

Key Updates to CORENET X Code of Practice



AGENDA

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What is the COP and how to use it?

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Updates on Process Reviews & Refinements made

- ST submissions for large projects
- Regulatory process for infrastructure works

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**Streamlining efforts on space
classification for regulatory purpose**



Overview of Code of Practice

What is the Code of Practice?

- First edition was **released on September 2023**
- Intended to help industry practitioners in understanding **how to prepare multi-agency regulatory submissions across the key submission gateways in CORENET X**
- Includes **recommended procedures** and **good practices** to address common BIM issues
- This Code of Practice does not substitute Handbooks, Circulars or other regulatory publications of our regulatory agencies.
- **Complements other resources on the CORENET X website**, including the IFC-SG Resource Toolkit

[NEW] The 2nd edition has just been published!



corenetx



Code of Practice
Second Edition | Published on 2024-11

How to use the Code of Practice

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

- QP's statutory obligations under CORENET X?
- What do abbreviations like RABW and IFC-SG stand for?
- Making a CORENET X Submission from project registration to Completion Gateway

Section 3: Specific Requirements

- RABW Requirements categorised by **Regulatory Agencies**
- RABW Requirements categorised by **Key Gateways**
- RABW Requirements for **other Building Works**:
 - External Works
 - Direct Submission Process
 - Conservation
 - Part-ST Submissions
 - Infrastructure Works

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?

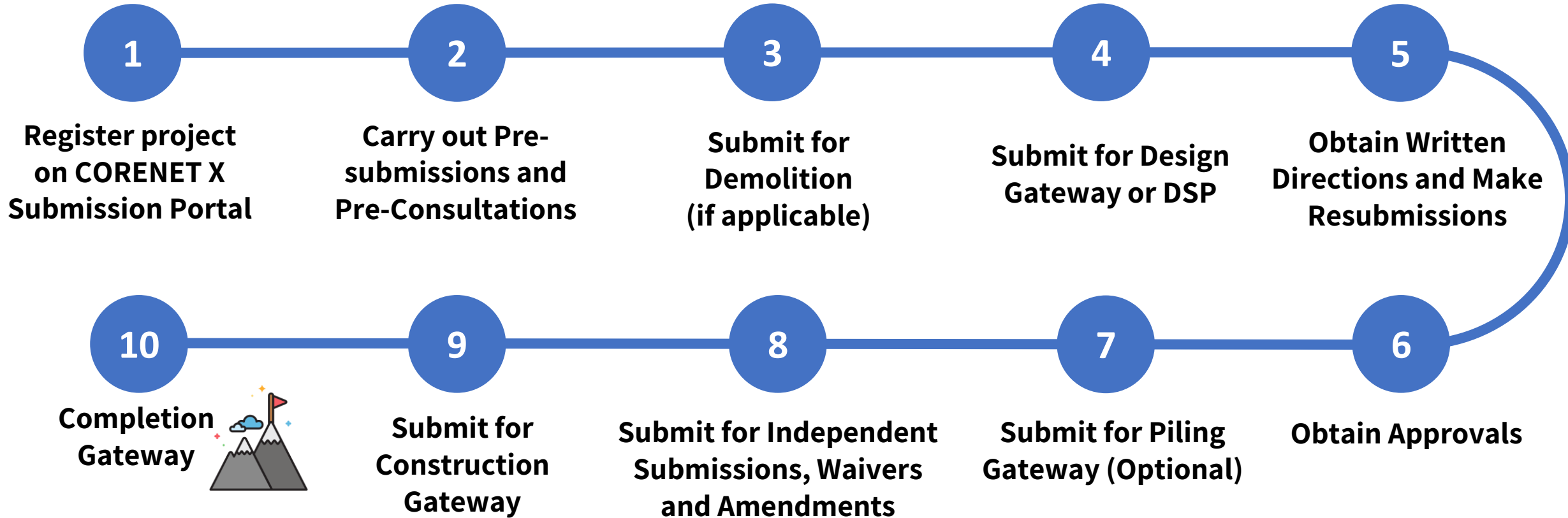


Key Updates to COP

10-Step Submission Workflow using the new RABW



To help project teams with upfront planning of timeline and coordination among different project members for CORENET X submission, COP Section 2 is updated with an example of a Project Team's Submission Workflows to exemplify submission workflows using the new RABW.



Each step includes a checklist of key items and good practices that project teams should take note of

Overview of process reviews to address industry feedback

Performance-based fire safety design submissions may delay project timeline

SCDF has reviewed its process to mitigate delay

- If the **Fire Engineering Design Brief (FEDB)** in-principal approval (IPA) cannot be obtained before CG submission, project team **can still submit CG submission** and will need to obtain the IPA before CG approval.
- If the team needs more time to prepare the **Fire Engineering Report (FER)** and is unable to furnish that during CG submission, the project team can still proceed with CG submission but must not commence the relevant fire safety works until relevant FER is cleared.

Impractical to complete the full structural details of the entire development in one go

BCA will allow **Part ST Submissions** for qualifying large projects:

- Full coordinated structural BIM carcass model at 1st CG submission
- Detailed structural submissions (incl detailed calculations, AC/ACO report, etc) can be submitted in parts – 1st part in CG and remaining parts after CG as independent submission

Concern over potential timeline delays for infra works due to RABW

Agencies have reviewed gateway requirements for infra projects:

- Guidelines on Infrastructure Works have been added to provide greater clarity on RABW process for infra projects under Sub-Section on Infrastructure Works

Overview of process reviews to address industry feedback

External work clearance may delay the main development

LTA, NParks and PUB have reviewed and aligned the process:

- In the event external works cannot be fully cleared at CG, **only interfacing details** with the main development **will be cleared at CG**
- Remaining details can be followed up & submitted separately after CG

Difficult to provide engineering assessment for rail protection at DG stage

LTA is reviewing if rail protection requirements should vary based on different site conditions:

- LTA acknowledge that depending on site condition, it may not be necessary to provide full engineering assessments upfront at Design Gateway.

Difficult to provide operational details at DG/CG without builders onboard

Agencies are reviewing the submission requirements in the COP

- **Calibrate level of details required at DG and CG** to an appropriate level, in alignment of the intent of the gateways and taking into consideration general industry practices

May not be able to complete NEA's assessments for industrial projects before DG submission

NEA is reviewing the submissions of assessments for industrial proj:

- NEA has consulted with industry practitioners on Energy Efficiency Opportunities Assessment, Pollution Control Study and Quantitative Risk Assessment and will be further reviewing the calibration of requirements for DG and CG submission.

Guidelines on Model Preparation

Guidelines on overall IFC-SG model preparation is relocated to COP Section 4 from Section 2. Project Teams should ensure:



Models are correctly geo-referenced:

- Models should be assigned real-world coordinates from the Singapore SVY21 coordinate system (EPSG: 3414) for Easting and Northing.



Levels and Zones are aligned across all disciplines' models

- Models from all disciplines **must** name levels and zones consistently - models should have **one set of level names** and **accurate “Z” values** for all levels



Exported Models can be opened using openBIM viewer (CORENET X Submission Portal offers a viewer for viewing/ checking after models are uploaded):

- A model quality check list will be provided in Section 4 for reference, alongside with modelling tips and good practices for each BIM authoring software.

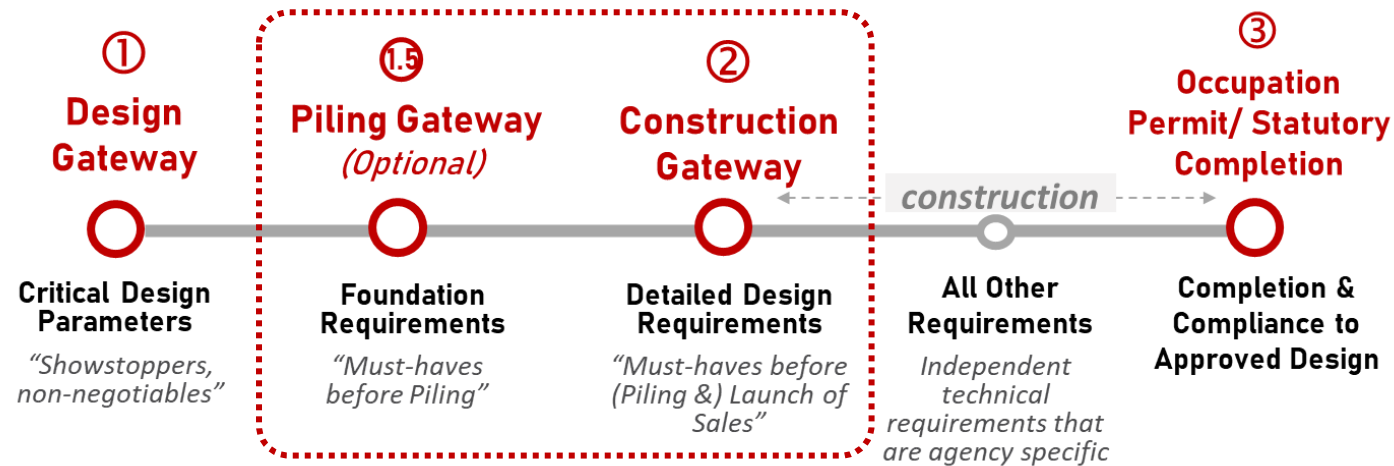
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Updates on Process Reviews & Refinements made

- ST submissions for large project
- Regulatory process for infrastructure works

Recap of 3 Gateway Process for Structural Project

Under the new Regulatory Approval for Building Works (RABW) framework:



- **At each gateway,**
 - Project teams are required to collaborate and submit a set of coordinated model
 - Requirements imposed at the gateway are major requirements that have cross agencies' dependency
- **Agency specific requirements** may be submitted as independent submissions subsequently.
Examples of independent submissions include:
 - Structural submissions for ancillary works (eg: cladding, barrier)
 - Structural submissions for temporary works (eg: ERSS)

Challenges faced for large projects



What happens with CORENET X?

Must the full structural submission (including detailed design and calculations, AC/ACO report, etc.) for the whole project be submitted in one go under CORENET X?

Current Practices

- Today, the structural design for large projects are usually submitted in multiple STs.
- This allows construction works to commence early and progressively.

Industry's Concerns

- While overall design is done upfront, detailed structural calculations, AC/ ACO reports take time.
- For huge projects, it is impractical to complete detailed structural design of the whole project in one attempt.
- Projects will face significant delays in commencement of works if detailed structural design of the whole project must be submitted and cleared before the relevant approval and permit can be issued.

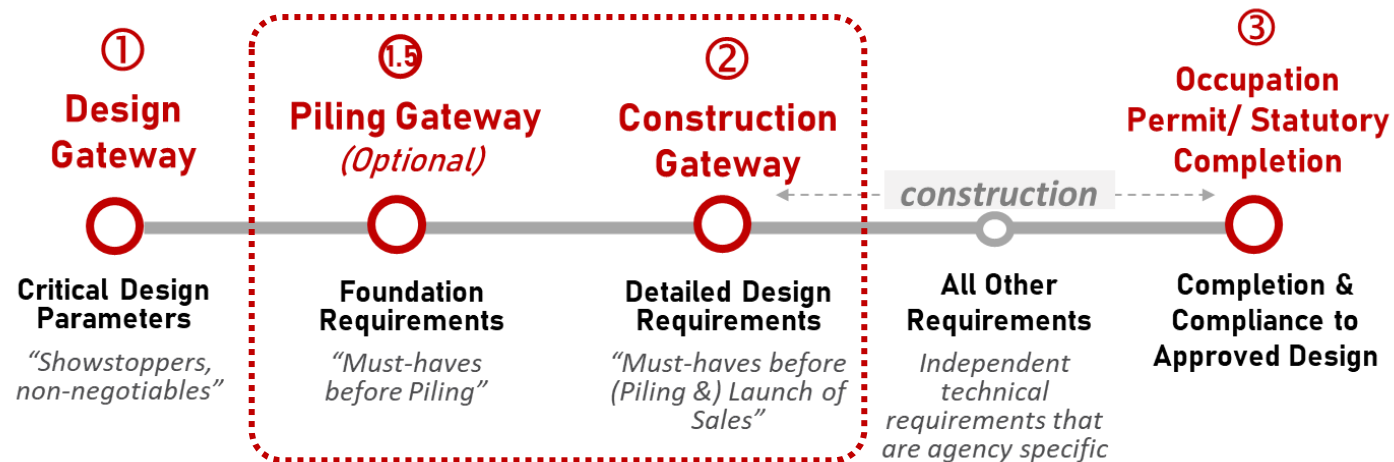
Challenges faced for large projects



What happens with CORENET X?

Must the full structural submission (including detailed design and calculations, AC/ACO report, etc.) for the whole project be submitted in one go under CORENET X?

Within 1 project, the key concern is with the submissions at **Piling Gateway (PG)** and **Construction Gateway (CG)**, where structural details and calculations need to be submitted



To address industry's concern that structural design takes time (especially if AC/ACO reports are required) and it is impractical to complete the full structural details in one go

- Detailed structural design and calculations of eligible projects **need not** be submitted in a single attempt but done through a **limited number of part ST submissions** (please see details in the next few slide)

Large projects that qualify for part ST Submissions

□ Building projects:

1. Any project with a **Gross Floor Area (GFA) > 40,000sqm** is eligible for part ST submission if –
 - a. the project consists of 5 or more blocks of building of at least 4 storeys high each; or
 - b. the project consists of 3 or more blocks of building of at least 4 storeys high each, with common podium or basement.
2. Cluster housing projects with 40 or more landed units [NEW]

□ Infrastructure projects:

1. Infrastructure works that function like a building **with length > 150m** (e.g. MRT stations, transport nodes/ interchanges);
2. Infrastructure works that are mostly engineering works **with length > 400m** (e.g. viaducts, large scale drains, sewers [NEW])
3. Infrastructure works that are mostly coastal works **with length > 4,000m** (e.g. land reclamation, revetment, sea wall, bund wall [NEW])

Illustration: Flow of Part ST Submissions (Construction Gateway)

First CG Submission (CG01) (All agencies BP, WP and C&S Part ST 01)

1. Coordinated IFC Model comprising:
 - a) Full Architectural model
 - b) Full M&E model; and
 - c) Structural model (contains full details of structures under Part ST 01; carcass only for structures in remaining Part STs)
2. Supplementary structural drawing, detailed calculations, AC/ACO report for Part ST 01



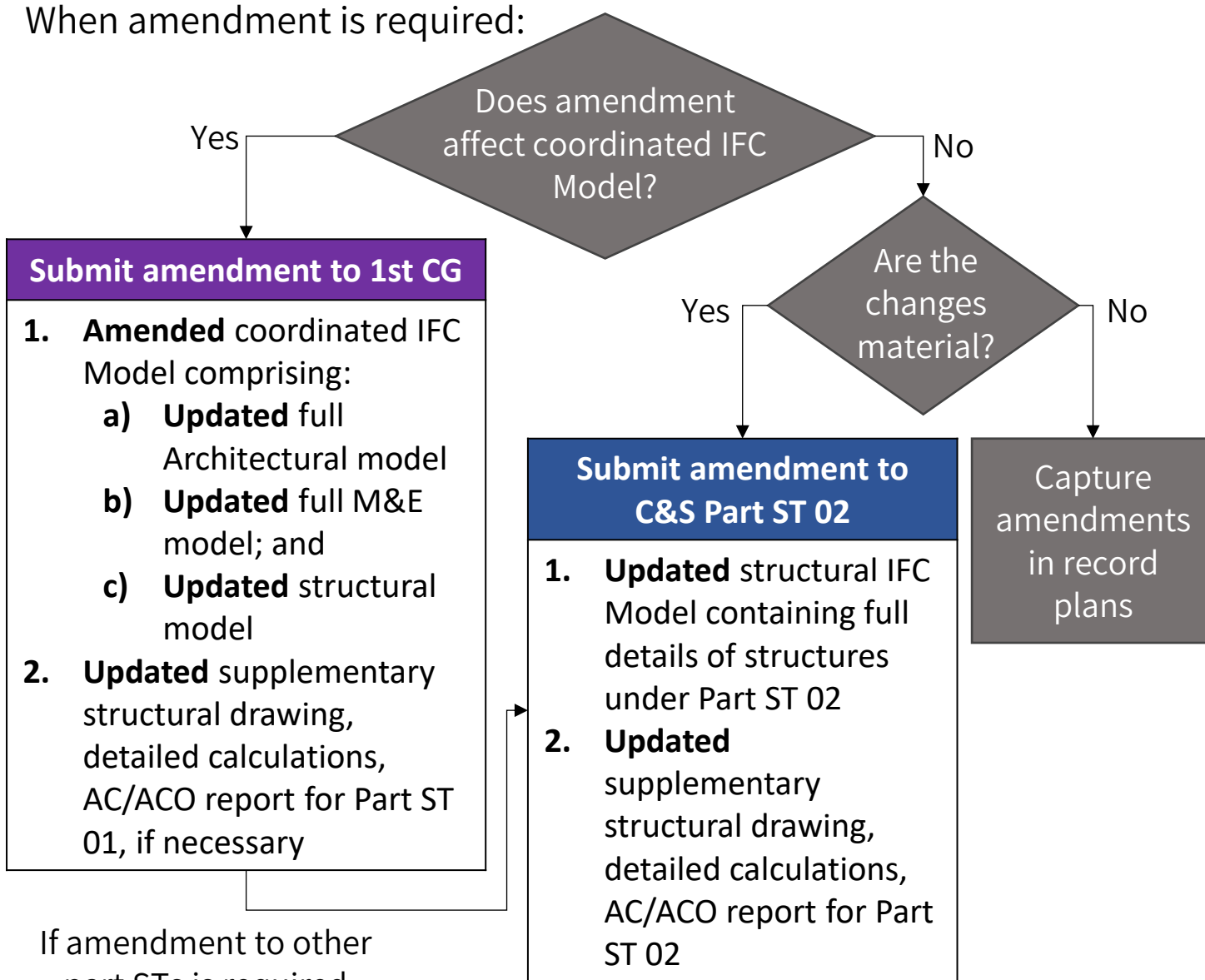
Subsequent ST submissions

C&S Part ST 02 (C&S only)

1. Structural IFC Model containing full details of structures under Part ST 02
2. Supplementary structural drawing, detailed calculations, AC/ACO report for Part ST 02

Approval for **subsequent** C&S Part ST can only be obtained after First CG is approved.

When amendment is required:



If amendment to other part STs is required

All amendments must be made to the original submission

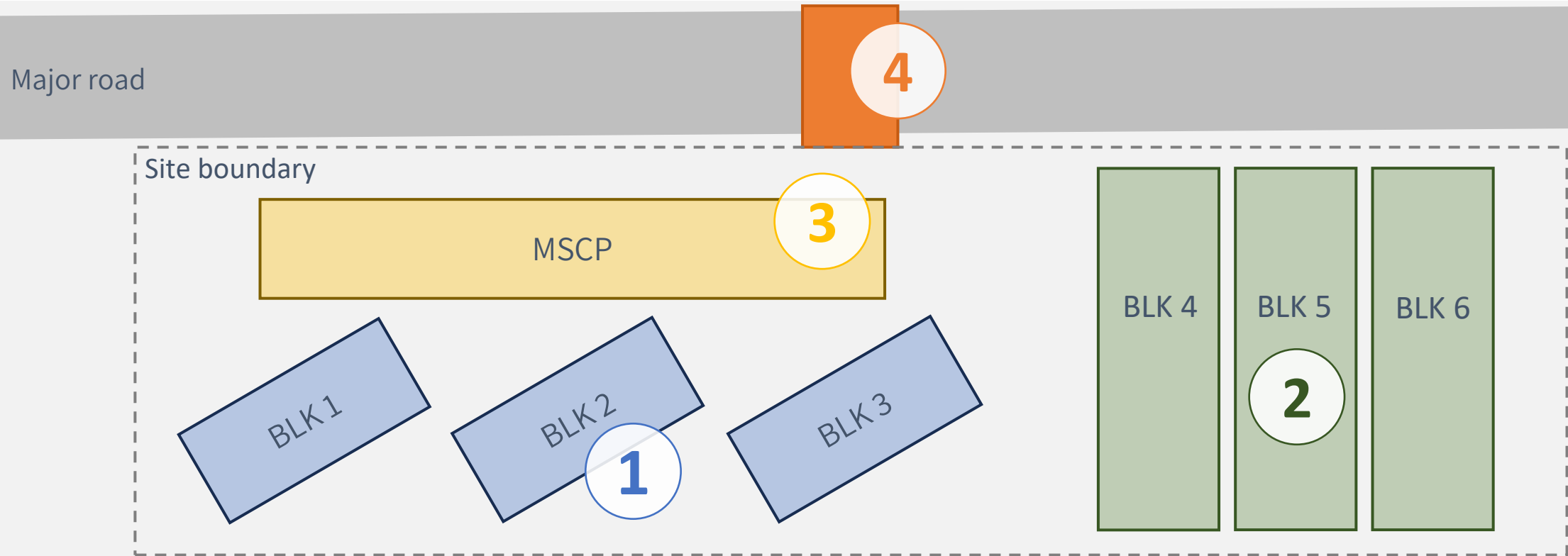
Guidelines on Part ST Submissions (Large Building Projects)

Project teams should propose the Part ST Submission plan based on below guidelines and seek agencies' concurrence during pre-submission consultations, before making any submissions.

Scope of Works	Number of Part ST Submissions Allowed
Superstructure	1 no. of Part ST Submission for every 4 blocks (rounded to nearest unit) 1 no. of Part ST submission for every 40 landed units (rounded to nearest unit) [NEW] <u>Example:</u> For a building project consisting of 9 tower blocks, 3 no. of Part ST Submissions of <u>equal GFA</u> is allowed. (i.e. if the total GFA is 105,000 sqm, each of the Part ST Submission should be about 35,000 sqm)
Common Basement	1 no. of Part ST Submission
Common Podium	1 no. of Part ST Submission
All ancillary works	1 no. of Part ST Submission
All external works	1 no. of Part ST Submission
ERSS	
Cladding	Part ST submission not applicable (submitted under Independent submissions as per <i>the current arrangement under the standard RABW (without phasing) framework</i>)
Façade	
Temporary Deck	

Guidelines on Part ST Submissions (Large Building Projects)

Example Project: 6 HDB blocks with MSCP and ancillary works



 Part ST Submission 1: Block 1 – 3

 Part ST Submission 2: Block 4 – 6

 Part ST Submission 3: Ancillary works within site boundary

 Part ST Submission 4: External works outside site boundary

Categories of Infra Projects

Infrastructure that functions like a building



UG Substation



UG MRT Station



Bus interchange

Examples include

- MRT Station (including exits)
- Transport nodes/ interchange
- Electrical substation
- UG MRT Station, UG substation

Such project functions like a building and will be subject to the 3 Gateway process, just like any other building projects

Civil Engineering Works that is external of a development

Examples include

- new/widening of roads/drain
- commuter facilities such as POB, walking/ cycling path, covered linkway, taxi/bus shelter
- drain/road improvements

Such project will follow the process for external works

Standalone structures, such as covered linkways, taxi/bus shelter are covered under Direct Submission Process

Public Infrastructure Works undertaken by public agencies



Viaducts | MRT tracks | HSR



Expressways



MRT tunnel

Examples include:

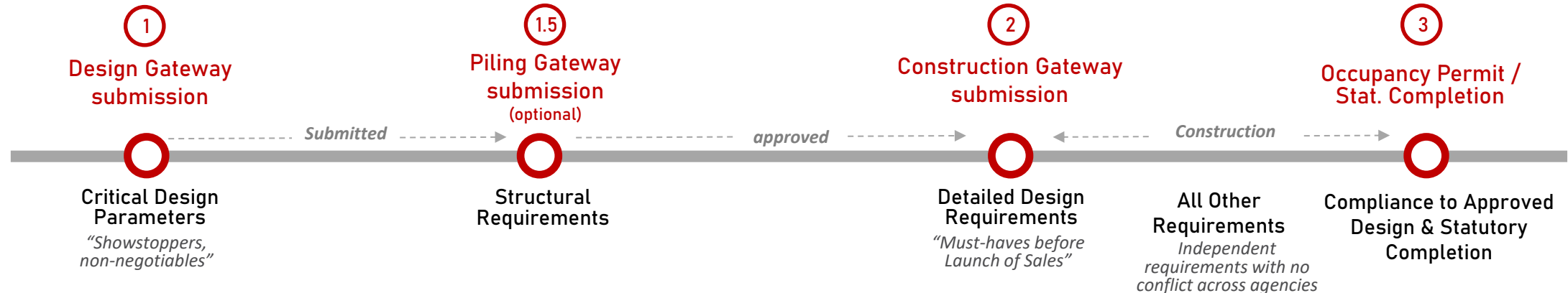
- Railway track, underground railway tunnels
- Viaducts

Such project will largely follow the 3 Gateway process, though extent of Design Gateway will differ

3 Gateway process for Infra Projects

The 3 Gateway process remains the default RABW for all infrastructure projects

- The relevancy of Design Gateway (in terms of the number of agencies involved) are dependent on the following factors:
 - The nature of the works
 - The site condition and extent of infrastructure works
 - Pre-submission consultations that might have taken place earlier
- The Design Gateway and 3 gateway submission workflow remains relevant and viable to accommodate the range of infrastructure works



3 Gateway process for Public Infra Projects

How would the 3 Gateway process look like for public infrastructure projects?

- Compared to a building project, the aspects to be cleared under each gateway vary based on the types of infra works

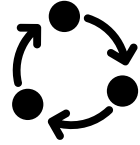
	Others (e.g.: Pre-sub process/consultation, Independent)	Design Gateway	Piling Gateway (optional)	Construction Gateway
URA	<ul style="list-style-type: none"> Must seek land use approval for the infra alignment prior to DG. For new roads & rail, proposed road/rail must keep within approved road reserve/railway area 	<ul style="list-style-type: none"> Buildings above and below ground e.g. ventilation buildings, MRT station boxes, entrances and associated structures. Proposals that deviate from the approved land use approval 	NIL	<ul style="list-style-type: none"> Buildings above and below ground e.g. ventilation buildings, MRT station boxes, entrances and associated structures. Proposals that deviate from the approved land use approval
LTA	<ul style="list-style-type: none"> Submission via LTA Prompt 	<ul style="list-style-type: none"> If within existing railway protection zone If works within road reserve/ affected by road structure safety zone 	<ul style="list-style-type: none"> If within existing railway protection zone 	<ul style="list-style-type: none"> If within existing railway protection zone If works within road reserve/ affected by road structure safety zone
NParks	<ul style="list-style-type: none"> EIA, EMMP, advanced works e.g. tree cutting/earthworks 	<ul style="list-style-type: none"> If new/affecting existing roadside trees, green verges and/or existing park/PCN/ nature area/ nature reserve/ heritage road green buffer, etc. 	NIL	<ul style="list-style-type: none"> If new/affecting existing roadside trees, green verges and/or existing park/PCN/ nature area/ nature reserve/ heritage road green buffer, etc.
PUB	<ul style="list-style-type: none"> Access to sewers (Form B) Submission via B&P Portal (POWS) 	<ul style="list-style-type: none"> If new/ affecting existing sewer works If new/ affecting existing drainage works 	NIL	<ul style="list-style-type: none"> If new/ affecting existing sewer works If new/ affecting existing drainage works
NEA	<ul style="list-style-type: none"> EIA, NIA (for projects within 70m of resi/ noise sensitive developments) 	<ul style="list-style-type: none"> If within 70m of resi/ noise sensitive developments For any environmental health/ pollution control requirements 	NIL	<ul style="list-style-type: none"> If within 70m of resi/ noise sensitive developments For any environmental health/ pollution control requirements
BCA	<ul style="list-style-type: none"> Complex structures, ERSS etc. 	NIL	<ul style="list-style-type: none"> If piling works involved 	<ul style="list-style-type: none"> For main structural works
SCDF	<ul style="list-style-type: none"> Performance-based fire engineering 	NIL	NIL	<ul style="list-style-type: none"> For underground tunnels

3 Gateway process for Public Infra Projects

Potential Scenarios

	Type of public infra works and site condition	Design Gateway	Piling Gateway (optional)	Construction Gateway	Independent
1	JTC/HDB precinct level involving new roads/drains, overhead bridge affecting green verge and trees	LTA, PUB, NParks	BCA	LTA, BCA, PUB, NParks	Agency-specific requirements e.g. NParks tree cutting
2	LTA at-grade road construction/ viaduct by LTA, affecting green verge & drains/sewers more than 1.5m deep	PUB, NParks	BCA	PUB, BCA, NParks	-
3	PUB construction of drains within railway protection zone, affecting green verge, less than 1.5m depth	NParks, LTA Rails	LTA Rails	LTA Rails, NParks	-
4	LTA aboveground railway viaduct affecting some existing drains & green verge/trees within 70m of residential development	PUB, NEA, NPARKS	BCA	PUB, BCA, NEA, NParks	Agency-specific requirements e.g. NEA noise assessment, NParks tree cutting
5	LTA cut and cover road tunnel affecting green verge requiring diversion of sewer > 1.5m deep	NParks, PUB	BCA	PUB, BCA, SCDF, NParks	-
6a	LTA underground rail bored tunnel/ common service tunnels within road reserve affecting green verge & trees	NParks	-	BCA, SCDF, NParks	Agency-specific requirements e.g. NParks tree cutting
6b	LTA underground rail bored tunnel/ common service tunnels within road reserve affecting existing sewer	PUB	-	BCA, SCDF, PUB	Agency-specific requirements e.g. performance-based FE
7	PUB DTSS affecting trees and existing sewer	PUB, NParks	-	BCA, NParks	Agency-specific requirements e.g. NParks tree cutting

Process Refinement



The process has been refined to **allow concurrent submissions and remove dependencies**, relieving time pressure for project teams:



1. **Full demolition application** (joint submission to URA and BCA) **can proceed independently** from new development submissions. Demolition fees must be paid with the demolition application.

2. After creating the initial Design Gateway draft, **drafts for any submission can be created at any time.**



3. **Piling Gateway submission may be made** while Design Gateway is still pending clearance.

4. **Construction Gateway submission may be made** while Piling Gateway submission is still pending clearance.



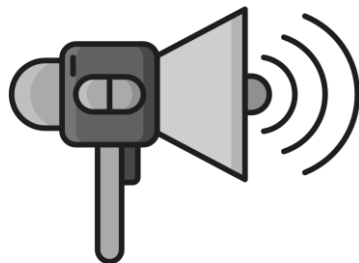
Additional Initiatives to Support Industry

Addressing concern that projects may be delayed because the industry is unfamiliar with the new requirements

- A temporary 6-month extension will be granted to qualifying projects submitted fully on CORENET X during the transition phase between 18 Dec 2023 - 31 Dec 2025 to:
 - Additional Buyer's Stamp Duty (ABSD) remission timeline
 - Project Completion Period (PCP) timeline

Addressing impact of CORENET X on payment milestones for consultancy services

- Payment milestones under Annex C of the Standard Consultancy Agreement for public sector consultancy services have been reviewed to align with the new submission gateways under CORENET X
- The TACs agreed to take reference from public sector and make the necessary adjustment for private projects



Find out the latest updates on refinements to the CORENET X process here:





Streamlining Efforts on Space Classification for Regulatory Purposes

Challenges with Space Classification under previous Approval Process



Inconsistencies in inter-agencies' space requirements

One agency's regulatory requirement is distinguished by "purpose group", while another by "building type" or "category of premises"



No standardisation in naming

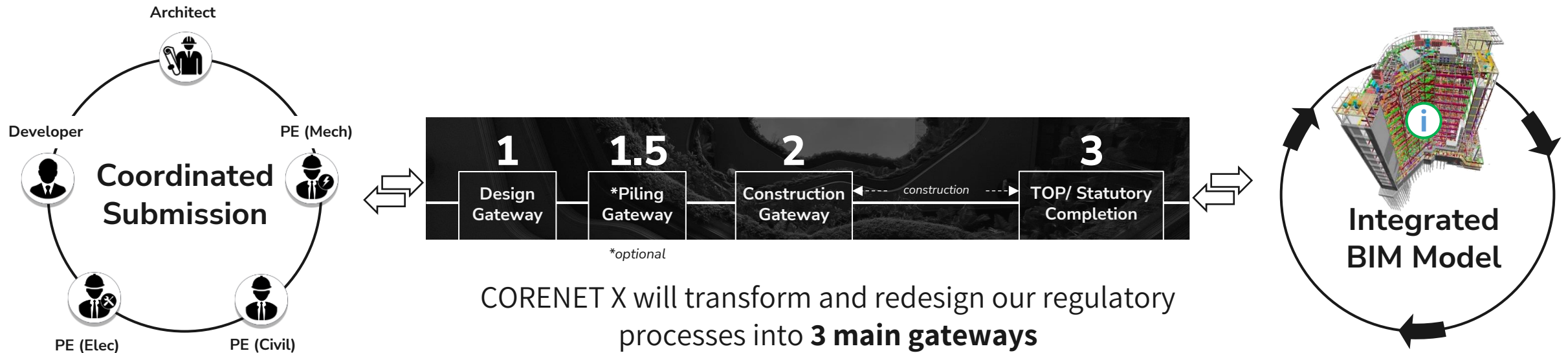
Many ways to name the same space, sometimes even using acronyms, which can cause confusion to processing officers and time will be wasted to seek clarity from the project team



Misunderstandings due to lack of explanation

Project teams may follow their own interpretation of the codes and be only informed later that the understanding is different from that of the processing officer

New approach to Space Classification under new RABW



CORENET X will transform and redesign our regulatory processes into **3 main gateways**

To align with the intent of upfront coordinated submission, we have published in the COP a streamlined set of requirements that facilitates collaboration among the project team and the submission of **one set of floor plans*** for regulatory clearance by all agencies.

*The space classification is meant to provide a standardised presentation of the uses within the floor plan. Besides space classification, project team also needs to provide area scheme for purpose of area computation. See details in the COP. We welcome feedback to help us refine these initiatives.

New approach to Space Classification under new RABW

Only **1 room plan and 2 properties** **required** to determine space usage and typology for all agencies' requirements

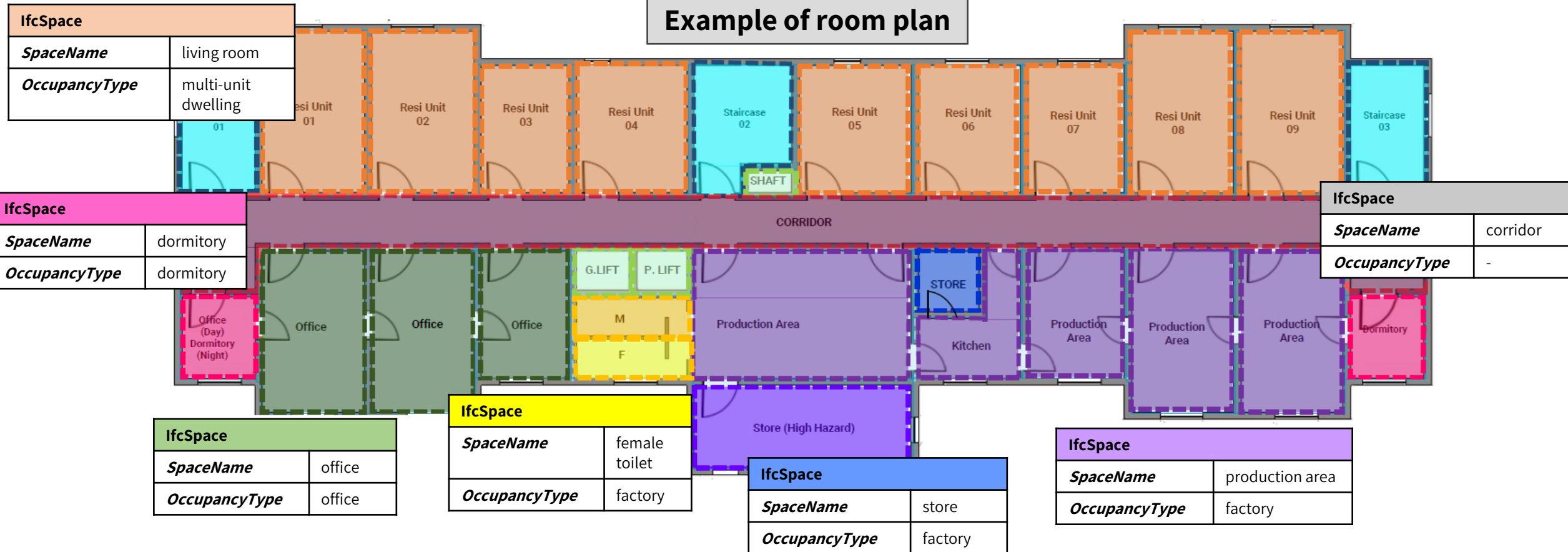


Harmonise agencies' space requirements

Less modelling effort

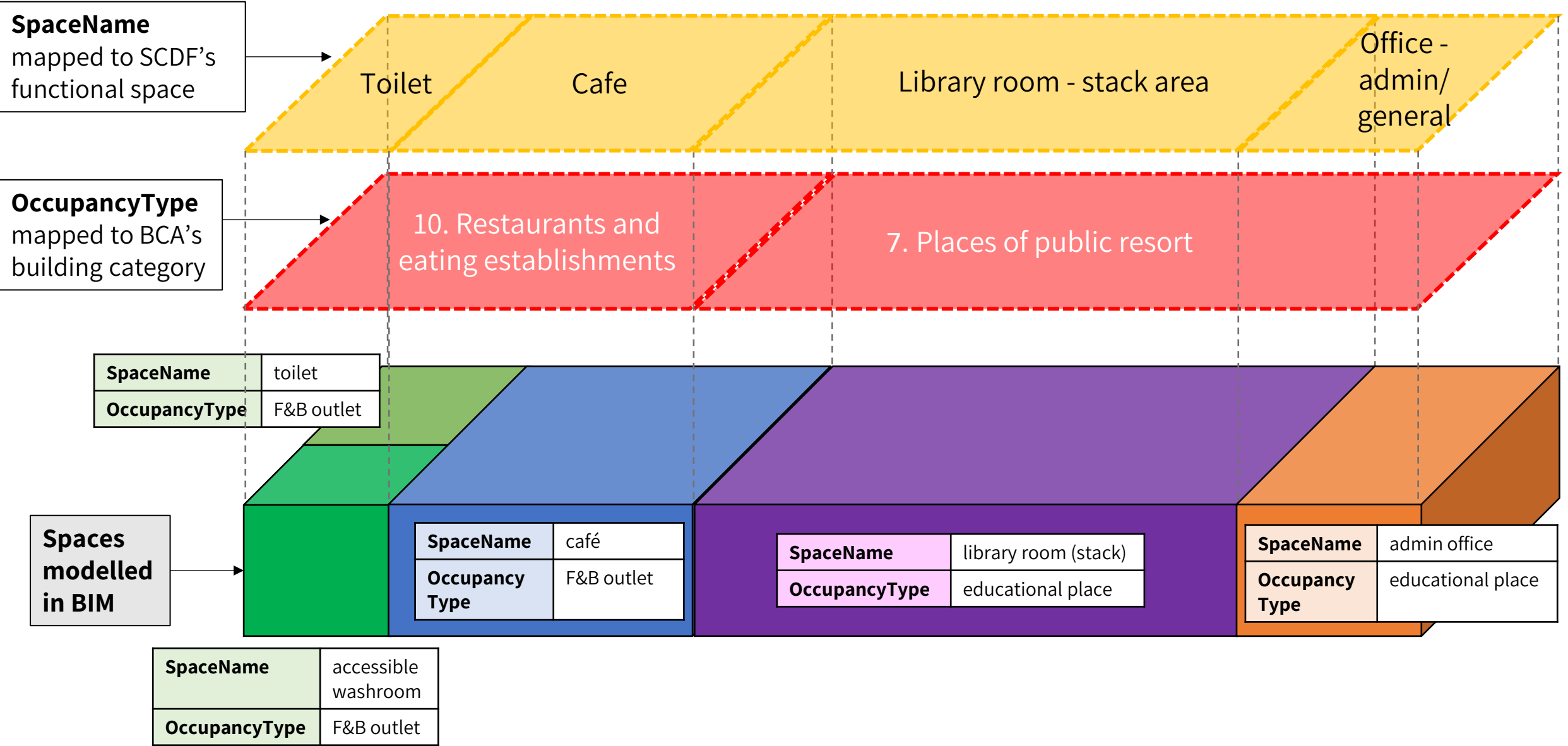
Set of standardized values brings greater clarity to industry

Example of room plan



New approach to Space Classification under new RABW

Example Plan: Library with Cafe



Space Representation in Code of Practice

Standardised list of Space Names and Occupancy Types are provided in Section 4: IFC-SG and Modelling Good Practices, “Usage” sub-section

Property value to be provided in IFC model under “OccupancyType” property

Examples of space that this Occupancy Type is applicable to

How the property value maps to each agency’s space’s categories, for clarity

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

Values to be provided in IFC model under “SpaceName” property

How this space relates to SCDF’s Functional Spaces and corresponding occupancy load factor

S/N	Property Values to input for the IFC-SG Property “SpaceName”	Agencies with Applicable Spaces				SCDF	
		BCA	LTA	NEA	PUB	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

THANK YOU!

If you have any feedback, suggestions and queries on CORENET X, please feel free to write to us at <https://go.gov.sg/cxenquiry>



More details on CORENET X can be found at <https://go.gov.sg/cx>

