Teaching Kit DAT
Bringing Green and Healthy Living to Harmonious Communities

The Hong Kong Housing Authority's Experience

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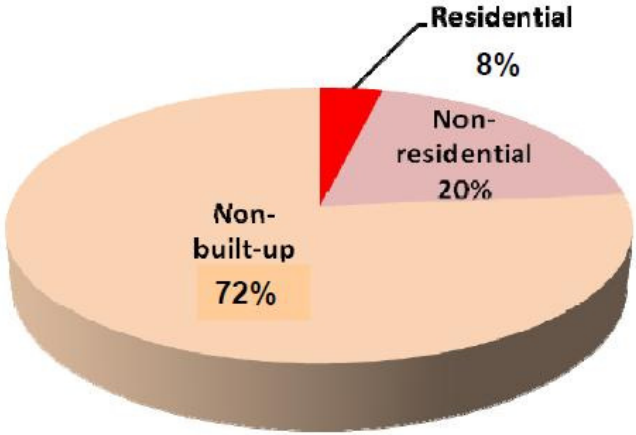
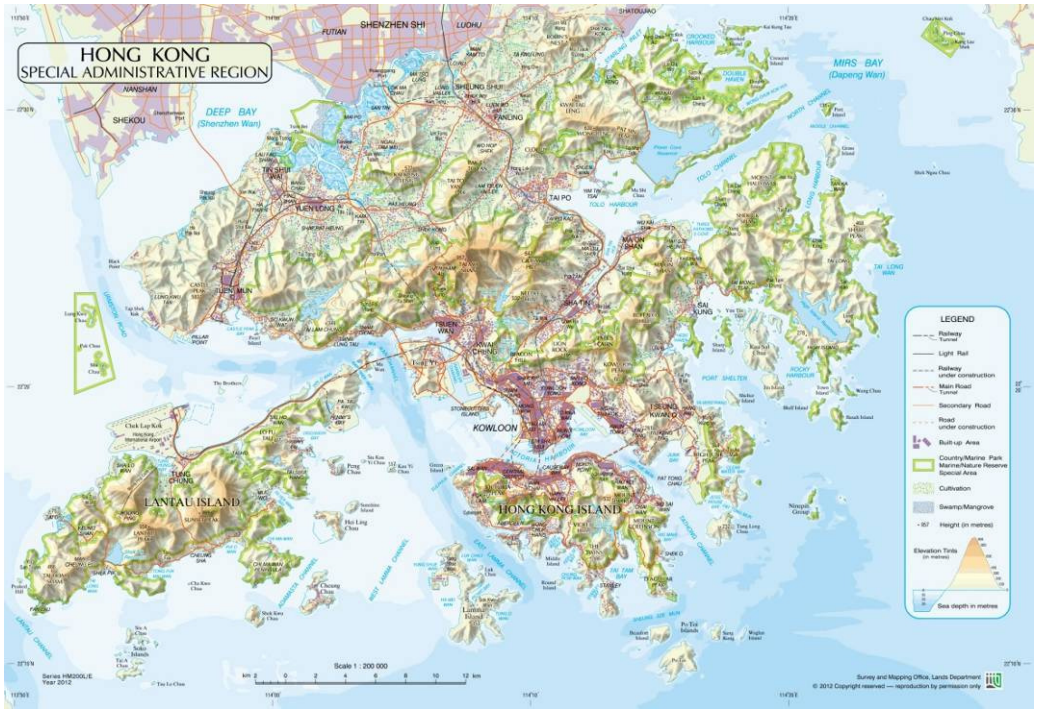
1. Introduction

Land Use in Hong Kong



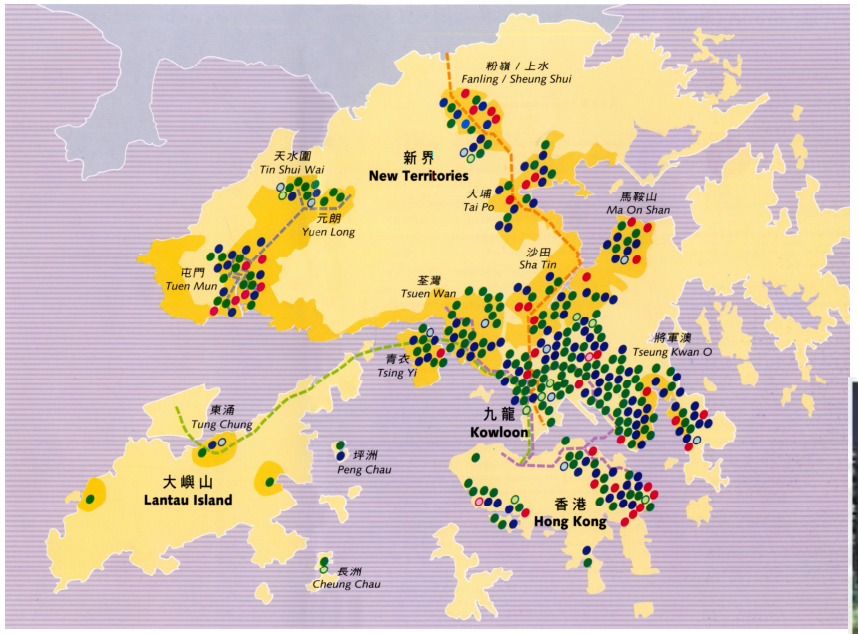
- ***Hong Kong is widely known for her high density and efficient use of land, which is a scarce resource and thus must be optimized in its use.***
- ***Depending on districts, the planning brief for land earmarked for public housing development typically dictates a plot ratio of around 5 to 6.***
- ***When planned according to statistically predicted flat mix to meet housing demand, this density will roughly translate into about 1000 flats per hectare, or 2800 persons per hectare.***
- ***We need to build high rise domestic blocks of 30 to 40 storeys in order to accommodate this density.***

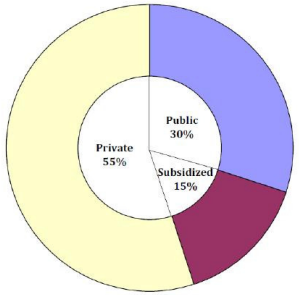


Overall Land Area :	1,108 km^2
Residential Area :	
Private Housing	25 km^2
Public Rental Housing	12 km^2
Subsidized Sale Housing	4 km^2
Rural Settlement	35 km^2

Density in Hong Kong (2)

- ***About 30% of Hong Kong's 7 million people are residing in public rental housing.***





We have an existing stock of about 730,000 public rental flats

Allocation standard is 7m2 per person. Average living space is about 12.8 m² per person.

Permitted Plot Ratio

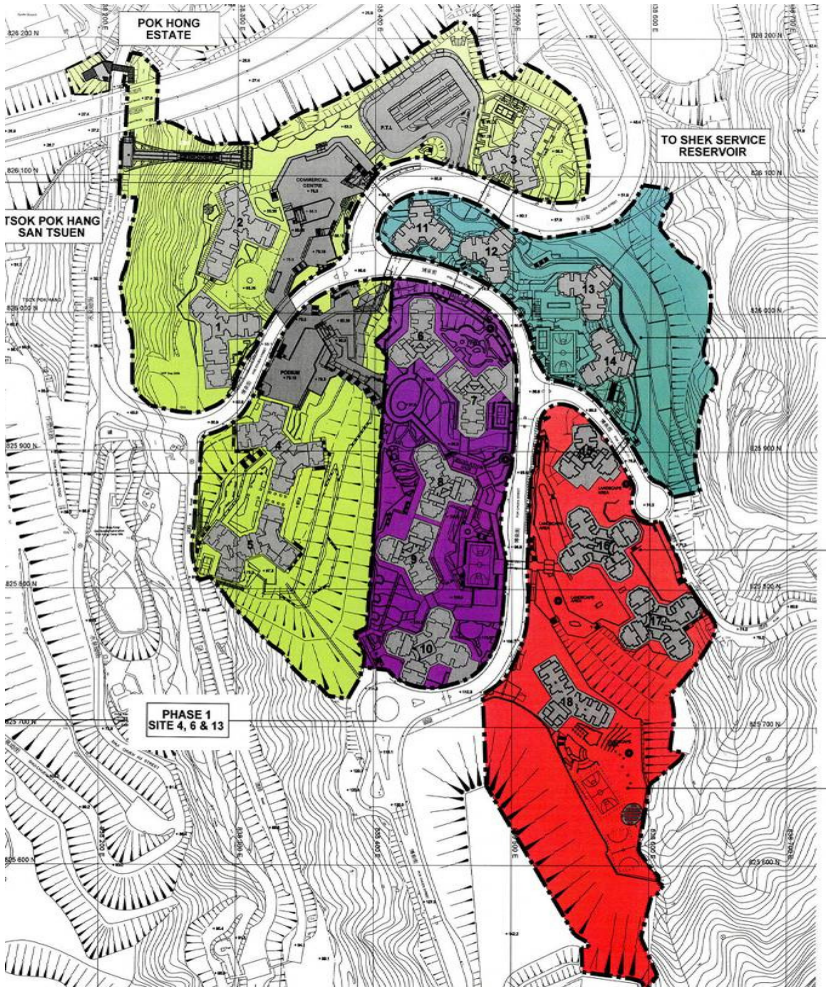
- **Hong Kong Island : 8 to 10**
- **Kowloon : 6 to 7.5**
- **New Territories : Not more than 5**

Upper Ngau Tau Kok Estate

Plot Ratio : 7

Shui Chuen O PRH Development

Plot Ratio : 5



Hung Shui Kiu

PRH Development

Plot Ratio : 4

Compact City –

High-Rise, High Density Urban Living Environment

Calls for **innovation** in creating a **comfortable living environment** …..

….. In particular for low income families.

The Hong Kong Housing Authority

- The **Hong Kong Housing Authority (HA)** was established in 1973 under the Housing Ordinance
- The **Housing Department (HD)** is HA's executive arm
- The HA develops and implements a **public housing programme** to provide subsidized housing for people who cannot afford private housing
- The HA **plans, builds, manages** and **maintains** different types of public housing
- The HA has an existing stock of about **730,000** public housing flats and builds an average of about 15,000 flats a year with a rolling 5-year programme until 2016/17, and we shall build 100,000 flats in the five year period from 2018 onwards.
- In the coming years, the HA will build 17,000 subsidized sale flats from 2016/17 to 2019/20, and thereafter build 5,000 flats each year under the Home Ownership Scheme

HA's Vision, Mission & Core Values

Vision 理想

People-centric approach

- **To help low-income families with housing need to gain access to affordable housing**

Mission 工作目標

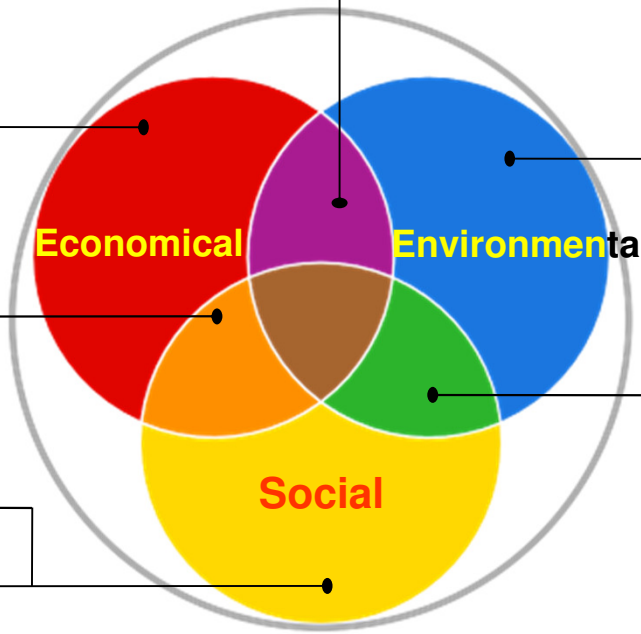
- **To provide affordable quality housing, management, maintenance and other housing related services in a proactive and caring manner**
- **Cost-effective and rational use of public resources**
- **Competent, dedicated and performance-oriented team**

Core Values 基本信念

發展•建築

Building a Sustainable Community

To meet present social, economic and environmental needs but NOT at the expense of future generations.



- Promote renewable energy
- Minimize construction waste
- Balance the development potential
- Effective use of resources
- Optimize use of social welfare and communal facilities
- Enhance environmental comfort by considering microclimate in planning
- Minimize environmental impact to the neighborhood
- Vitalize local economy
- Enhance accessibility & linkage
- Integrate green landscape planning
- Enhance environmental awareness
- Enhance health & exercise awareness for all ages
- Enhance social interaction
- Strengthen community Identity
- Encourage outdoor family activities

2. Caring for People

Living Experience

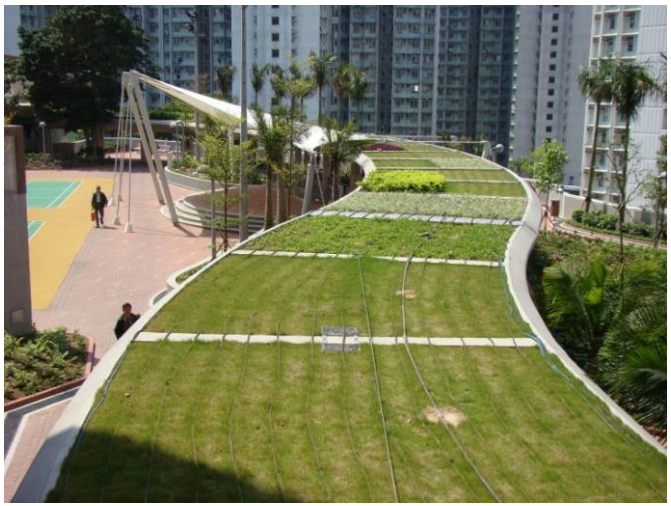
On My Way Home …….

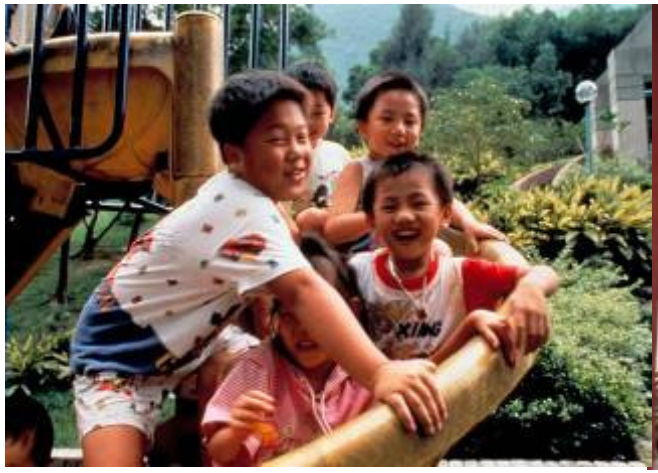
….. close to public transport terminus and pick-up areas and shops ….. linked up with covered walkways and lift towers …..

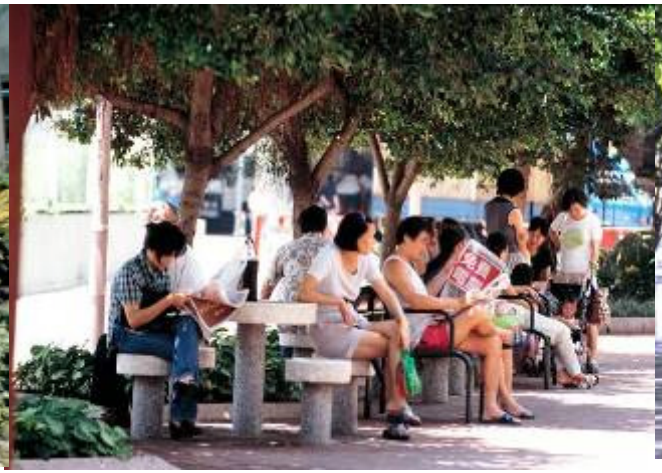
….. Tactile Guide Path System with Multi-sensory Map installed at strategic locations of housing estates to lead people to domestic blocks and major estate facilities …..

Play areas, leisure and greening

- Community play area for all ages and abilities
- Provide planting at grade and slope areas as far as possible.
- Plant at least one tree for every 15 flats.
- Greening Ratio: at least 20% (30% for large sites)







Green Roof , Vertical Greening and Community Farm
to reduce urban heat island effect

- Grow plants on roof tops
- Install vertical green panels on the external walls of public facilities.
- Introduce community planting to enhance neighbourliness.

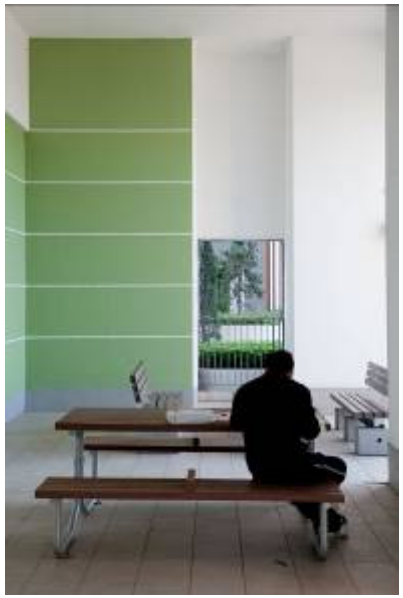
Comfortable Environment ……

….. a comfortable and functional external environment - an essential facility in housing estate…..

….. seats provided in rest areas …..

Social Cohesion

….. seats provided inside and outside G/F lobby and other communal areas ……



….. free WiFi provided at G/F lobby ….

….. domestic block entrance protected from the weather with security door phone system …..

In safe hands ……

….. 24-hour security patrol, passenger lifts with Closed Circuit TV, mail boxes with secure front panels and mail delivered from the rear via a locked mail delivery room …..

……. floor directional plan and colour identification to individual corridor for user-friendliness ….

….. Barrier Free Access provided to all lobbies, corridors and lifts ….. uninterrupted lift service ….. and 2-level Lighting System in corridors….

Home Sweet Home ……

…… self contained flat with basic provisions include flat entrance gateset, window grilles, kitchen sink, cooking bench, wash basin, sunken shower, laundry rack to meet essential needs …..

….. no bedroom partitions, no floor finish to allow flexibility and choice of furniture layout and partitioning by tenants …….

We mitigate noise to create comfortable living environment for residents.

At Source

Low noise road surfacing

Noise Enclosure

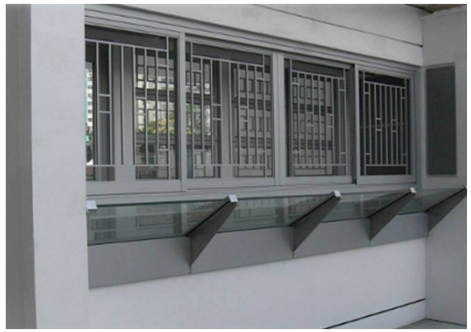
At Propagation Path

Noise Barrier

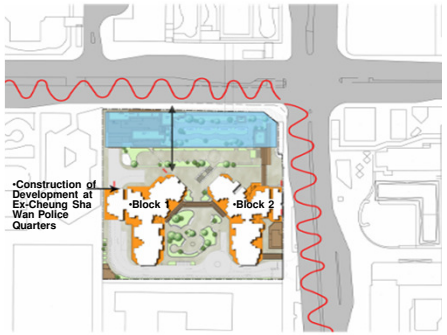
Non noise sensitive building

At Receiver End

Building setback



Acoustic Balcony



Flat configuration & Disposition

Acoustic Windows

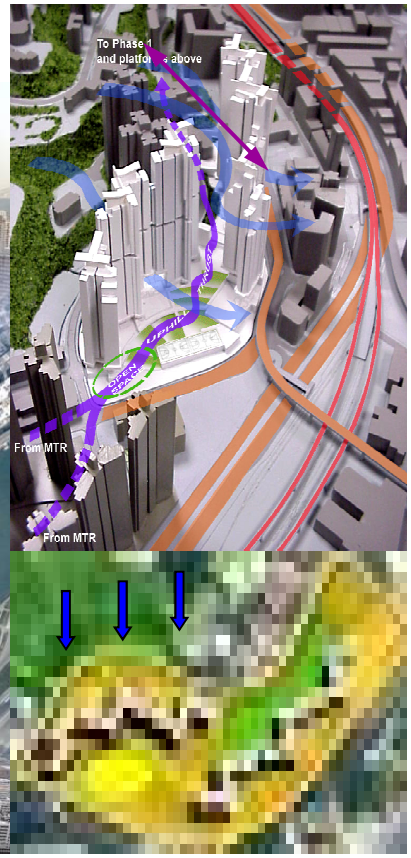
We make best use of natural lighting and ventilation to create comfortable external environment.

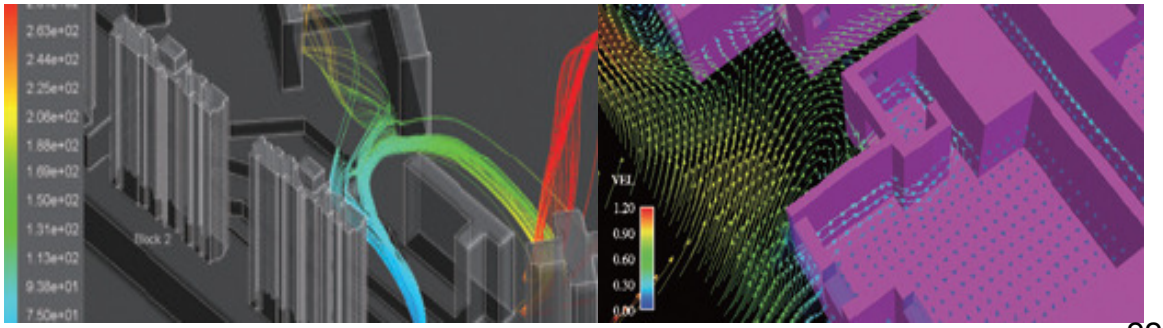
Micro climate study and **passive design**

- Energy Saving
- Low Carbon Emission
- Reduce Electricity Bill

Disposition, design and orientation of buildings

- Harness the natural characteristics of the site, such as local wind direction for natural ventilation, solar path for natural lighting
- Create wind corridor
- Reduce solar heat gain





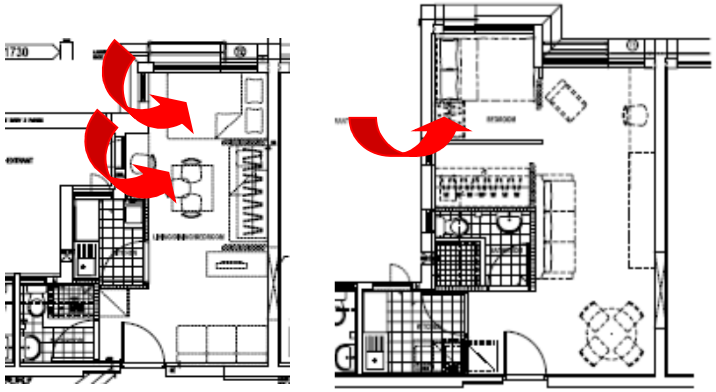
We make best use of natural lighting and ventilation to create comfortable internal environment.

Corridors and Lobbies -

- Enhance natural lighting and cross ventilation

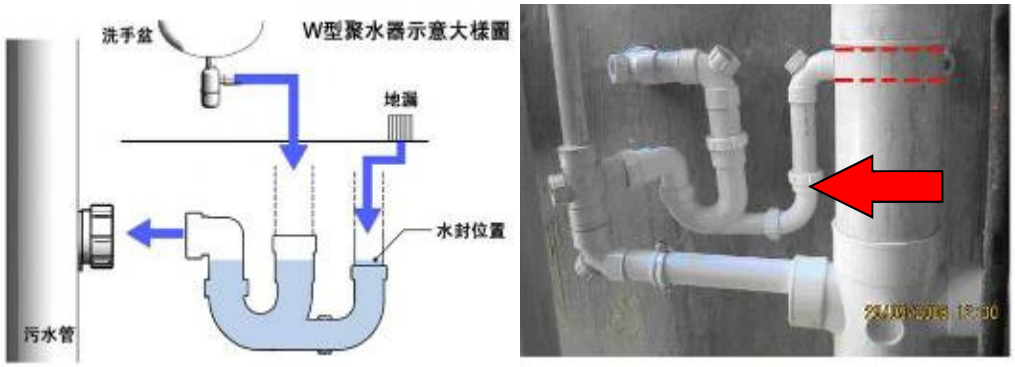
Domestic Flat -

- Additional and enlarged windows for better natural lighting and cross-ventilation in living areas, bathroom and kitchen.

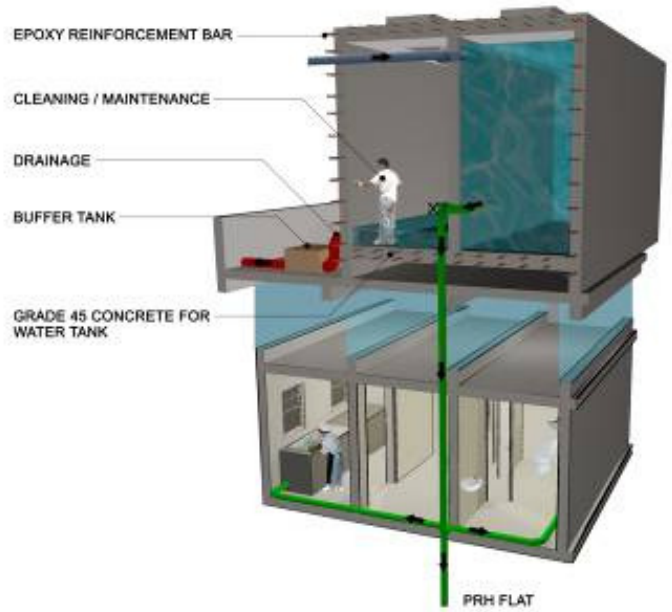


We innovate to create healthier, more hygienic, and convenient living environment

- Incorporate Common W-Trap System in drainage system to prevent dry up floor drain trap.



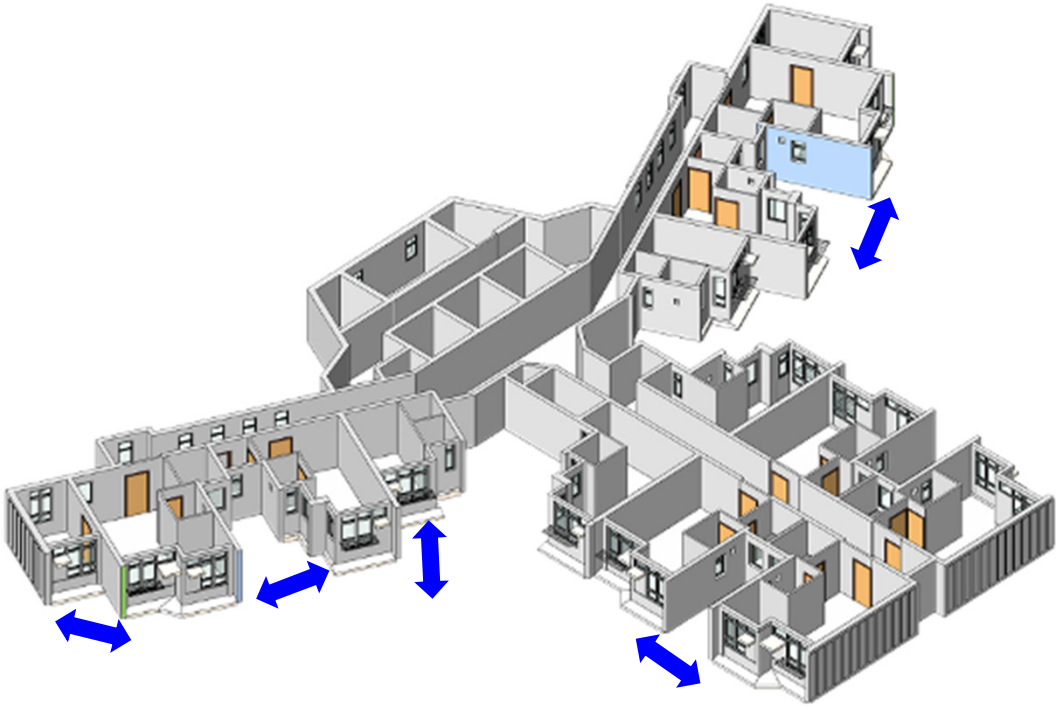
- Twin Tank System for uninterrupted supply of fresh / flush water.



- Mail box type collection system for sorted recycling materials

We endeavour to reduce nuisance in the neighbourhood for harmonious living.

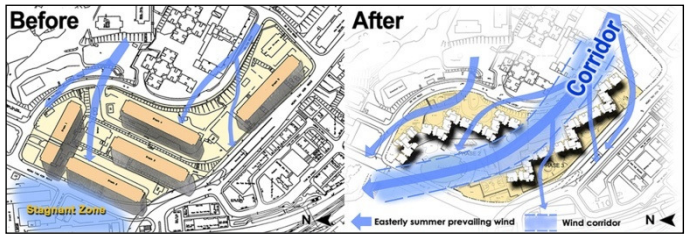
- Minimize overlooking problem in modular flat design.
- Keep the flat entrance away from lift lobby.
- Locate the refuse storage and material recovery room and refuse chute away from domestic flats



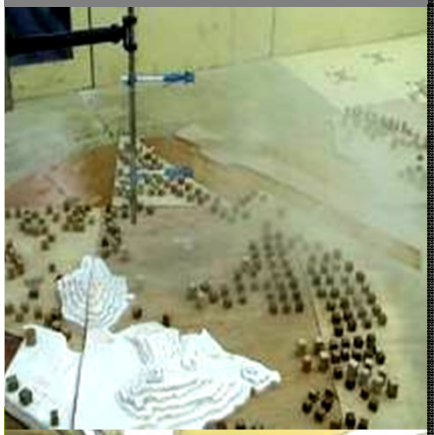
Microclimate Studies

- **Determination of prevailing wind by Wind Tunnel Test**
- **Ventilation conditions of mid, high and low zones of domestic blocks are studied**
- **Enhancement to immediate neighbourhood**

Wind Corridor Design



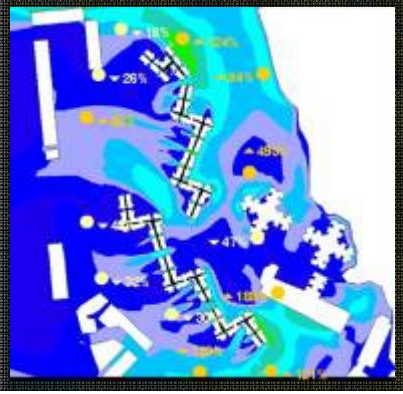
Wind Tunnel Test



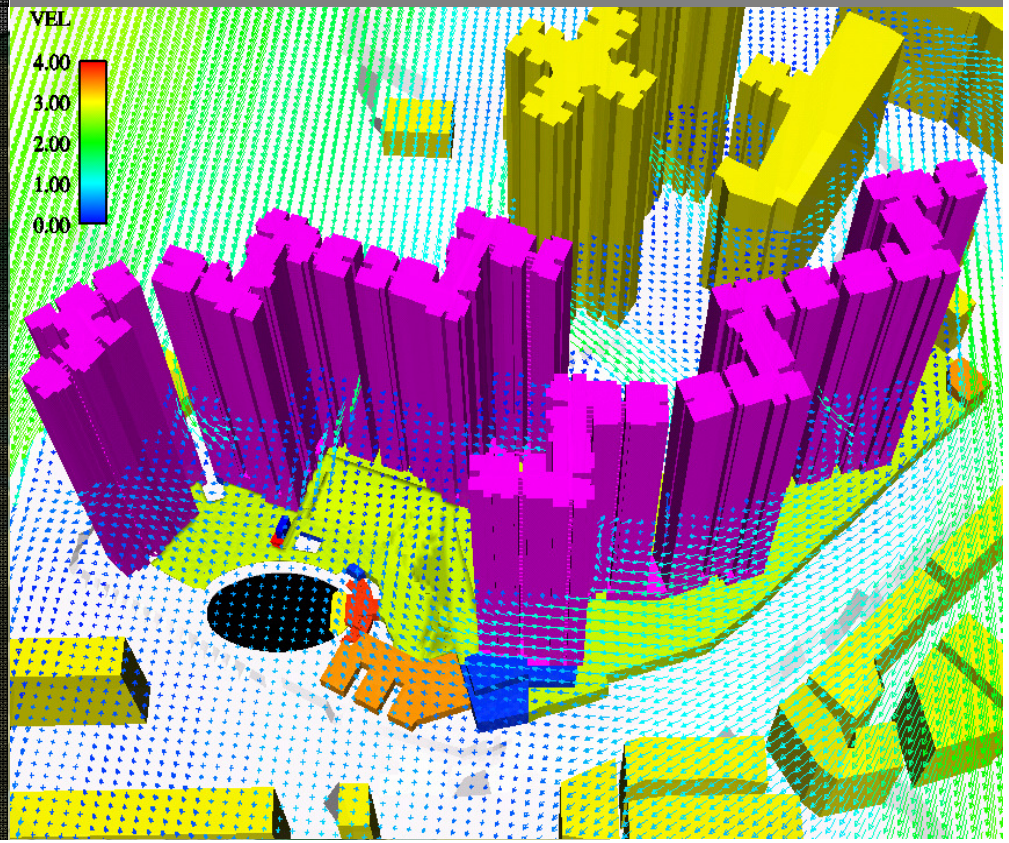
Wind Environment

Before Redevelopment

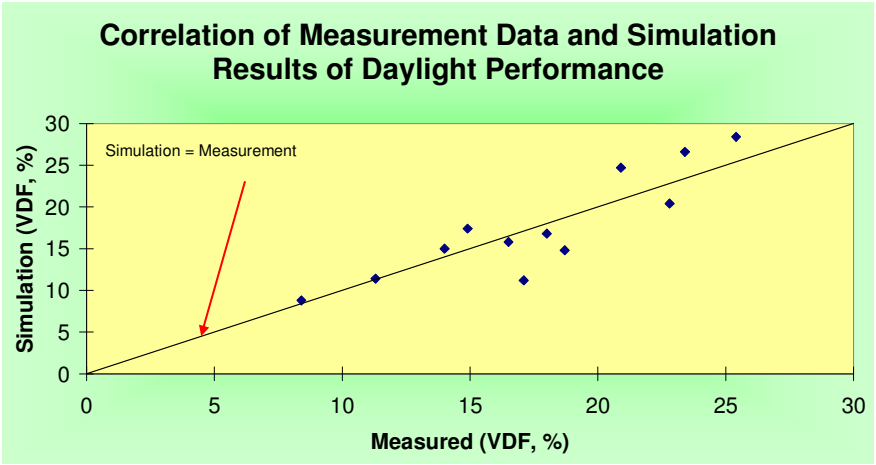
After Redevelopment



CFD simulations



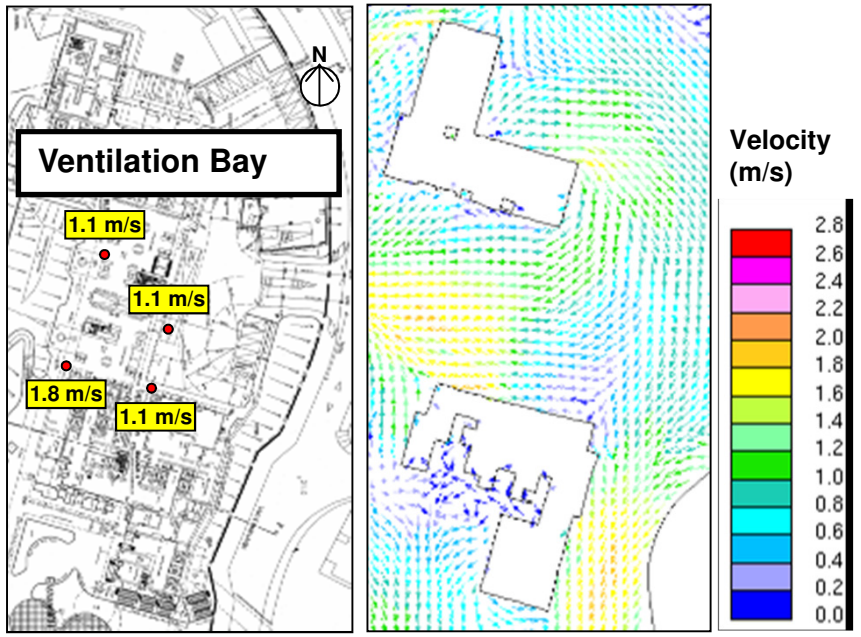
Microclimate Studies – simulations and on-site measurement



Verification of simulation results with measurement data

Wind Permeability at Pedestrian Level

- No podium
- Ventilation bays at pedestrian levels: up to 1.8m/s (summer) per on site measurement
- Residents' response: 91% very satisfactory



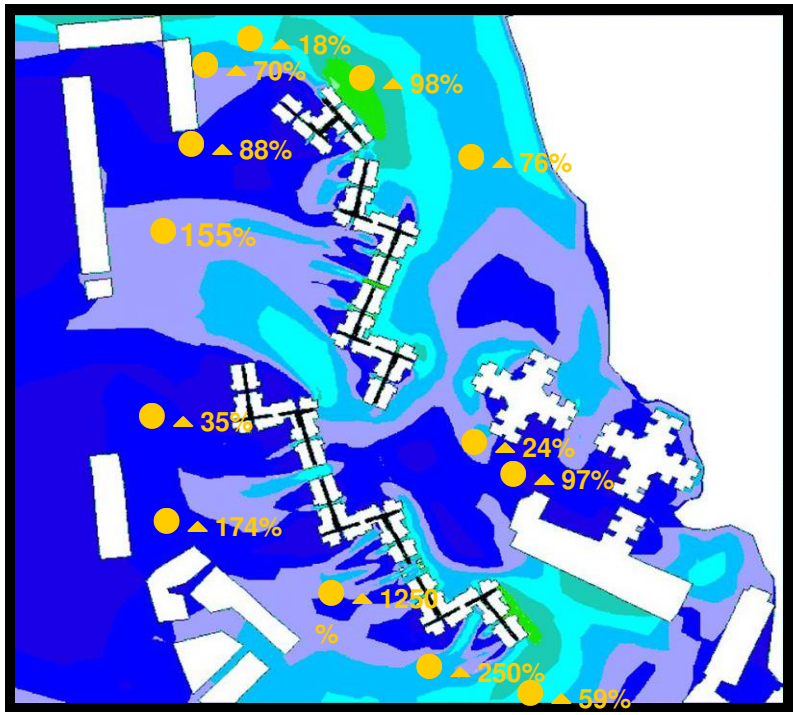
Measurement Simulation

Building Permeability

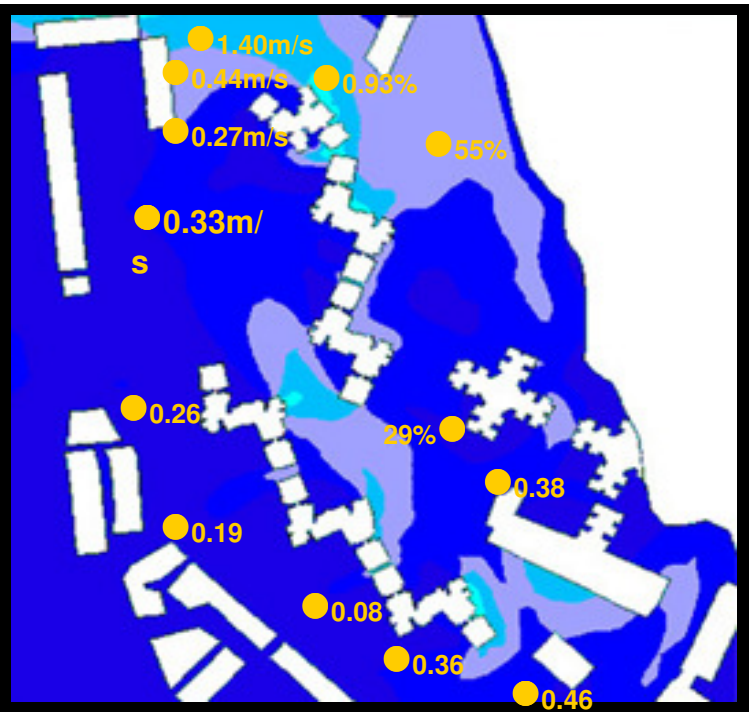
To enhance building permeability towards prevailing wind, we apply cross ventilated corridor design by providing openings on each floor. With more permeable building, wind passes through even high-rise buildings.

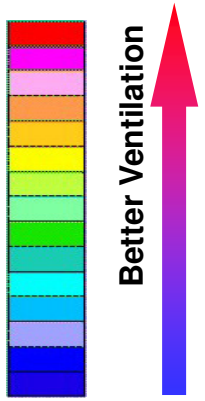
Upper Ngau Tau Kok Estate Phase 2 & 3

*Proposed Development **with** **cross-ventilated corridor***



*Proposed Development **without** **cross-ventilated corridor***

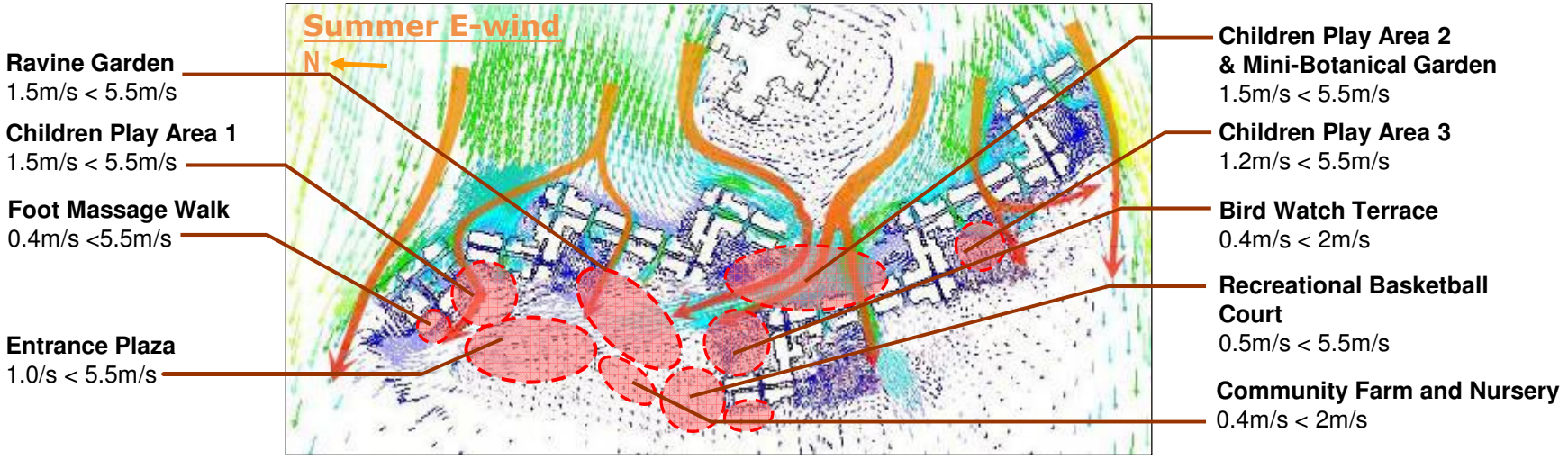




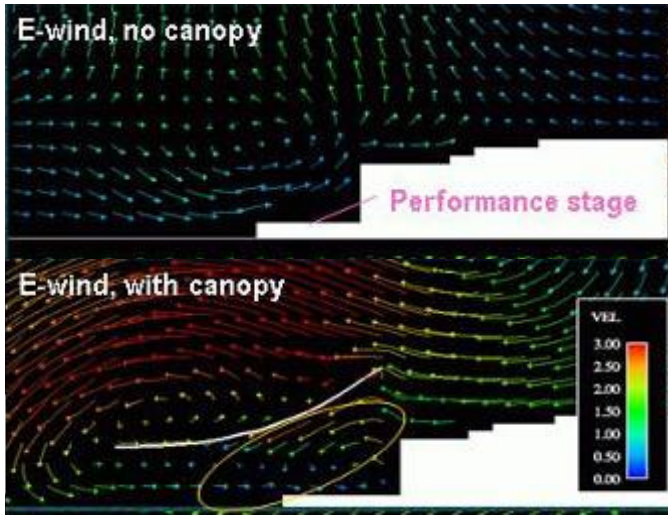
Thermal Comfort at External Environment

Resident survey result:

up to 99% very satisfactory on wind environment in external public areas

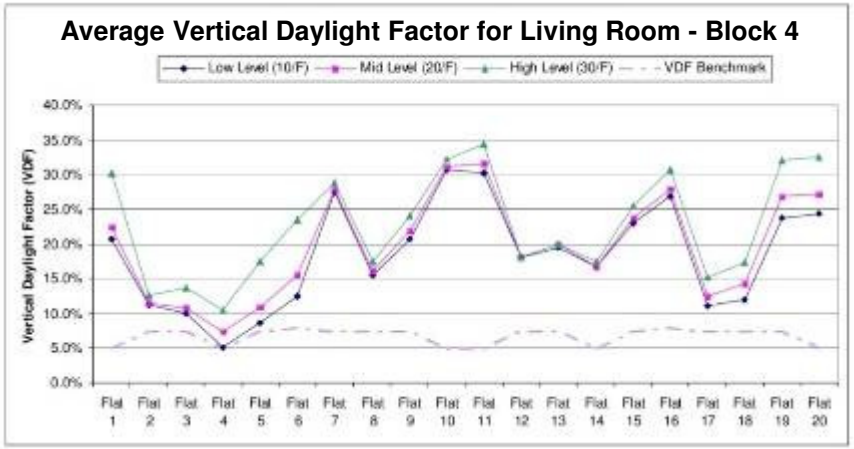


Tensile cover as wind deflector to enhance wind environment of Entrance Plaza

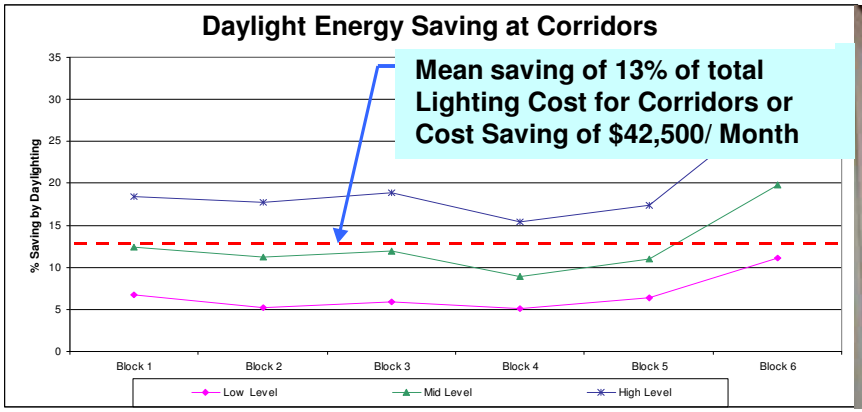


Daylight Enhancement

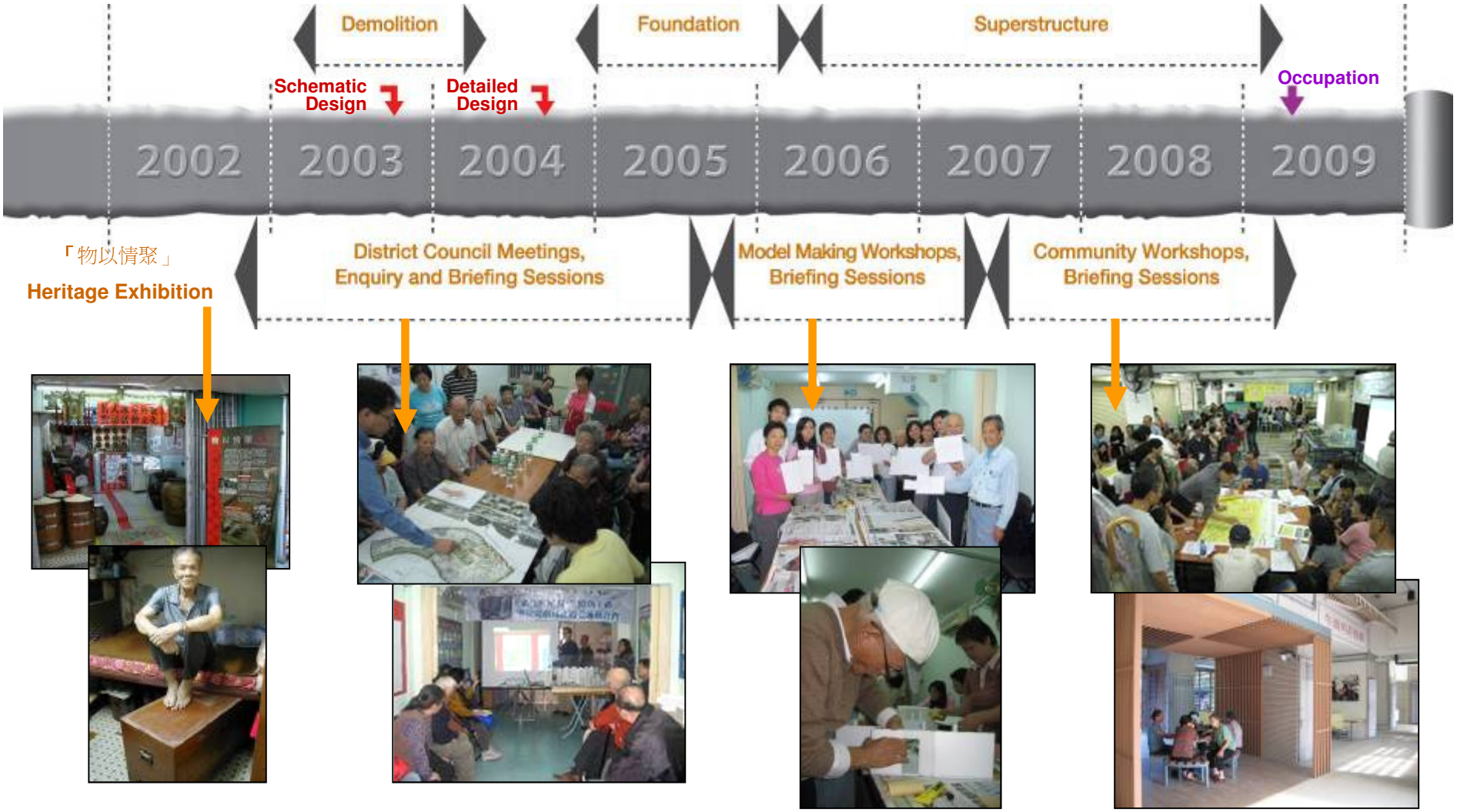
Maximize view and daylight penetration for domestic flats and common areas



Ventilated corridors with natural daylight achieve energy saving up to 15%



Partnering with Residents – Community Engagement



Tenants' Participation in Design

Shuttle Lift stops on Levels 1 and 2 to meet the need of the elderly and the disabled.

Tenants' Participation in Design

Handrails, guided paths and seats were added along the main covered walkways.

Exercise Areas for the Elderly

Heritage Gallery – design was based on local café in Lower NTK Estate

Leisure Sitting-out Area

Heritage Conservation

Artifacts donated by tenants are transformed into displays in 2009.

「物以情聚」
懷舊展覽會
Heritage
Exhibition in 2002

Upper Ngau Tau Kok Estate

In designing our projects, we carry out **Community Engagement** to collect stakeholders' views and aspirations, and incorporate them.

We also carry out **surveys of residents' views** after the occupation of new estates to gauge our success and identify areas for improvement.

Action Seedling

Community Art

We care not only for our tenants, but also for our construction workers

Prevent Heat Stroke

Drinking Facility

Sheltered Rest Area

Free Distribution of Watermelon on every Wednesday in Summer

Health Checking

First Aid Facilities & Equipment

Pre-work Health Check

Securing and Monitoring

Wages Payment to Workers

發展・建築

We change the culture of the Construction Industry

4D Business

- Dirty
- Dangerous
- Demanding
- Disruptive

→

- Clean & tidy
- Safe
- Satisfying
- Sustainable

香港房屋委員會改善工地安全措施藍圖
Roadmap of Housing Authority's Site Safety Initiatives Implementation

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015

策略（1）：採購策略和表現監察
Prong (1): Procurement Strategy and Performance Monitoring

1. 訂定房屋署的建築承建商名冊。(1990年)
   Housing Department's list of Building Contractors (1990).
2. 在承建商表現評分制中，最高20%的評審得分與工地安全有關。(1992年)
   A maximum of 20% of PASS output scores related to site safety (1992).
3. 修訂承建商表現評分制中有關工地安全的部份，加入罰分制度。(1995年)
   PASS site safety revised with Penalty points (1995).
4. 改善承建商表現評分制中有關工地安全的部份，加入罰分和獎分制度。(1996年)
   PASS site safety enhanced with Penalty and Bonus points (1996).
5. 推行綜合評分制度。(1999年)
   Preferential Tender Award System, PTAS (1999).
6. 加強紀律處分：暫時取消投標資格。(2000年)
   Disciplinary action enhanced: suspension of tender (2000).
7. 實施優質承建商組別計劃。(2000年)
   Premier League (2000).
8. 把承建商表現評分制中的安全因素比重定為10%，並加入稽核分數。(2002年)
   PASS safety weighs 10% and audit scores were incorporated (2002).
9. 實施承建商表現評分制和屋宇裝備承辦商表現評分制聯合安全評估的安排。(2003年)
   Joint PASS and BS PASS safety assessment (2003).
10. 加入機構表現評分的部份，並對因安全問題而被定罪的承建商，採取更嚴厲的規管行動。(2005年)
    Introduce Corporate Performance Score component, tightening regulatory actions for safety convictions (2005).
11. 修訂綜合評分制度，加入地盤安全的部份。(2005年)
    Corporate Scores with safety component under the PTAS (2005).
12. 按嚴重事故引發風險管理考慮，對投標進行仔細查核。(2006年)
    Quarantine tender on risk management grounds as triggered by serious incident (2006).
13. 在拆卸工程招標時實施初步篩選和雙軌投標評審制度。(2006年)
    Demolition tenders: shortlisting and two-envelope evaluation (2006).
14. 改善承建商表現評分制的工地安全評分。(2007年)
    Enhanced PASS Site Safety assessments (2007).

策略（2）：合約規定和管理
Prong (2): Contractual Requirements and Administration

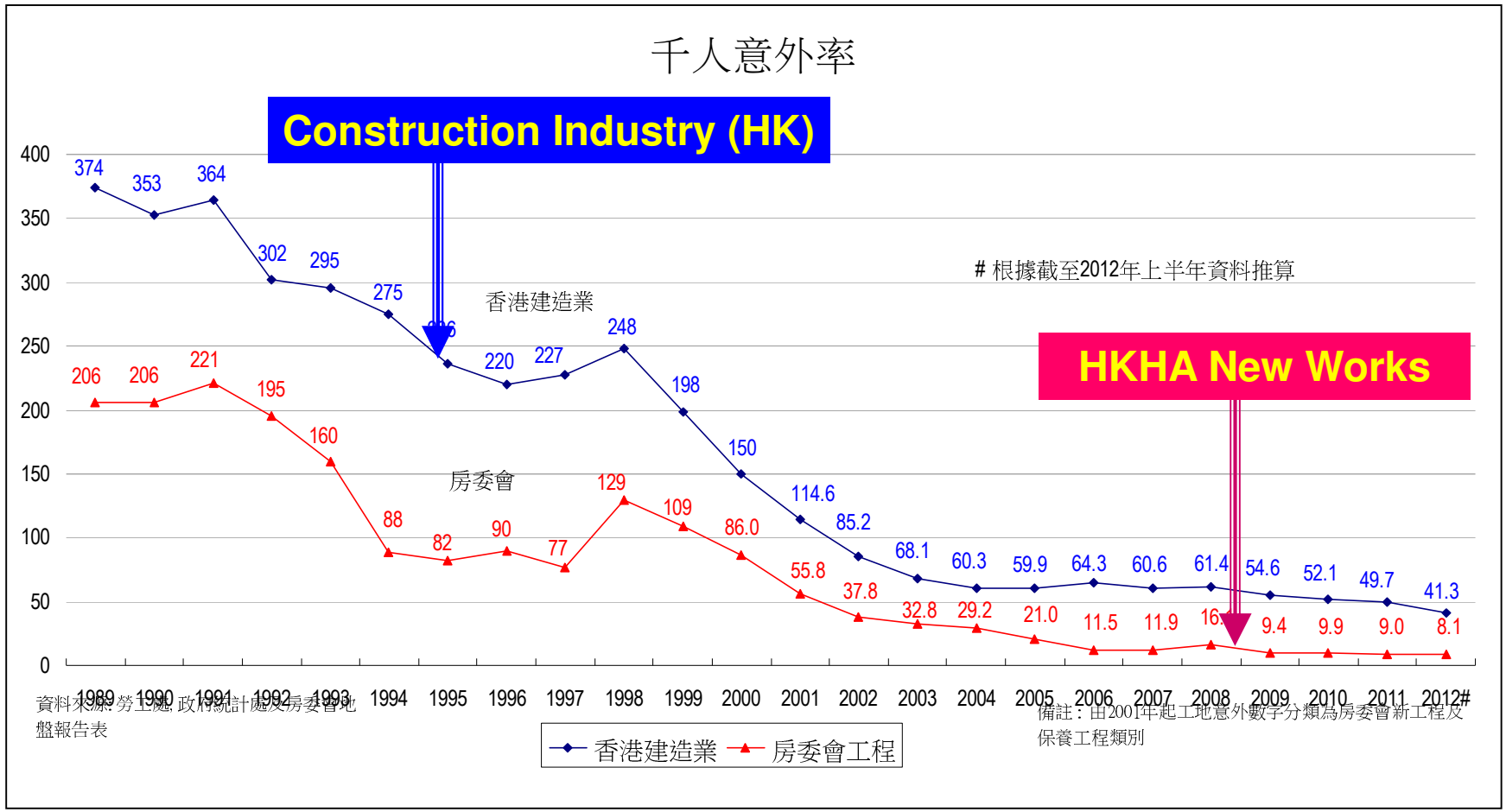
1. 設立安全主任職位。(1990年)
   Safety Officer (1990).
2. 在升降機井口設置防護設施。(1990年)
   Protection of lift well opening (1990).
3. 設置棚架、防墮網、保護篷蓋。(1991年)
   Scaffolding / Catch fans / Protective canopies (1991).
4. 設置施工樓層通道。(1991年)
   Access to working floor (1991).
5. 設置意外事故統計布告板。(1993年)
   Accidents Statistics signboard (1993).
6. 禁止使用手挖沉箱。(1993年)
   Hand-dug caissons ban (1993).
7. 工人必須接受工藝測試。(1994年)
   Trade testing of workers (1994).
8. 工地會議議程須加入有關安全事項的議題。(1994年)
   Safety on agenda of site meeting (1994).
9. 規定工人持有平安卡。(1995年)
   Green Card (1995).
10. 制定工作安全計劃和進行安全稽核。(1996年)
    Safety Plans and Audits (1996).
11. 規定工人持有超級平安卡。(1997年)
    Silver Card (1997).
12. 實施安全支付計劃。(2000年)
    Pay for Safety provision (2000).
13. 在打樁工程合約內限制分包合約。(2001年)
    Piling contracts: restriction on subcontracting (2001).
14. 由獨立審查組監督工地安全。(2002年)
    Site Safety Supervision by Independent Checking Unit (2002).
15. 實施安全施工程序。(2003年)
    Safe Working Cycle (2003).
16. 推行綜合支付環境、衛生及安全計劃。(2003年)
    Integrated Pay for Environment, Hygiene and Safety (PEHS) Scheme (2003).
17. 加強在建築工地實行硬地施工法的規定。(2005年)
    Enhanced hard paving provision in construction sites (2005).
18. 在拆卸工程合約內規定：每兩星期由註冊結構工程師和全職駐工地工程師巡視；每天早上由安全主任和適任技術人員進行實地視察；以及加裝攝錄機，以監察承托支架的拆除工作。(2005年)
    Demolition contracts: bi-weekly RSE visit and full-time site engineer, daily morning site inspection by Safety Officer and TCPs, and extra video cameras to monitor props removal (2005).
19. 擴展綜合支付環境、衛生及安全計劃，以涵蓋屋宇裝備指定分包合約。(2006年)
    Extend PEHS Scheme to building services nominated sub-contracts (2006).
20. 優化安全稽核。(2007年)
    Enhanced Safety Audit (2007).
21. 銀咭擴展至10個類別高危害工種。(2007年)
    Silver Card expanded to 10 high-risk trades (2007).
22. 優化安全支付計劃，加入推動成效的項目。(2007年)
    Pay for Safety enhanced with performance driven initiatives (2007).

策略（3）：研究、培訓和推廣
Prong (3): Research, Training and Promotion

1. 與勞工處舉行聯絡會議。(1990年)
   Liaison meeting with Labour Department (1990).
2. 推行工地安全運動。(1990年)
   Site Safety Campaign (1990).
3. 設立意外事故統計記錄。(1990年)
   Statistics on Accidents (1990).
4. 成立房屋署地盤安全委員會。(1992年)
   Establishment of HD Site Safety Committee (1992).
5. 就意外事故進行研究。(1993年)
   Research into accidents (1993).
6. 推行房屋委員會安全稽核計劃。(1997年)
   Housing Authority Safety Audit Scheme implemented (1997).
7. 簽署安全約章。(1997年)
   Signing of Safety Charter (1997).
8. 實施工人須擁有安全鞋的規定。(1998年)
   Workers' ownership of safety shoes (1998).
9. 舉辦以安全管理為題的研討會。(1998年)
   Safety Management Seminar (1998).
10. 舉辦房委會「優質居所 攜手共建」會議，主題為安全管理。(2000年)
    HA Quality Housing: Partnering for Change Conference - Safety Management (2000).
11. 制定工地安全策略。(2000年)
    Site Safety Strategy formulated (2000).
12. 與建造業檢討委員會配合，採取一致的安全措施。(2001年)
    Safety measures aligned with CIRC initiatives (2001).
13. 房屋署優質公共房屋建造及保養維修大獎計劃。(2003年)
    HD Quality Public Housing Construction & Maintenance Award Scheme - Site safety awards (2003).
14. 成立房屋署工地安全小組委員會。(2006年)
    Establishment of HDSSSC (2006).
15. 勞工處為維修保養工程和新工程承建商和房屋署員工舉辦的安全研討會。(2006年)
    Safety Seminars by Labour Department for contractors and HD staff (2006).
16. 職安局按安全稽核新版本舉行安全研討會。(2007年)
    Safety Seminars by OSHC to tie in with the new edition of Safety Audit (2007).
17. 舉行吊運操作安全警覺研討會。(2007年)
    Safety Alert session on lifting operations (2007).
18. 工地安全約章和研討會。(2007年)
    Site Safety Charter Signing and Forum (2007).

Our SAFETY achievements are encouraging!

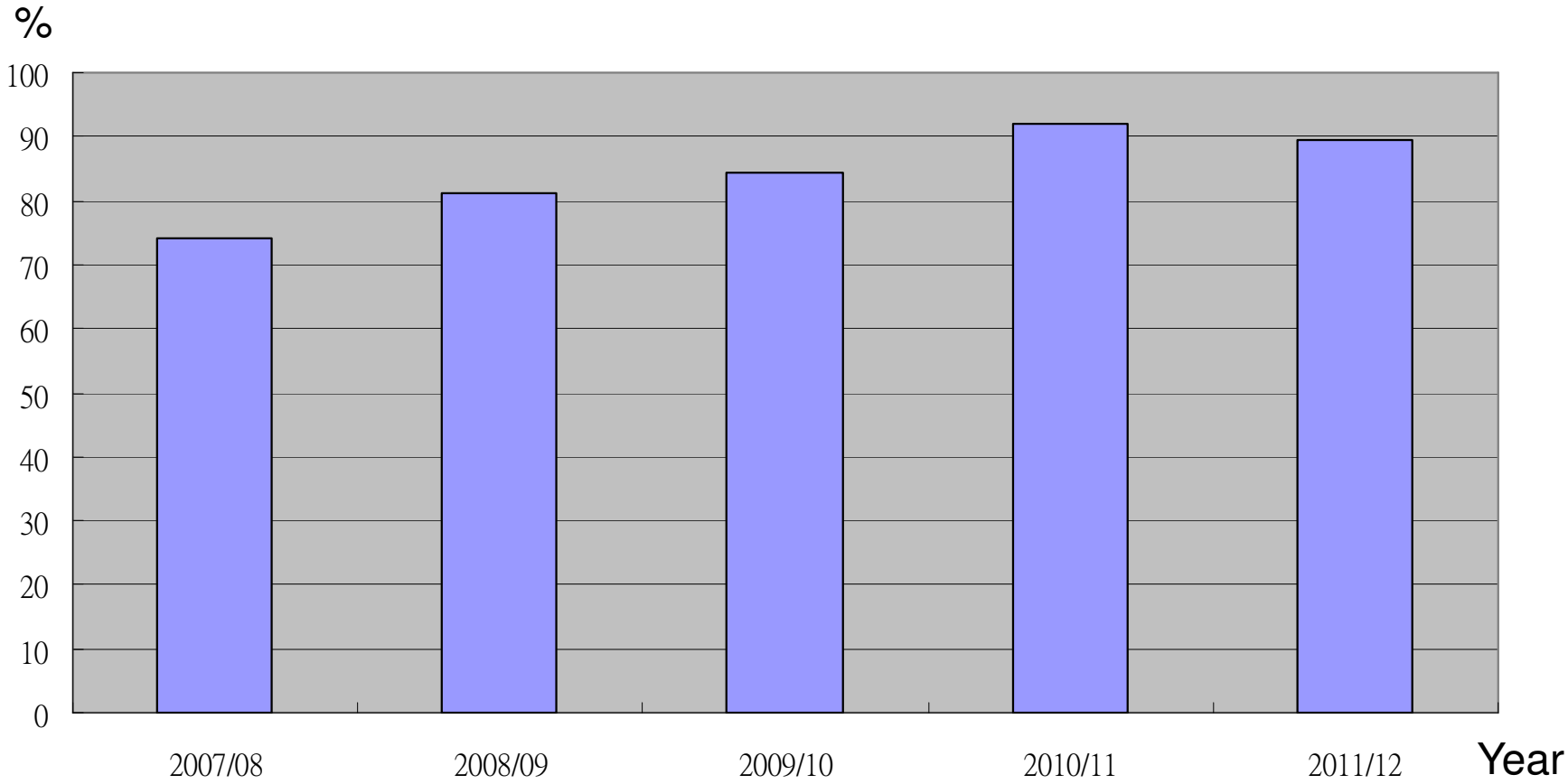
New Works Site Safety Performance



Customer Survey Results

Customer Satisfaction Index of the past five years

(from > 74% in 2007/08 to about 90% in 2010/11, 2011/12)



Society Results

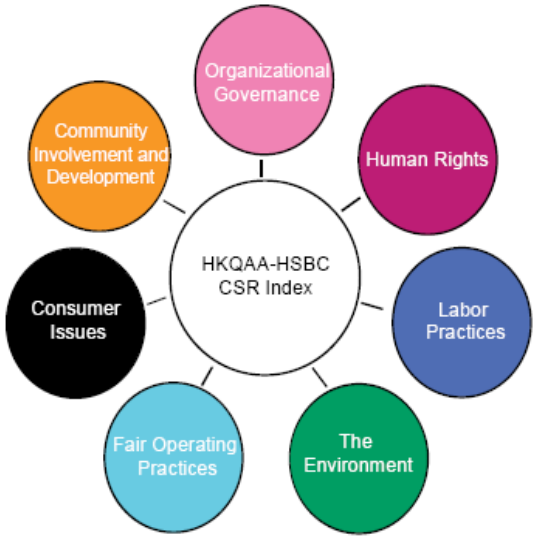
High achievement in HKQAA-HSBC CSR Index *(ISO 26000)* assessment

CSR advocate HKQAA-HSBC CSR INDEX

CSR Advocate since 2010

	2010	2011	2012
HA (DCD)	4.90	4.97	**5.00**
HK average	4.57	4.62	4.64

Maximum score = 5.00



7 Core Subjects of ISO 26000

同心展關懷 caringorganisation 2008/09

Awarded by The Hong Kong Council of Social Service 香港社會服務聯會頒發

Since 2006

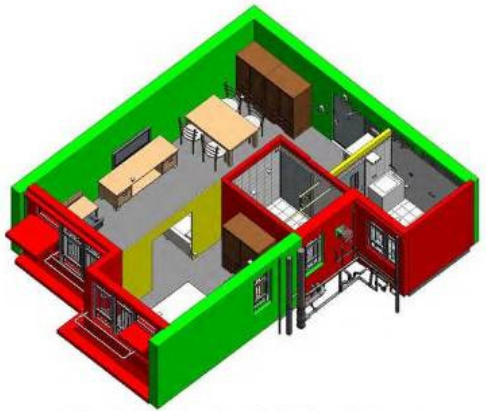
減廢 Wastewi$e
Hong Kong Awards for Environmental Excellence
香港環保卓越計劃
Excellence 卓越
membership no. WW-0000-0055
Class of Excellence Wastewi$e Label

Since 2000

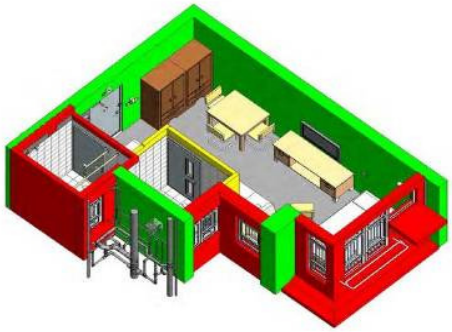
3. Caring for the Environment

Using Modular Flat Design

- **Regulated standards**
- **Enhanced buildability, consistency & economies of scale**

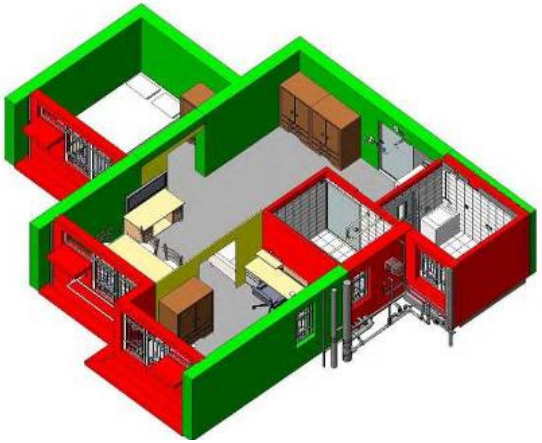


1 Bedroom Flat



2-3 Person Flat

1-2 Person Flat



2 Bedrooms Flat

Using Prefabricated Elements …..

- Staircases
- Facades
- Semi-precast slabs
- Volumetric precast-bathrooms/ Kitchens
- beams

- Production under factory environment
- Less material wastage
- 30% less C&D wastes on-site, safer






….. Including Volumetric Precast Elements

Using Large Panel Formwork, etc.

- Metal large panel formwork / Metal hoarding
  - Mechanised construction/precasting
  - Less material wastage
  - Repeated use, recycle
- Timber from sustainable sources for temporary works

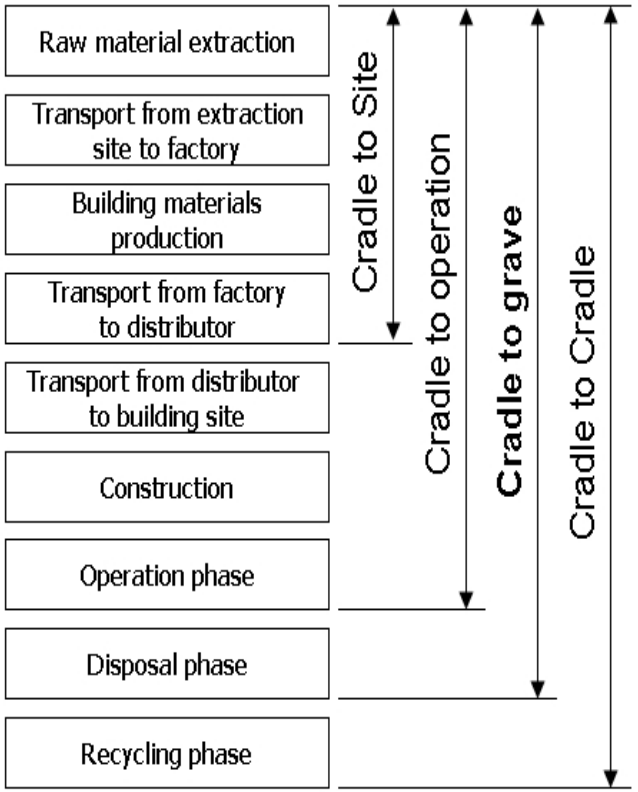
Save 15000 tonnes of timber in 2011/12

Using recycled materials

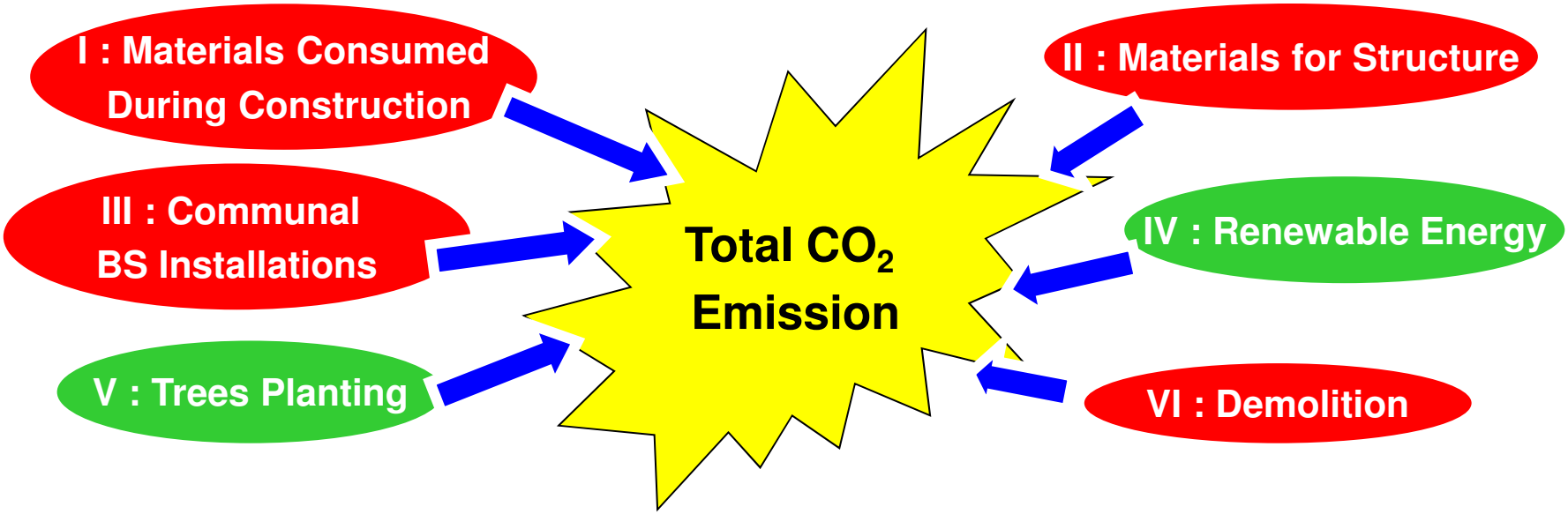
- Cement–stabilised marine mud recycled for backfilling and making masonry blocks, pavers and roof tiles.
- Paving Blocks with Recycled Glass & Aggregates
- Use bore-logs as planter kerbs.
- Use GGBS to partially replace cement in precast concrete construction.
- Recycled excavated rock materials for construction of ‘footing’ of site hoarding and for constructing Gabion structures

Carbon Emission Estimation (CEE)

- To realize green and low carbon building designs, a straight and pragmatic methodology is necessary to give a direct indication of the holistic environmental impacts from residential buildings .
- Potential to reduce carbon emission is high if decision is made at building **design stage**.
- An effective **design verification tool** to holistically gauge the net carbon emission of domestic buildings.
- Focusing on the CO2 emission associated with major construction materials and building operations from **cradle to grave** for a building life of **100 years**.



Total CO_2 Emission



I + II + III – IV – V + VI = Total CO_2 Emission

Methodology for Carbon Emission Estimation

Two "**Green**" aspects, i.e. **Aspect IV** and **Aspect V** are included to take stock of the provisions with "**carbon-reduction**" and "**carbon-absorption**" effect.

Reduction of Energy Consumption


CERTIFIED COMPANY
HKQAA

HOUSING DEPARTMENT
Development and Construction Division

Planning, design, project management and contract administration for the construction of public housing

HONG KONG QUALITY ASSURANCE AGENCY

Chief Executive Officer | Director

Certified to ISO 50001 in June 2012, the first organization in Hong Kong for residential building design.

Lighting -

- Optimizing daylight through employment of photo sensors and time switches
- Adoption of energy efficient electronic ballasts and T-5 fluorescent tubes
- Optimization of illumination levels by means of 2-level lighting system for lift lobbies, corridors and staircases on typical floors

Lifts -

- Optimization of lift provision and design
- Light weight lift car decoration design
- Adoption of variable voltage variable frequency (VVVF) lift driving system

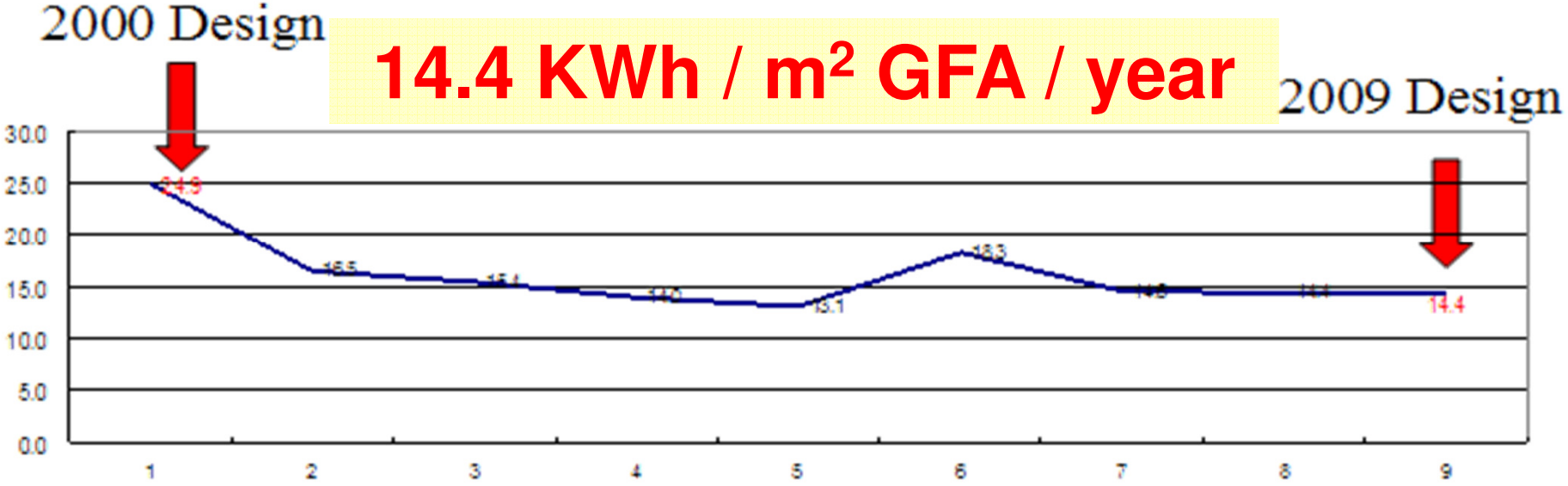
Water Pumps -

- Electronic variable speed drive control
  systems coupled with stamped stainless steel pumps in the fresh water booster pump system
- High efficiency motors

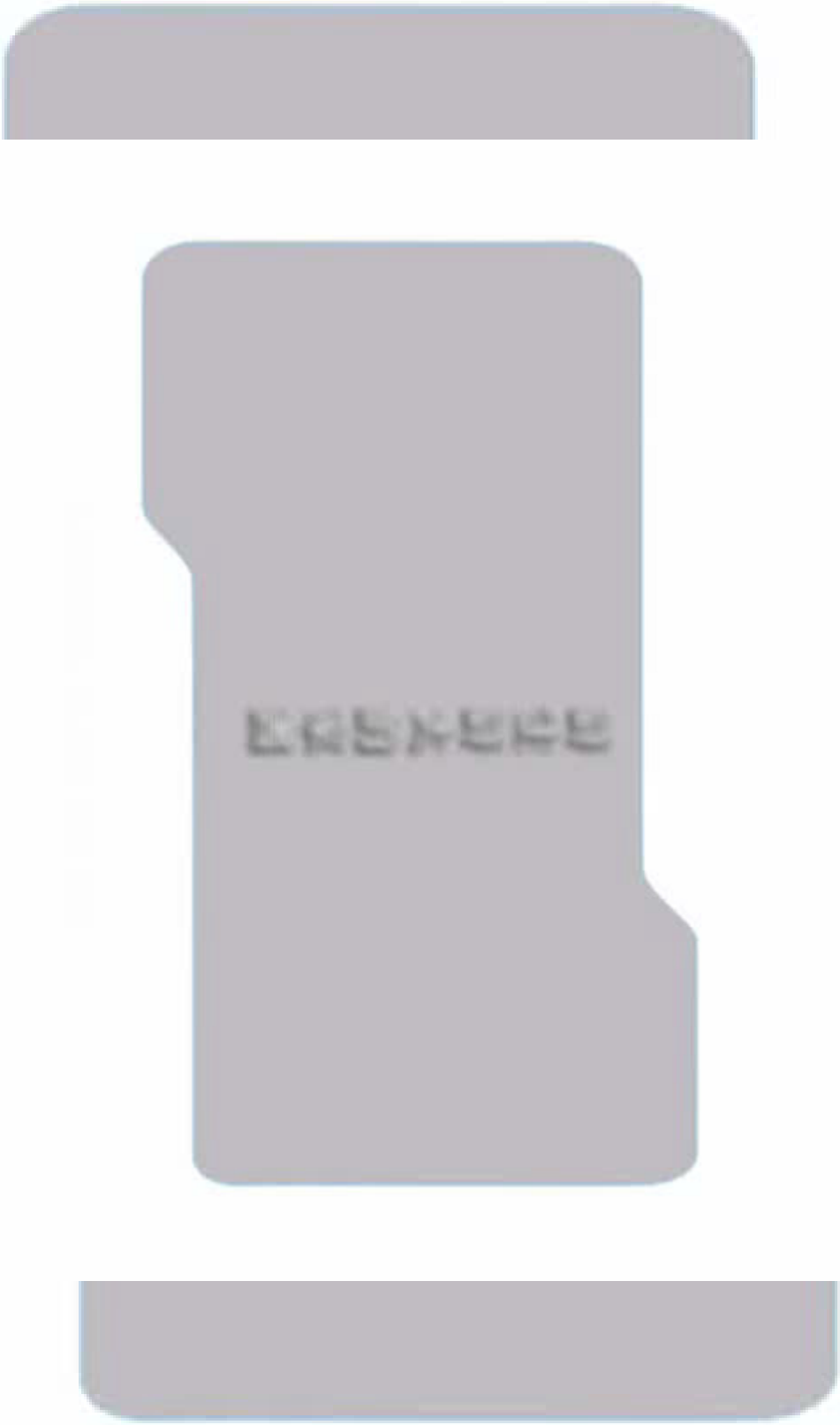
Use of Renewable Energy




New Buildings – How Are We Doing ?

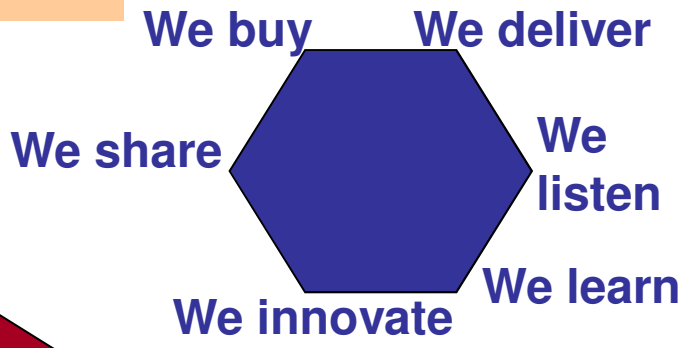


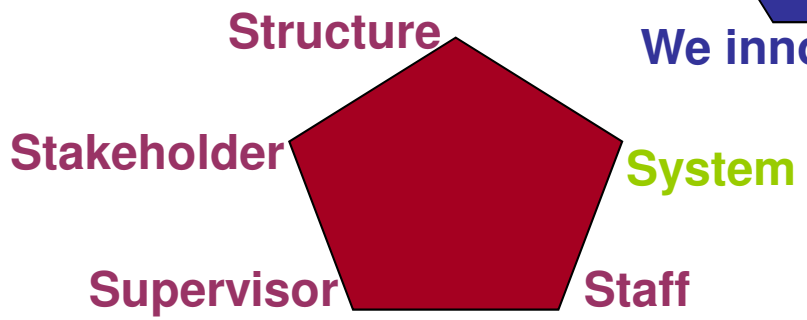
The sum of all the above
= Contented Tenants!

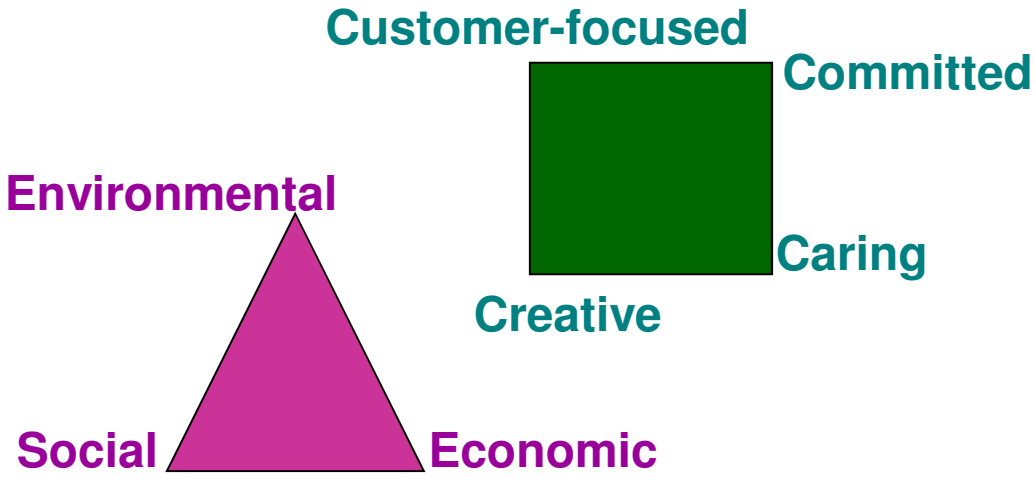


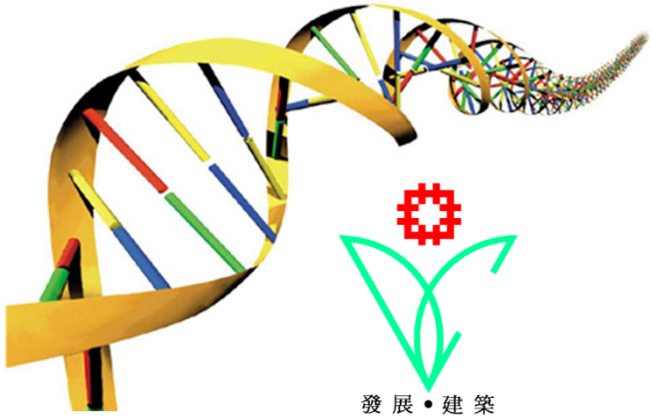
Our "Big Picture": We walk the talk.

We have holistic vision and effective operation through ***Total Quality Management****, involving both internal and external parties.*









>> **This is our DNA.**

A **Compact City** is **NOT**

a **City "Without Ground"**

- It is grounded in **people's needs**
- It is grounded in people's **way of life**
- It is grounded in its **natural environmental characteristics**
- It is a city with its ground intelligently and optimally freed up and **greened** to support **community building**

We serve, we excel through a people-centric approach,
applying our Core Values of 4Cs,
plus Total Quality Management
to assure -

Green and Healthy Living in a High-Rise, High Density, Subtropical Urban Environment