

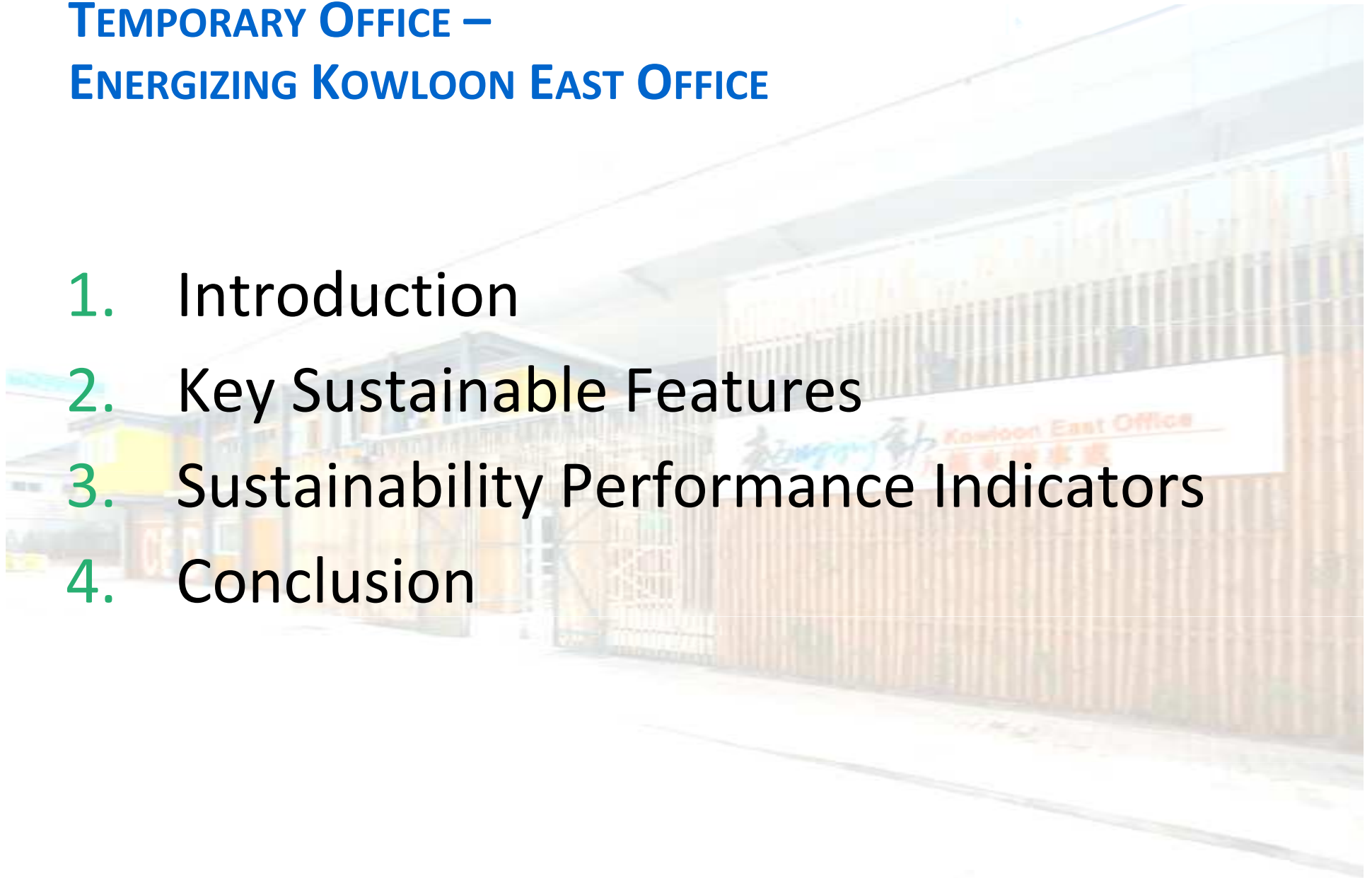
A NEW DIMENSION FOR ENVIRONMENTAL FRIENDLY TEMPORARY OFFICE – ENERGIZING KOWLOON EAST OFFICE



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A NEW DIMENSION FOR ENVIRONMENTAL FRIENDLY TEMPORARY OFFICE – ENERGIZING KOWLOON EAST OFFICE

1. Introduction
2. Key Sustainable Features
3. Sustainability Performance Indicators
4. Conclusion



1. Introduction



1.1 Introduction – The Project Team

- Client / Developer



Development Bureau

- Project Manager



Architectural Services
Department

- Co-designer



Civil Engineering and
Development Department

- Sustainable Design, Building
Physics and BEAM Plus
Consultant

ARUP

Arup
Building Sustainability
Group

- Architect, Civil & Structural
Engineer, Building Services
Engineer and Main Contractor



Shui On Building
Contractors Limited

1.2 Introduction – Development Information

- **Locate at a piece of unattractive land underneath Kwun Tong Bypass**
- **2-storey temporary office building to accommodate 20 staff and 50 visitors**
- **Joint effort to complete the project in 6 months**
 - **Design: 3 months**
 - **Construction: 3 months**



1.2 Introduction – Development Information

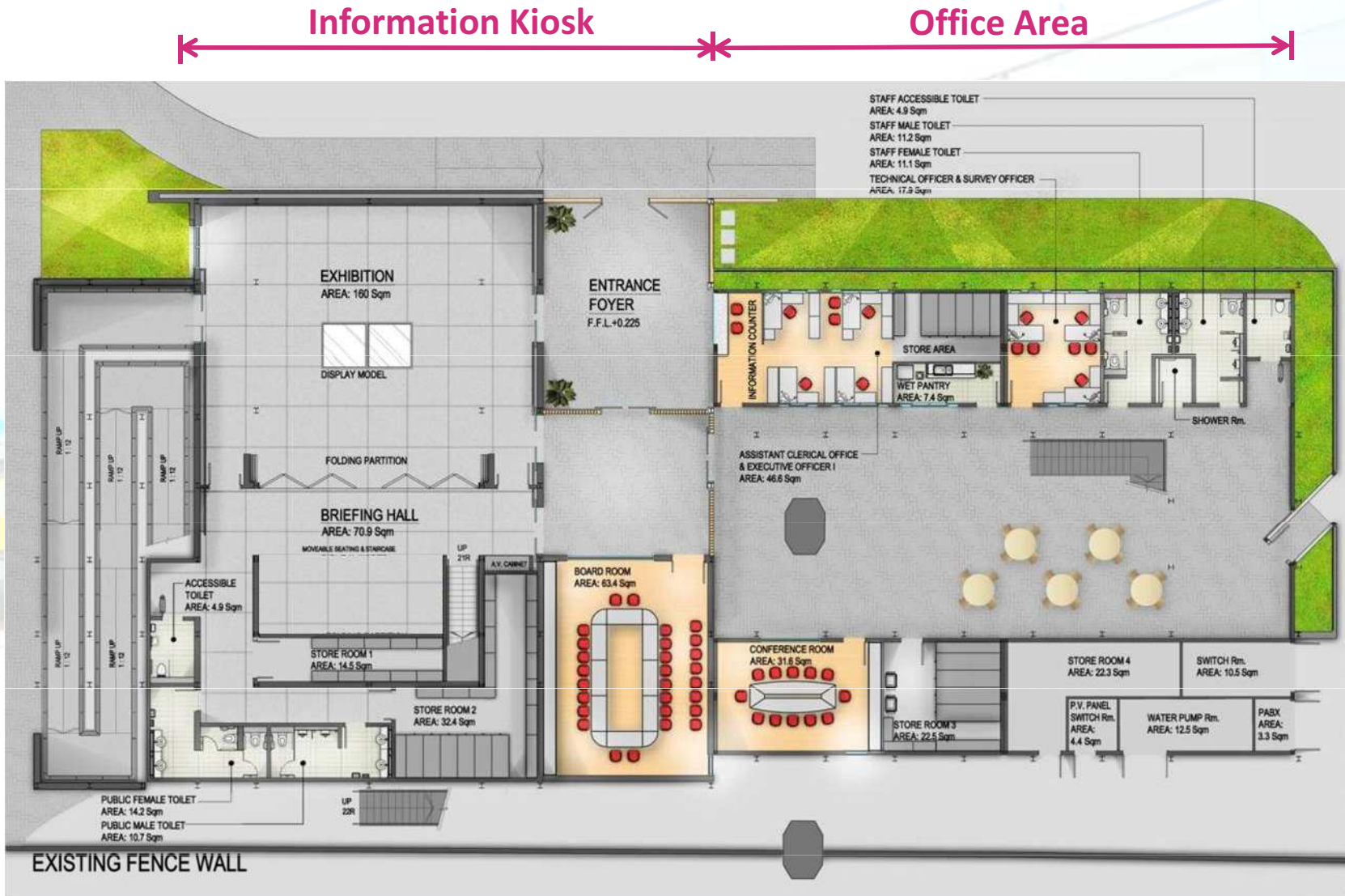


The Site



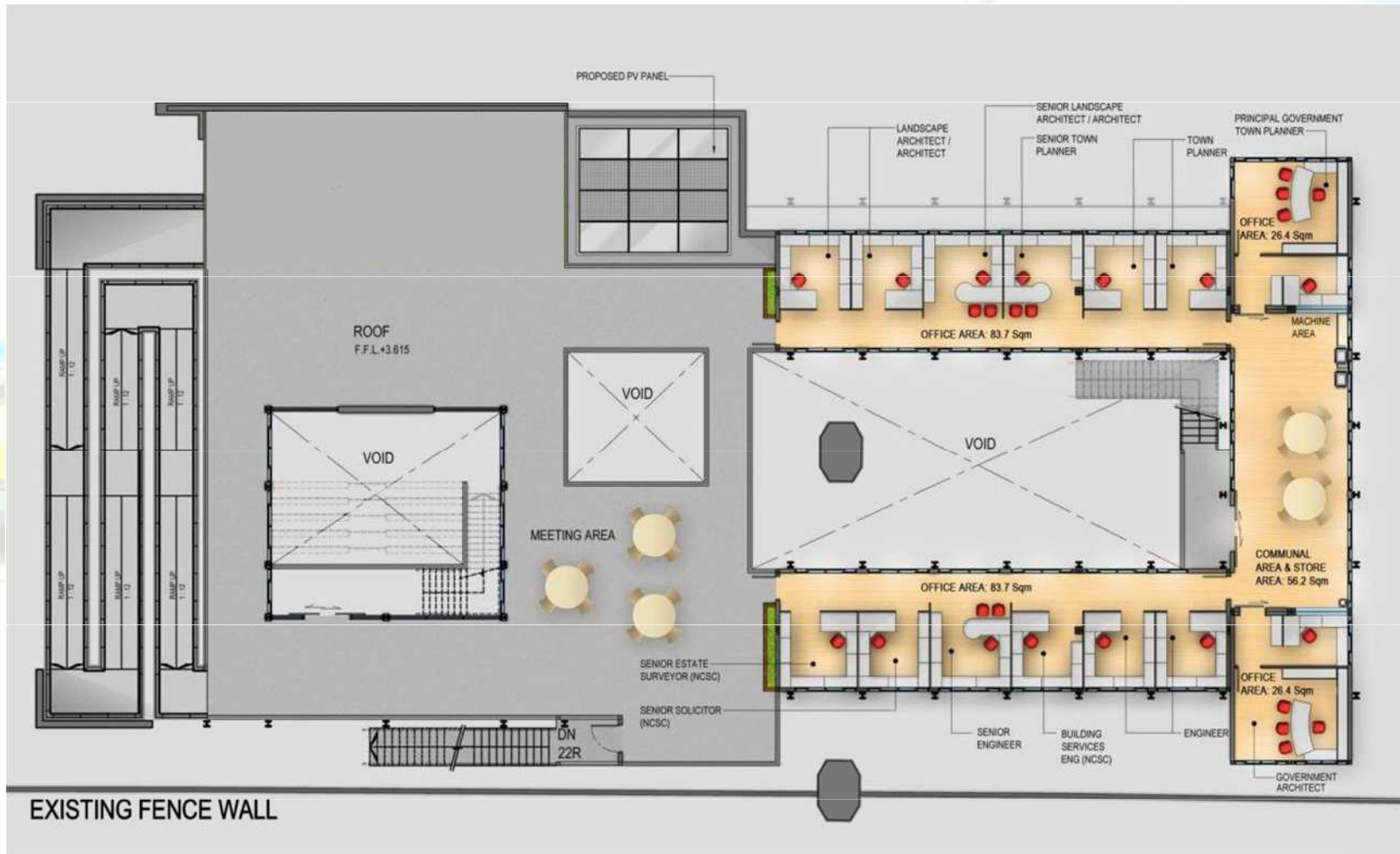
Site Area:	3,615 m ²
CFA:	1,907.9 m ²
GFA:	1,213.7 m ²
Building Footprint Area:	991.6 m ²
Inauguration Date:	7 June 2012

1.3 Introduction – G/F Layout



1.4 Introduction – 1/F Layout

Information Kiosk Office Area



2. Key Sustainable Features



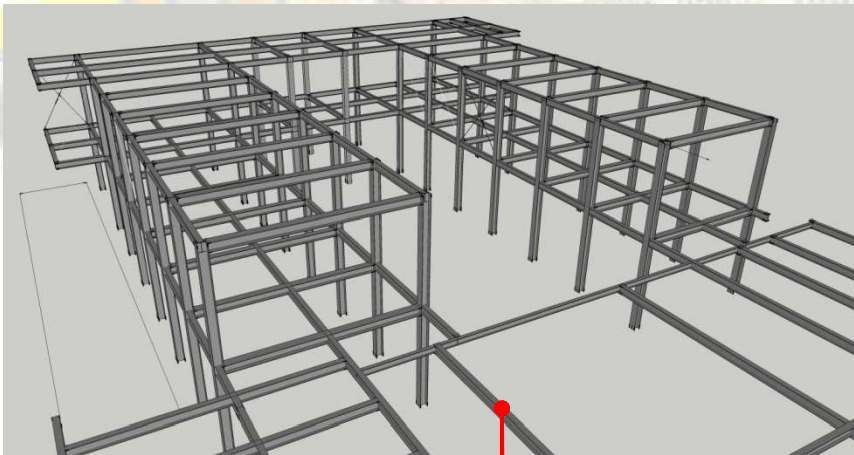
2. Key Sustainable Features

- 1) **Modular Construction**
 - 2) **Use of Green Construction Materials**
 - 3) **Passive Design:** Minimise Solar Heat Gain; Optimise Urban Wind Microclimate; Natural Ventilation; & Enhance Daylighting
 - 4) **Energy Efficient Systems :** Air Conditioning & Lighting
 - 5) **Total Water Management**
 - 6) **Quality Indoor Environment :** IAQ & Daylighting
 - 7) **Waste Minimization**
 - 8) **Site Specific Design for Land Saving**
 - 9) **Efficient Construction Management**
- 

2.1 Modular Construction

Saving Materials throughout Whole Building Life Cycle

- **Lean Construction** with **Standardised Used Freight Containers** and **Modular Structural Steel Members** as major building components
 - Maximise Use of **Prefabrication**, i.e. **Reduce Construction Waste and Environmental Impacts**
 - Can be **Easily Disassembled** and **Reused (Almost 100%)**



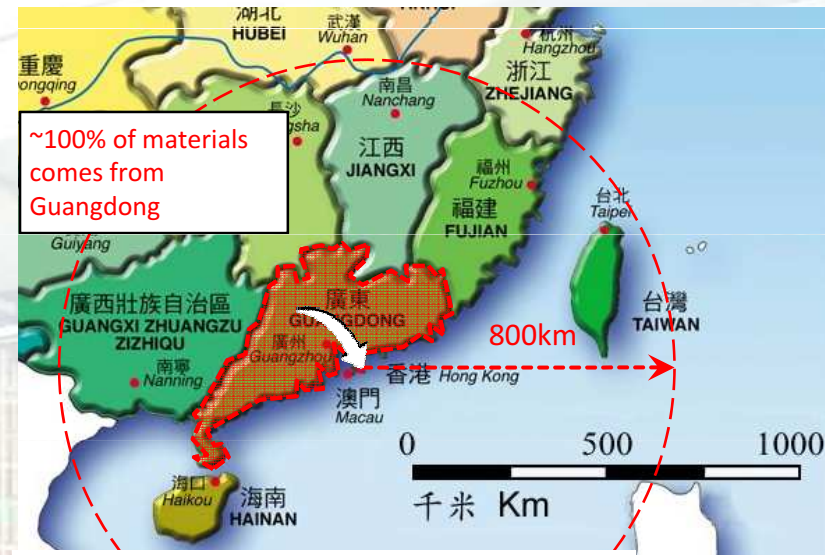
**Modular Structural
Steel Members**



**2nd-hand Freight
Containers**

2.2 Use of Green Construction Materials

- **Almost 100% of Materials from Regional Sources**
(manufactured within 800km of the project site)



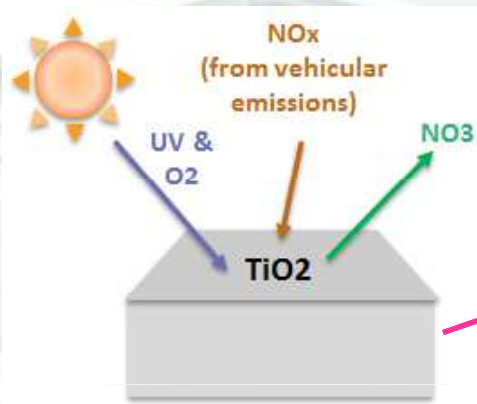
- **Use of certified timber from sustainable forest**
e.g. Wood cabinets in office

2.2 Use of Green Construction Materials

- **Maximise Use of Recycled / Reused Materials**

Used containers, paving blocks made from recycled aggregates, recycled glass, sand and fly ash, etc.

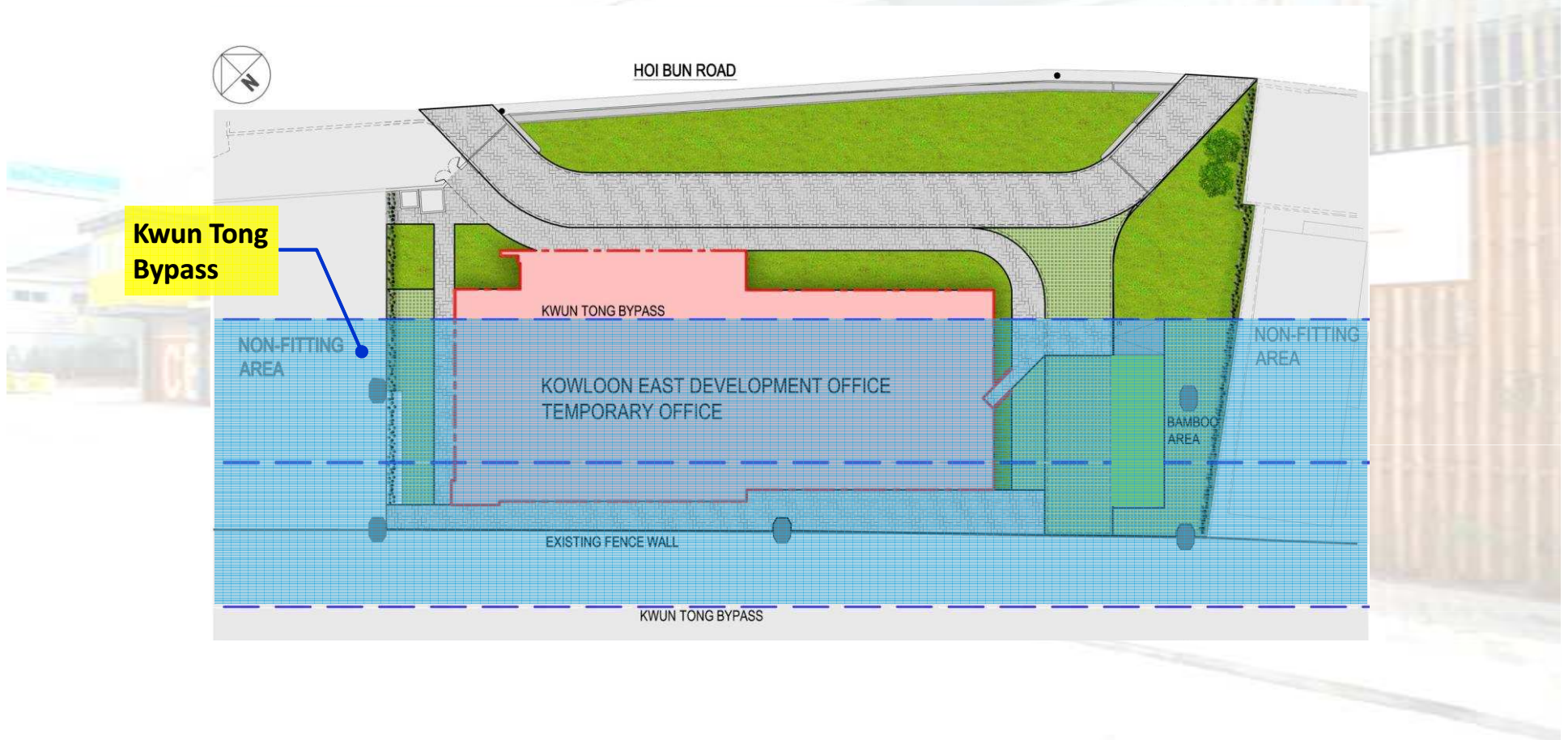
2nd hand Freight Containers



Paving blocks made of recycled materials and coated with Titanium Dioxide

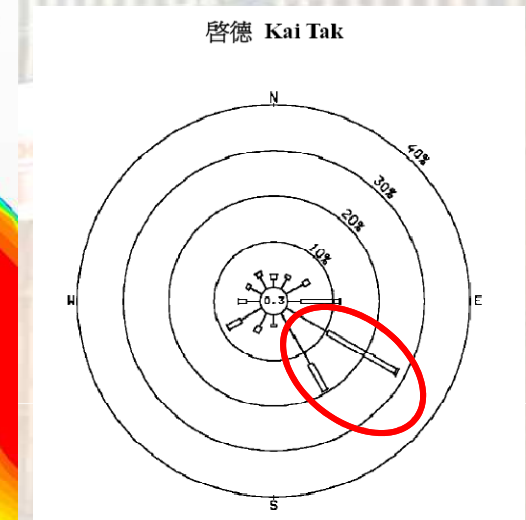
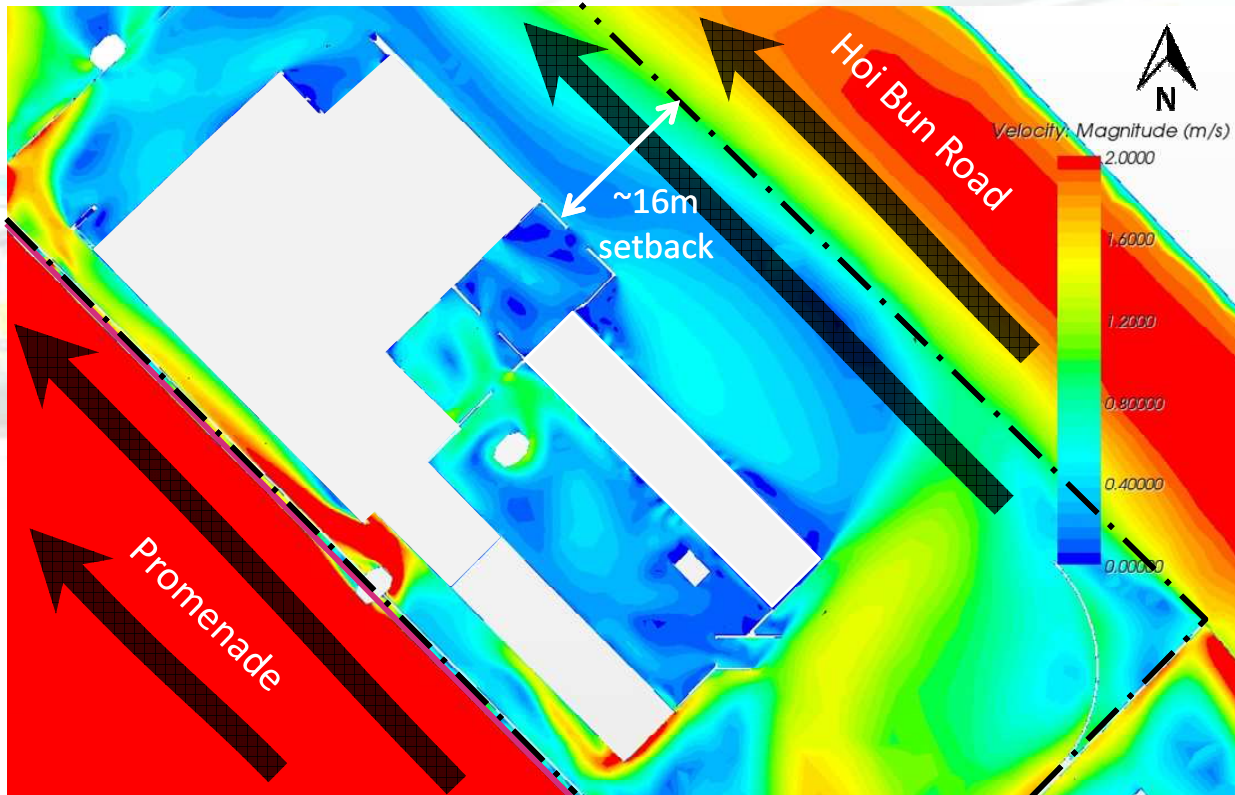
2.3 Passive Design (1) – Minimise Solar Heat Gain

- Optimum use of site features to minimise solar heat gain with 80% roof area under covered by Kwun Tong Bypass



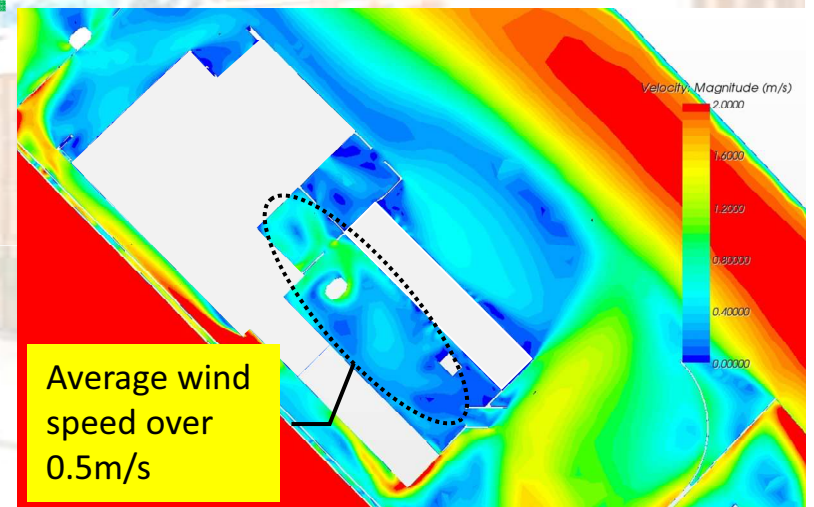
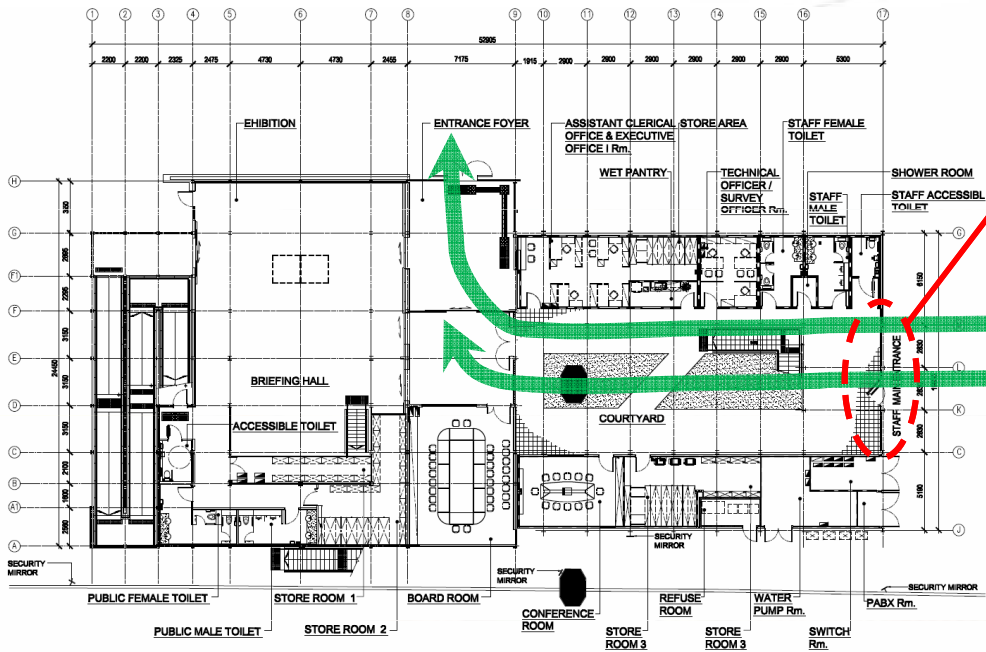
2.3 Passive Design (2) - Optimise Urban Wind Microclimate

- Building shape aligns with the annual prevailing wind direction (SE)
- Building setback



2.3 Passive Design (3) – Natural Ventilation: Courtyard

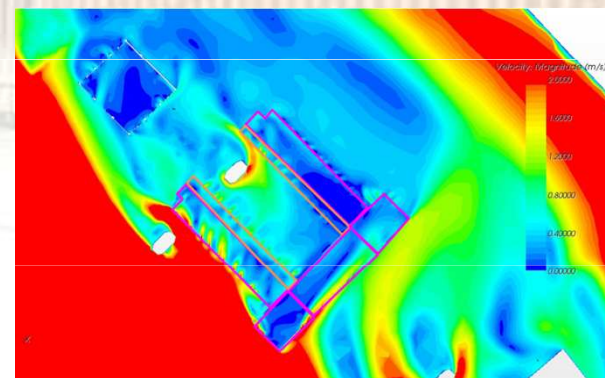
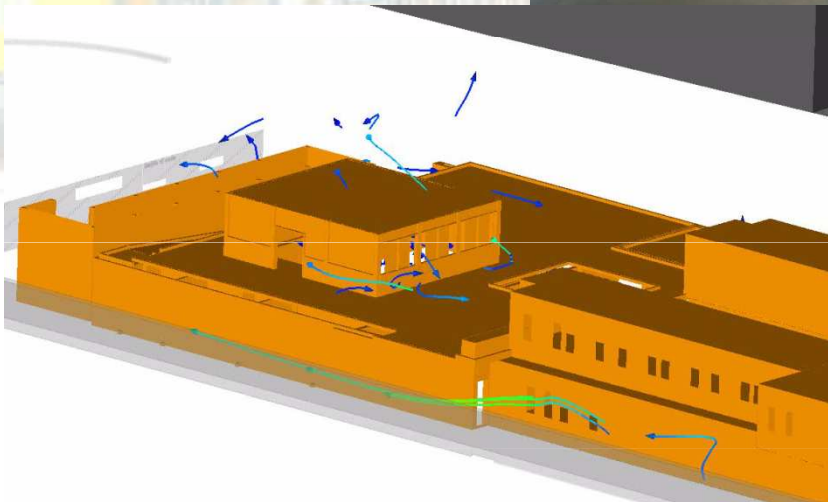
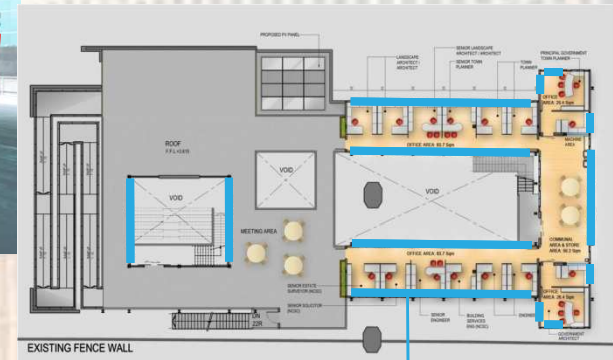
- Perforated fence wall & openable windows to facilitate natural ventilation at courtyard and office.



2.3 Passive Design (3) – Natural Ventilation: Indoor Areas

- Provision of cross-ventilated openings to utilise natural ventilation during desirable seasons

Exhibition Area



Windows

Office Area

2.3 Passive Design (4) - Enhance Daylighting

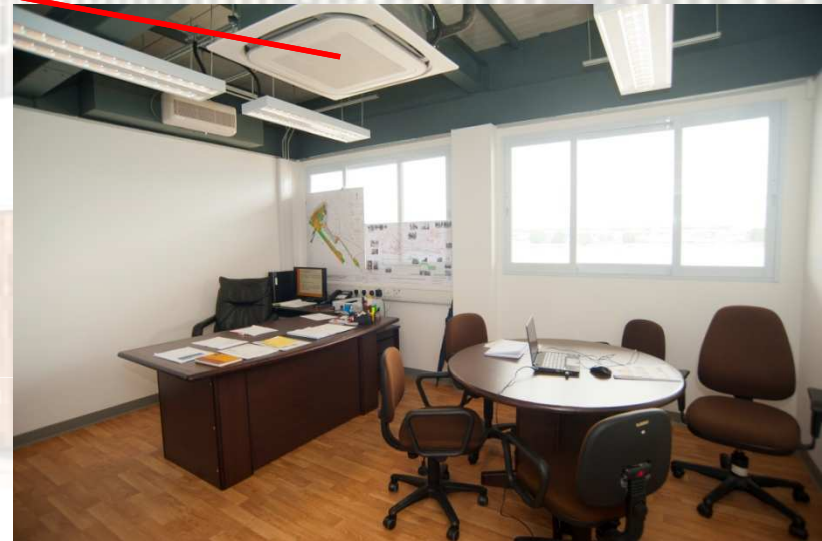
- Daylighting to reduce lighting energy consumption



2.4 Energy Efficient Systems (1) – Air Conditioning

- Variable Refrigerant Volume (VRV) units with higher COP (> 3.8) instead of window / split type air-conditioners (≤ 3.0) i.e. $>26\%$ increase in energy efficiency

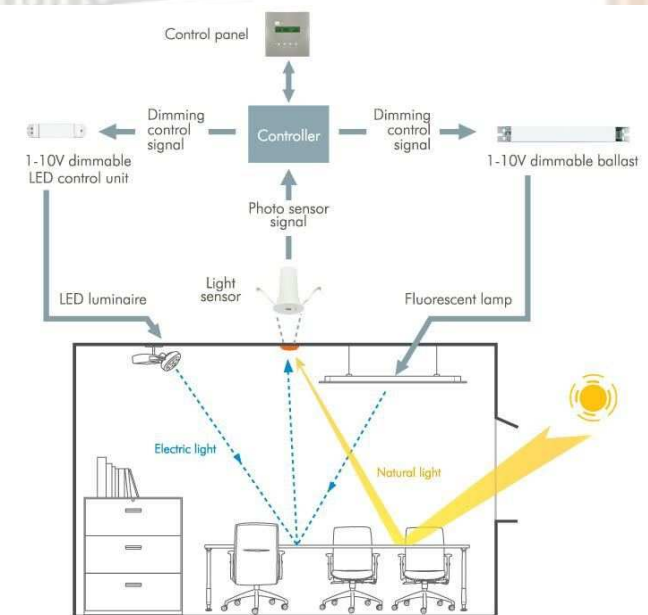
VRV units



2.4 Energy Efficient Systems (2) - Lighting

- T-5 Lamps + Task Lights w/ adjustable illuminance (30%-100%)
- Avg. lighting power density (LPD) for office = 8.2 W/sq.m
i.e. 45% less than the requirement of BEC 2012 (15 W/sq.m)
- Daylight and occupancy sensors

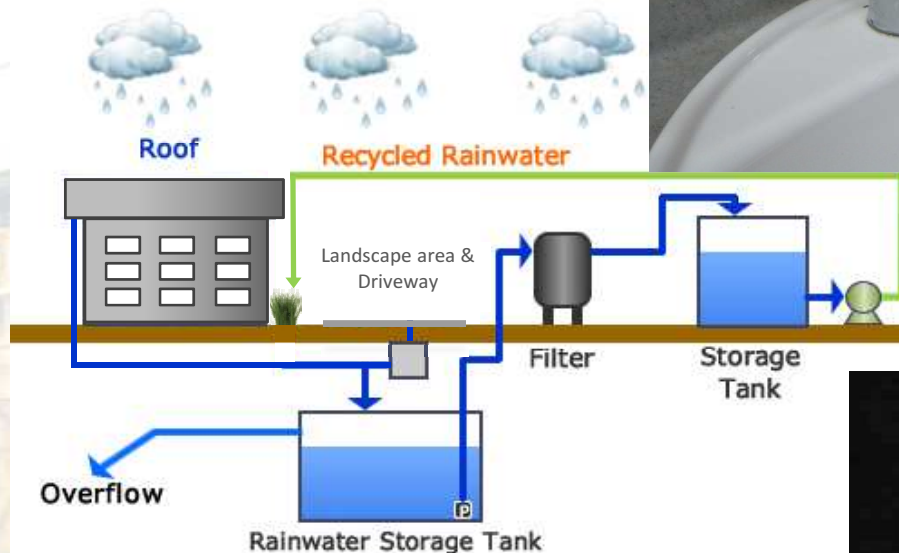
T-5 Luminaires



2.5 Total Water Management

Reduce Fresh Water Demand

- Use of low flow and sensor-controlled taps
- Rainwater recycling for irrigation



Reduce Flushing Water Demand

- Use of low flow urinal and dual flush WC



2.6 Quality Indoor Environment (1) - IAQ

- Increased ventilation (>30% of min. requirement by ASHRAE 62.1-2007)
- Independent exhausts for photocopiers
- IAQ measurement reveals good IAQ standard is achieved



Independent Exhaust

Measurement Location	Time slot	Total Volatile Organic Compounds (ppb)	Formaldehyde ($\mu\text{g}/\text{m}^3$)	Radon (Bq/m^3)
IAQ Certification Scheme – Good Class		< 261	< 100	< 200
Inside Exhibition Hall (G/F) [Point 5]	1	30	28	17.2
	2	26		72.4
	3	26		44.5
	4	37		41.9
	Average	30		28
Inside Board Room (G/F) [Point 6]	1	23	24	74.8
	2	25		41.8
	3	0		61.4
	4	4		69.7
	Average	13		24
Inside Office (1/F) [Point 7]	1	23	38	40.3
	2	28		57.5
	3	0		50.2
	4	0		61.4
	Average	13		38
Inside Communal Area (1/F) [Point 8]	1	23	24	74.8
	2	25		23.0
	3	19		66.9
	4	0		66.9
	Average	17		24

IAQ Measurement Results

2.6 Quality Indoor Environment (2) - Daylighting

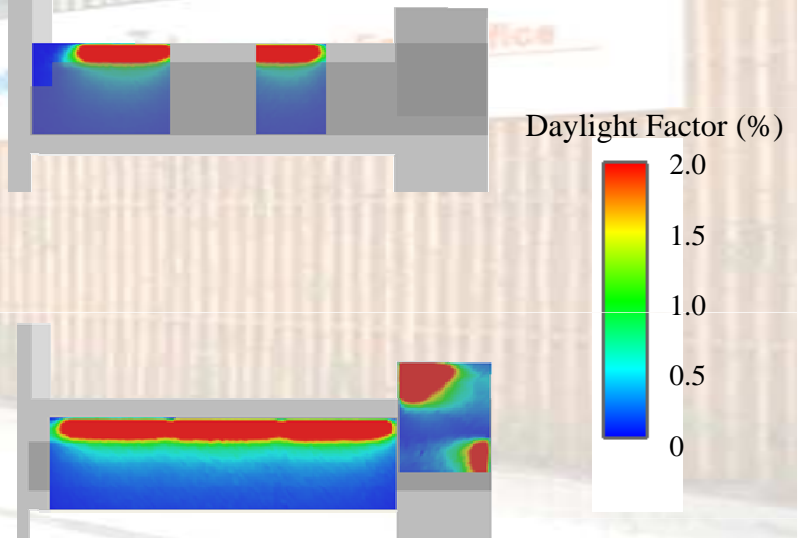
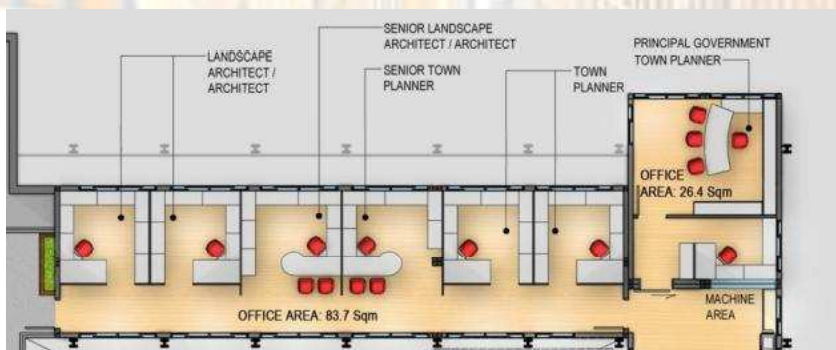
- Optimum window area
- balance daylighting and solar heat gain



G/F



1/F



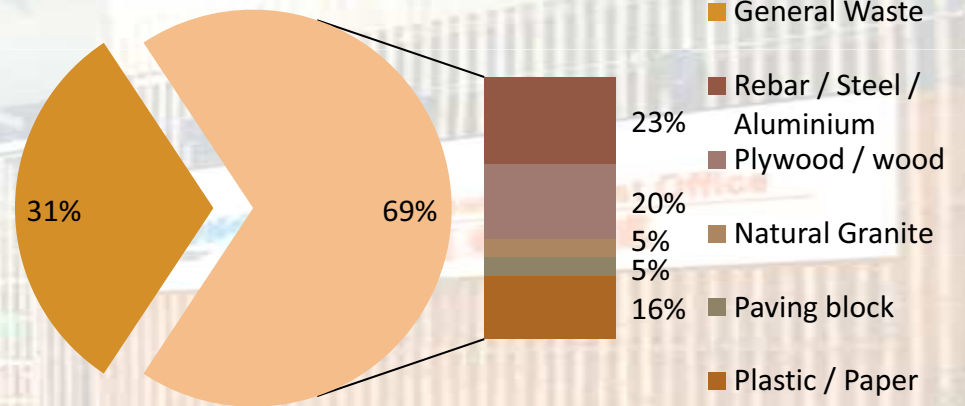
2.7 Waste Minimization

- **Construction: Waste sorting** to facilitate recycling
- **Operation: Recycling bins** for metal, waste paper, plastic and rechargeable battery



Construction Waste Recycling

Construction Waste Estimation



Operation Waste Recycling



2.8 Site Specific Design for Land Saving

- Revitalise a piece of unattractive land on a site under Kwun Tong Bypass
- Convert site constraints into opportunities



Before Development



After Development

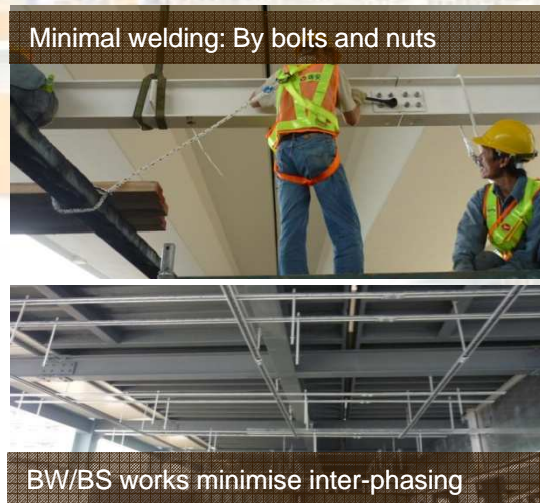
2.9 Efficient Construction Management

Meet tight construction programme and reduce nuisance to surroundings

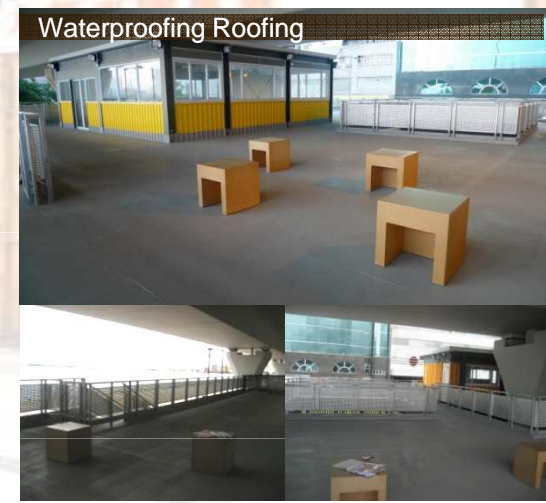
- Off-site fabrication
- Minimise inter-phasing
- Simplify the design



Off-site Fabrication Yard



Minimise Inter-phasing of Building Structure & BS Works



Simplify the design

3. Sustainability Performance Indicators



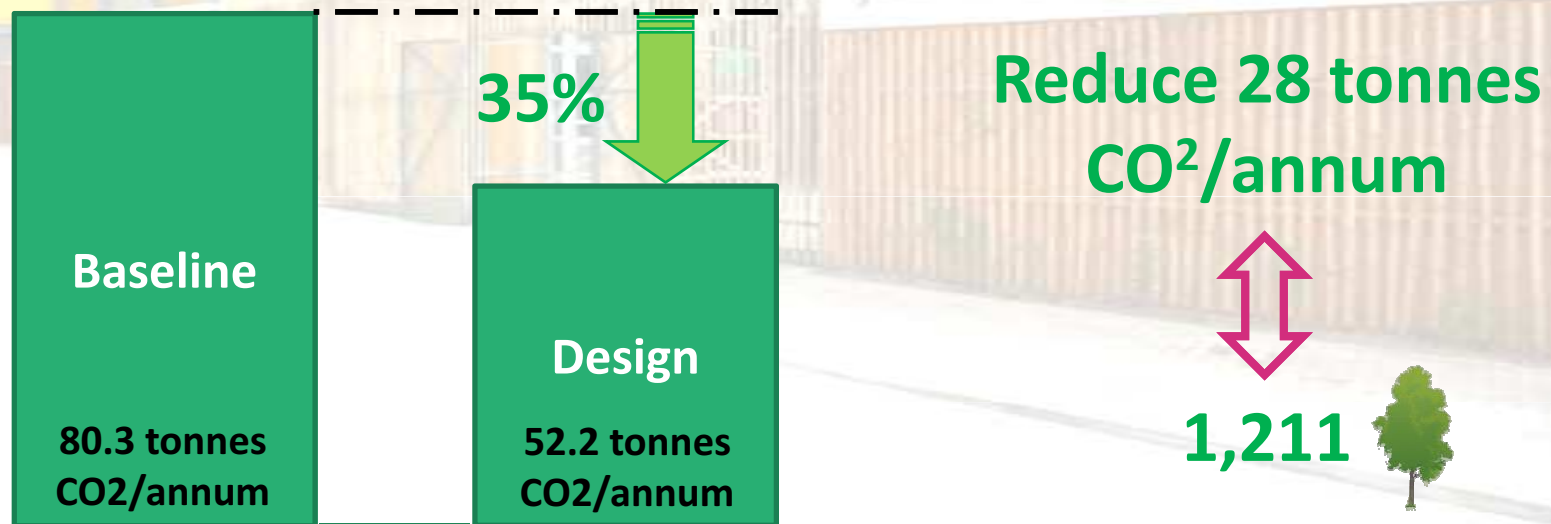
3. 1 Sustainability Performance

Aspects	Sustainable Measures	Estimated Savings / Reduction
Energy	<ul style="list-style-type: none"> • Passive designs • Use of energy efficient systems 	~35% or ~47,000 kWh/year
Water	<ul style="list-style-type: none"> • Use of water efficient fixtures • Rainwater harvesting 	~61% or ~553,000 L/year
Materials	Use of environmental friendly materials <ul style="list-style-type: none"> • Regional materials • Recycled materials • Certified timber 	<ul style="list-style-type: none"> • ~100% of building materials were manufactured regionally • 46% of building structure and 30% of outdoor works were made from recycled materials • Certified timber for 80% of wood products
Waste	Waste minimization through <ul style="list-style-type: none"> • Modular construction • Recycling construction waste 	<ul style="list-style-type: none"> • Modular design for 90% of building structure • Recycled 80% or ~13,000 kg of construction waste
IAQ	<ul style="list-style-type: none"> • Increased ventilation • Independent exhausts for photocopiers 	Good Class of IAQ Certification Standard

3.2 Carbon Abatement

Carbon Reduction throughout the Whole Building Life Cycle

- Material Extraction to Construction – Low Embodied Carbon
 - Modular construction + reused / recycled materials
=> Reduce **2.3 TJ embodied energy**
 - ~100% regional materials , i.e. reduce transportation emissions
- Operation – **35%** Carbon Reduction by minimizing resources demand (e.g. energy, water, materials, etc.)



3.3 Green Building Certification

BEAM Plus and Green Building Award

- 1st Office Building to achieve BEAM Plus Provisional Platinum



4. Conclusion



Conclusion

- 1st low carbon temporary office
- Apply new concept for future temporary buildings
e.g. site offices



Sustainable Development Showcase & Green Education

- Promote public awareness on sustainable development
- Drive the building industry to design buildings in an innovative and sustainable approach
- Demonstrate government's effort on promoting low carbon environment



Guided Tours



Workshops

Thank You

