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Case Study No.1

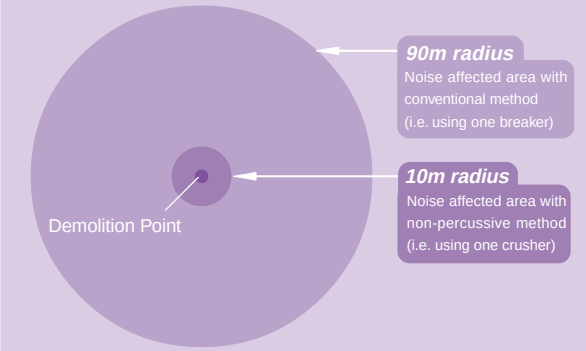
Environmentally Sensitive Demolition
No.16 Westlands Road and No.23-29 Wing Fung Street

Located in the heart of Quarry Bay and Wan Chai respectively, the demolition of No. 16 Westlands Road (WR) and No. 23-29 Wing Fung Street (WFS) were particularly challenging. Both sites are situated in densely populated neighbourhoods, such that our immediate concern was to minimise the potential disruption and nuisance to local residents, including noise and dust impacts arising from the demolition activities. To address this, we implemented innovative demolition methods despite increased costs and a longer working schedule.

Innovative Technology Reducing Noise and Dust Impacts. In partnership with our main contractor, we tailored an innovative demolition programme for WR, which used only concrete crushers, as opposed to the typical percussive breakers or combined crushers and breakers. The crusher, which had to be imported from overseas, engages a biting action that dismantles the concrete structure in small pieces. This significantly reduces the noise and dust impacts generated by traditional percussive methods. Our success in minimising the potential impacts was evident when several weeks into the works, nearby tenants asked our site staff when the demolition works were due to start!

Waste Reduction and Recycling. By using both the concrete crusher at WR as well as implementing a waste management plan (that required our contractor to maximise demolition waste recycling), we were able to recover a substantial amount of the demolition waste for recycling and reuse. This included 2,840 tonnes of steel, 57,125 tonnes of concrete and bricks and 740 tonnes of other inert materials. Only 1% of waste from the demolition works was disposed of to landfill.

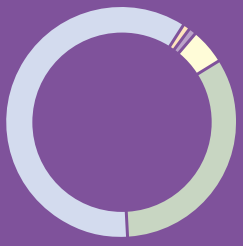
Noise Generation Comparison



WFS is a relatively small and confined site of approximately 223 m^2. After extensive research, no suitable compact concrete crusher could be found for use on this confined site, hence conventional demolition methods were used. However, to maximise the recycling potential, the demolition waste was collected and hand sorted by site workers. Consequently over 80% of the waste was collected for recycling and reuse, including 23 tonnes of steel and 324 tonnes of concrete and bricks, leaving just 19% of waste for disposal to landfill.

It is considered that WR has set a new 'benchmark' for minimising the proportion of waste from a demolition site going for landfill disposal.

Westlands Road -
Total Waste Produced & Recovered for Recycling / Reuse



- 60% Concrete and bricks reused for reclamation
- 33% Concrete recycled
- 5% Steel recycled
- 1% Other construction waste recycled / reused
- 1% Construction waste disposed of in landfill (SENT*)

Wing Fung Street -
Total Waste Produced & Recovered for Recycling / Reuse

- 76% Concrete and bricks reused for reclamation
- 5% Steel recycled
- 19% Construction waste disposed of in landfill (SENT*)

* SENT = South East New Territories Landfill

Source: Gammon Skanska Limited

Case Study No.2

Environmentally Responsible Construction

An Office Building - Cambridge House

Extensive environmental and energy efficiency considerations were incorporated into the building design of Cambridge House. This earned it an *Excellent* rating (with the highest score ever achieved) under HK-BEAM for new office buildings. Examples of the environmental features adopted include:

Pre-cast Elements. Over 70% of the total gross floor area was built using pre-cast elements. Modular pre-fabrications including slabs, beams and staircases were produced off-site and then transported to site for installation, thereby reducing on-site pollution and material wastage.

Pre-fabricated Electrical & Mechanical Components. Pre-fabricated components include air ducts, water supply & drainage and fire service piping systems. 95% of building services components were fabricated off-site. This reduced construction waste, reduced installation time and improved quality.

Reusable Formwork. The use of timber and potential wastage was significantly reduced by the use of reusable metal formwork systems. In particular, steel and aluminum formwork were adopted for constructing core walls, columns, slabs and beams.

Jump Lift. By applying a jump lift system, the internal finishing and installation work was accelerated and the entire construction period shortened. The speed of transporting people and materials was increased by 30%. Jump lifts are also considered to be safer than temporary external lifts.

Water Recycling During Construction. Water was used to suppress dust from construction activities, particularly as sprays over dusty areas and for vehicle wheel washing. To reduce water consumption, water recovered on site was collected, treated and recycled.

Good Housekeeping. Overhead nozzles for dust suppression improve the air quality on the site and the adjacent areas. Temporary drainage pipes keep the site dry and clean, thus discouraging mosquito breeding.

Quick Facts

- Completed in 2003
- Commerical development located on King's Road, Quarry Bay
- 36-storey glass curtain wall commercial tower, with 33 floors of mutli-tenant offices, two podium floors of banking, retail and amenity services
- Pedestrian bridge connecting to Devon House
- Total gross floor area approximately equals 24,000m^2

Formwork and pre-cast beams

Pre-cast staircases

Pre-fabrication yard off-site

Water recycling system

Pre-fabricated duct work

Case Study No.3

Environmentally Responsible Design
A Residential Building - The Orchards

A premium Swire Homes residential development, The Orchards embodies our **'Think Living'** concept, which conveys our aim to provide distinctive high quality homes with unique environmental features - for a better living experience. In achieving this, **'Think Green'** has been at the forefront of our design concepts, construction methods, materials used and the construction site management practices adopted. This was reinforced when The Orchards became the first urban residential development to achieve an award of excellent under HK-BEAM. When we introduced The Orchards to the public in early 2003 we conveyed this concept with the help of an exhibition and an on-line charitable environmental donation campaign.

Building Materials. We carefully specified the building materials, such as timber originating from sustainable forests for floors and fittings, and recycled rubber flooring for the children's playground. Aluminum is used, instead of the usual timber formwork, as it is more durable and reusable. 'Lost formwork' (a pre-cast concrete wall panel which, unlike timber formwork, does not need to be dismantled after concreting) reduces manpower requirements and construction waste.

Sky Gardens and Planting Area. Two themed sky gardens situated at the 17/F and 32/F in each residential tower enhance the green living environment. Surrounding the building edge, and in keeping with The Orchards' theme, we also planted native plants (e.g. Cape jasmine and Chinese hibiscus) and fruit trees (e.g. mango and banana). At the podium garden, a children's planting area was established with the intention to run it for organic farming programmes. These programmes provide the opportunity for environmental education through family recreation.

Energy. Energy efficient lighting systems, equipped with photoelectric switches and/or timer controls are installed in public areas. A solar powered landscape lighting system stores up energy during the day for use at night. Energy efficient and flexible mechanical ventilation for the carpark was also implemented. External sunshades for every bedroom and living room reduce heat gain and glare. These and the other energy saving features will provide estimated energy savings of $500,000 per year.

Water. All apartments are equipped with dual flush toilets and flow control taps to save water. Rainwater is used to reduce freshwater consumption for irrigation by about 33%.

Enhanced Quality of Internal Space. In addition to providing more daylight, the widened lobbies with openable windows provide natural ventilation to common areas. For each residential unit, shading devices and balconies deflect unwanted heat while allowing better ventilation and natural lighting to reduce energy consumption. High cellings and windows at opposite sides of the room promote natural ventilation.

Quick Facts

- Completed in 2003
- Residential development located on 3 Greig Road in Island East
- 442 apartments in two 38-storey residential towers
- Four sky gardens, a car park and a recreational clubhouse
- Gross floor area approximately equals 37,000m^2

Japanese skygarden

Lobby with natural light

Children's planting area

Case Study No.4

Waste Separation and Recycling at Taikoo Shing

The key stakeholders (Swire Properties, Taikoo Shing (Management) Limited and flat owners of the Taikoo Shing residential estate) have successfully worked together over a number of years to improve waste management practices at the Estate. Together we have developed and implemented an effective and unique waste separation and recycling scheme.

Historical Waste Management. Prior to the adoption of the scheme, waste disposal practices at the Taikoo Shing estate were typical of those currently practiced throughout Hong Kong. After temporary storage in containers located on the landing of each floor, residents' domestic waste was disposed of by the appointed cleaning contractor via waste disposal chutes located in small refuse (hopper) rooms. The waste was then collected at ground level by a private contractor, handed over to a government waste disposal agency and disposed of in landfill. There was no effective waste separation and hence no recycling to reduce waste quantities. In addition the presence of large quantities of waste stored on each floor gave rise to odour that was physically obstructive, unsightly and unhygienic, as waste would often overflow onto the floor.

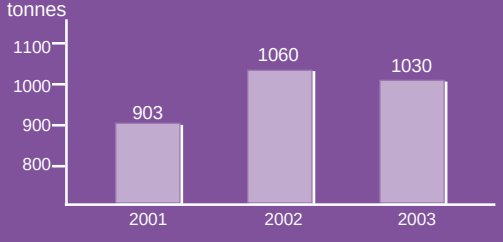
The Scheme. The waste separation and recycling scheme, which became operational in 2001, involved the renovation of the hopper rooms to allow residents to easily separate at home and dispose of in the hopper room. Each hopper room was renovated to accommodate separated waste through designing simple storage areas for paper, aluminum cans and plastics (dry waste). Other general waste (wet waste) is not stored, but is bagged by the residents in their homes and disposed of down the chutes at their convenience. A solid security door has been installed at the entrance to each hopper room. Each flat has its own key; this also promotes ownership. Each hopper room renovation has cost the residents HK$1,000 (per flat).

At designated times, the cleaning contractors collect the separated dry waste and dispose of it, also down the chutes. A recycling contractor collects the dry waste. The wet waste is disposed of to landfill. As an incentive to further ensure effective implementation, the cleaning porters receive (directly from the recycling contractors) all the money payable in respect of the recyclable materials collected by them in the buildings under their responsibility, which amounts to about HK$500/tower/month. As a result of the scheme a total of **over 1,000 tonnes of dry waste per annum** is now being collected from the participating towers for recycling.

Key to Success. As a result of the renovations, waste separation has been made easy - there is no need for residents to store separated waste at home, nor do they need to access communal recycling bins, which may be inconveniently located. There is no longer a need to store residents' waste on the landings of each floor prior to collection, thus improving overall hygiene.

The development and overall success of the scheme depended on the residents' approval for renovating the hopper rooms and their willingness and active participation in separating waste at home. It is the residents' commitment and their close working relationship with Taikoo Shing (Management) Limited that has ensured success.

Total Dry Waste Collected for Recycling
(paper, aluminum cans and plastics)



In addition, textile waste, electric appliances and metal wastes are placed on the floor of each refuse room and collected by the cleaning contractors as required.

The Taikoo Shing Estate consists of 12,698 flats configured in 61 towers and accommodating 1,697 refuse rooms. The scheme is on-going, currently 10,377 flats (49 towers) participate. It is hoped that the scheme can be expanded and the quantity of waste recycled increased further with the future participation of the remaining 12 towers.

Case Study No.5

Improving Energy Efficiency at Festival Walk

Festival Walk is a large scale mixed-use commercial complex featuring a shopping mall, an office tower and related amenities. Previously 70% of the total electricity consumed in running the complex was associated with the provision of air-conditioning. The development is situated outside the service boundaries of seawater pumping stations, and the air-conditioning system was therefore primarily designed with a cooling mechanism using air, as opposed to seawater, as a medium for heat exchange (i.e. air-cooled systems).

Until recently, cooling by use of fresh water was prohibited in Hong Kong due to the risk of water shortage, as was experienced in Hong Kong from the late 1970s to the early 1980s. Air-cooled systems, however, require significantly more energy input to operate than their water-cooled counterparts.

Recognising that water shortage has become less of a threat to the community, the Government started to promote the use of fresh water for cooling in air-conditioning systems in June 2000.

In 2002, Festival Walk joined the Government's Pilot Scheme to convert its air-cooled system to a water-cooled one to significantly improve energy efficiency. The new system is a combination of conventional air-conditioning and innovative yet straight forward automation control strategy. It involved a capital investment of approximately HK$13 million, but is estimated to reduce energy consumption by almost 5 million kWh per year, a reduction equivalent to about 3 million kg of carbon dioxide (CO_2) emissions and savings of about HK$4 million per year.

With the commissioning of its new water-cooled system in August 2003, Festival Walk has become the largest commercial complex in Hong Kong to employ this kind of energy efficient air-conditioning system.

Water cooling towers

Interface of the computerised Building Management System (BMS) at Festival Walk that controls the chiller plant

Use of natural lighting

Panoramic view of Festival Walk

Case Study No.6

INTEGER Pavilion

INTEGER was a unique industry collaborative project originated in the UK, adapted for and brought into Hong Kong, promoting green and intelligent technologies that can be adopted in the design and construction of residential developments. It involved participants from across the local industry as well as government departments to explore the ideal 'home for tomorrow', improving the quality of lives in Hong Kong. A pavilion, open to the public, was set up in Admiralty from November 2001 to December 2002, with Swire Properties as one of the founding members.

Some of the key features of the pavilion included:

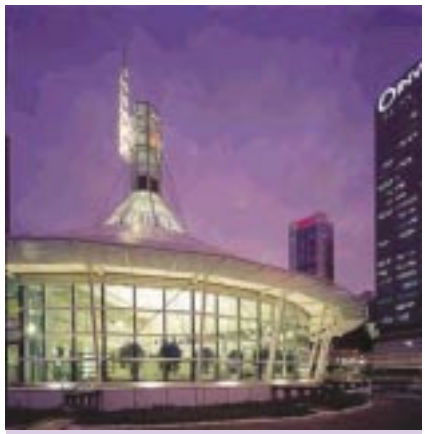
- An educational exhibition highlighting environmental building issues and solutions particular to Hong Kong
- Two demonstration residential units showcasing green and intelligent concepts for building design, construction and energy efficiency
- A design for a 40-storey residential tower using green and intelligent building concepts

An extensive children's education programme brought more than 26,000 students to the pavilion in order to increase awareness of the future stakeholders in Hong Kong:

- Workshops for teachers were held to provide practical skills and approaches for teaching fun project-based lessons
- Student packs were produced to facilitate the school visits and allow the students to bring home the INTEGER ideas
- Summer camps for 360 local students were organised at Kadoorie Research Centre and PLK Tai Tong Holiday Camps. Students learnt about green and intelligent concepts through a variety of task-based activities

Through the INTEGER Research Committee, the private sector, Government and academic institutions collaborated to:

- Organise a series of education programmes with 17 seminars and workshops covering topics such as renewable energy, Life Cycle Analysis (LCA) / Life Cycle Costing (LCC), green building case studies (including The Orchards and Cambridge House), and smart home technology
- Complete a research study on comparing LCA and LCC of typical residential towers in the private sector, public sector and the INTEGER 40-storey conceptual design
- Sponsor construction waste research



Exterior of the INTEGER pavilion

An inside view of the pavilion

Spacious corridor using natural lighting and ventilation

Demonstration unit with energy efficient 'smart' appliances

Another view of the pavilion