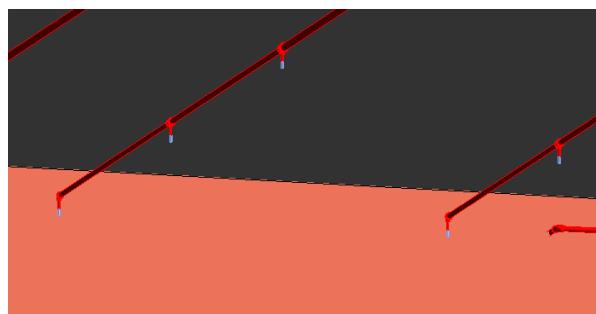
► By IFC Representation

IFC Entity: IfcCovering						
IFC SubType: SOFFIT						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	FireRating	Text	-	-	No	-

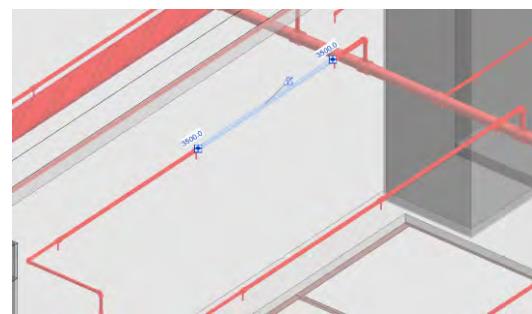
Sprinkler (Non-Fire; For NEA)

Legend:  Architecture  C&S  M&E

► By IFC Representation



S4 – Fig 98 : Exposed Sprinkler



S4 – Fig 99 : Sprinkler



S4 – Fig 100 : Sprinkler

IFC Entity: IfcSanitaryTerminal						
IFC SubType: SPRINKLER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
-	-	-	-	-	-	-

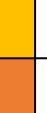
Notes

- Refer to [Space Usage \(Others\)](#) for representation of Sprinkler for Fire Protection purposes

Staircase

Legend:  Architecture  C&S  M&E

► By Key Gateways

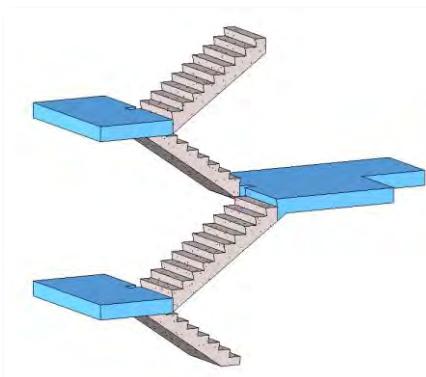
G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Access to Site	BCA	<ul style="list-style-type: none"> Passenger Alighting Point and Boarding Point Accessible Route (to the ingress / egress of the development entrance)
	Access within Building only		<ul style="list-style-type: none"> Headroom and Ceiling Height Accessible Route and Maneuvering Space (within the development)
  	Buildability	BCA	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p> Buildable Design Score (B-Score)</p> <p>a) BS01 Form (in Excel format) to be submitted</p>
	Exit	SCDF	<p>Means of Escape</p> <ul style="list-style-type: none"> Compliance of adequate means of escape are provided: <ul style="list-style-type: none"> Adequate number of exits Capacity of exits and occupant load Remoteness of exit Travel distance Smoke-free approach to exit staircase Discharge of exit staircase Ventilation of exit Staircase re-entry Compliance of special requirements for Person With Disabilities (PWDs) are provided: <ul style="list-style-type: none"> Provision of PWD holding point unless otherwise exempted Siting of PWD holding point Protection of PWD holding point
	Staircase	BCA	<ul style="list-style-type: none"> Minimum Width, Tread and Riser Nosing, Handrail / Railing
	Structural Design		<p>Structural Design (Main Structural Elements of Building)</p> <ul style="list-style-type: none"> Complete set of IFC-SG model(s) for all structural elements & details 2D drawings limited to: <ul style="list-style-type: none"> General notes Special details (e.g. slab reinforcement detailing, complex structure detailing, transfer plate detailing, irregular section detailing, precast joints, prestressed details, steel connections.)
	Structural Fire Precautions	SCDF	<p>Element of Structure</p> <ul style="list-style-type: none"> Compliance of element of structure requirements Minimum periods of fire resistance Exemption of fire resistance rating Non-load-bearing external wall Single storey buildings <p>Protected Shafts</p> <ul style="list-style-type: none"> Compliance of services running inside and/or passing through fire lift lobby and smoke-free lobby Compliance of gas pipe running inside an internal corridor / lobby

Staircase

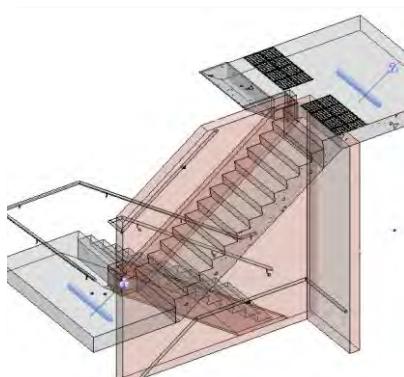
Legend:  Architecture  C&S  M&E

► By Key Gateways

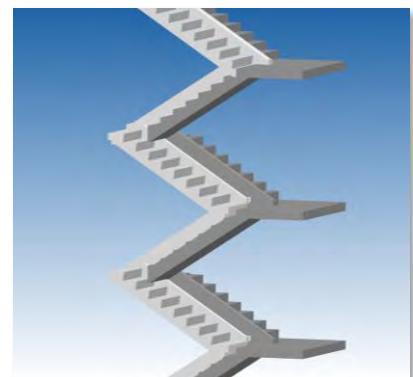
G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Structural Fire Precautions <i>(continued from previous page)</i>	SCDF	<ul style="list-style-type: none"> • Compliance of roof construction requirements: <ul style="list-style-type: none"> ◦ Surface spread of flame rating ◦ Composite panel as roofing covering ◦ Roof covering containing plastic ◦ Exemption of roof construction material • Compliance of requirements for protected shaft: <ul style="list-style-type: none"> ◦ Fire resistance rating ◦ Non-combustible ◦ Material of construction ◦ Opening in protected shaft ◦ Ventilation ◦ Fire resistance rating of doors in protected shaft • Compliance of requirements for lift shaft: <ul style="list-style-type: none"> ◦ Material of construction ◦ Exemption of enclosure in protected shaft located at edge of atrium ◦ Provision of protected lobby when lift is at basement ◦ Compliance of requirements for private lift for exclusive use of occupants in residential under PG 2 • Compliance of protected shaft containing exit staircase: <ul style="list-style-type: none"> ◦ Compartmentation of exit staircase with masonry or drywall construction ◦ Fire resistance of door opening into exit staircase ◦ Finishes within exit staircase shall be non-combustible ◦ Types of services allowed in exit staircase • Compliance of protected shaft containing other services installations: <ul style="list-style-type: none"> ◦ Electrical conduits / cable tray 	



S4 – Fig 101 : Precast Staircase



S4 – Fig 102 : Staircase



S4 – Fig 103 : Staircase

► Modelling Staircase in IFC-SG

- All the stair elements shall be modelled in IFC-SG model with the necessary information required as stipulated in the tables below.
 - The reinforcement for stair shall be indicated in IFC-SG parameters and substantiate with stair reinforcement details in 2D drawings.
- 2D detail drawings are allowed for the connection details of stairs with the indication of drawing number in the IFC-SG parameter “ReferTo2DDetail”.

Staircase

► By IFC Representation

IFC Entity: IfcStair						
IFC SubType: N.A., CURVED_RUN_STAIR, SPIRAL_STAIR, STRAIGHT_RUN_STAIR						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	MaterialGrade	Text	All staircase	-	Yes	Refer to list^
2	Mark	Text	All staircase	-	No	ST1, ST-A1
3	ReferTo2DDetail	Text	When required / relevant	-	No	Dwg number
4	ReinforcementSteelGrade	Text	RC staircase	-	No	Refer to list^
5	SectionFabricationMethod	Text	Steel staircase	-	No	Refer to list^
6	ConstructionMethod	Text	RC staircase	-	No	Refer to list^
7	MemberSection	Text	Steel staircase	-	No	RHS600x30x4, CHS500x3.0, 254x254x63kg/m
8	Thickness	Length	All staircase	mm	No*	150
9	Width	Length	All staircase	mm	No*	2200
10	BottomDistribution	Text	RC staircase	-	Yes	H25-150+H16-300
11	BottomMain	Text	RC staircase	-	Yes	H25-150+H16-300
12	TopDistribution	Text	RC staircase	-	Yes	H25-150+H16-300
13	TopMain	Text	RC staircase	-	Yes	H32-150+H20-300
14	ConnectionDetailsBottom	Text	When required / relevant	-	No	Detail 1
15	ConnectionDetailsTop	Text	When required / relevant	-	No	Detail 1
16	ConnectionTypeBottom	Text	When required / relevant	-	Yes	Refer to list^
17	ConnectionTypeTop	Text	When required / relevant	-	Yes	Refer to list^
18	FireExit	Boolean	When required / relevant	-	Yes	TRUE / FALSE
19	Accreditation_PAS	Boolean	-	-	Yes	TRUE / FALSE
20	MechanicalConnectionType	Text	-	-	No	-

* Parameter is populated from the dimensions of BIM elements modelled.

^ List can be found [here](#).

Staircase

IFC Entity: IfcStairFlight						
IFC SubType: N.A., CURVED, SPIRAL, WINDER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	NumberOfRisers	Integer	All staircase	-	No	-
2	RiserHeight	Length	All staircase	mm	No	-
3	NumberOfTreads	Integer	All staircase	-	No	-
4	TreadLength	Length	All staircase	mm	No	-
5	MaterialGrade	Text	All staircase	-	Yes	Refer to list^
6	ConstructionMethod	Text	RC staircase	-	No	Refer to list^
7	MechanicalConnectionType	Text	-	-	No	-

* Parameter is populated from the dimensions of BIM elements modelled.

^ List can be found [here](#).

► Example of Staircase (RC Staircase) Structural Element Input

150mm thick RC Precast Stair Flight	IFC Entity: IfcStair		
	IFC SubType: N.A.		
<ul style="list-style-type: none"> • Mark – SC2 • Width – 1.6m • Concrete grade C32/40 • From 1st storey to 2nd storey • Main rebar H10-200 top & bottom • Distribution bar H10-200 top & bottom • Typical precast staircase connection 	S/N	IFC-SG Property	Examples
	1	MaterialGrade	C32/40
	2	Mark	SC2
	3	ReinforcementSteelGrade	500B
	4	ConstructionMethod	PC
	5	Thickness	150
	6	Width	1600
	7	BottomDistribution	H10-200
	8	BottomMain	H10-200
	9	TopDistribution	H10-200
	10	TopMain	H10-200
	11	ConnectionDetailsBottom	Typical precast staircase connection
	12	ConnectionDetailsTop	Typical precast staircase connection
	13	ConnectionTypeBottom	Pinned
	14	ConnectionTypeTop	Pinned

System

► By Key Gateways

Legend:  Architecture  C&S  M&E

G1 Design Gateway			
Key Words	Agency	Requirement Category	
Detention System (External)	PUB	Peak Run Off	<ul style="list-style-type: none"> Key Objective: To demonstrate how this is catered for, area is set aside for detention tank provision, location, OR drain widening Calculation of peak run off factor (C value) max. 0.55 (based on code and chart) e.g. area of development of greenfield site
Public Sewerage System (External)		Sewer Connection	<ul style="list-style-type: none"> Connection Point – where the proposed location is
Sanitary (Internal)		Sewerage System	<ul style="list-style-type: none"> Alignment of Sewers, Dimensions, Gradient
		Indicative Location(s) of Drain-line and Inspection Chamber	<ul style="list-style-type: none"> Details (e.g. alignment) and Invert Level to be provided by M&E in Construction Gateway (G2)
		Used Water Flow Rate	<ul style="list-style-type: none"> Key Objective: To check that sewer can contain this flow Quantity & flow rate expected to be discharged from development, where it is to be discharged (based on no. of toilets, shower head, etc. - in relation to no. of DUs)

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Environmental Health (COPEH)	NEA	COPEH - Section 1 : Refuse Storage and Collection	<p>1.1 Objective 1.2 Refuse Output 1.3 Refuse Chute 1.4 Refuse Chute Chamber 1.5 Refuse Room</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Equipment can be modelled as placeholders and supplier details can be provided in a separate document.
		COPEH - Section 3 : Ventilation, Ducting and Kitchen Exhaust Systems for Food Shop	<p>1.6 Refuse Bin Point and Refuse Bin Centre 1.7 Pneumatic Waste Conveyance System (PWCS) 1.8 Mandatory Waste Reporting Scheme 1.9 Location of Grease Trap 1.10 On-Site Food Waste Treatment System</p> <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
		3.1 Objective 3.2 Design Requirements	<p>3.3 Operations Requirements 3.4 Other Requirements and Guidelines</p> <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.
		When to apply:	<ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Terminals and façade louvres are to be modelled. Ducting can be in 2D.

System

Legend:  Architecture  C&S  M&E

► By Key Gateways

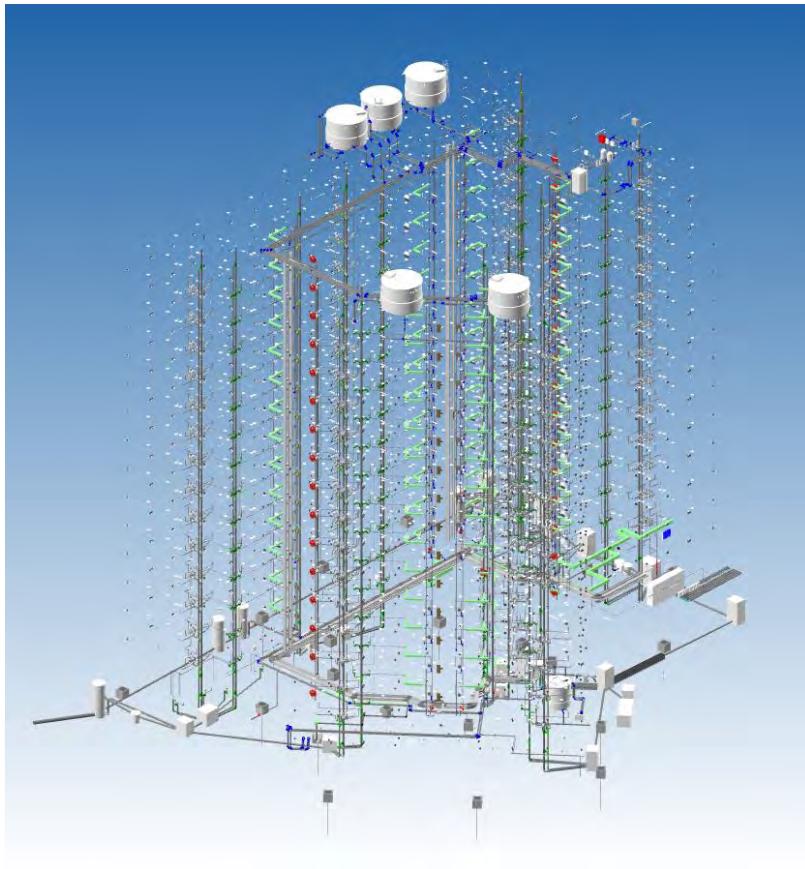
G2 Construction Gateway			
	Key Words	Agency	Requirement Category
Environmental Health (COPEH) <i>(continued from previous page)</i>	NEA		<p>COPEH - Section 4 : Cooling Tower (<i>when it is provided</i>)</p> <p>4.1 Objective 4.2 Design Requirements</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2)
			<p>COPEH - Section 6 : Storage and Collection System for Recyclables at Strata-Titled properties with Residential Units</p> <p>6.1 Objective 6.2 Recyclables Output</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2).
Infra & Utilities (Internal)	PUB		<p>Sanitary Network</p> <ul style="list-style-type: none"> Drain-lines, Inspection Chamber, Discharge Lines, etc. Sanitary Stack System <p>Basement Pumped System</p> <ul style="list-style-type: none"> May model a box as a placement holder. Details is to be drawn by Specialised PE Retention Tank RC Trench <p>Sewer Network</p> <ul style="list-style-type: none"> Minor Sewer (when applicable) <p>Drainage Network</p> <ul style="list-style-type: none"> C&S: Effective tank capacity and other hydraulic details associated with the tank M&E: For pumped detention tank, M&E to provide pump details <p>Proposed Treatment of Common Drain</p> <ul style="list-style-type: none"> Longitudinal / sectional profile Side gates

System

Legend:  Architecture  C&S  M&E

► By Key Gateways

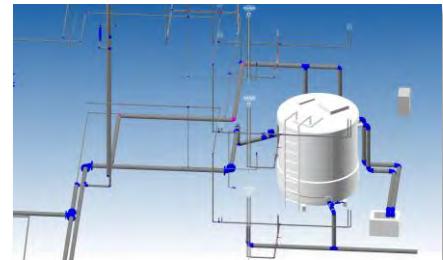
G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Firefighting System	SCDF	<p>Rising Mains and System</p> <ul style="list-style-type: none"> Type of rising main provided (Dry or Wet) Number of rising main Location and coverage of landing valve <p><u>Components to be modelled for Dry and Wet Riser:</u></p> <ul style="list-style-type: none"> Breeching inlet Landing valve <p><u>Provision of Standby Fire Hose:</u></p> <ul style="list-style-type: none"> Types of buildings requiring standby fire hose Number of standby hose Located not more than 2m from landing valve <p><u>Provision of Breeching Inlet:</u></p> <ul style="list-style-type: none"> Location Number 	



S4 – Fig 104 : Combined System(s)



S4 – Fig 105 : Sanitary System



S4 – Fig 106 : Plumbing System



S4 – Fig 107 : Electrical System

System

► By IFC Representation

IFC Entity: IfcDistributionSystem						
IFC SubType: CHILLEDWATER, DOMESTICCOLDWATER, DRAINAGE, DRYRISER, FOAMFIREEXTINGUISHING, FOAMSPRINKLER, POTABLEWATER, RAINWATER, SANITARY, SEWAGE, SPRINKLER, WETRISER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Material	Text	-	-	-	-
2	Diameter	Length	-	mm	-	-
3	Gradient	Text	-	-	-	-
4	Length	Length	-	mm	-	-
5	Height	Length	-	mm	-	-
6	TradeEffluent	Boolean	-	-	Yes	TRUE / FALSE

Notes

- The Foam Fire Extinguishing System should include Foam Inlet and Foam Outlet components.
- The Wet Riser System and Dry Riser System should include [Breeching Inlet](#) and [Landing Valve](#) components.
- The Foam Sprinkler System and Sprinkler System should include [Breeching Inlet](#) components.
- Refer to [Space Usage \(Others\)](#) for representation of rest of Fire Protection Systems

Tank

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
Key Words	Agency	Requirement Category	
Detention System (External)	PUB	<p>Peak Run Off</p> <ul style="list-style-type: none"> Key Objective: To demonstrate how this is catered for, area is set aside for detention tank provision, location, OR drain widening Calculation of peak run off factor (C value) max. 0.55 (based on code and chart) e.g. area of development of greenfield site 	

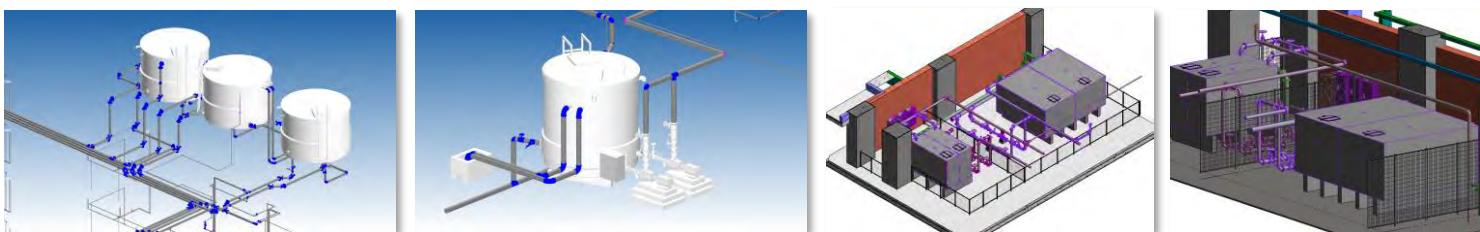
G1 Construction Gateway			
Key Words	Agency	Requirement Category	
Environmental Health (COPEH)	NEA	<p>COPEH - Section 1 : Refuse Storage and Collection</p> <p>1.1 Objective 1.2 Refuse Output 1.3 Refuse Chute 1.4 Refuse Chute Chamber 1.5 Refuse Room</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Equipment can be modelled as placeholders and supplier details can be provided in a separate document. <p>COPEH - Section 4 : Cooling Tower (<i>when it is provided</i>)</p> <p>4.1 Objective 4.2 Design Requirements</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2) <p>COPEH - Section 5 : Aquatic Facility</p> <p>5.1 Objective 5.2 Minimum Design Criteria</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). Balancing Tank is to be modelled. 	<p>1.6 Refuse Bin Point and Refuse Bin Centre 1.7 Pneumatic Waste Conveyance System (PWCS) 1.8 Mandatory Waste Reporting Scheme 1.9 Location of Grease Trap 1.10 On-Site Food Waste Treatment System</p> <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways.

Tank

Legend: Architecture C&S M&E

► By Key Gateways

G1 Construction Gateway			
Key Words	Agency	Requirement Category	
Environmental Health (COPEH) <i>(continued from previous page)</i>	NEA	<p>COPEH - Section 6 : Storage and Collection System for Recyclables at Strata-Titled properties with Residential Units</p> <p>6.1 Objective 6.2 Recyclables Output</p> <p>When to apply:</p> <ul style="list-style-type: none"> Applicants should provide the above information (either in 2D, 3D or supporting documents) and should be concluded by Construction Gateway (G2). <p>Who to submit:</p> <ul style="list-style-type: none"> QP appointed should submit the above information and keep other relevant QPs in the loop. The same QP should follow through the submissions for all gateways. 	
Infra & Utilities (Internal)	PUB	<p>Sanitary Network</p> <ul style="list-style-type: none"> Drain-lines, Inspection Chamber, Discharge Lines, etc. Sanitary Stack System <p>Basement Pumped System</p> <ul style="list-style-type: none"> May model a box as a placement holder. Details is to be drawn by Specialised PE Retention Tank RC Trench <p>Sewer Network</p> <ul style="list-style-type: none"> Minor Sewer (when applicable) <p>Drainage Network</p> <ul style="list-style-type: none"> C&S: Effective tank capacity and other hydraulic details associated with the tank M&E: For pumped detention tank, M&E to provide pump details <p>Proposed Treatment of Common Drain</p> <ul style="list-style-type: none"> Longitudinal / sectional profile Side gates 	



S4 – Fig 108 to 111 : Water Tank

Tank

► By IFC Representation

IFC Entity: IfcTank						
IFC SubType: STORAGE, DETENTIONTANK, RAINWATERHARVESTINGTANK, IRRIGATIONTANK, SPRINKLERTANK, BALANCINGTANK, SECTIONAL, REFUSEHANDLINGEQUIPMENT, VESSEL, RECHARGEWELL						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	IsPotable	Boolean	-	-	Yes	TRUE / FALSE
2	NominalCapacity	Real	-	-	-	-
3	Diameter	Length	-	mm	No	-
4	Height	Length	-	mm	No	-
5	Length	Length	-	mm	No	-
6	Thickness	Length	-	mm	No	-
7	Width	Length	-	mm	No	-
8	TradeEffluent	Boolean	-	-	Yes	TRUE / FALSE
9	CompactionRatio	Text	-	-	No	-
10	EquipmentType	Text	-	-	No	-
11	TradeEffluent	Boolean	-	-	Yes	TRUE / FALSE

► RC Tank

IFC Entity: IfcSpace						
IFC SubType: N.A.						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Area	Length	-	m ²	-	-
2	Height	Length	-	mm	-	-
3	SpaceName	Text	-	-	-	-
4	Volume	Text	-	-	-	-
5	IsPotable	Boolean	-	-	Yes	TRUE / FALSE
6	NominalCapacity	Real	-	-	-	-
7	Thickness	Length	-	mm	No	-

Type Bedding for Pipe

► By IFC Representation

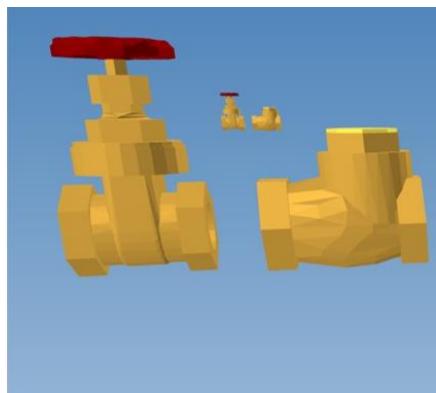
IFC Entity: IfcPipeSegment						
IFC SubType: FOUNDATION						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	BeddingType	Text	-	-	-	Type 1, Type 2, Type 3

Valve

Legend:  Architecture  C&S  M&E

► By Key Gateways

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Fire Alarm System	SCDF	Combined Sprinkler and Wet Riser System <ul style="list-style-type: none"> Types of buildings / areas requiring combined sprinkler and wet riser system Provision of sprinklers for basement and aboveground QP to declare combined sprinkler and wet riser system is provided for the functional space <u>Components to be modelled:</u> <ul style="list-style-type: none"> Location of Sprinkler Control Valve Breeching Inlet Landing Valve <u>Components to be indicated:</u> <ul style="list-style-type: none"> Fire Alarm Panel 	
		Sprinkler System <ul style="list-style-type: none"> Types of buildings / areas requiring sprinkler system Provision of sprinklers for basement and aboveground buildings Exemption of sprinkler system <u>Components to be modelled:</u> <ul style="list-style-type: none"> Location of Sprinkler Control Valve Breeching Inlet <u>Components to be indicated:</u> <ul style="list-style-type: none"> Fire Alarm Panel 	
Firefighting System		Rising Mains and System <ul style="list-style-type: none"> Type of rising main provided (Dry or Wet) Number of rising main Location and coverage of landing valve <u>Components to be modelled for Dry and Wet Riser:</u> <ul style="list-style-type: none"> Breeching inlet Landing valve <u>Provision of Standby Fire Hose:</u> <ul style="list-style-type: none"> Types of buildings requiring standby fire hose Number of standby hose Located not more than 2m from landing valve <u>Provision of Breeching Inlet:</u> <ul style="list-style-type: none"> Location Number 	



S4 – Fig 112 : Valve

Valve

► By IFC Representation

IFC Entity: IfcValve						
IFC SubType: LANDINGVALVE, SPRINKLERCONTROL, DOUBLECHECK, MIXING, AIRADMITTANCE, DRAINOFFCOCK, CHECK, ISOLATING						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Boolean	-	-	Yes	TRUE / FALSE	Boolean

Notes

- Ensure the Landing Valve is also exported as part of the [Wet Riser System and Dry Riser System](#)

Wall

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
Key Words	Agency	Requirement Category	
Earthworks / Topography	URA	Earthworks, Retaining Walls and Boundary Walls	<ul style="list-style-type: none"> Height of retaining wall(s), extent of earth-fill and impact on surroundings where relevant
		Earthworks, Platform Level	<ul style="list-style-type: none"> Minimum Platform Level / Change to site topography

G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Buildability	BCA	Buildability Design Implementation Plan (BDIP) <ul style="list-style-type: none"> BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems Where any of the above cannot be modelled in BIM, 2D plans can be submitted  Buildable Design Score (B-Score) <ul style="list-style-type: none"> a) BS01 Form (in Excel format) to be submitted 	
Earthworks / Topography	URA	Earthworks, Retaining Walls, and Boundary Walls	<ul style="list-style-type: none"> Proposed site and platform levels Earthworks Boundary wall Retaining wall
Household / Storey Shelter	BCA	Architecture <ul style="list-style-type: none"> Compliance with technical requirements on shelter position, size, setback requirements  Supporting Documents: <ul style="list-style-type: none"> a) Submit CD Shock Calculations as supplementary non-BIM documentation 	C&S <ul style="list-style-type: none"> Compliance to structural requirements stipulated in technical requirements on household shelters and storey shelters M&E <ul style="list-style-type: none"> M&E inputs required for Transit Shelter

Wall

Legend:  Architecture  C&S  M&E

► By Key Gateways

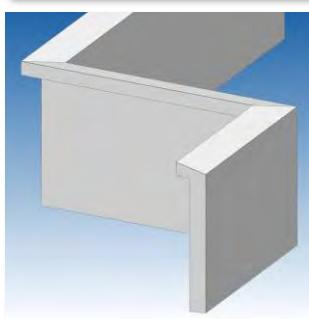
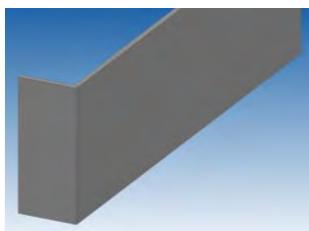
G2 Construction Gateway			
Key Words	Agency	Requirement Category	
Structural Fire Precautions	SCDF	<p>Compartmentation</p> <ul style="list-style-type: none"> Compliance of compartmentation requirements: <ul style="list-style-type: none"> Area and cubical extent to comply with Table 3.2A (for buildings not protected with sprinkler system) Maximum of 3 storeys per compartment when habitable height is not exceeding 24m Maximum of 1 storey per compartment when habitable height exceeds 24m Compliance of requirements for Atrium space Compliance of requirements for High hazard occupancy Exemption of size limitation of compartment for car park Compliance of area / room / usage requires compartmentation Location of fire damper 	
		<p>Compartmentation Walls and Compartmentation Floors</p> <ul style="list-style-type: none"> Compliance of requirements for compartment walls or compartment floors: <ul style="list-style-type: none"> Fire resistance rating Non-combustible Use of fire shutter as compartment wall Room / space allows the use of fire rated roller shutter 	
		<p>External Wall</p> <ul style="list-style-type: none"> Compliance of requirements for external walls <ul style="list-style-type: none"> Fire resistance rating Non-combustible Compliance of setback distance for unprotected opening Compliance of external wall finishes Compliance of vertical fire spread requirements 	
		<p>Element of Structure</p> <ul style="list-style-type: none"> Compliance of element of structure requirements Minimum periods of fire resistance Non-load-bearing external wall Single storey buildings Exemption of fire resistance rating 	
		<p>Protected Shafts</p> <ul style="list-style-type: none"> Compliance of services running inside and/or passing through fire lift lobby and smoke-free lobby Compliance of gas pipe running inside an internal corridor / lobby Compliance of roof construction requirements: <ul style="list-style-type: none"> Surface spread of flame rating Composite panel as roofing covering Roof covering containing plastic Exemption of roof construction material Compliance of requirements for protected shaft: <ul style="list-style-type: none"> Fire resistance rating Non-combustible Material of construction Opening in protected shaft Ventilation Fire resistance rating of doors in protected shaft Compliance of protected shaft containing exit staircase: <ul style="list-style-type: none"> Compartmentation of exit staircase with masonry or drywall construction Fire resistance of door opening into exit staircase Finishes within exit staircase shall be non-combustible Types of services allowed in exit staircase 	

Wall

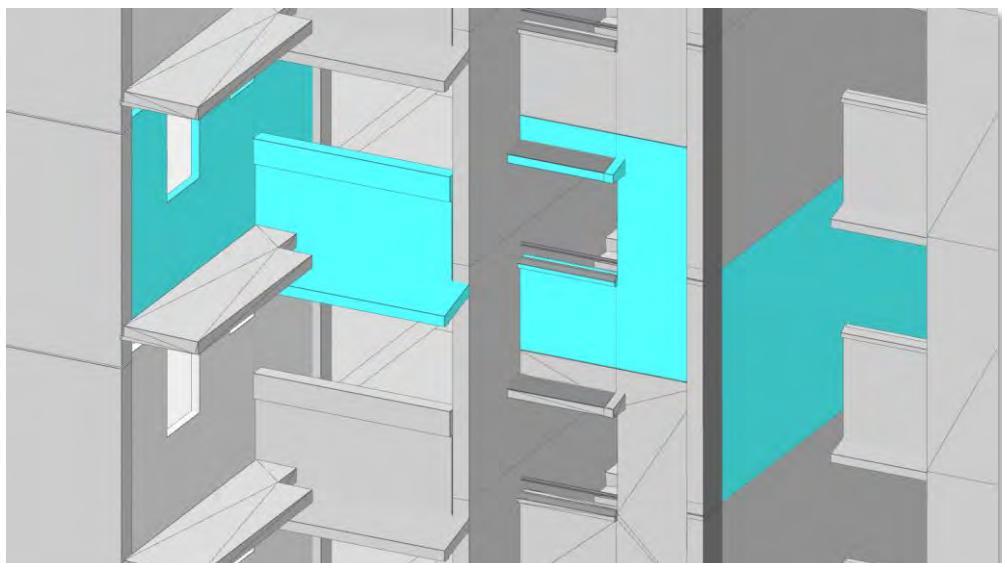
Legend: Architecture C&S M&E

► By Key Gateways

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Structural Fire Precautions <i>(continued from previous page)</i>	SCDF	<ul style="list-style-type: none"> Compliance of requirements for lift shaft: <ul style="list-style-type: none"> Material of construction Exemption of enclosure in protected shaft located at edge of atrium Provision of protected lobby when lift is at basement Compliance of requirements for private lift for exclusive use of occupants in residential under PG 2 Compliance of protected shaft containing other services installations: <ul style="list-style-type: none"> Electrical conduits / cable tray
Separating Walls			
<ul style="list-style-type: none"> Exemption of separating wall requirements for PG 1 & 2 buildings Compliance of Openings in separating wall requirements Compliance of requirements for separating walls <ul style="list-style-type: none"> Fire resistance rating Non-combustible 			
Use of other fire rated material			
<ul style="list-style-type: none"> Compliance of requirements on use of Fire rated board 			
	Structural Design	BCA	<p>Structural Design (Main Structural Elements of Building)</p> <ul style="list-style-type: none"> Complete set of IFC-SG model(s) for all structural elements & details 2D drawings limited to: <ul style="list-style-type: none"> General notes Special details (e.g. slab reinforcement detailing, complex structure detailing, transfer plate detailing, irregular section detailing, precast joints, prestressed details, steel connections.)



S4 – Fig 113 : Wall (Parapet)



S4 – Fig 114 : Various Wall Types in relation to Building

Wall

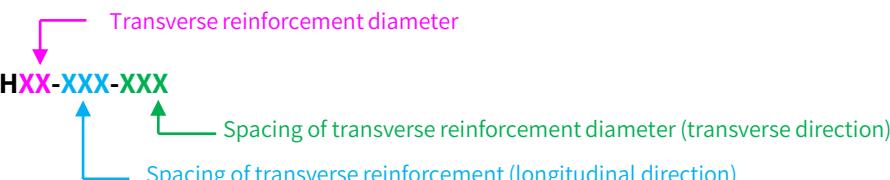
Legend:  Architecture  C&S  M&E

► Modelling Wall in IFC-SG

- All the wall elements shall be modelled in IFC-SG model with the necessary information required as stipulated in the tables below.
 - Typical wall are allowed to have same marks and design information. The marks and design information have to be embedded in every wall element.
 - Multiple wall elements shall be modelled from storey to storey for continuous wall.
 - Civil defence shelter wall will need to be indicated as “Yes” in IFC-SG parameter “ShelterUsage” and substantiate with civil defence shelter reinforcement details in 2D drawings.
- 2D detail drawings are allowed for any irregular or complex wall section (e.g. L shape wall, D wall, retaining wall, etc.) with the indication of drawing number in the IFC-SG parameter “ReferTo2DDetail”.

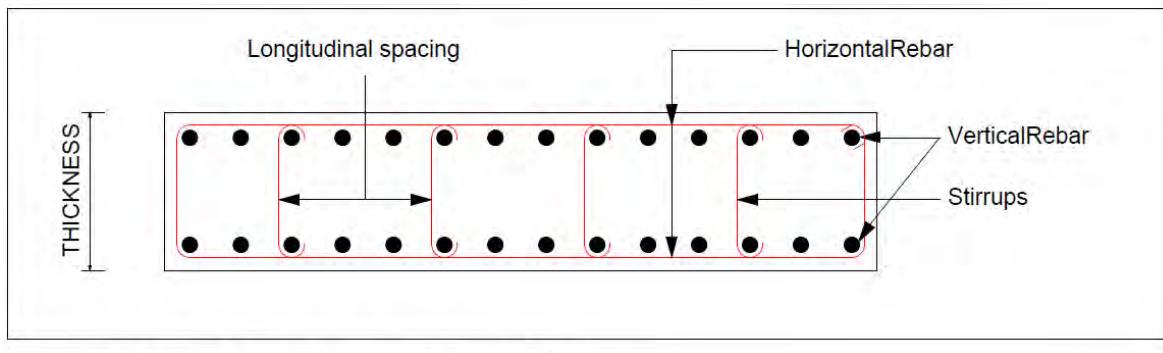
► Wall Dimension and Reinforcement Definition

Column Dimension and Reinforcement Definition

1	QP may substantiate a set of 2D wall schedule drawings to present the orientation and arrangement of wall reinforcement for illustration.
2	<p>The input for VerticalRebar & HorizontalRebar shall be "HXX-XXX" while "H" is a must, XX is the longitudinal reinforcement diameter and XXX is the spacing of longitudinal reinforcement.</p> <ul style="list-style-type: none"> • Use ‘2’ for similar reinforcement provided for 2 faces (e.g. 2H16-200) • Use ‘+’ for more than 1 layer of reinforcement 
3	<p>The input for Stirrups shall be “HXX-XXX-XXX” while “H” is a must, XX are the transverse reinforcement diameter, 1st XXX is the longitudinal spacing of transverse reinforcement and 2nd XXX is the transverse spacing of transverse reinforcement.</p> <ul style="list-style-type: none"> • Indicate the longitudinal spacing and follow with transverse spacing (e.g. H8-100-100) 

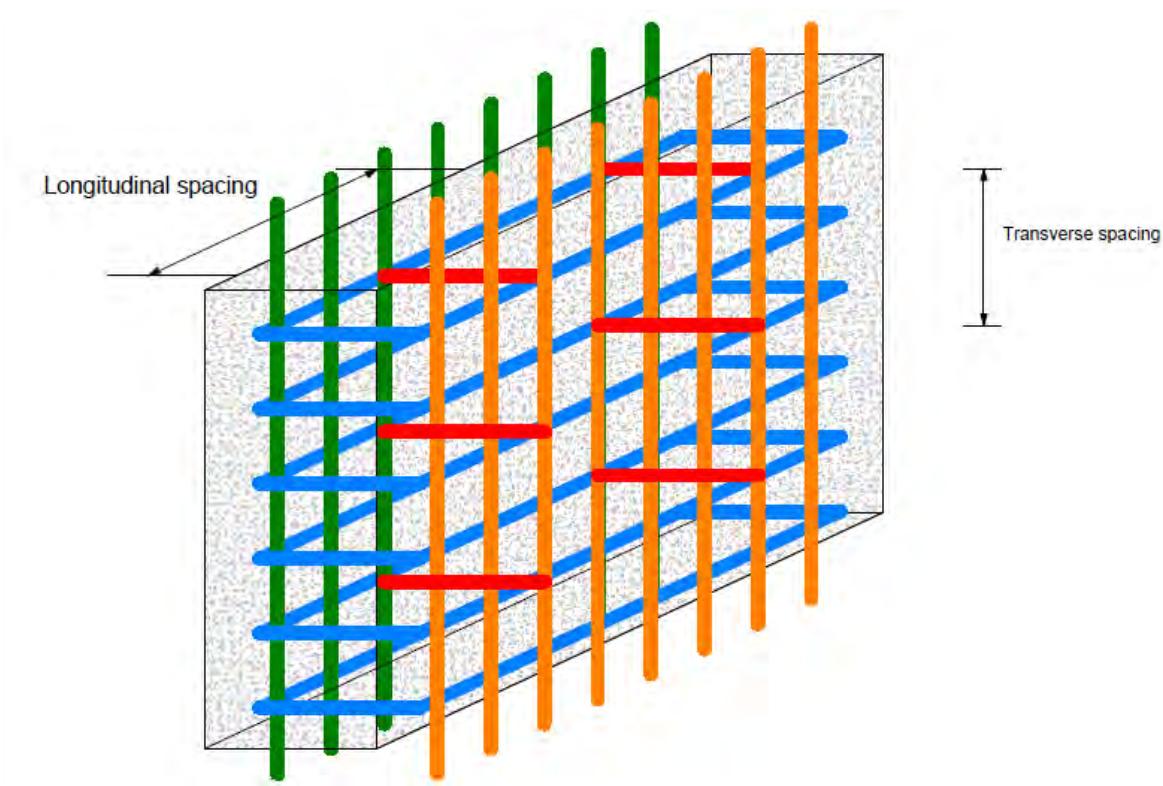
Wall

► Wall Dimension and Reinforcement Definition (continued from previous page)



WALL REINFORCEMENT ANNOTATION

S4 – Fig 115 : Wall Reinforcement Annotation

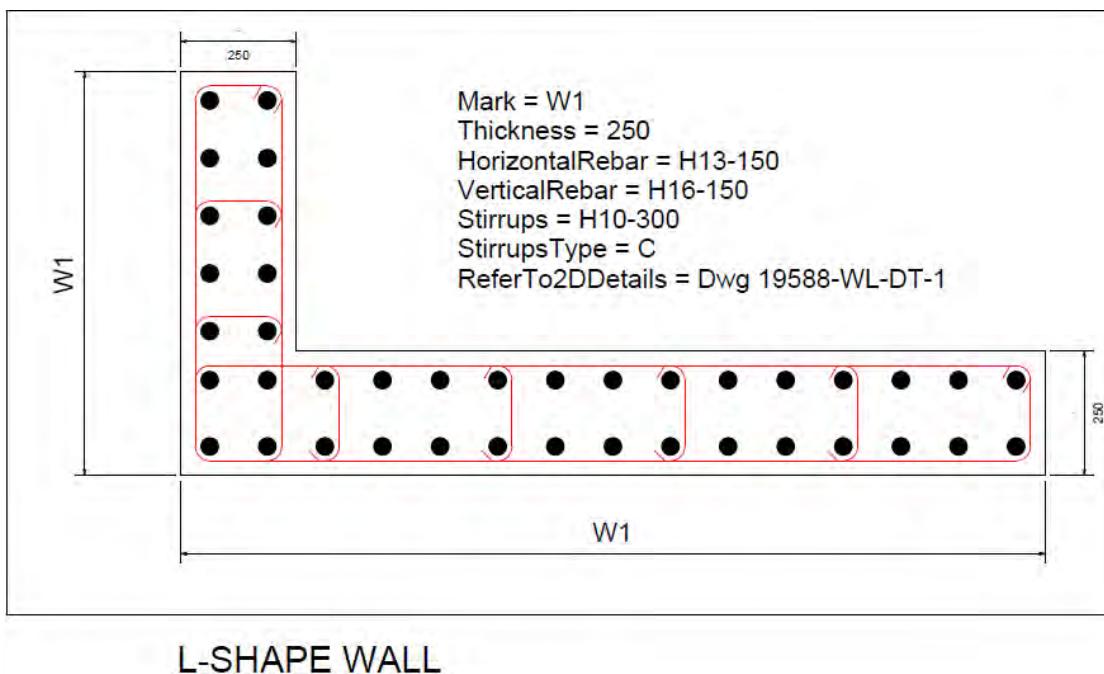


S4 – Fig 116 : Wall Reinforcement Annotation

Wall

► L-Shape Wall

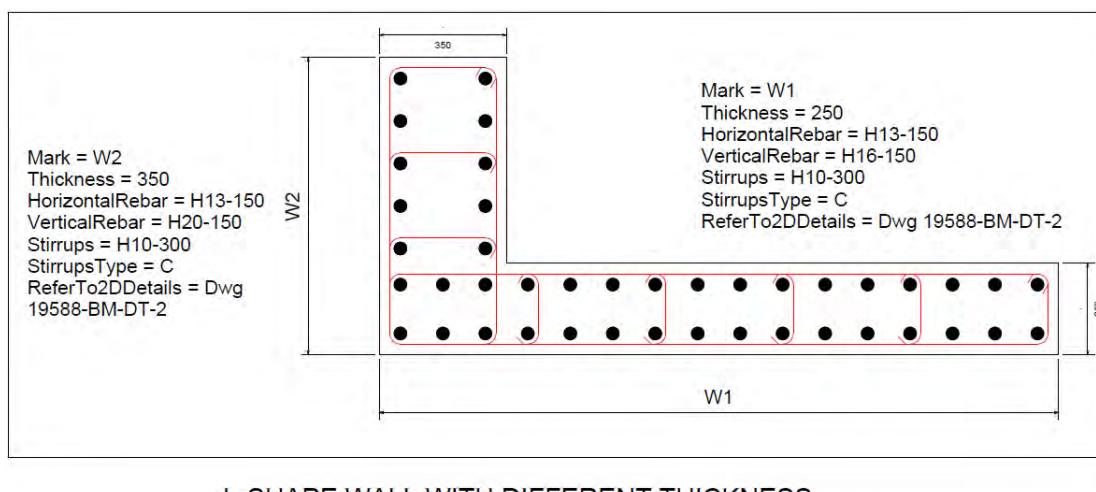
- Typical wall are allowed to have same marks and design information. The marks and design information have to be embedded in every wall element.



S4 – Fig 117 : L-Shape Wall

► L-Shape Wall with Different Thickness

- Different wall thickness should have different wall marks even the design information are the same.



S4 – Fig 118 : L-Shape Wall with Different Thickness

Wall

► By IFC Representation

IFC Entity: IfcWall						
IFC SubType: N.A., BOUNDARYWALL, PARAPET, RETAININGWALL						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	MaterialGrade	Text	All walls	-	Yes	Refer to list^
2	ConstructionMethod	Text	All walls	-	Yes	Refer to list^
3	ReferTo2DDetail	Text	When required / relevant	-	No	Dwg Number
4	ReinforcementSteelGrade	Text	All walls	-	No	Refer to list^
5	ShelterUsage	Boolean	When required / relevant	-	Yes	TRUE / FALSE
6	Mark	Text	All walls	-	No	W1, W2
7	Thickness	Length	All walls	mm	No*	300
8	HorizontalRebar	Text	All walls	-	Yes	2H20-150
9	Stirrups	Text	All walls	-	Yes	H10-150-300
10	StirrupsType	Text	Optional	-	Yes	Refer to list^
11	VerticalRebar	Text	All walls	-	Yes	H32-150+H25-150
12	WorkingLoad_DA1-1	Integer	When required / relevant	kN	No	1234
13	WorkingLoad_DA1-2	Integer	When required / relevant	kN	No	1234
14	Accreditation_PAS	Boolean	-	-	Yes	TRUE / FALSE
15	LoadBearing	Boolean	-	-	Yes	TRUE / FALSE
16	MechanicalConnectionType	Text	-	-	No	Flexible Loops
17	PrefabricatedReinforcement Cage	Boolean	-	-	Yes	TRUE / FALSE
18	IsPartyWall	Boolean	-	-	Yes	TRUE / FALSE
19	IsExternal	Boolean	-	-	Yes	TRUE / FALSE
20	BeamFacade	Boolean	-	-	Yes	TRUE / FALSE
21	DoubleBayFacade	Boolean	-	-	Yes	TRUE / FALSE
22	PrefinishedFacade	Boolean	-	-	Yes	TRUE / FALSE
23	ArrangementType	Text	-	-	Yes	Multi-Tier

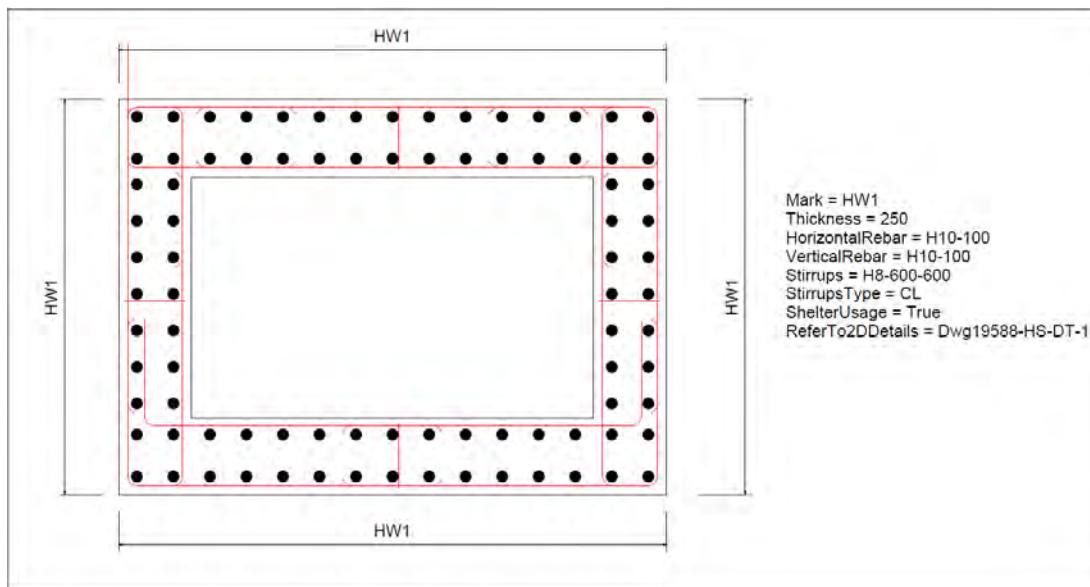
* Parameter is populated from the dimensions of BIM elements modelled.

^ List can be found [here](#).

Wall

► Household Shelter Wall

- Typical wall are allow to have same marks and design information. The marks and design information have to be embedded in every wall element.

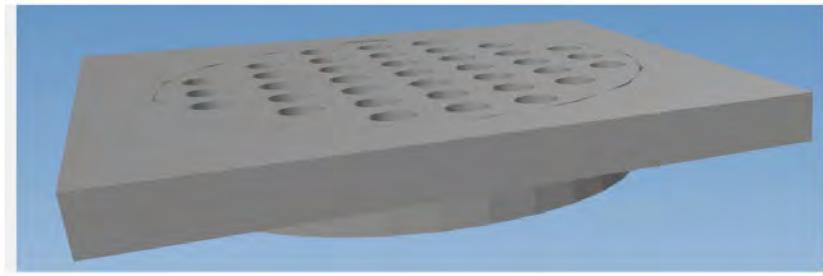


S4 – Fig 119 : Household Shelter Wall

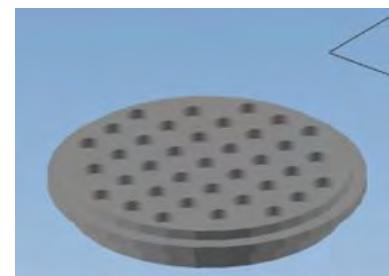
► Example of Wall (RC Household Shelter Wall) Structural Element Input

250mm thick RC Precast Household Shelter Wall	IFC Entity: IfcWall		
	IFC SubType: N.A.		
• Mark – HS1	S/N	IFC-SG Property	Examples
• Concrete grade C32/40	1	MaterialGrade	C32/40
• From 1 st storey to 2 nd storey	2	ConstructionMethod	PC
• Vertical rebar H13-100	3	ReferTo2DDetail	Dwg 19588-HS-DT-1
• Horizontal rebar H13-100	4	ReinforcementSteelGrade	500B
• Shear link H8-600	5	ShelterUsage	Yes
	6	Mark	HS1
	7	Thickness	250
	8	HorizontalRebar	H13-100
	9	Stirrups	H8-600-600
	10	StirrupsType	CL
	11	VerticalRebar	H13-100

Waste Terminal



S4 – Fig 120 : Floor Trap



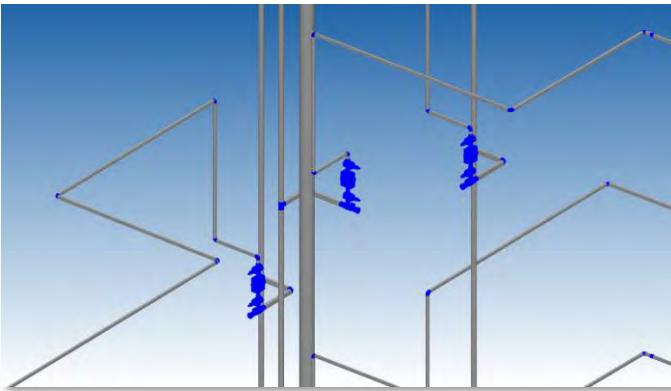
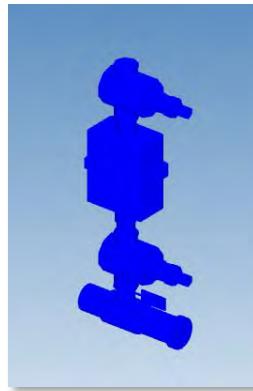
S4 – Fig 121 : Floor Trap

► By IFC Representation

IFC Entity: IfcWasteTerminal						
IFC SubType: FLOORTRAP, FLOORWASTE, GULLYSUMP, GULLYTRAP, WASTETRAP, WASTESUMP						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Material	Text	-	-	-	-
2	TradeEffluent	Boolean	-	-	Yes	TRUE / FALSE

Water Meter

Legend:  Architecture  C&S  M&E



S4 – Fig 122 to 124 : Water Meter

► By IFC Representation

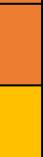
IFC Entity: IfcFlowMeter						
IFC SubType: WATERMETER						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	Capacity	Volume	-	L	No	-
2	Diameter	Length	-	mm	No	-
3	Length	Length	-	mm	No	-
4	Purpose	Text	-	-	No	Private
5	UnitNumber	Text	-	-	-	-
6	UnitNumberTag	Boolean	-	-	Yes	TRUE / FALSE
7	WaterSupplySource	Text	-	-	-	-

Window

Legend:  Architecture  C&S  M&E

► By Key Gateways

G1 Design Gateway			
	Key Words	Agency	Requirement Category
	Fire Engine Accessway / Access Road	URA	<p>Indication of Fire Engine Accessways / Access Road</p> <ul style="list-style-type: none"> • To design upfront and not added as an afterthought • Compliance of provision of fire engine accessway / access road does not affect the requisite planting areas and roadside green verges • Indication of all the fire engine access road and accessway within project boundary • Clearly indicate if public road is used as fire engine accessway / access road • Compliance of distance between fire engine accessway and fire access opening • Compliance of no obstruction between fire engine accessway and fire access opening

G2 Construction Gateway			
	Key Words	Agency	Requirement Category
	Buildability	BCA	<p>Buildability Design Implementation Plan (BDIP)</p> <ul style="list-style-type: none"> • BIM model which describes and defines the type, extent of use and details of the Design for Manufacturing (DfMA) technologies, building systems, building components, buildable features, design standardisation across the Structural, Architectural and Mechanical, Electrical and Plumbing (MEP) systems • Where any of the above cannot be modelled in BIM, 2D plans can be submitted <p> Buildable Design Score (B-Score)</p> <p>a) BS01 Form (in Excel format) to be submitted</p>
	Household / Storey Shelter	BCA	<p>Architecture</p> <ul style="list-style-type: none"> • Compliance with technical requirements on shelter position, size, setback requirements <p>C&S</p> <ul style="list-style-type: none"> • Compliance to structural requirements stipulated in technical requirements on household shelters and storey shelters <p>M&E</p> <ul style="list-style-type: none"> • M&E inputs required for Transit Shelter <p> Supporting Documents:</p> <p>a) Submit CD Shock Calculations as supplementary non-BIM documentation</p>
	Site Planning & External Firefighting Provisions	SCDF	<p>Fire Access Opening</p> <ul style="list-style-type: none"> • Compliance of provision of fire access opening • Location, signage & size • Number and position of access opening • Exemption of fire access opening for PG 1 & 2 buildings
	Ventilation	BCA	<ul style="list-style-type: none"> • Provision of Ventilation (Natural Ventilation for residential development) • Minimum 5% opening for Natural Ventilation • Maximum distance (12m) from Natural Ventilating opening • Natural Ventilation (dimension of recess / airwell) • Carpark Ventilation

Window



S4 – Fig 125 : Window



S4 – Fig 126 : Window in relation to Building

► By IFC Representation

IFC Entity: IfcWindow						
IFC SubType: BAYWINDOW, VENTILATIONSLEEVE, LOUvre, WINDOW						
S/N	IFC-SG Property	Property Type	Type of Elements	Unit	Input Limitation	Examples
1	InnerDiameter	Length	-	mm	No	N.A.
2	OuterDiameter	Length	-	mm	No	N.A.
3	FireAccessOpening	Boolean	-	N.A.	Yes	TRUE / FALSE
4	StructuralWidth	Length	-	mm	No	N.A.
5	StructuralHeight	Length	-	mm	No	N.A.
6	Material	Text	-	-	No	-
7	SafetyBarrierHeight	Real	-	-	-	-
8	OperationType	Text	-	-	-	-
9	PercentageOfOpening	Real	-	-	-	-

CORENET X Code of Practice

CORENET X FAQs and Website

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

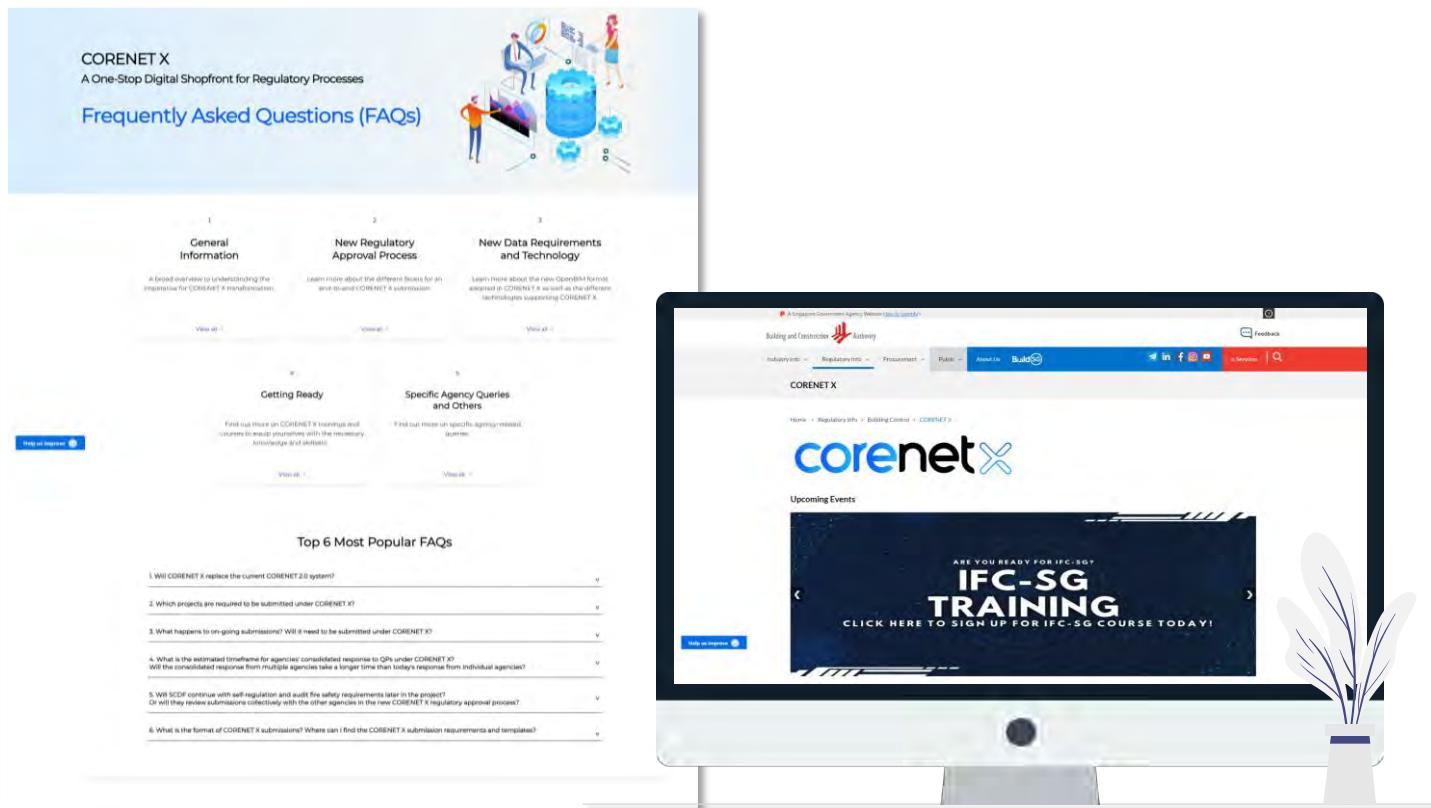
• KEY GATEWAYS •

• OTHER BUILDING WORKS •

BIM DATA REPRESENTATION

CORENET X Website and FAQs

[CORENET X website](#) was launched on 07 Sep 2021 at the [Opening Ceremony of the International Built Environment \(IBEW\) 2021](#) during Minister Desmond Lee's announcement. The website contains one-stop information on future regulatory process, FAQs, infographics and resource toolkits.



The image shows two screenshots of the CORENET X website. The left screenshot displays the 'Frequently Asked Questions (FAQs)' page, which includes sections for General Information, New Regulatory Approval Process, New Data Requirements and Technology, Getting Ready, and Specific Agency Queries and Others. The right screenshot shows a laptop screen displaying the main CORENET X website, featuring a banner for 'IFC-SG TRAINING'.



Scan here to access CORENET X
website or go to
<https://go.gov.sg/cx>



CORENET X is a multi-agency effort by



CORENET X Code of Practice

Acknowledgements

INTRODUCTION TO CX

GENERAL REQUIREMENTS

• REGULATORY AGENCIES •

• KEY GATEWAYS •

• OTHER BUILDING WORKS •

BIM DATA REPRESENTATION



Agencies

Building and Construction Authority	(BCA)
Housing Development Board	(HDB)
JTC Corporation	(JTC)
Land Transport Authority	(LTA)
National Environment Agency	(NEA)
National Parks Board	(NParks)
Public Utilities Board	(PUB)
Singapore Civil Defence Force	(SCDF)
Singapore Land Authority	(SLA)
Urban Redevelopment Authority	(URA)

Industry Partners

ADDP Architects LLP
Alpha Consulting Engineers Pte Ltd
BECA (Singapore)
DCA Architects Pte Ltd
ECAS Consultants Pte Ltd
ID Architects Pte Ltd
KCL Consultants Pte Ltd
KTP Consultants Pte Ltd
LSW Consulting Engineers Pte Ltd
PDC Consultants Pte Ltd
P&T Consultants Pte Ltd
Squire Mech Pte Ltd
United Projects Consultants Pte Ltd



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