Innovation Construction CIC: B2B Event on MiC

Presented by
Dragages Hong Kong Limited / Dragages Singapore Pte. Limited

06 November 2018

BOUYGUES CONSTRUCTION

Dragages Singapore
A member of Bouygues Construction group

香港寶嘉 Dragages HongKong
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Dragages Hong Kong
Introduction
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CONSTRUCTION

ABIGAIL TAM

Business Development Manager /

Senior Design Manager

Dragages Hong Kong Limited

FELIX HARTANTO

Business Development Manager

Dragages Singapore Pte. Limited

innovative construction in our DNA

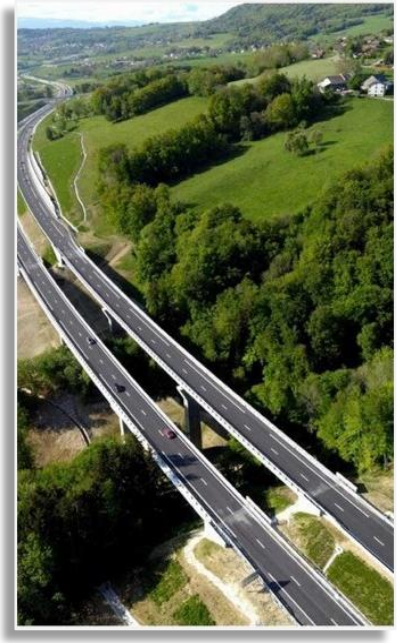
Founded in 1952 by Francis Bouygues, Bouygues Construction specialized in innovative precast construction in the post war period providing much needed housing in the Paris region which was much faster than conventional construction.

BOUYGUES CONSTRUCTION

A global player in construction and services

BUILDING

Housing, schools & universities, hospitals, hotels, office buildings, stadiums, airports, exhibition centers, leisure amenities, etc.



CIVIL WORKS

Roads & highways, transport infrastructures, etc.

ENERGY & SERVICES

Energy networks, street lighting, digital networks, electrical, mechanical & HVAC engineering, facilities management, etc.

CONCESSIONS

Management & operation of transport infrastructures, sports & leisure amenities, port areas, etc.


26 COUNTRIES

DRAGAGES HONG KONG

Innovative construction solutions
in Hong Kong since 1955

Global Construction
Network since 1986

Pioneer in construction
techniques & technologies

Full Service Provider

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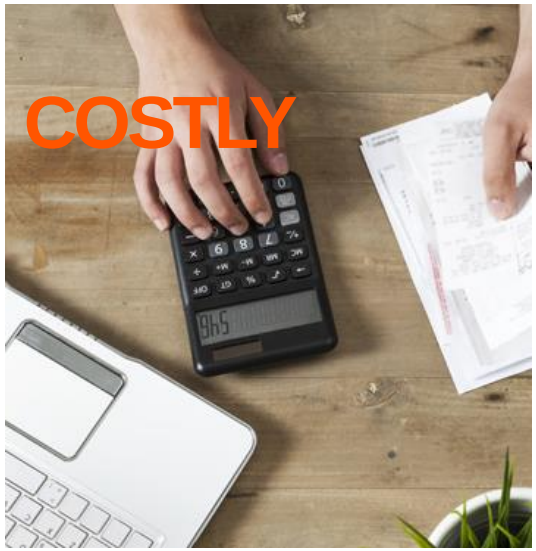
WHY MiC?



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PPVC System
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DRAGAGES SINGAPORE

World Class Expertise

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1000+ employees

5 Platinum Greenmark Lables

9 Gold and Gold Plus Greenmark Labels

35+ projects in Singapore

125 Awards

Triple Certification
ISO 9001, ISO 14001, OHSAS 18001

Highest Conquas quality score achieved in Singapore

PPVC
BIP License and Certificate for Manufacturer Accreditation Scheme

bizSAFE Partner & Star

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What is PPVC?

"Prefabricated Prefinished Volumetric Construction"

- means a construction method whereby free-standing volumetric modules (complete with finishes for walls, floors and ceilings) are constructed and assembled in an accredited fabrication facility, in accordance with any accredited fabrication method, and then installed in a building under building works.

PRECAST

FIT OUT

PREFINISHED

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Type of PPVC System

Steel PPVC

Hybrid PPVC

Concrete PPVC

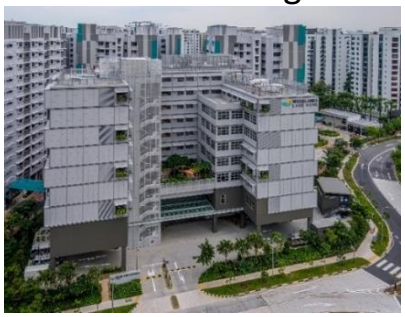
Dragages Singapore PPVC Experience

Crowne Plaza Hotel Extension

Steel PPVC System

10 storey hotel, 252 PPVC modules

Woodlands Nursing Home



Hybrid PPVC System

9 storey nursing home,
343 PPVC modules

Clement Canopy

Concrete PPVC System

40 storey residential (505 units),
1866 PPVC modules

Park Colonial, Woodleigh

Concrete PPVC System

6 blocks, 14-15-16 storey apartments
(837 units),
2514 PPVC modules

Garden Residences, Serangoon

Concrete PPVC System

5 blocks, 15 storey apartments
(613 units),
2012 PPVC modules

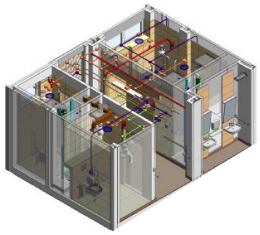
Perumal Road

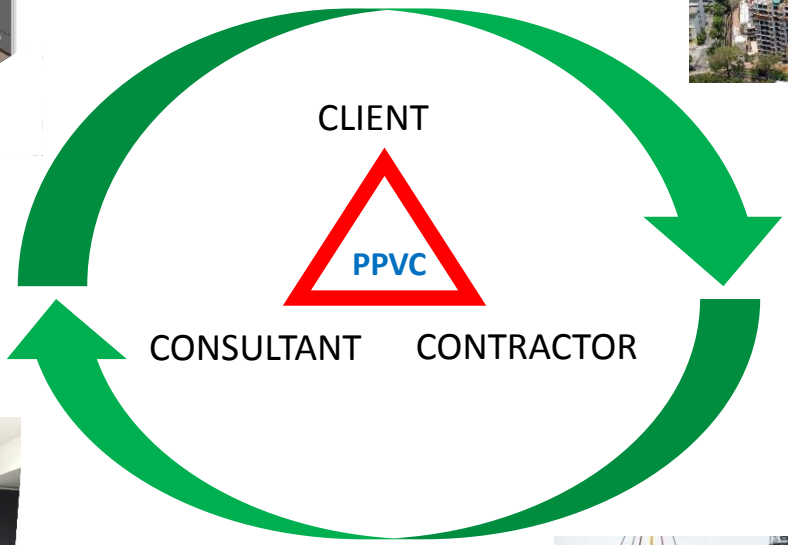
Concrete PPVC System

1 tower 23 storey residential (116 units)
1 tower 18 storey service apartment (240 units)
680 PPVC modules

PPVC Concept

- The need of 3C Teamwork
- Upfront Design Development
- Factory Production Line and Construction
- Multi Coordination between the Factory and Project Site
- "Lego style" Installation Process
- Clean Construction Site
- High Quality Product
- Shorter Construction Period and High Productivity





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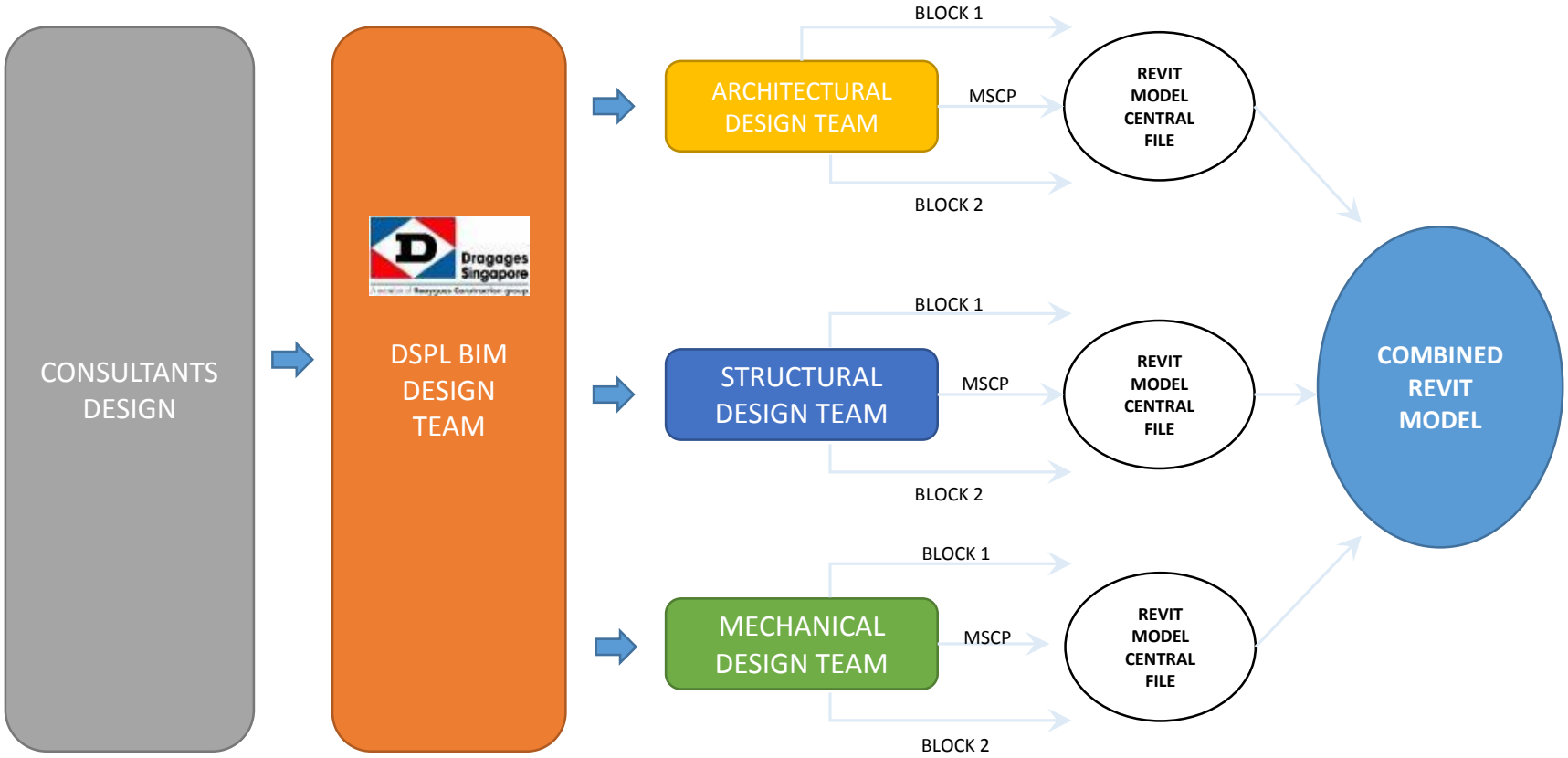
Level of off-site finishes requirements

Since 2001, BCA had implemented the buildability legislation for all building projects to raise productivity in the built environment sector.
Code of Practice (COP) sets out the requirements of minimum Buildable Design Score, minimum Constructability Score as well as the requirements for the specific productive technologies such as PPVC.

Element	Minimum level of completion off-site
Floor Finishes	80%
Wall Finishes	100%
Painting	100% base coat, only final coat is allowed on-site
Windows frame & Glazing	100%
Doors	100%, only door leaves allowed for on-site installation
Wardrobe and Cabinets	100%, only wardrobe and cabinet doors allowed for on-site installation
M&E including water & sanitary pipes, electrical conduits & ducting	100%, only equipment and fixtures to allowed for on-site installation
Electrical sockets and light switches	100%, only light fittings allowed for on-site installation

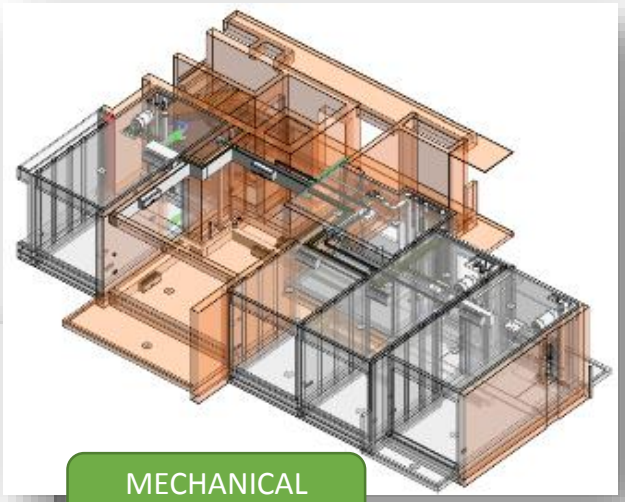
PPVC Design Development

BIM used in the Design to facilitate precast and prefabrication coordination



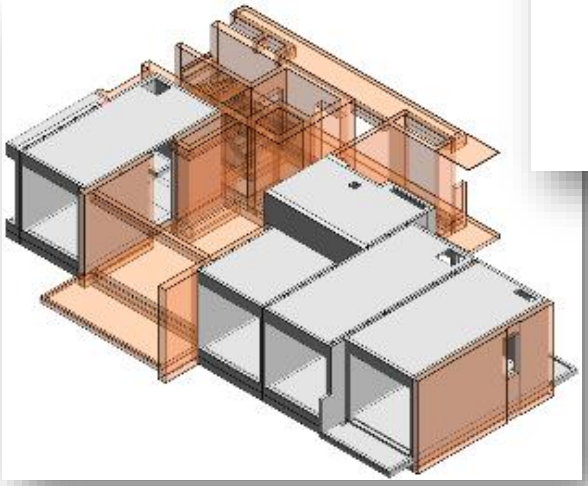
PPVC Design Development

Design Teamwork
3 Disciplines to develop PPVC collaboratively

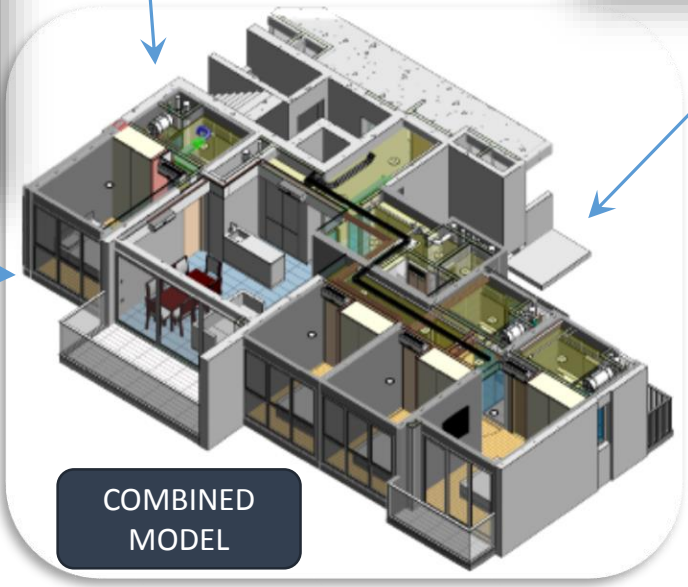


MECHANICAL SERVICES

ARCHITECTURAL FINISHES



STRUCTURAL MODEL



COMBINED MODEL

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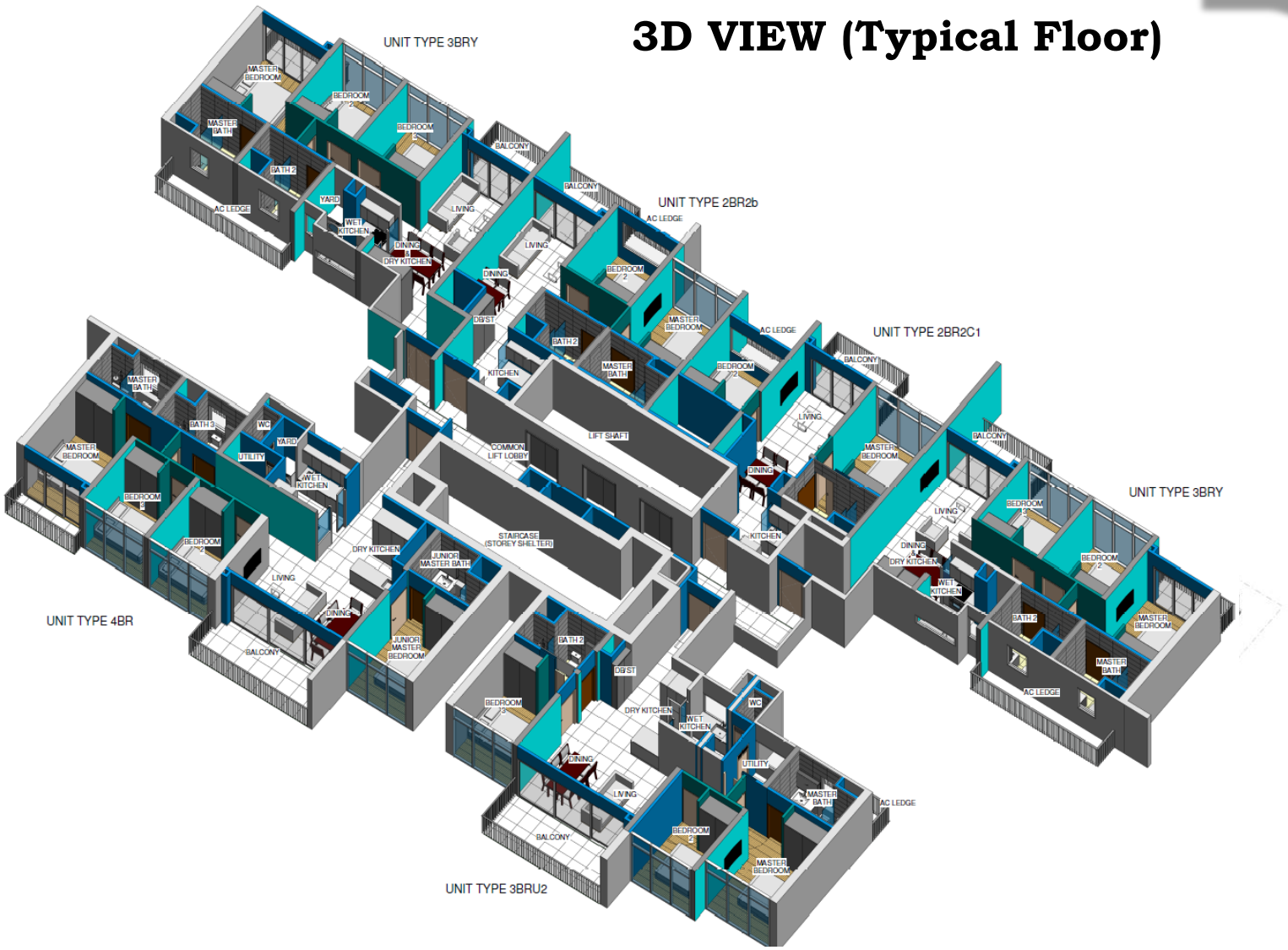
PPVC Design Development

3D VIEW (Typical Floor)



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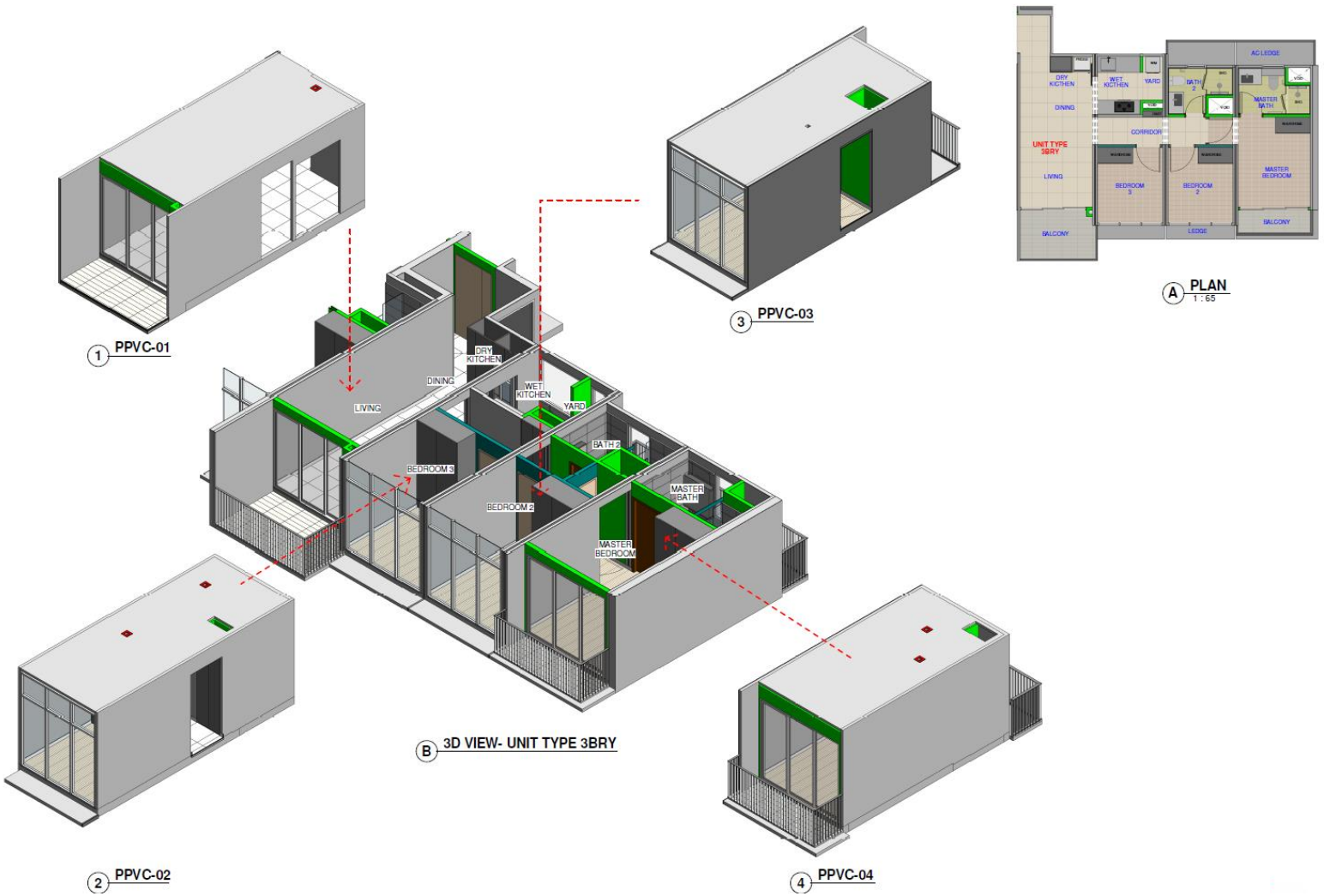
MODULAR DESIGN FOR APARTMENT UNIT



Characteristics of the proposed system

6 Sided RC PPVC Module

Wall
Comprises of RC walls located on the two long sides of the modules.

Floor Slab
Comprises of RC floor slab spanning across the shorter span of modules on beams.

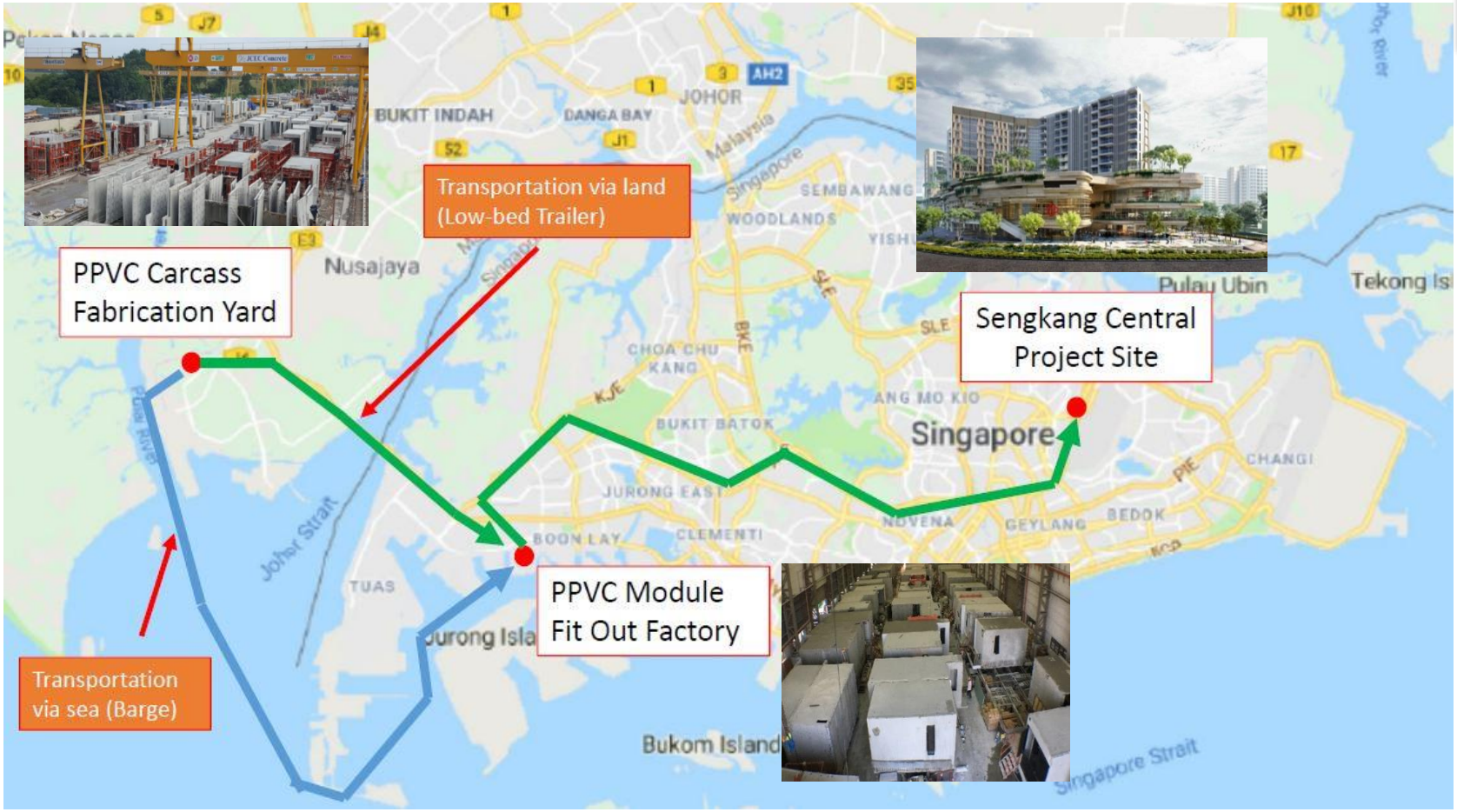
Balcony and AC Ledge
Balcony/ AC slab will be cantilever.

Ceiling
RC ceiling flat slab is provided

RC PPVC Modules
– Pre-finished in the factory
Following Requirements of COP on Buildability 2015

This PPVC system developed by Dragages Singapore is particularly suited for building projects as it provides robustness on the structure and enhanced durability.

SITE AND FACTORY MANAGEMENT



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PPVC Construction

Stage 1 – Carcass Fabrication


Panel fabrication / casting


3D Module after casting

Module ready for delivery

Stage 2 – Fit Out Installation

Module arrangement


Fit out works

Module ready for delivery

Stage 3 – Site Installation

Preparation for Transfer Slab

Lifting process

PPVC Module is installed

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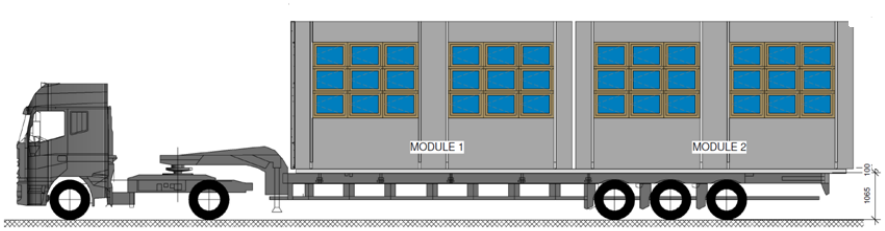
PPVC Construction – Logistic Management

Transportation Flow Chart

Carcass Fabrication Yard → Fit Out Factory → Final Installation

Typical Convoy



	Convoy Size	LTA Guidelines w/o Police Escort
Length	**→ 18.950 m**	**No limit**
Width	**→ 3.100 m**	**< 3.4m**
Height	**→ 4.315 m**	**< 4.5m**

PPVC Construction – Equipment

- High capacity tower crane
- ~ 15 minutes per module for lifting and installation only
- 10-12 modules a day per tower crane can be achieved

PPVC Benefits – Environmentally friendly

- Less dust
- Less noise
- Less vehicle trips on site

PPVC Benefits – Environmentally friendly

- Most of the fabrication works carried off-site
- Mostly Lifting works carried on-site

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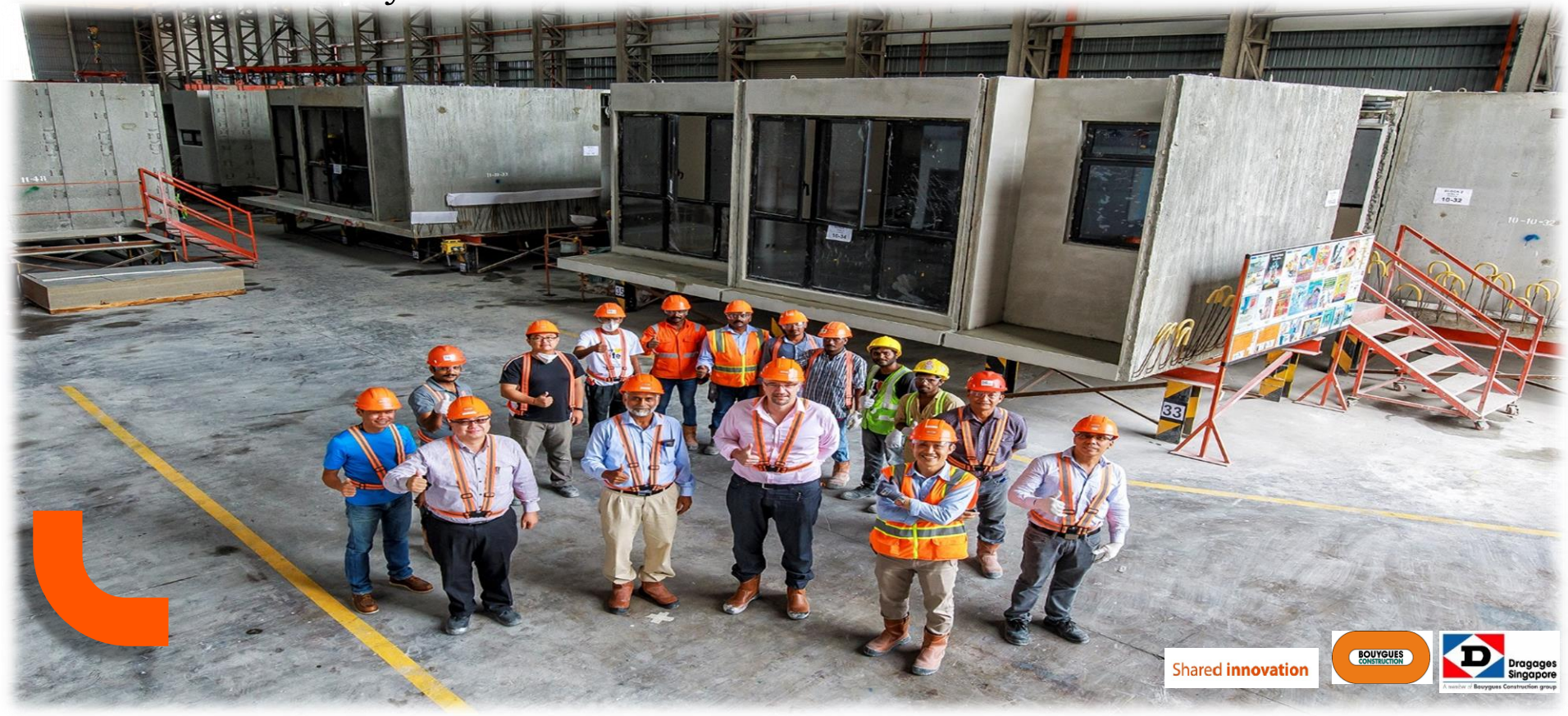
PPVC Benefits – Health and Safety

- Less risk exposure to working at height
- More work done at ground level (factory)
- Shorter duration of working at height (lifting)
- Less safety hazards in work area



PPVC = Higher Quality

- Off-site Construction
- Factory-like assembly
- Module Standardization

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PPVC Tolerance

STRUCTURAL	CONQUAS Tolerance	PPVC Tolerance
Verticality	+/- 3mm for 1m	+/- 1mm for 1m
Squareness	4mm for 300mm	1mm for 300mm
Concrete cover	+5mm	+2mm
Cross section dimensions	+10mm / -5mm	+/- 2mm
Opening size for door & window	+10mm	+5mm

ARCHITECTURAL	CONQUAS Tolerance	PPVC Tolerance
Floor evenness	3mm for 1.2m	0.5mm for 1.2m
Wall evenness	3mm for 1.2m	1mm for 1.2m
Squareness	4mm for 300mm	1mm for 300mm

How to be successful in PPVC project?

Having a Good Builder !

Strong Design Team

Good Project Management

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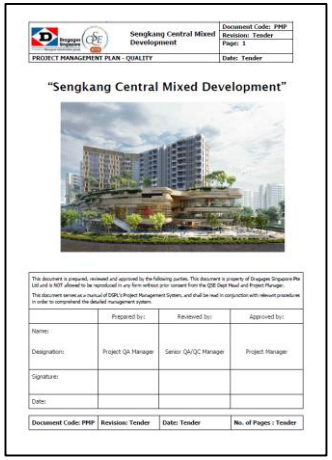
- *Good SOP (Standard Operation Procedure)*



Sengkang Central Mixed Development

Document Code: PMP
Revision: Tender
Page: 1
PROJECT MANAGEMENT PLAN - QUALITY
Date: Tender

"Sengkang Central Mixed Development"

	Prepared by:	Reviewed by:	Approved by:
Name:			
Designation:	Project QA Manager	Senior QA/QC Manager	Project Manager
Signature:			
Date:			

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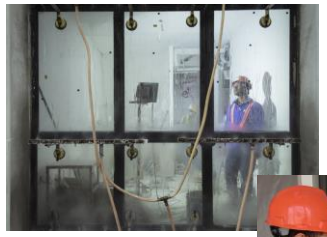
- *Professional and Reliable Project Team*

- *Proper Test and Inspection System*



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Thank You


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