

Environmental Protection and Testing: The Housing Authority's Experience

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Hong Kong Housing Authority**



Environmental Protection & Testing

- 1. Introduction – Sustainable Development**
- 2. Applying Innovative Procurement, Green Design & Construction**
- 3. Applying Intelligent Solutions & IT**
- 4. Conducting Applied Research for Green Solutions**
- 5. Quality Assurance & Material Testing**



Environmental Protection & Testing

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Public Housing in Hong Kong - a Sustainable Community

■ Vision

- To help all families in need to gain access to adequate and affordable housing

■ Mission

- 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 4 C's

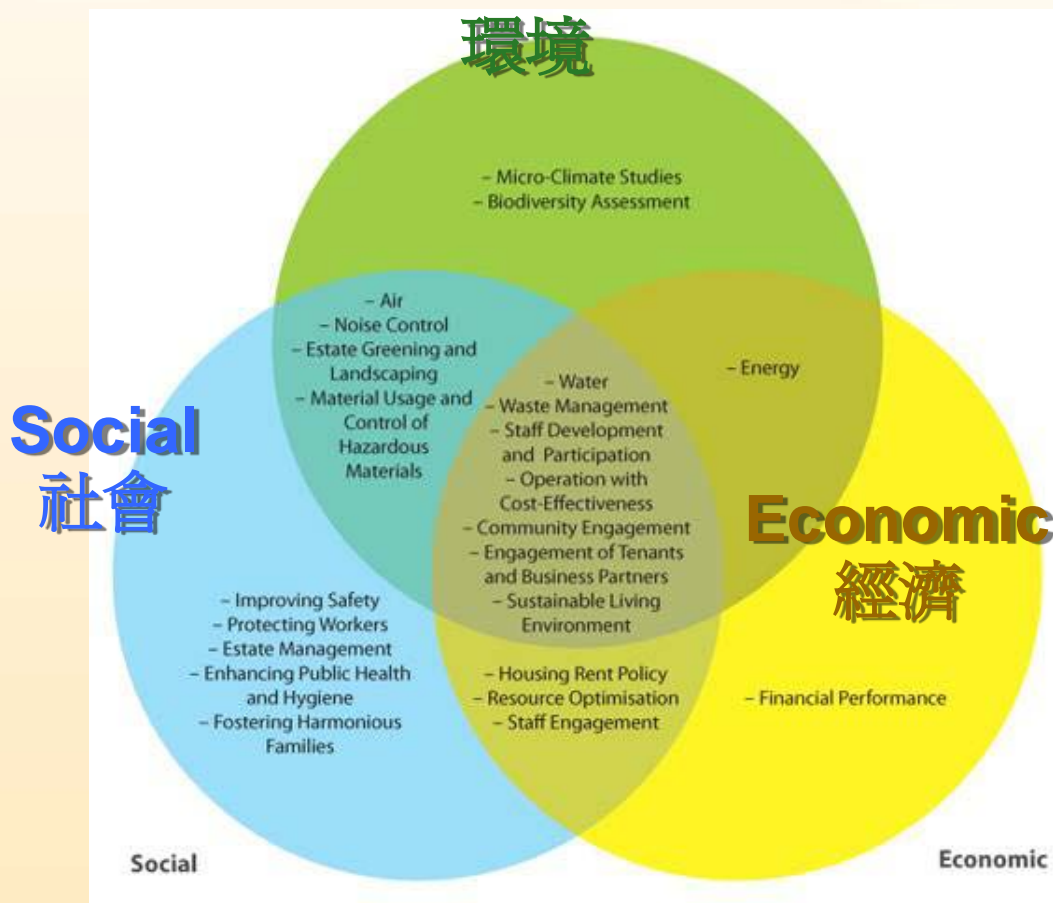




We have a stock of about **700,000 flats**, and we are building an average of about **15,000 flats per year**. About **30%** of Hong Kong's 7 million people are residing in public rental housing.

Sustainable Development : To meet present **social, economic and environmental** needs but **NOT** at the expense of future generations. We provide a green and healthy living environment for our community.

Environmental



Environmental Protection & Testing

1. Introduction – Sustainable Development

2. Applying Innovative Procurement, Green Design & Construction

- Three- envelope Tendering System for Integrated Procurement Contract
- Two- level Lighting System for Lobbies, Corridors and Staircases

3. Applying Intelligent Solutions & IT

4. Conducting Applied Research for Green Solutions

5. Quality Assurance & Material Testing



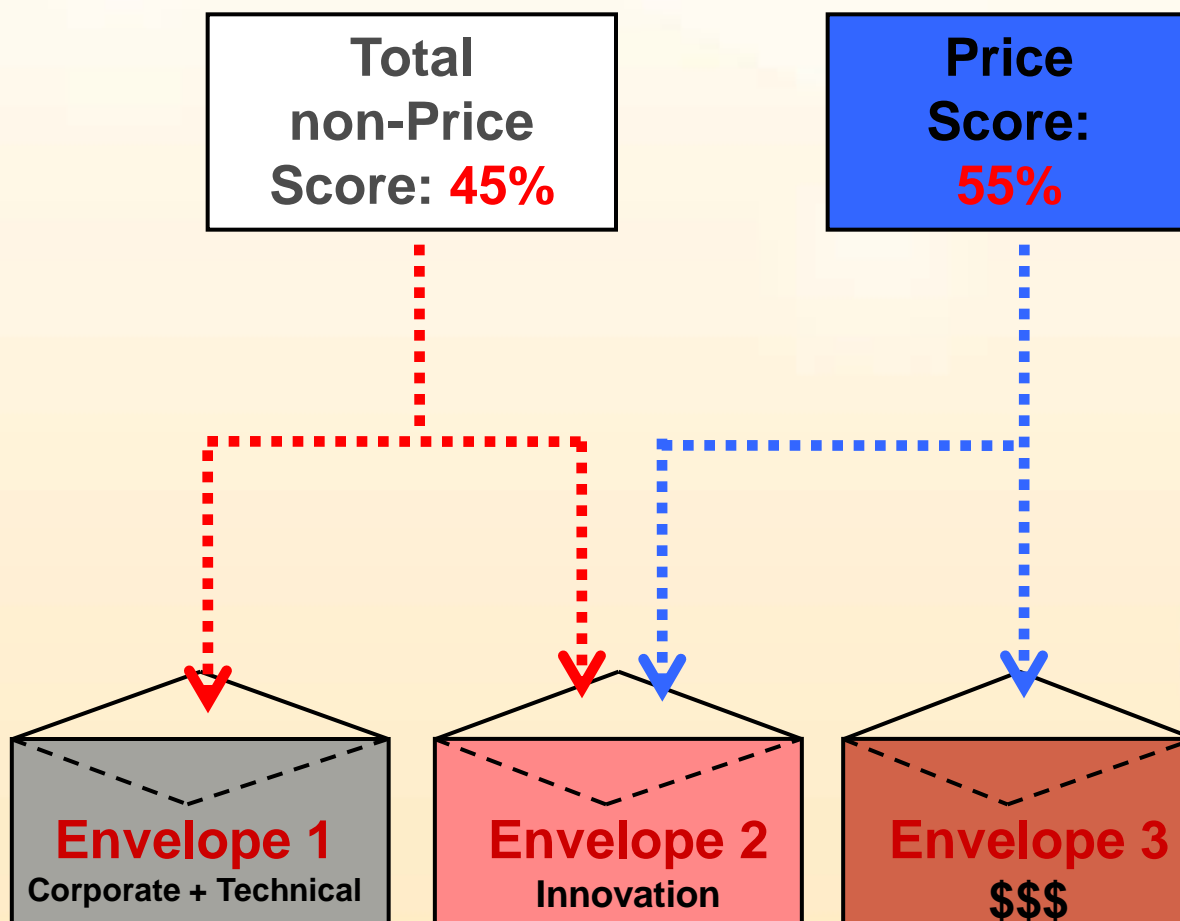
Procuring for Innovations : Incentivizing Innovations

Remember '2 Envelope Systems'?

- to select **designers (or 'contractors')** based on evaluation of both
(1) **Technical** and (2) **Price** – envelopes (proposals)

- HK Housing Authority aims to move Construction from 4Ds to 4Cs:
***from* Dirty, Dangerous, Demanding, Damaging/ Disruptive
to Caring, Customer-focused, Creative, Committed**
launched a '**3 Envelope**' System in 2009, with the additional Envelope requiring Tenderers to propose any **specific Innovations**.
- **1st (Technical) envelope** only relates to Client Design and proposal, hence must conform to that.
- **But 2nd envelope** will list any 'alternatives' as **innovations (in 2a)**; and secondly list corresponding **benefits** and **costs (in 2b)**.
- **Unsuccessful tenderers** will be paid a one-off lump sum for acquisition of intellectual property right **for their innovations**, specially on Design & Build projects as in the **pilot project now underway**.

Procuring for Innovations : The Three- envelope System



Procuring for Innovations : Assessment, Scoring & Selection of Innovation Proposals

Step 1 –Open *Envelope 2a* and Assess Technical Submissions

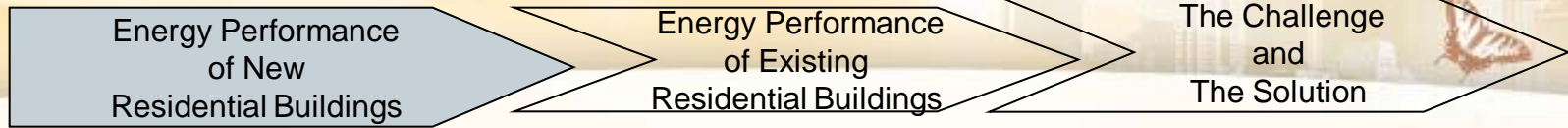


Step 2 –Open *Envelope 2b* and Prioritize Proposals



Step 3 –Select Proposals





2- Level Lighting System

- Design Manual: Barrier Free Access 2008 requires **85 Lux** at Common Areas for needy people
- **386,243 kWh** would have been consumed per annum
- A duty set of lighting system will provide **30 Lux** around the clock, it's the minimum requirement of the Code of Practice for Means of Escape
- Standby sets of lighting system at different areas to elevate to 85 Lux when switched/ triggered on
- Extra \$800,000 for the control, conduit and cable
- Only **264,799 kWh** will be consumed per annum, save 121,444 kWh, 7 years payback

2- Level Lighting System

Press the Button



Saving Mode
Bright Mode

Standby
Set Off

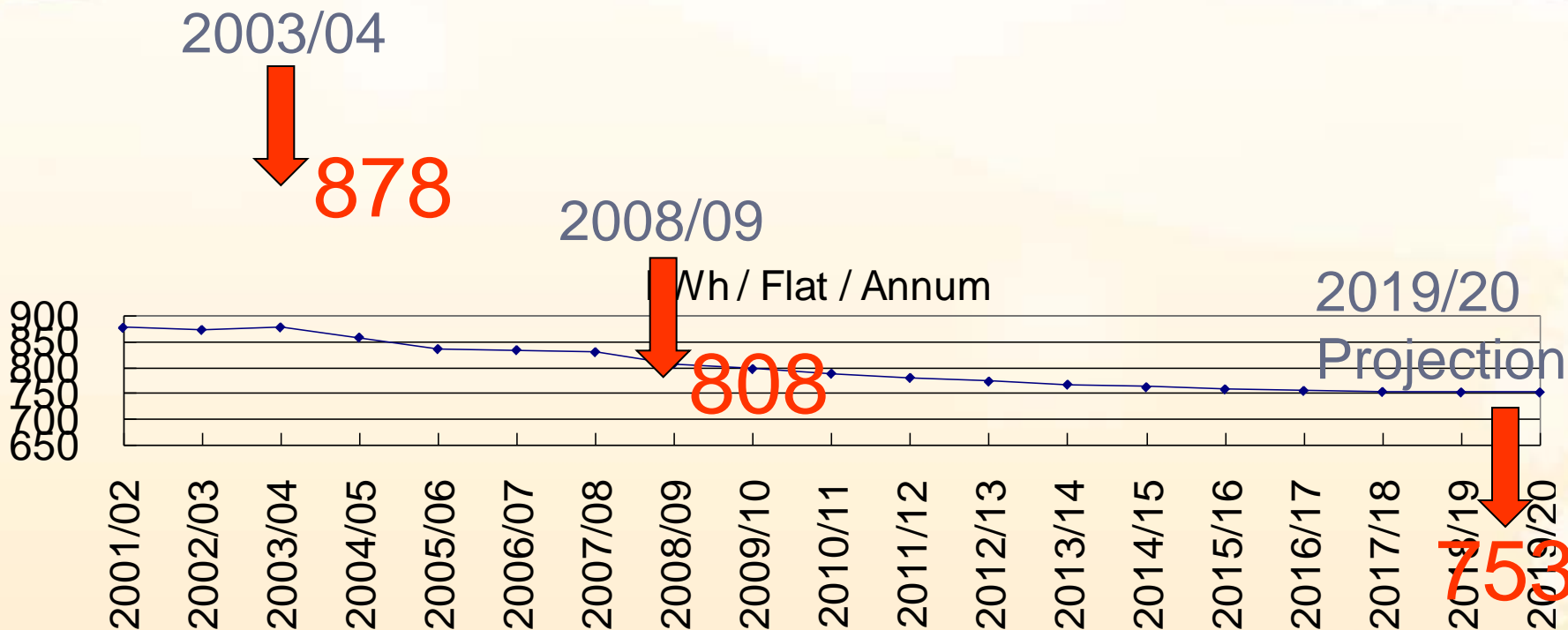
On for 10 mins

Corridor
Entrance

30 Lux
85 Lux



The Downward Trend of Electricity Consumption



- Trim down **over-illuminated** lighting level
- Employ high efficiency **T5** Fluorescent Tube to replace T8 Fluorescent Tube
- Employ high efficiency **Electronic Ballast** to replace Electromagnetic Ballast in lighting system
- Employ **Photo Sensor** to control lighting on/off
- Set **timer** according to season to control lighting on/off
- Modernize lifts with advanced **Variable Voltage Variable Frequency** control system

The Challenge

- The electricity consumed by lighting serving the common areas of all the HA's existing residential blocks is approximately **250 gWh** per annum
- **20%** saving would mean 50 gWh or \$50M or
- **35,000 tonnes of CO₂** emission reduction

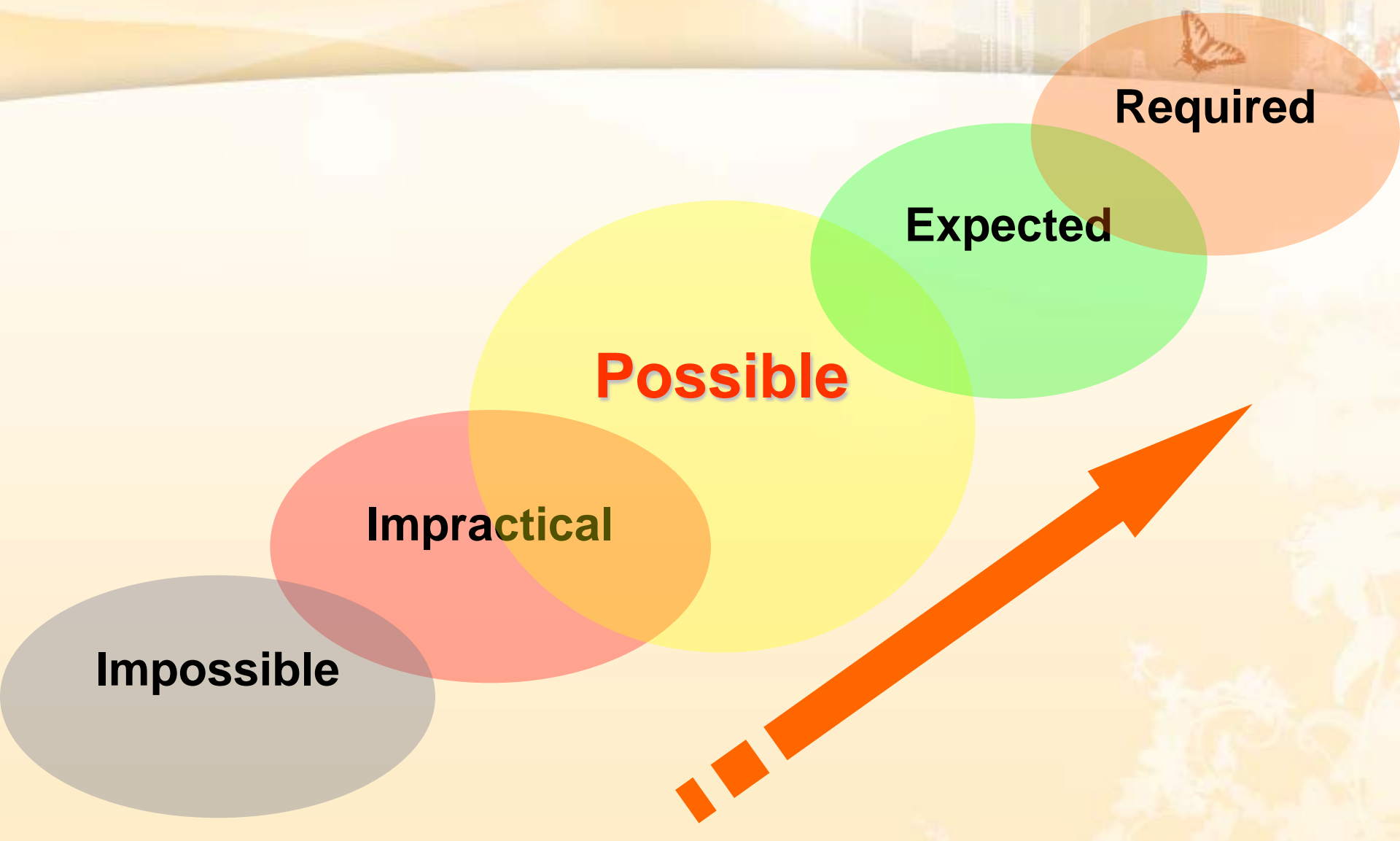
The Solution

- **LED** Lighting could be a solution to the challenge
- HA is actively **motivating the industry** to design and produce LED Lighting bulkhead fitting that can be used to replace the existing Compact Fluorescent Lighting bulkhead fitting
- If successful, the **private buildings can follow** and Hong Kong can benefit



Environmental Protection & Testing

1. Introduction – Sustainable Development
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- 3. Applying Intelligent Solutions & IT**
 - Use of Building Information Modeling (BIM)
 - Use of Geographic Information System (GIS)
 - Use of Radio- frequency Identification (RFID)
4. Conducting Applied Research for Green Solutions
5. Quality Assurance & Material Testing



Impossible

Impractical

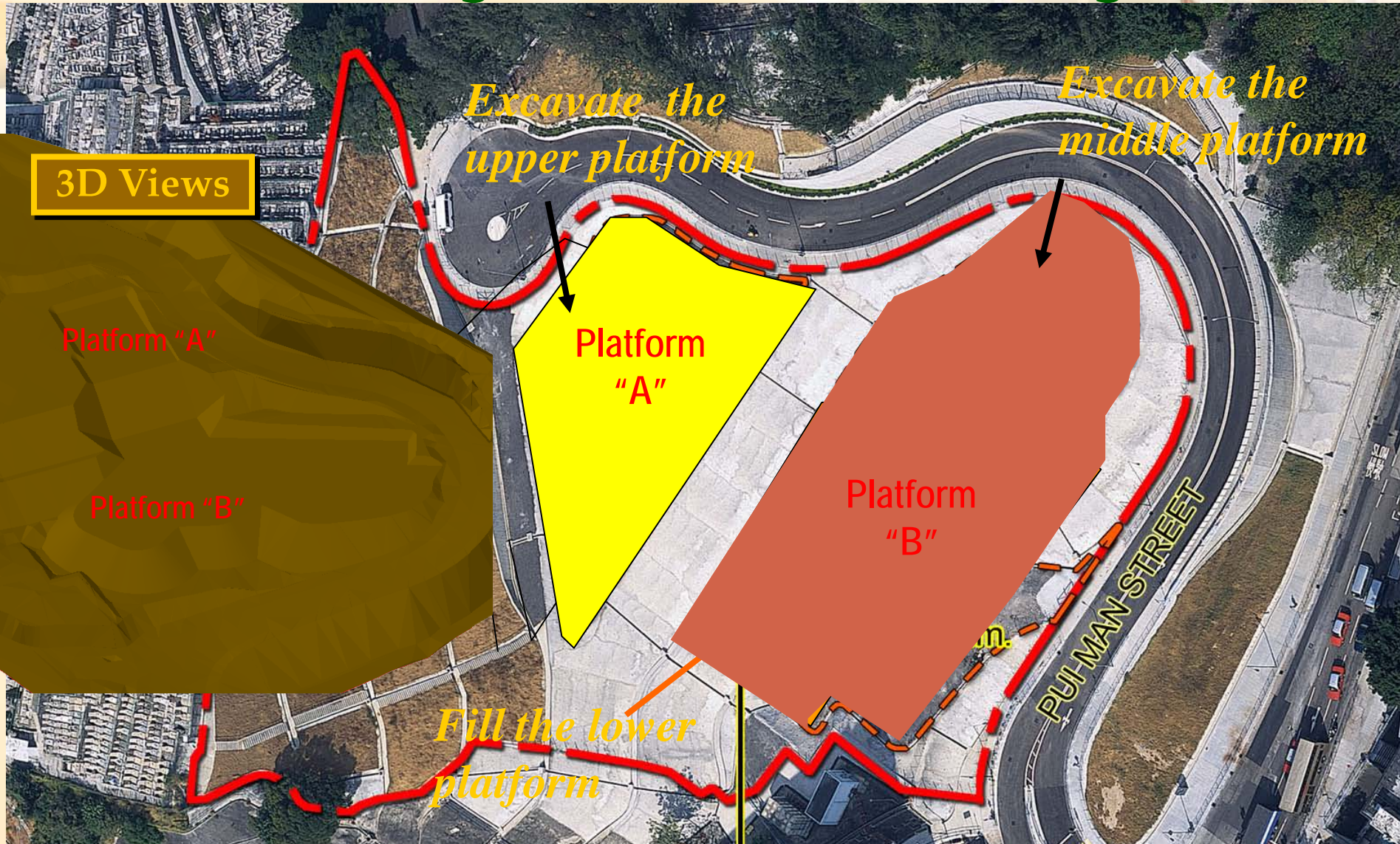
Possible

Expected

Required



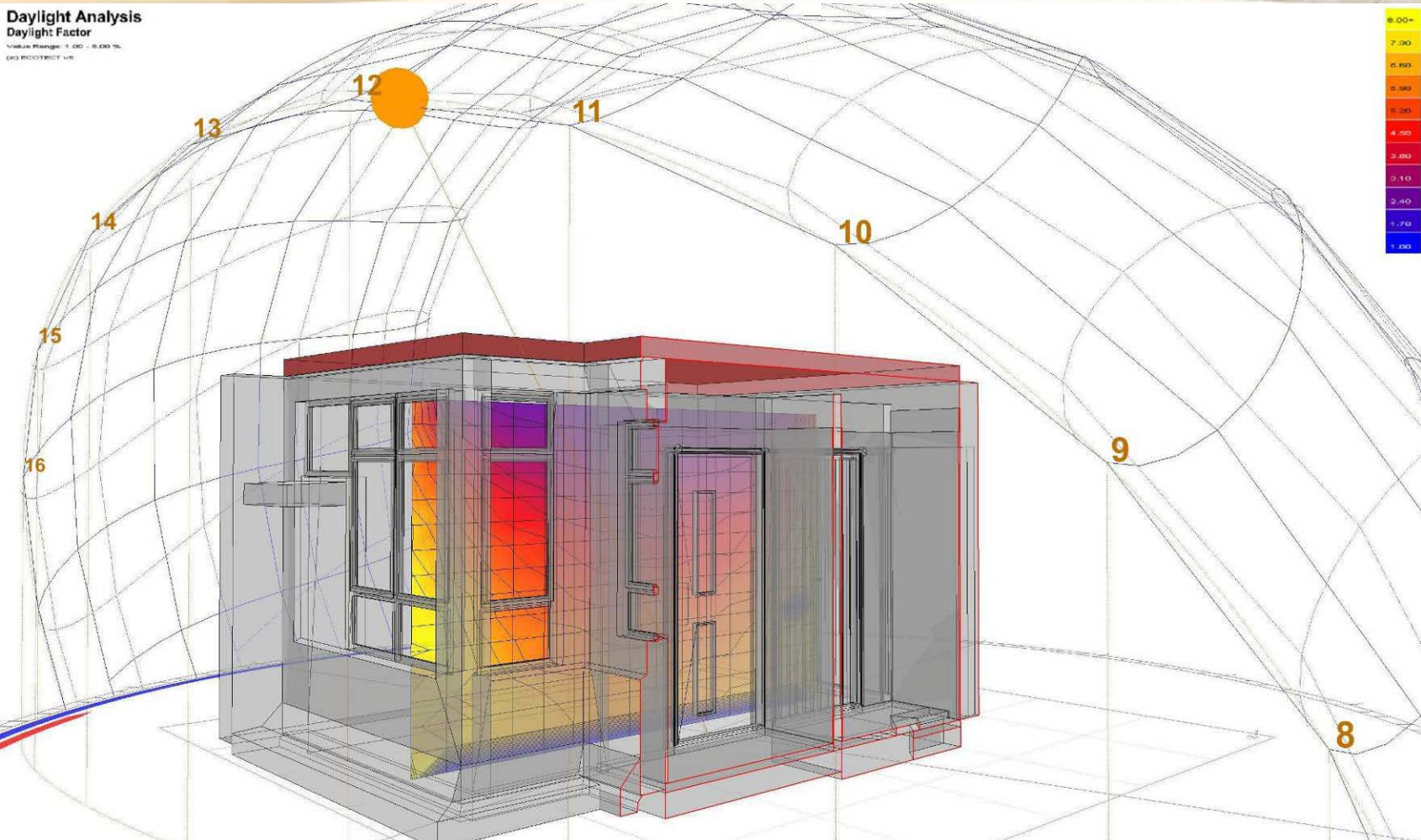
Building Information Modeling



Formation of Temporary Soil Platforms - "Cut and Fill Balancing" to minimize the import and export of fill materials

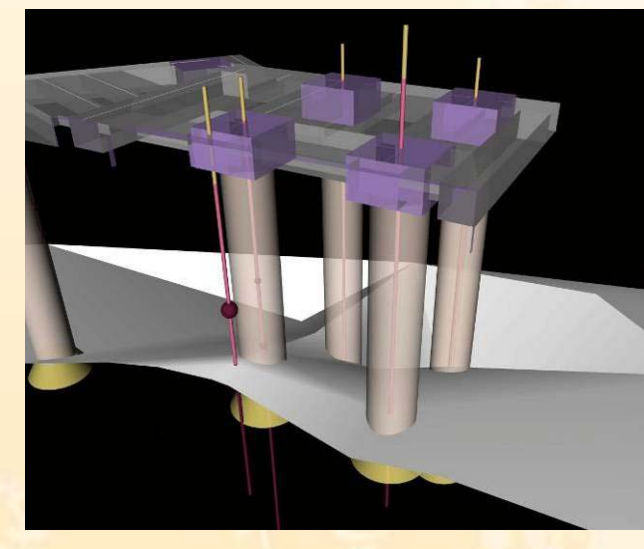
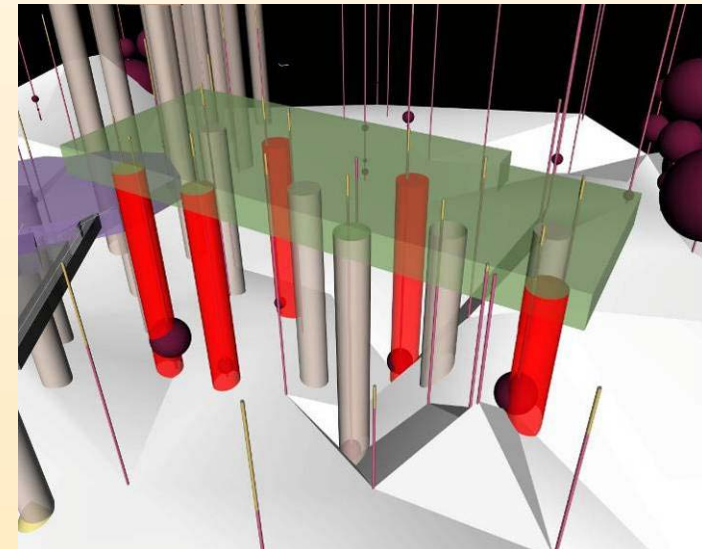
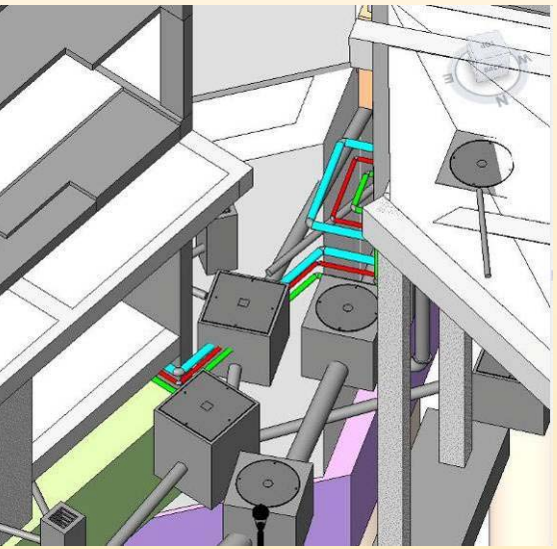
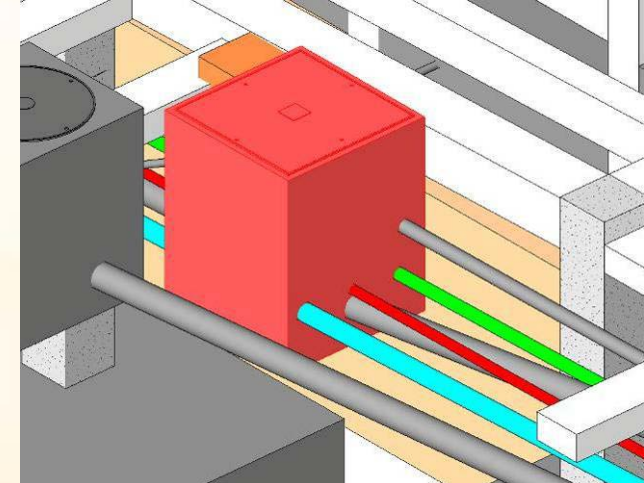
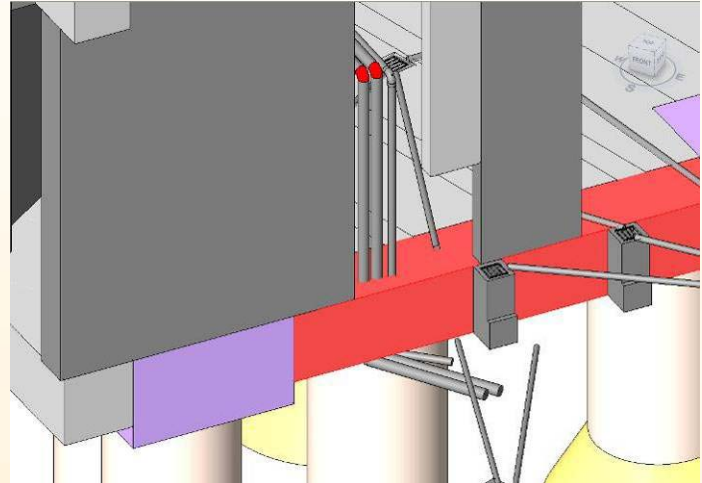
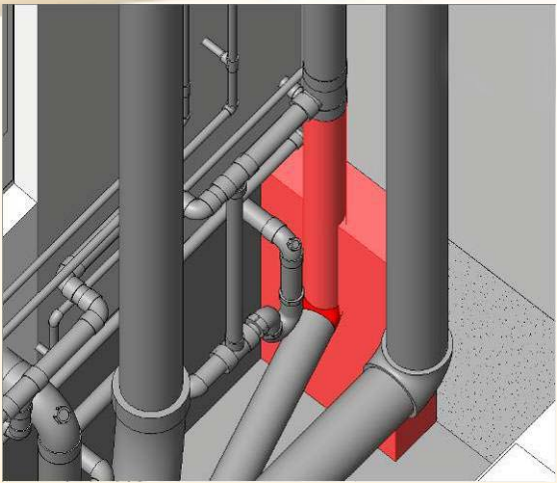


Building Information Modeling



Daylight Analysis - Apply BIM analysis software on a typical modular flat to achieve the daylighting target and minimize the use of artificial lighting

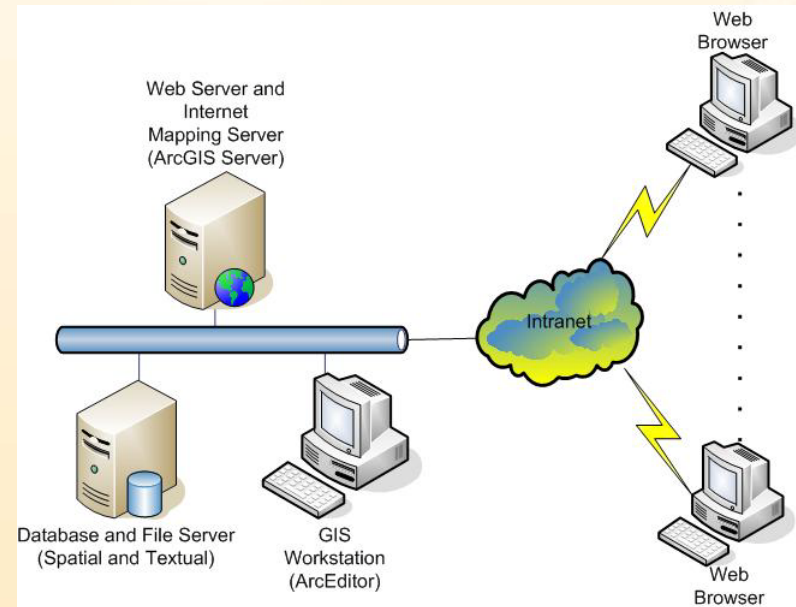
Building Information Management



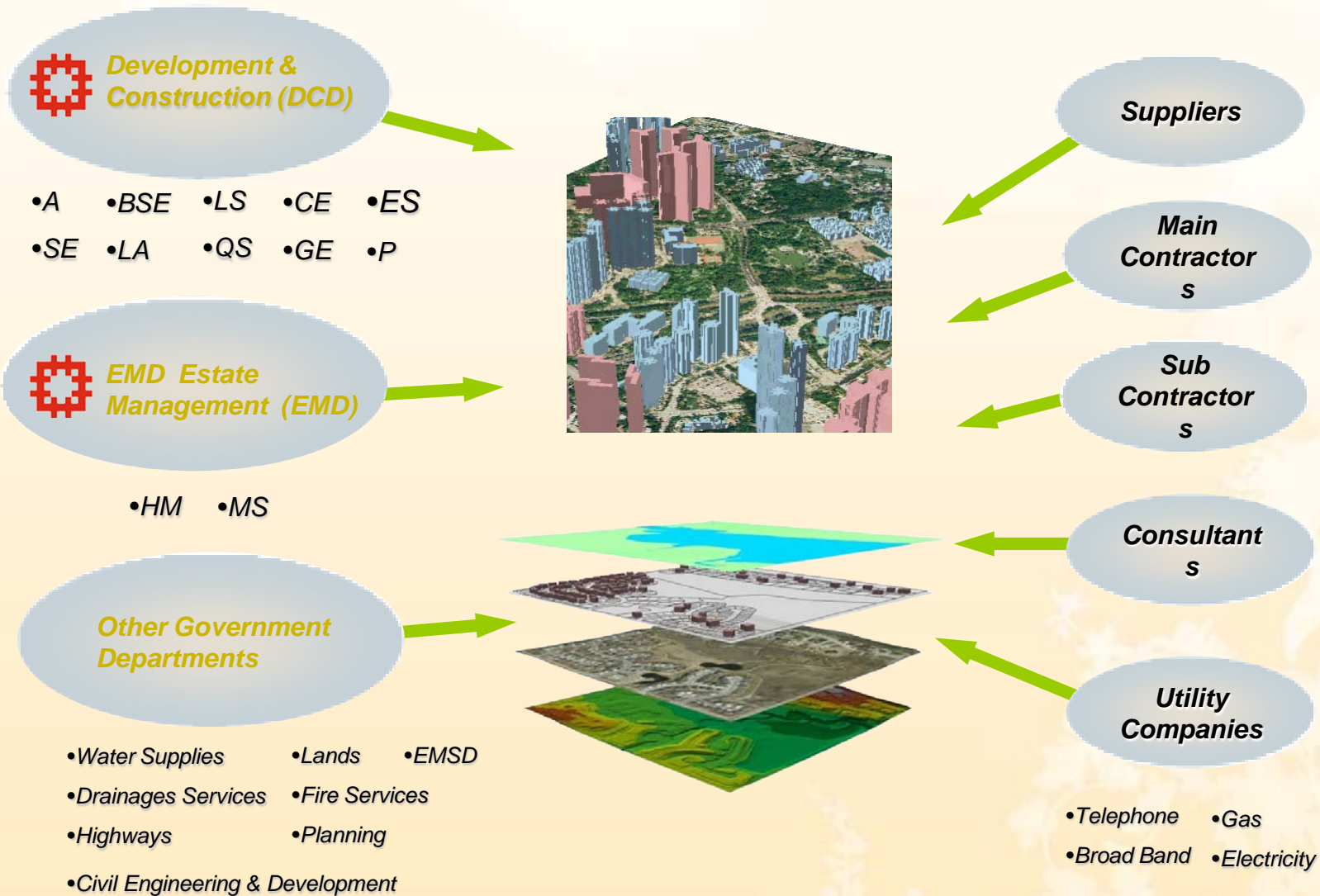
Construction Coordination - Avoid clashes, abortive works and wastes

Web- based GIS in Housing Authority

- Our new intranet-based **Geographic Information System (GIS)** helps our colleagues to collect and integrate geo-spatial information to assist in public consultation, site planning, design and construction works **and handling of public enquiries.**
- Integrate to **HA's information technology infrastructure as Single-Sign-On (SSO) Enabled Application**
- **Support 50 concurrent users**

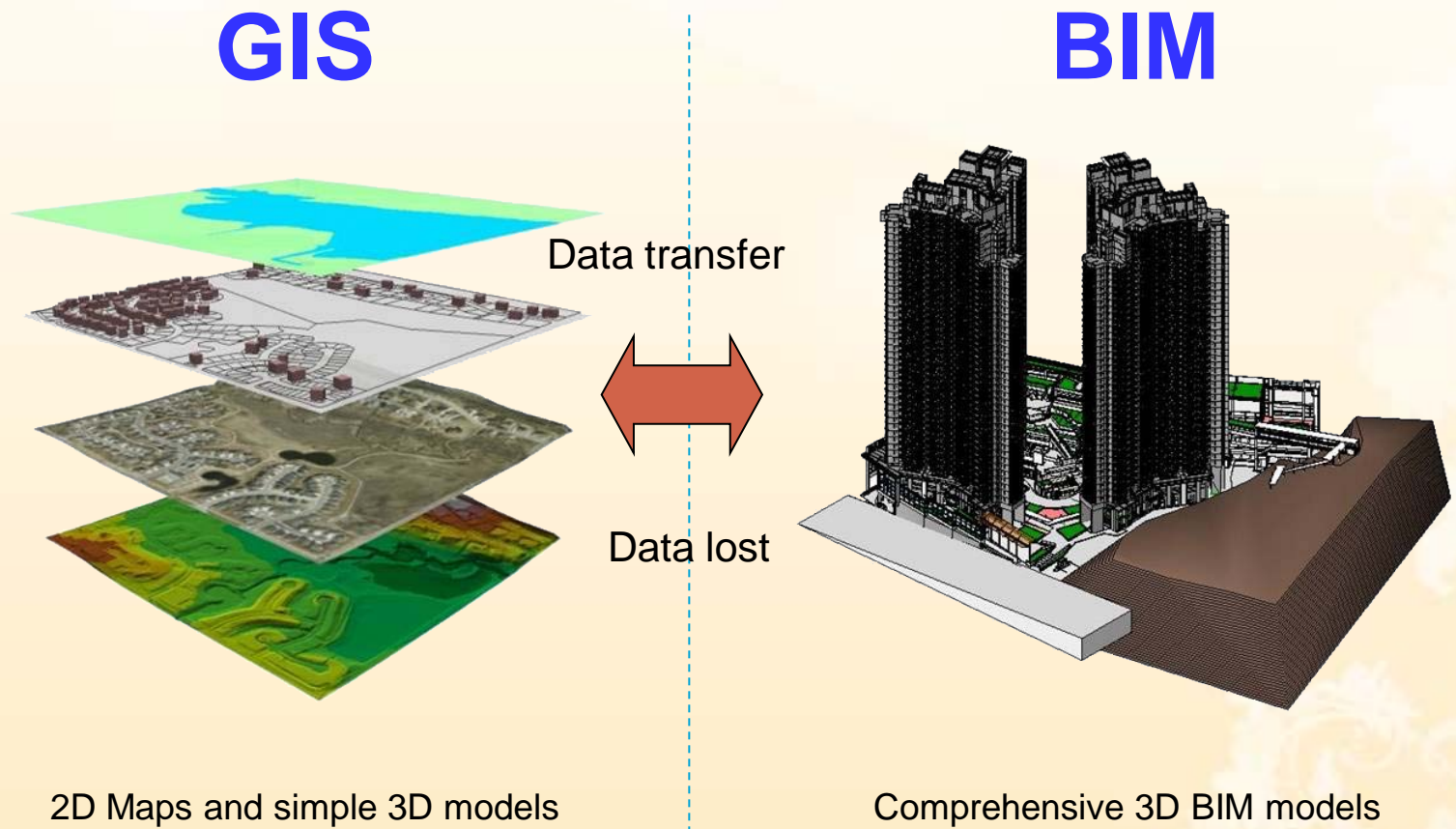


AEC Parties using GIS/BIM



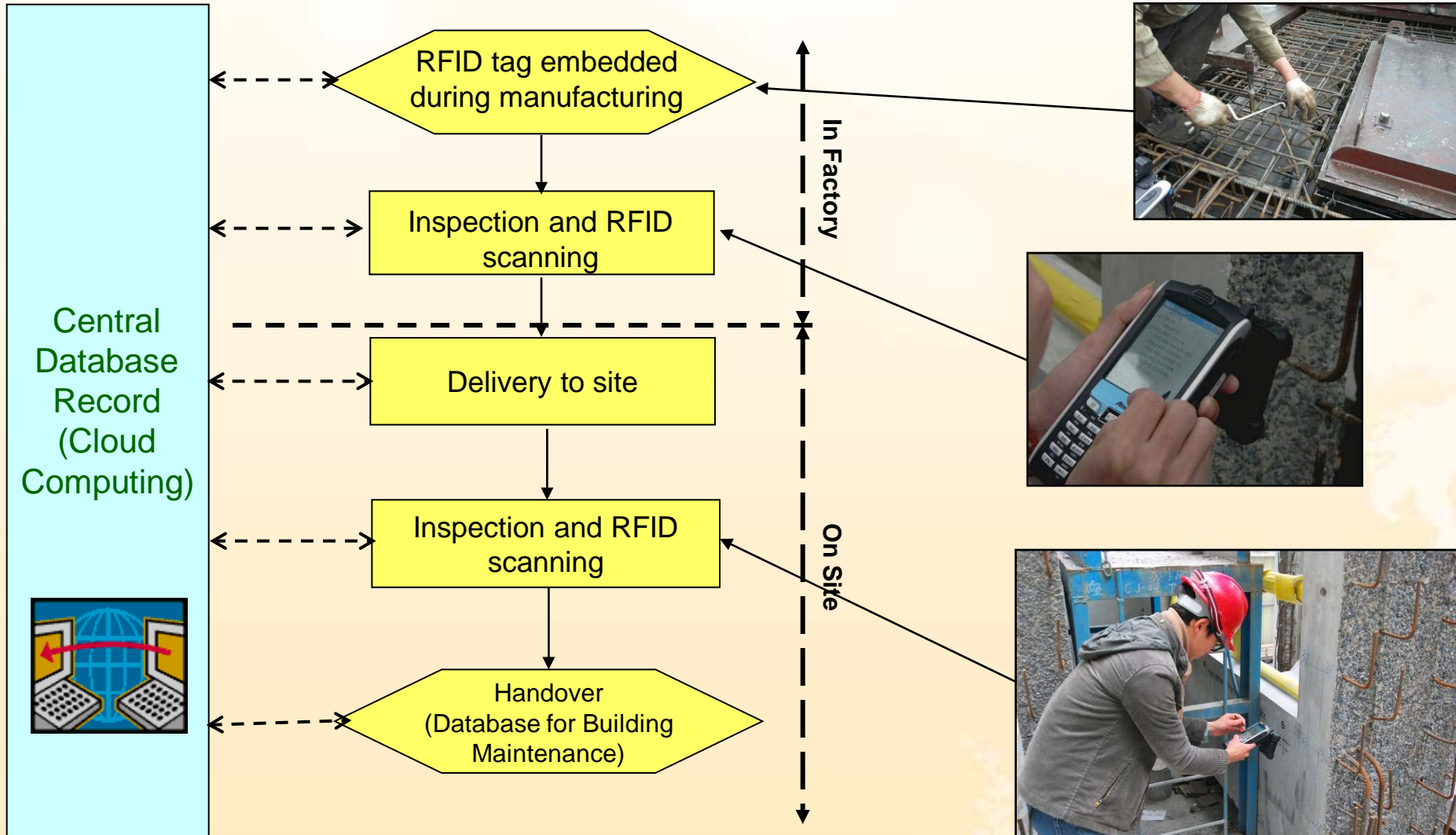


GIS and BIM applications developed from two arenas and different vendors



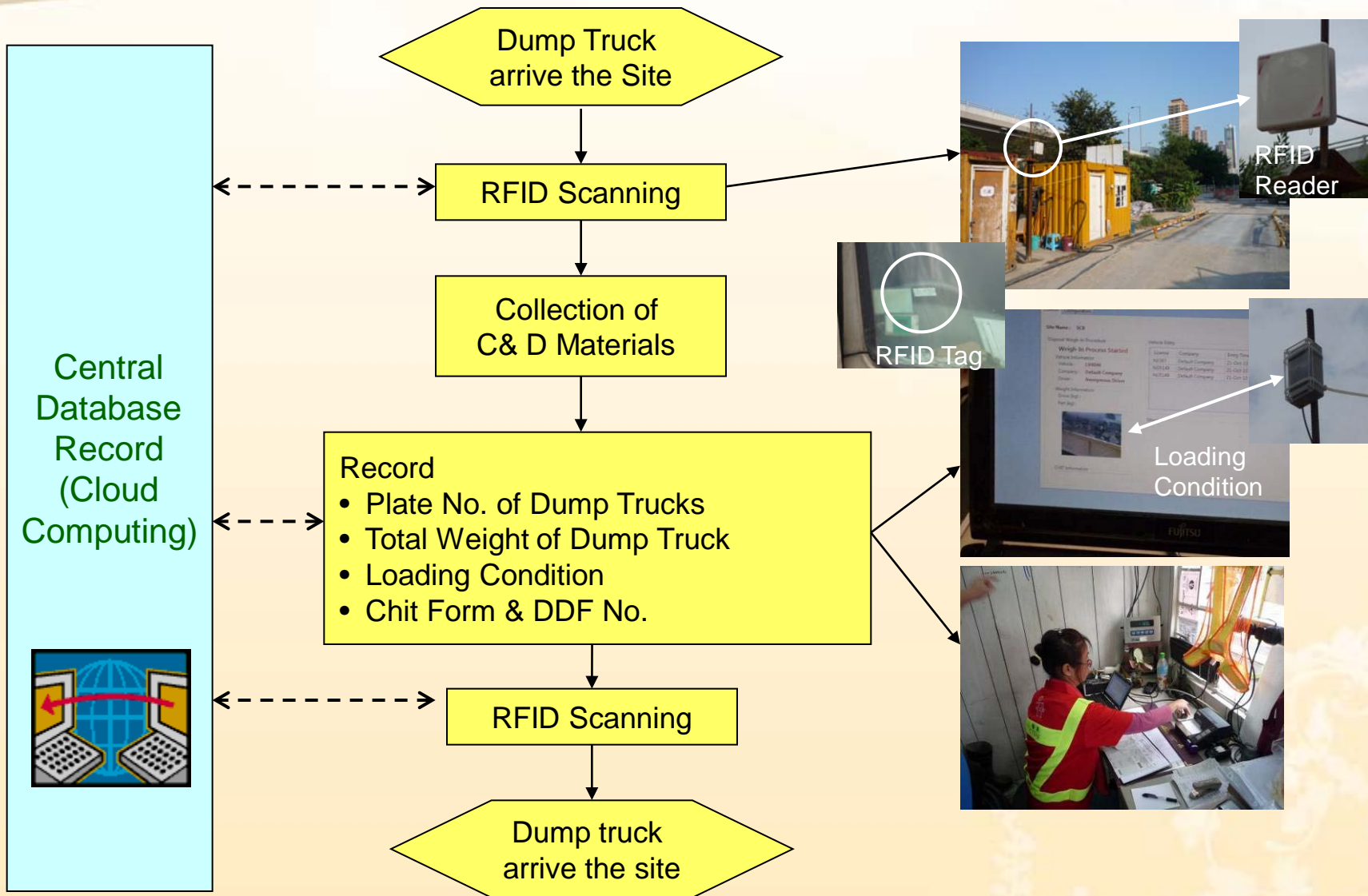


Use of RFID in monitoring the manufacturing, delivery and installation of Building Components



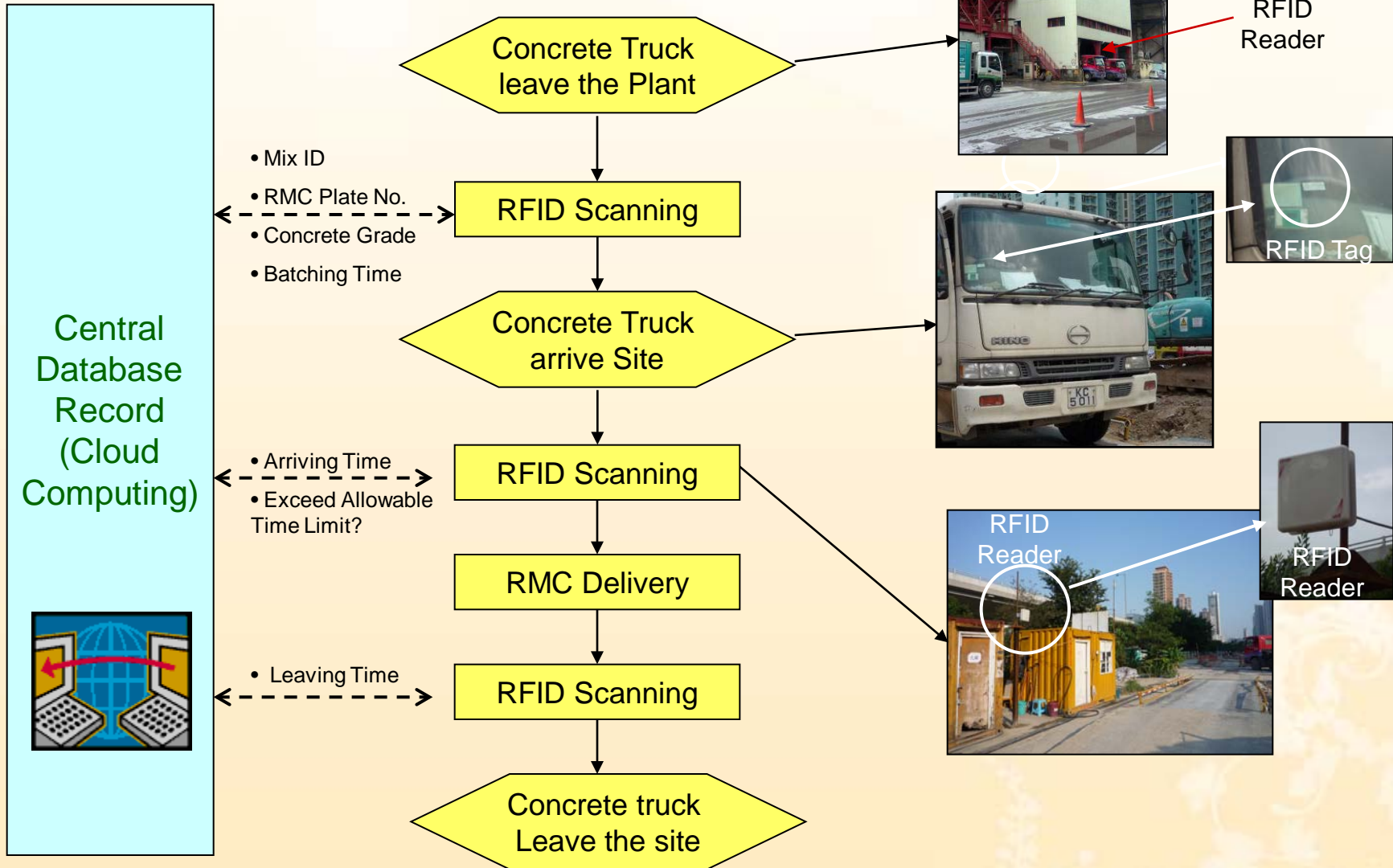


Use of RFID in Disposal of Construction & Demolition Material



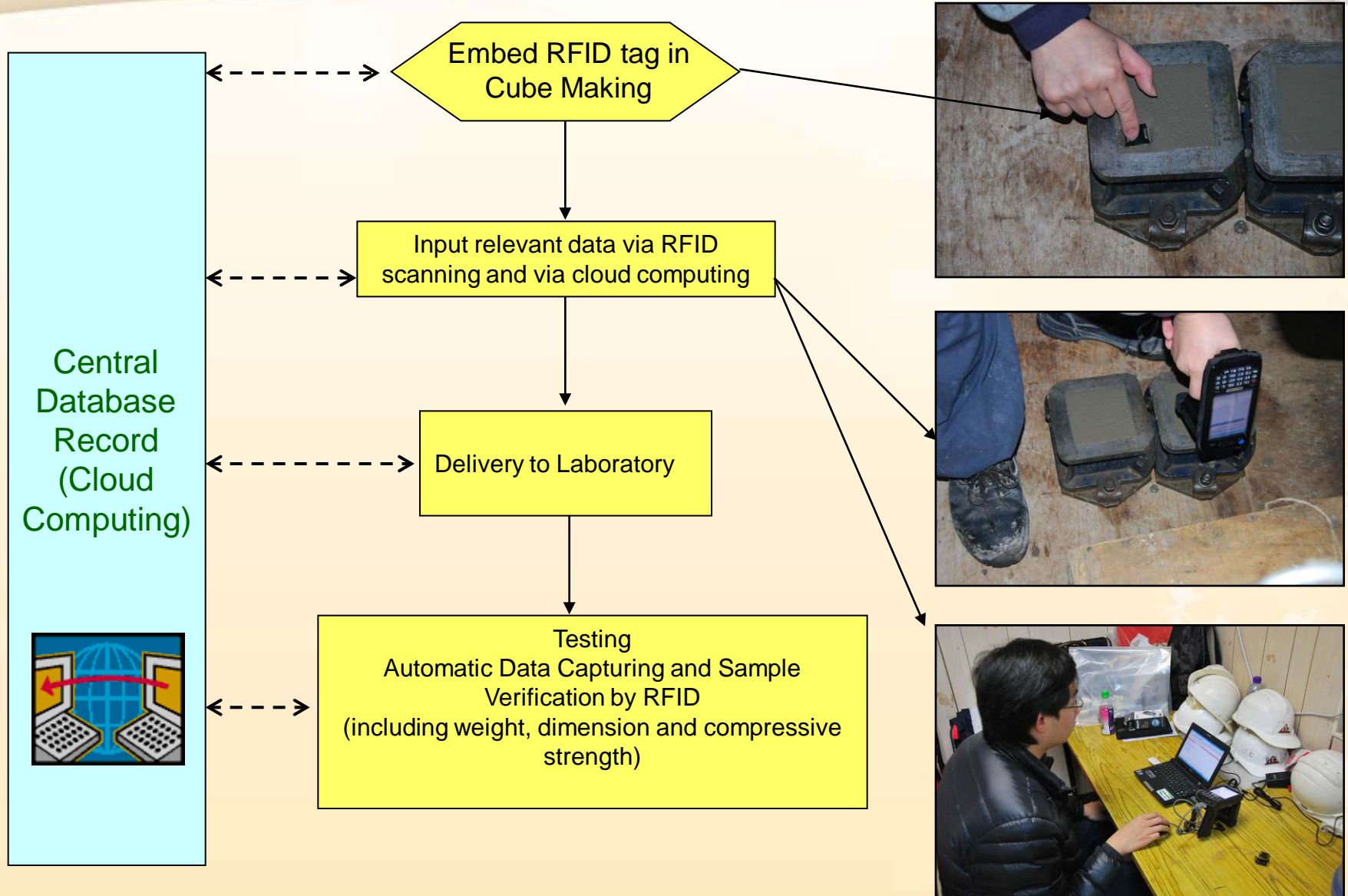


Use of RFID in Ready Mixed Concrete Delivery





Use of RFID in Concrete Cube Compression Test





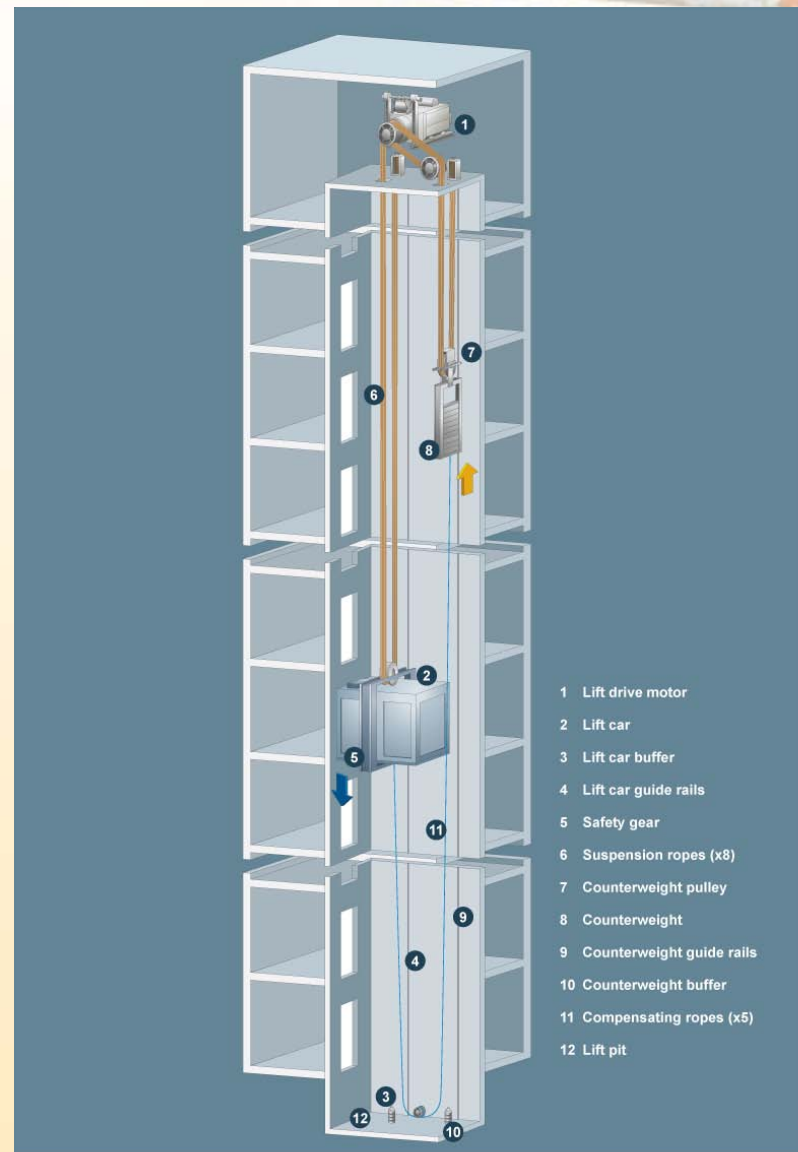
Environmental Protection & Testing

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 - Temperature Indicating Strip (lift)
 - W- trap
 - Twin Tank
 - Use of Marine Mud
 - Use of Concrete Cores
5. Quality Assurance & Material Testing

Temperature Indicating Strip

Background: Lift incident at Fu Shin Estate in 2008

- Incident:
Lift fell to ground level
- Cause:
Failure of counterweight pulley bearing





Temperature Indicating Strip

Issue:

- Early detection of fault of pulley bearings

Traditional method:

- Regular visual inspection



- Listen to any abnormal noise



- Feel any abnormal heat with hand



Temperature Indicating Strip

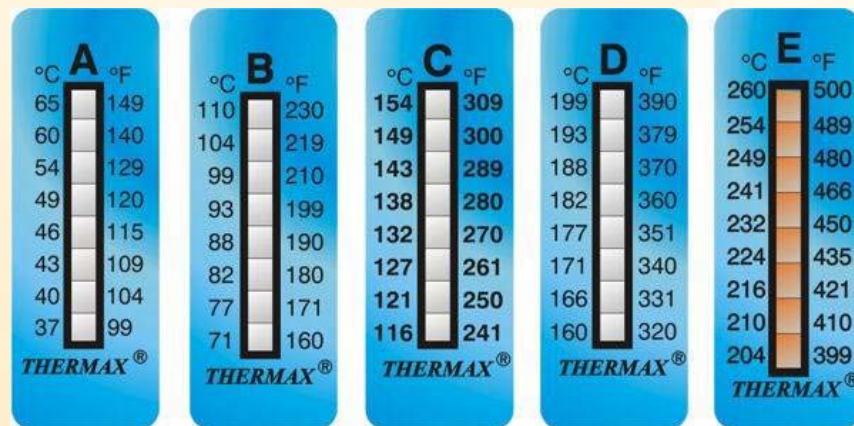
Fault Detection – Early Identification of Fault

More objective and quick-fix solution:

- ‘Temperature Indicating Strip’ on pulley assemblies (to alert maintenance personnel of any abnormality)

Temperature Indicating Strip:

- self-adhesive type
- give irreversible colour change
- permanently record the highest temperature of pulley assemblies





W- trap System

- The outbreak of SARS in March 2003 has aroused concern about dried up floor traps and transmission of virus into the bathroom / kitchen from a contaminated soil and waste stack.



BD,HD & FEHD's Guidelines

住宅單位內部排水管及潔具檢查維修指引

Guidelines on Inspection and Maintenance of Drainage Pipes and Sanitary Fittings inside Residential Units

1 應該定期檢查所有室內排水管和相連的潔具，並特別留意圖中以紅色虛線顯示部分。
All internal drainage pipes and associated sanitary fittings should be inspected regularly, with special attention being paid to the parts marked with red dotted lines in the following photos.

3 切勿將雜物丟進水廁及去水口內，以免造成排水管淤塞。
Do not drop any objects into the water closets and the inlets.

2 如發現下列現象，應立即通知大廈管理處/屋邨辦事處或聘用合資格承建商進行檢查及所需的維修。
If any of the following phenomena arises, please report immediately to your Management Office / Estate Office or appoint qualified contractor for inspection and repair.

4 每星期用約半公升清水倒進每個地台去水口，然後加進一茶匙1:99稀釋的家用漂白水。如找不到地台去水口，請向屋邨辦事處或合資格的專業人士/承辦商查詢。
Pour about half a litre of water into each floor drain every week. Then pour a teaspoonful of 1:99 diluted household bleach solution into the floor drains. If you cannot find the floor drains, please contact your Estate Office or consult a qualified professional/contractor.

6 確保所有潔具有適當的隔氣彎管。
Make sure that each sanitary fitting is fitted with a suitable trap.

- 排水管/潔具發出臭味或異響
foul smell or odd sound from drainage pipes/sanitary fittings
- 排水管/潔具出現裂縫或滲水漬
cracks in or rust stains on the drainage pipes/sanitary fittings
- 喉碼鬆脫
loosened pipe brackets
- 排水管/潔具滲漏或淤塞
leakage or blockage of the drainage pipes/sanitary fittings
- 水廁內不時泛起氣泡
bubbles coming out of the water closet from time to time

連接上層地台去水口
connected to the floor drain of the upper floor

排水管
drainage pipe

洗滌盆 sink

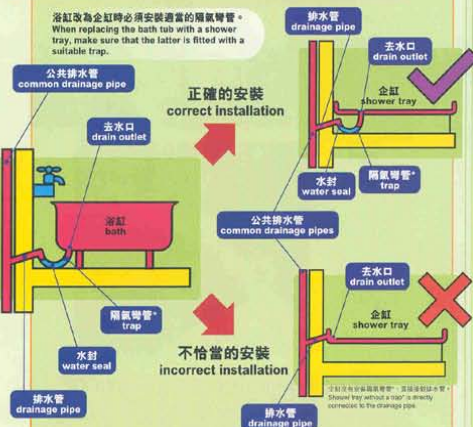
U型隔氣彎管
U-shaped trap

喉碼
pipe bracket

樽型隔氣彎管
bottle trap

5 不應在浴室安裝馬力過強的抽風扇，如有查詢，請諮詢合資格的專業人士/承建商。
Do not install exhaust fans of excessive capacity in bathrooms. For enquiries, please contact a qualified professional/contractor.

浴缸改為浴缸時必須安裝適當的隔氣彎管。
When replacing the bath tub with a shower tray, make sure that the latter is fitted with a suitable trap.



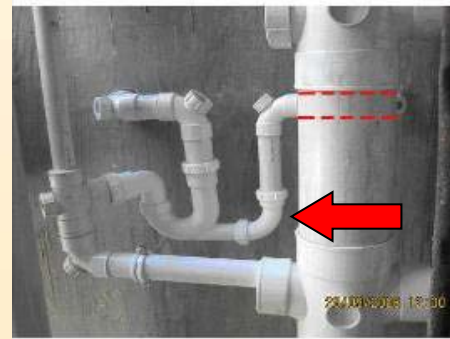
* 隔氣彎管應列入氣密範圍，應以建築形式防止「水封」洩失，這直接導致大量水滲入。
* A trap should be ventilated by an air syphonage pipe, constructed to prevent the loss of "water seal" or discharge directly into a hooded level.



W- trap System



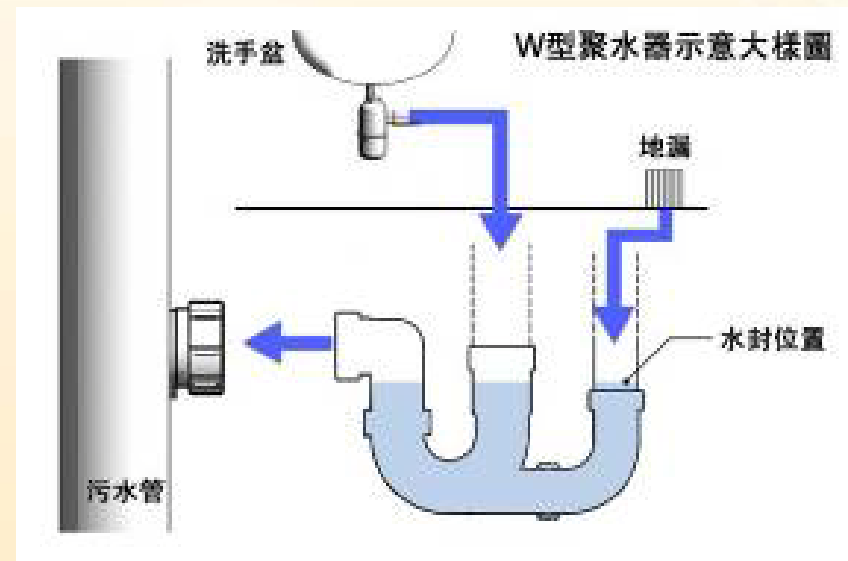
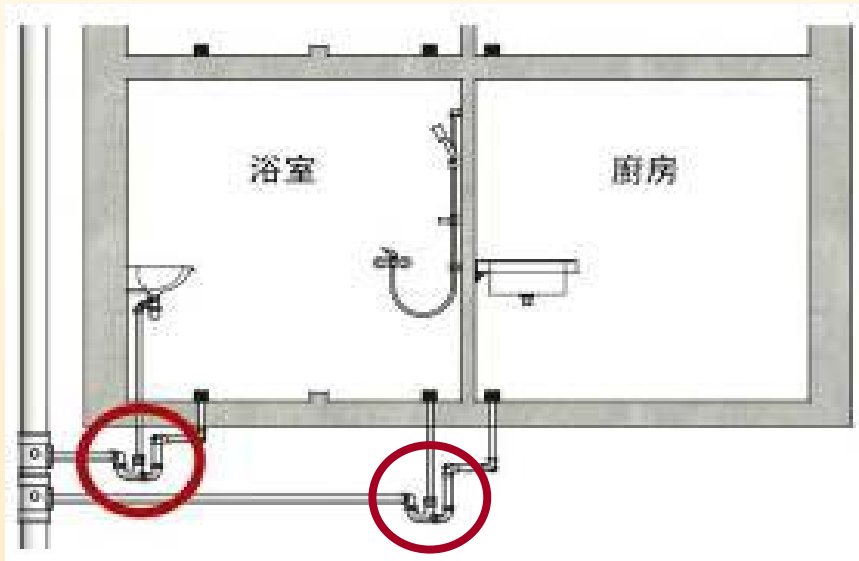
- Collaboration with City University of Hong Kong to study the W-trap system in 2003.
- A series of tests successfully verified the operational stability.





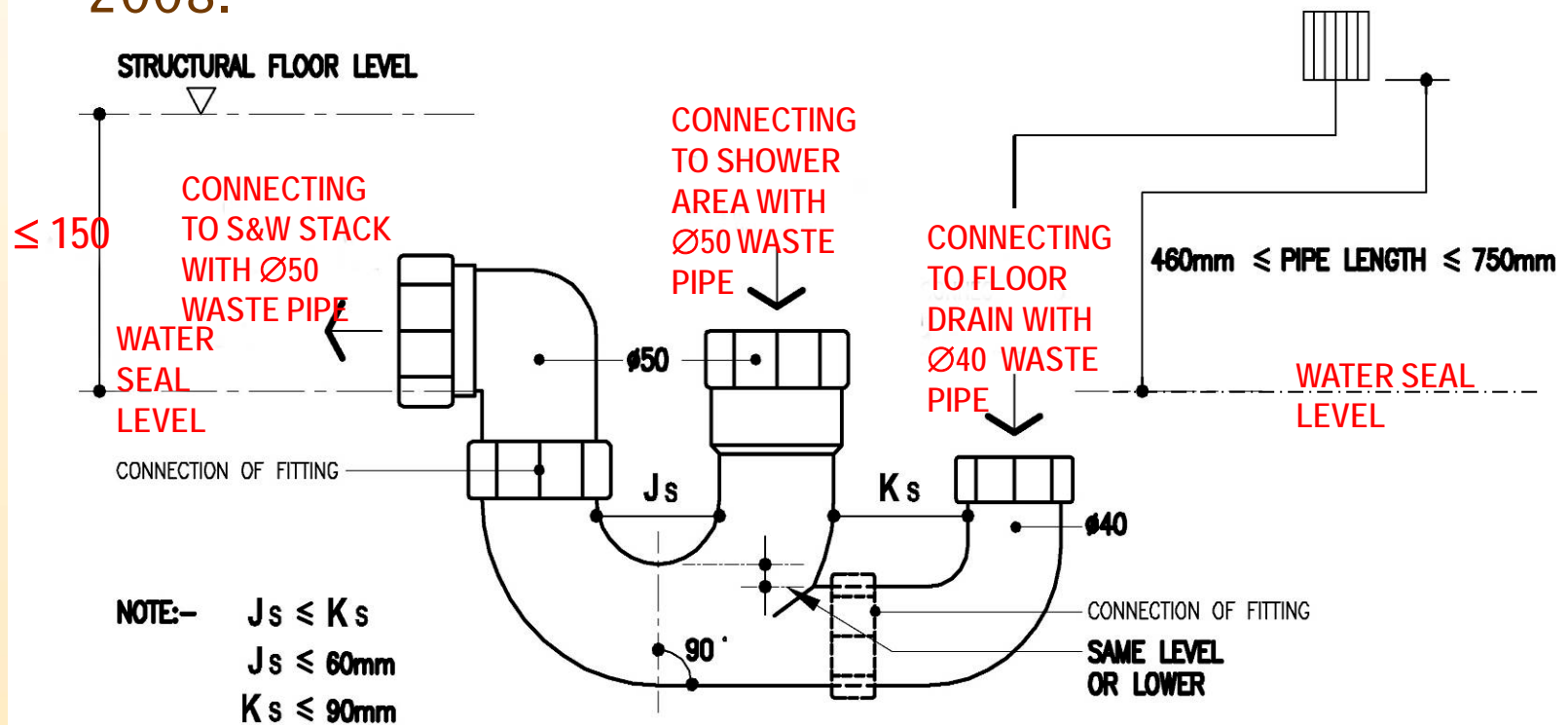
W- trap System

- Buildings Department approved in principle the use of W-trap for connection to the floor drains in toilets to maintain water seal.



W- trap System

- Design Guide and Technical Specification compiled for project implementation.
- Implemented in all new PRH projects since the completion of first project, East Harbour Crossing Site 3 (Yau Lai Estate), in 2008.



Twin Tanks System

Background

Cause

Before Stoppage



Store up clean water

During Stoppage



Use fresh water for flushing



Cleansing workers at work

IMPLICATION



After Resumption

Wash away muddy water

維修工程通告
Notice for Maintenance

暫停食水供應
Suspension of Fresh Water Supply

受影響樓宇/樓層/單位:
Affected Block/Floor/Unit

原因:
Reason

日期:
Date

時間:
Time

香港房屋委員會
Hong Kong Housing Authority

不便之處，敬請原諒 Sorry

維修工程通告
Notice for Maintenance

暫停沖廁水供應
Suspension of Flush Water Supply

受影響樓宇/樓層/單位:
Affected Block/Floor/Unit

原因:
Reason

日期:
Date

時間:
Time

香港房屋委員會
Hong Kong Housing Authority

不便之處，敬請原諒 Sorry for the Inconvenience Caused



Twin Tanks System

**PROVIDING
UN-INTERRUPTED
WATER SUPPLY**

SAVING WATER

**REDUCING
MAINTENANCE
+ REPAIR**

Objectives

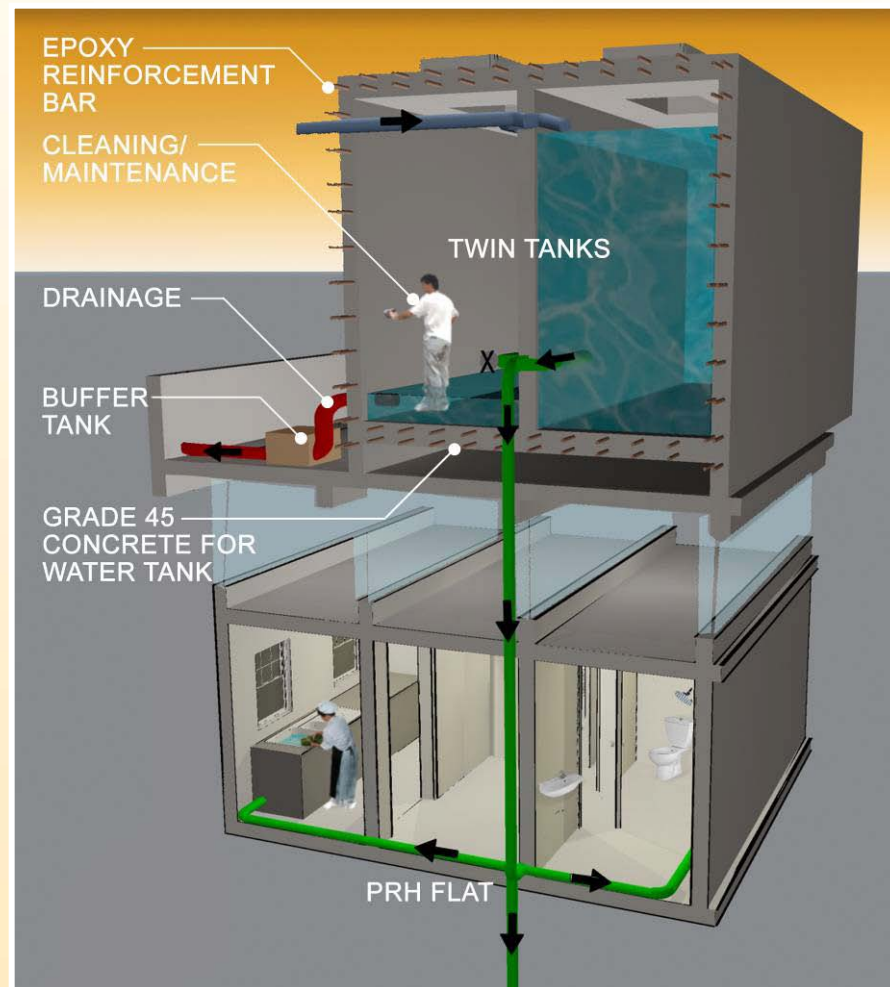


Twin Tanks System

Summary

Adopting Twin Tank System and Associated Enhancements

1. Achieve Green Management by **reducing water wastage**.
(Saving water 2.8 million litre per year)
2. Achieve better customer service through **un-interrupted water supply**.
3. Achieve durability of structure with **reduced maintenance and repair works**.
(Saving \$2 millions for replacement of water tanks in each block in 30 to 40 years)
4. Shek Mun Estate – the first estate using the twin tanks completed in May 2009. Full implementation in all public rental housing projects at design stage from **May 2008** onwards.





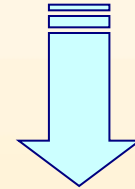
Use of Marine Mud

Cement-Stabilisation for Backfilling

- Marine mud is stiff, moist, low strength and high compressibility
- Mix 5% cement and 15% granular material



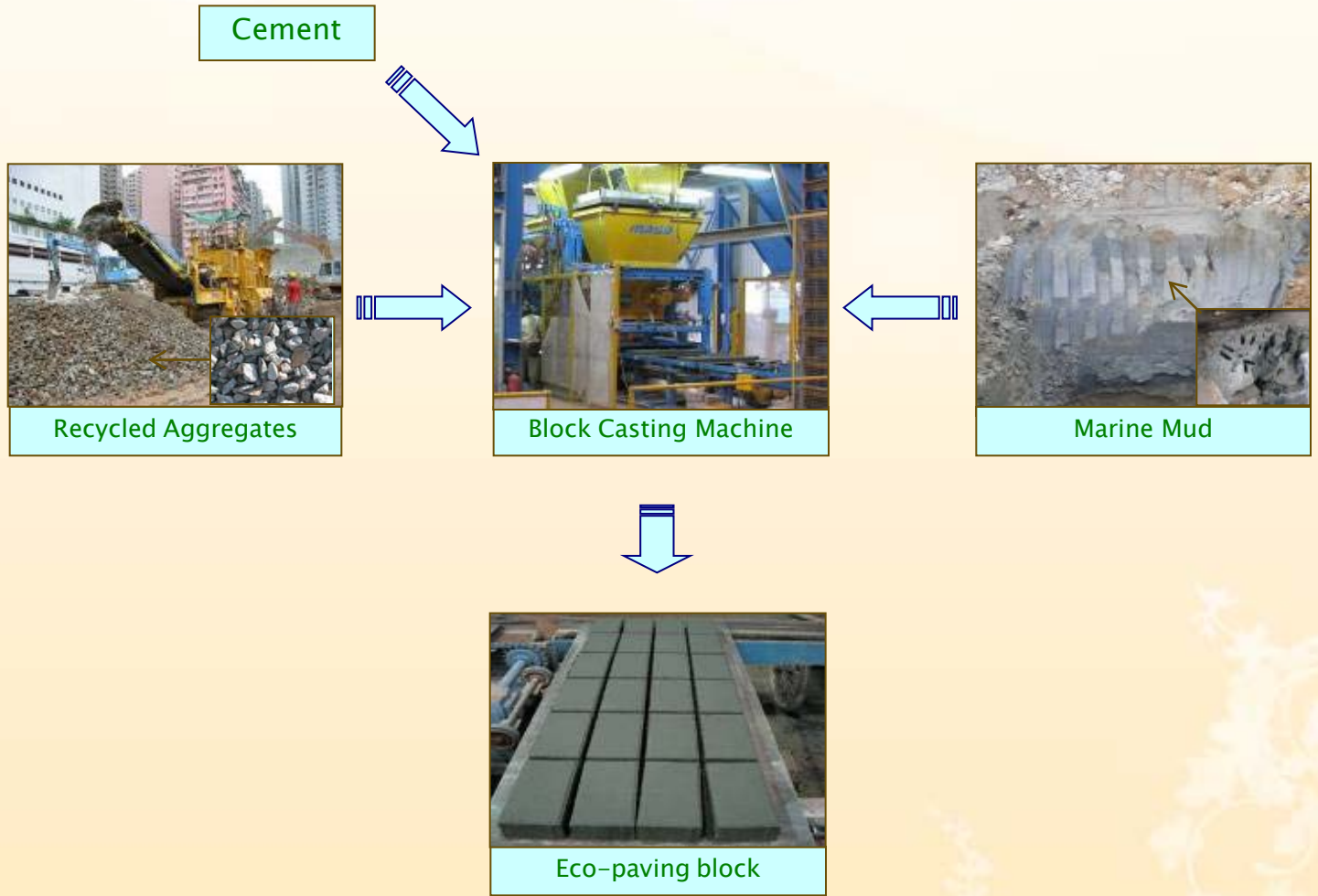
Mix marine mud with other materials



Backfill cement-stabilized marine mud around substructure

Use of Marine Mud

Production of Eco-Block

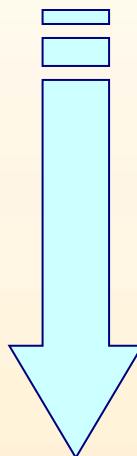




Use of Concrete Cores



Disposable rock cores collected from store



Used as planter kerbs





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5. **Quality Assurance & Material Testing**
 - Use of Product Certification
 - Use of Quality Assurance Systems



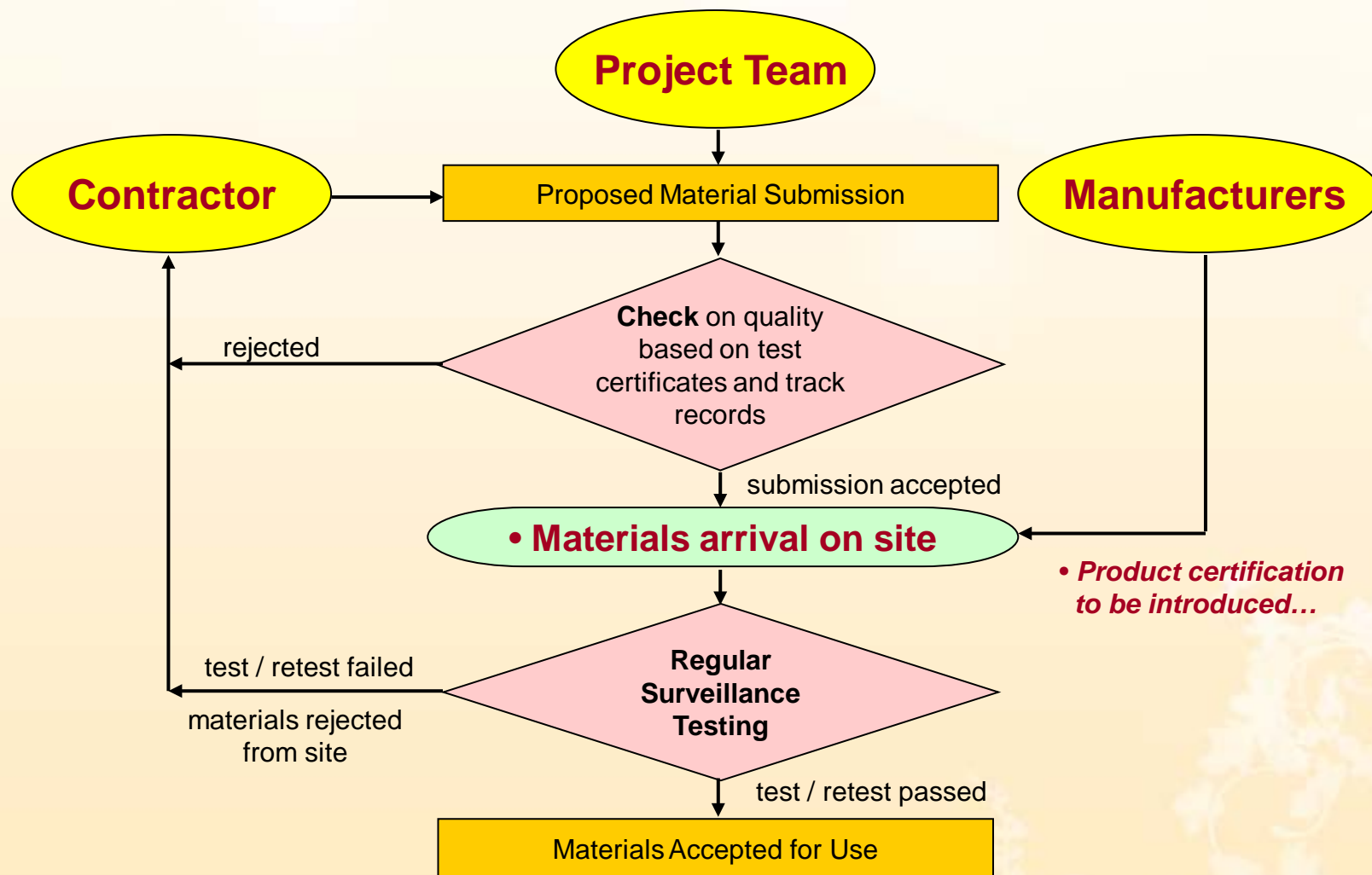
Product Certification

Promoting quality assurance through upstream control, Housing Authority spearheads implementation of product certification in its construction projects in stages in 2010/2011 for seven major building materials:

1. Fire-rated timber doors (防火門)
2. Panel Wall Partitions (板間牆)
3. Cement Products (for architectural use) (袋裝水泥)
4. Tile Adhesives (磁磚黏合劑)
5. Ceramic Tiles (磁磚)
6. Repair Mortars (修葺砂漿)
7. Aluminium Windows and 4-Bar Hinges Assembly (鋁窗及窗鉸組件)

Product Certification

HA's Surveillance Check of Building Materials on Site





Product Certification

What is Product Certification (產品認證)?

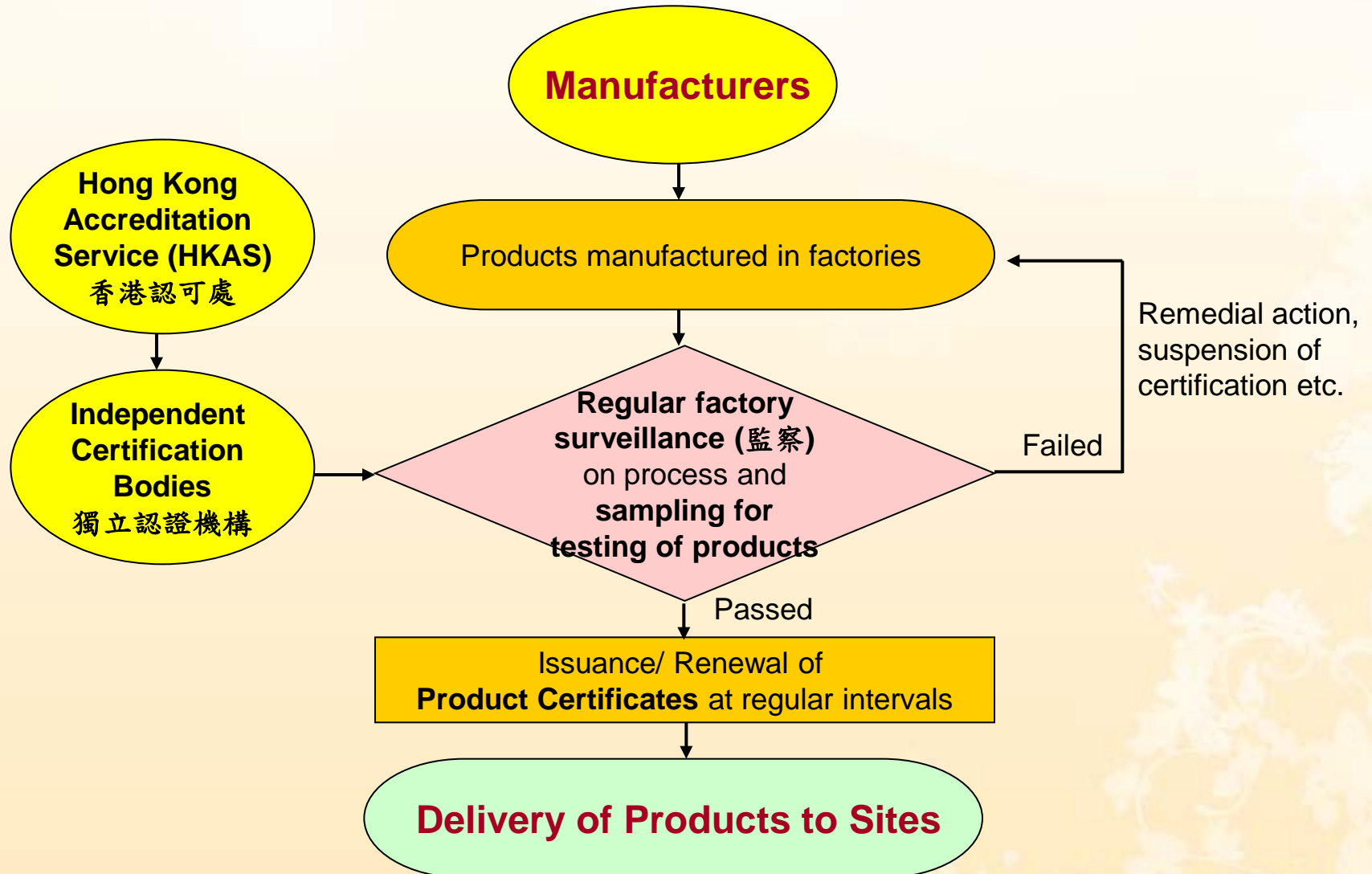
Product Certification is the **process** whereby a product is **certified** to achieving prescribed standards and quality requirements, through regular factory surveillance and periodic sampling and testing of products by third party of **accredited certification body**.

Benefits

- Promoting industrial quality through **upstream control**
- **Continuous surveillance** of production process in factory to ensure consistent production quality
- **Greater confidence** on product quality to recognized standards
- **Product Certification Mark** to enhance product reputation, and hence business opportunities and competitiveness

Product Certification

An Upstream Quality Control





Quality Assurance Systems

- ISO 9000 – quality
- ISO 14000 – environmental
- OHSAS 18000 – safety
- ISO 26000 – corporate social responsibility
- ISO 31000 – risk management
- ISO 50000 – energy

Environmental Protection & Testing

We care for our people.

We care for our environment.

- **To achieve Sustainable Development, we apply innovative procurement, green design & construction, intelligent solutions & IT.**
- **To ensure effective use of resources, we conduct Applied R&D for green & innovative solutions.**
- **To mitigate risks, we assure quality throughout the supply chain.**



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Thank You !