Project name

Hong Kong Science Park

Buildings 4a, 4b and 5

Location

Pak Shek Kok, New Territories, Hong Kong

Publication

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Hong Kong Science Park, Buildings 4a, 4b and 5

Technology centre

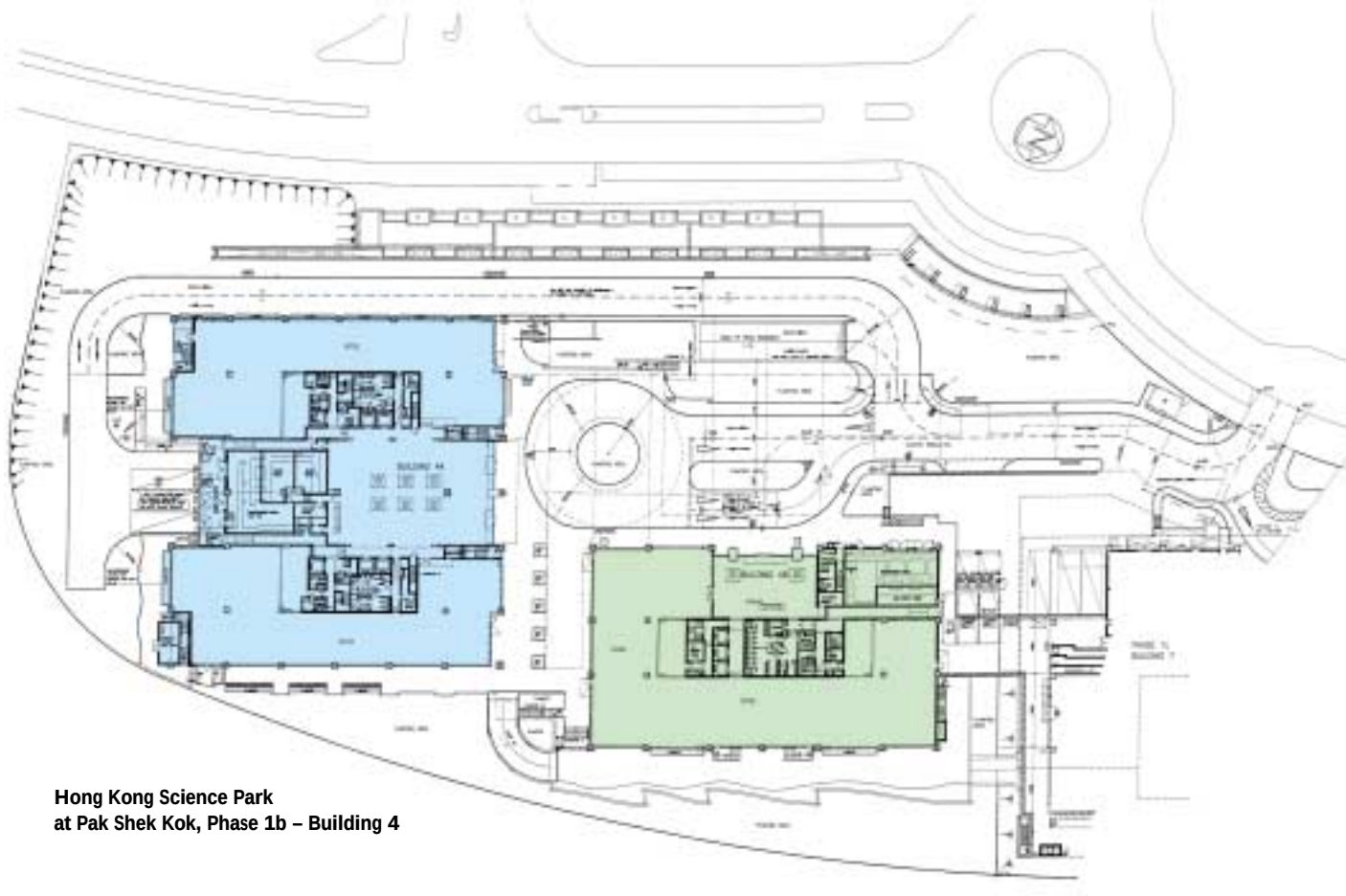
by Tim Youngs

The Hong Kong Science Park development at Pak Shek Kok continues to expand with the recent completion of its Phase 1b buildings.

The Hong Kong Science Park was conceived as a research and development campus to draw technology-oriented business and academic communities into a single location. Placed on a 22 ha reclaimed site beside Tolo Harbour at Pak Shek Kok, near Chinese University, the project is being developed in three phases. Divided into campus, core and corporate zones, the project is designed to house a range of tenants, from medium-sized operations in the campus buildings and larger firms in corporate buildings. Core buildings in the site meanwhile house necessary associated facilities including restaurants, exhibition areas and serviced apartments.

Phase 1a at Science Park opened in mid-2002, comprising a core building and a carpark building project managed by the Architectural Services Department and designed by Simon Kwan & Associates, who also developed the masterplan for the entire development (see BJ, July 2002). The most recent completions constitute Phase 1b and comprise Buildings 4a, 4b and 5, featuring spacious accommodation, advanced building services and careful consideration of environmental issues.

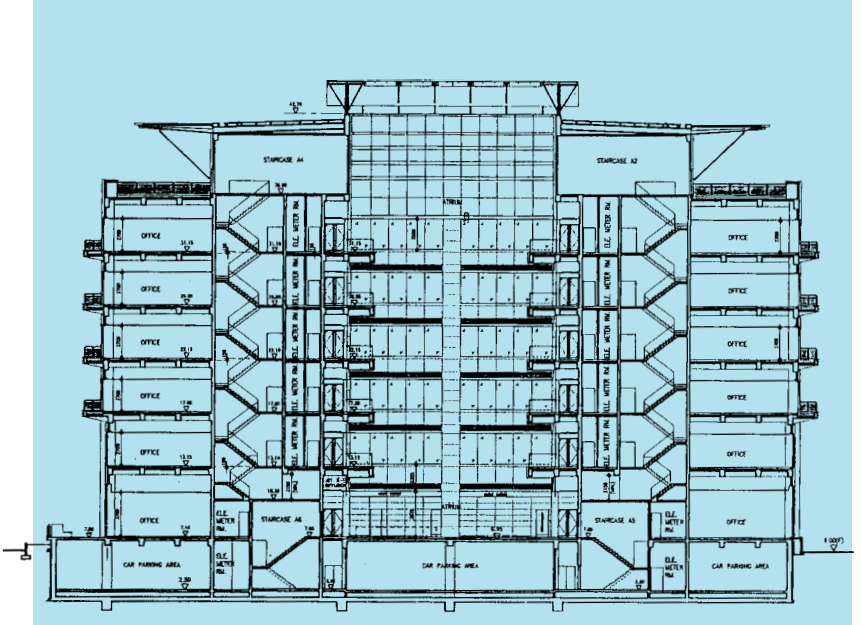
An approach in the design of the overall development is to create a park-like setting with a relaxed, interactive and pleasant working environment. Science Park buildings are designed without fences or boundary walls in order to achieve this campus setting, and the exterior design of the Phase 1 buildings is coordinated to give a coherent appearance while at the same time allow individual identities on the site.



Hong Kong Science Park
at Pak Shek Kok, Phase 1b – Building 4

Buildings 4a and 4b

The layouts of Buildings 4a and 4b are both based on 1.5 m planning modules and have a standardised structural grid of 9 m by 10.5 m. These modular designs were decided onto permit flexibility of subdivision and space planning. Buildings 4a and 4b are both designed with central services cores and the building depth in most parts of the offices does not exceed 10.5 m from the external or atrium walls, thus allowing better daylight penetration. The standardised modular planning also allowed for the use prefabricated structural elements such as semi-precast floors, pre-cast beams and staircases, and the use of metal formwork to reduce the need for timber during construction, reduce insitu wet trades and at the same time improve workmanship and shorten the construction programme.



Building 4a section

Buildings 4a and 4b are located at the southeast corner of Science Park Phase 1, within the development zone designated for corporate buildings. The site faces Tolo Harbour to the East and Science Park's main vehicular access is to the West. The two blocks are linked with a semi-common basement carpark that provides 167 car-parking spaces. The purpose of the development is to provide buildings for technology-based corporate tenants.

Building 4a is square in plan with a central landscaped atrium and has a total GFA of 14,780 sq m. The building is planned with two services cores, thus allowing the building to divided vertically into two entities. Although the development requirements for buildings 4a and 4b are primarily for single corporate tenants, the layout also permits the building to be subdivided horizontally for multiple tenants to allow flexibility in the future. The landscaped atrium is roofed over with a skylight, allowing daylight to reach the centre of the building.

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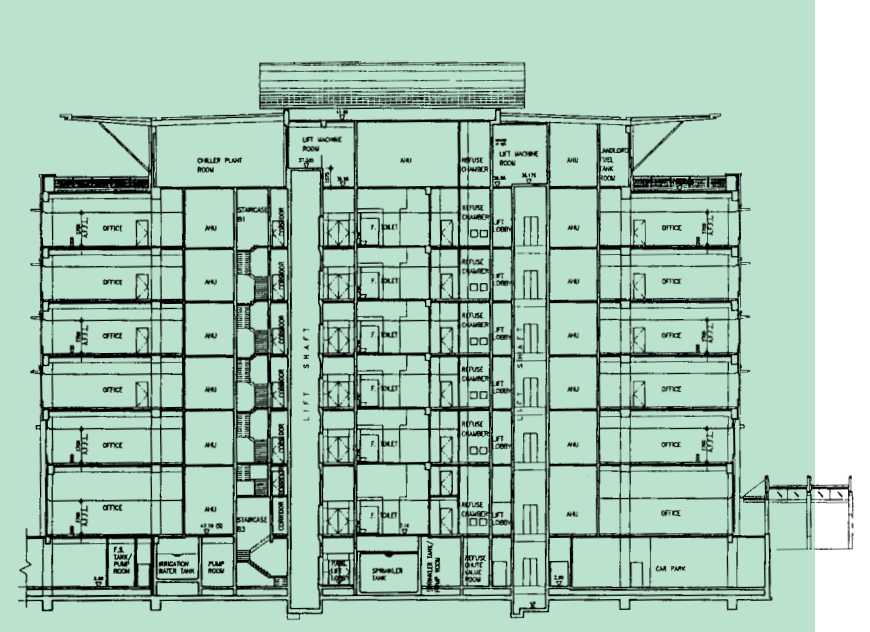
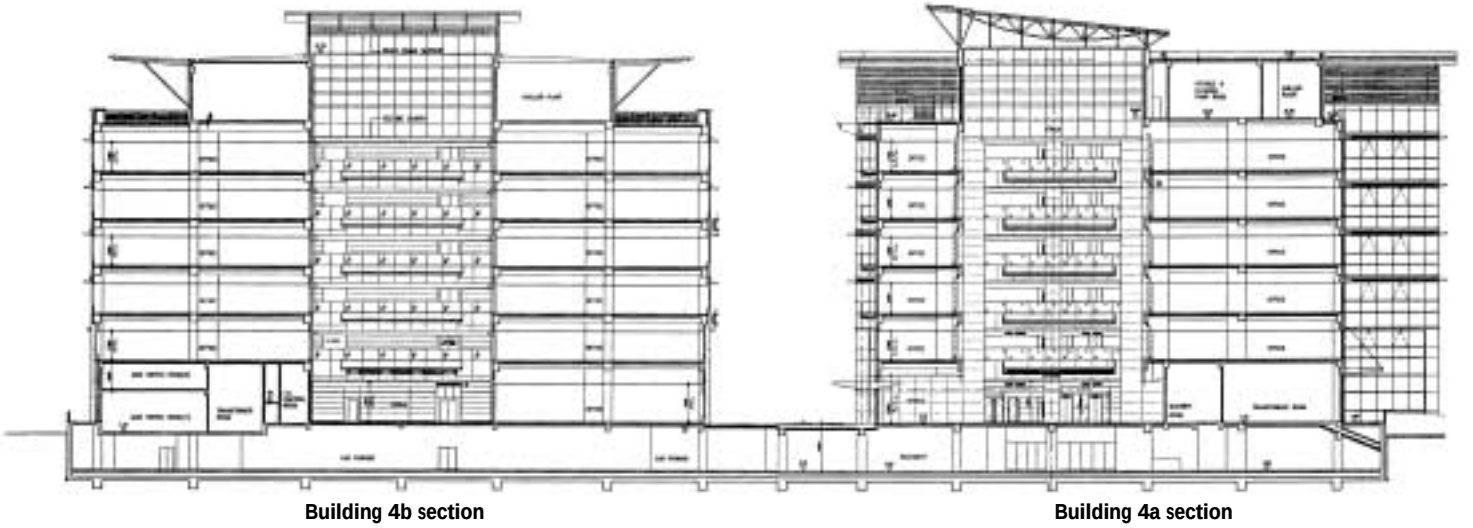
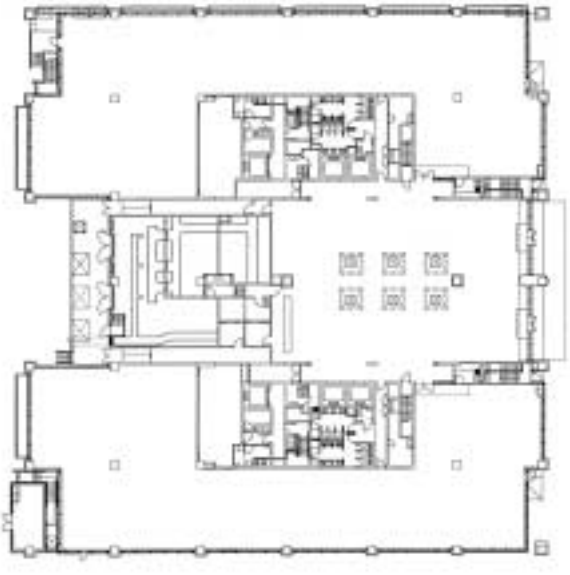


Building 4b section

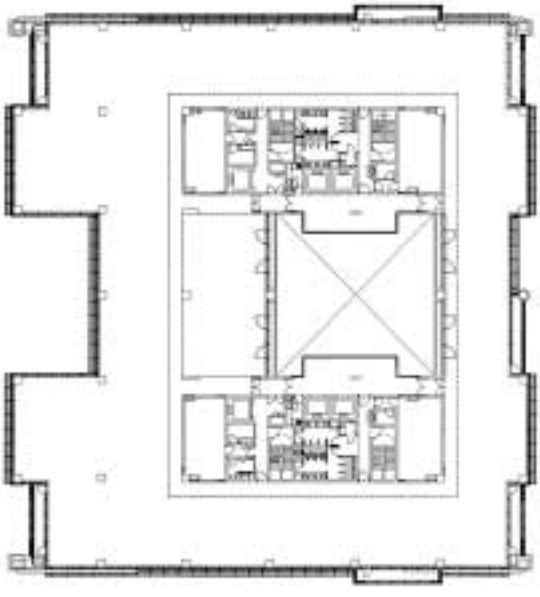


Building 4b section

Building 4a section



ground floor plan, Building 4a

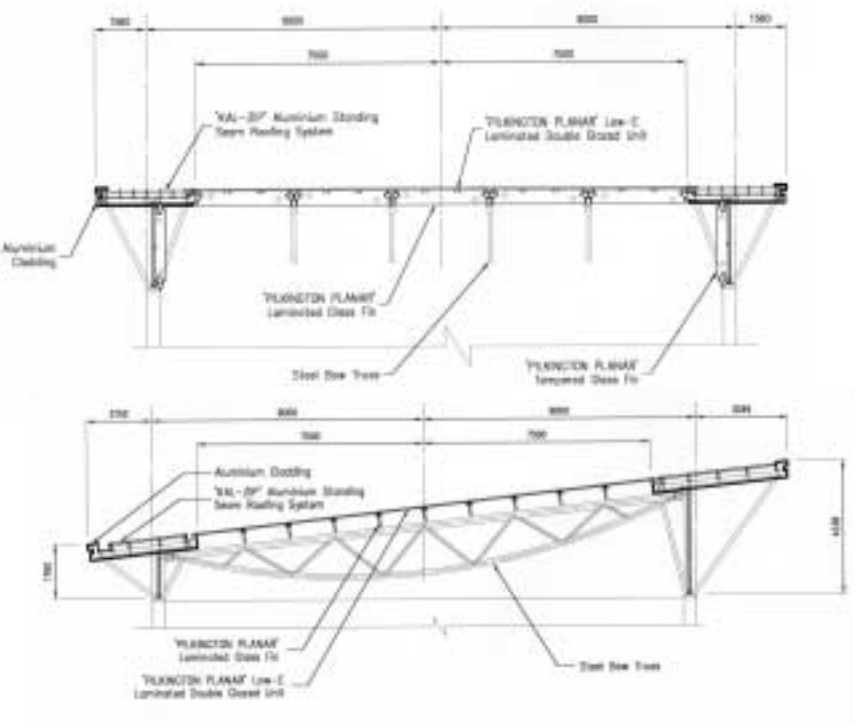


typical floor plan, Building 4a

(Continued from page 34)

Building 4b is rectangular in plan with an entrance atrium with a total GFA of 9,860 sq m. Like Building 4a, the design is intended for a single tenant but horizontal subdivision for multiple tenants is also possible. The six-storey high entrance atrium features a glass wall facing the landscaped entrance courtyard, enhancing the environment of the internal space and the relationship between the inside and outside. Informal seating in the atriums and common areas of both Buildings 4a and 4b is provided to encourage greater social interaction among staff.

The floor-to-floor height of typical office floors is 4.5 m, providing 2.7 m floor-to-ceiling offices with approximately 1 m high ceiling services zones and a 200 mm raised floor for tenants' services distribution. The provision of raised flooring ensures flexibility and adaptability to future changes in tenants' requirements and technologies. Open plans and high ceilings create



skylight and metal roof (21 m wide by 23 m long) at Building 4a

a spacious, relaxing office environment and areas open to the atrium double as interactive space with landscaped sitting areas for informal meetings. Balconies accessible from within offices provide access to fresh air for tenants, and feature views over the open space around the building.

The facades of the buildings are clad with a combination of aluminium panels, double glazed

window units and building integrated photovoltaic (BIPV) panels. Sunshades shield direct sunlight penetration, reducing heat gain to the offices. The use of double glazed window units with low-e coated clear glass enhances thermal and acoustic performance. The use of clear glass in lieu of reflective glass avoids light reflection disturbances to neighbouring buildings. The roofs are clad with insulated metal roofing sheets with large projected canopies covered with photovoltaic panels to provide shading to the main roof and offices below. The buildings' double glazing, low-e glass and sunshades combine to achieve an OTTV of 23w/m^2. The use of pre-fabricated cladding material reduced site works, wet trades and wastage on site during the construction period.

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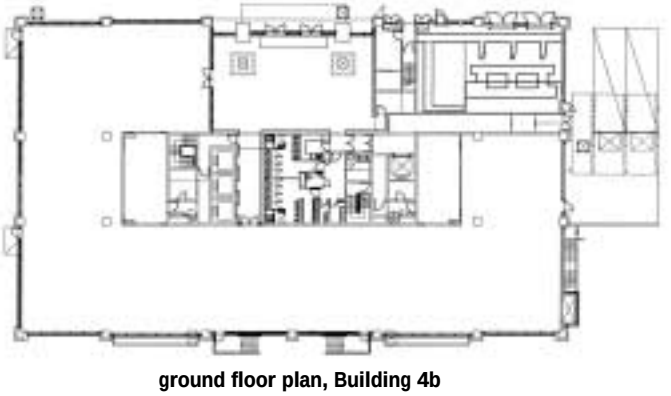
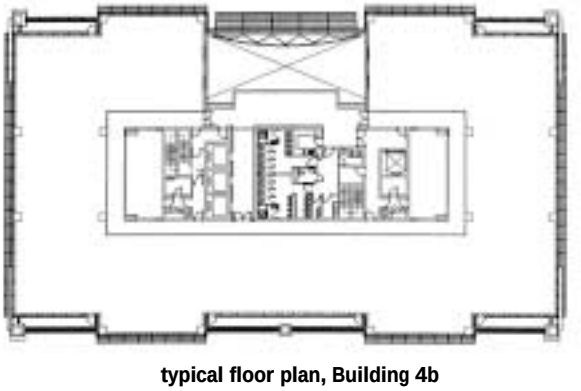


ground floor plan, Building 4b



typical floor plan, Building 4b

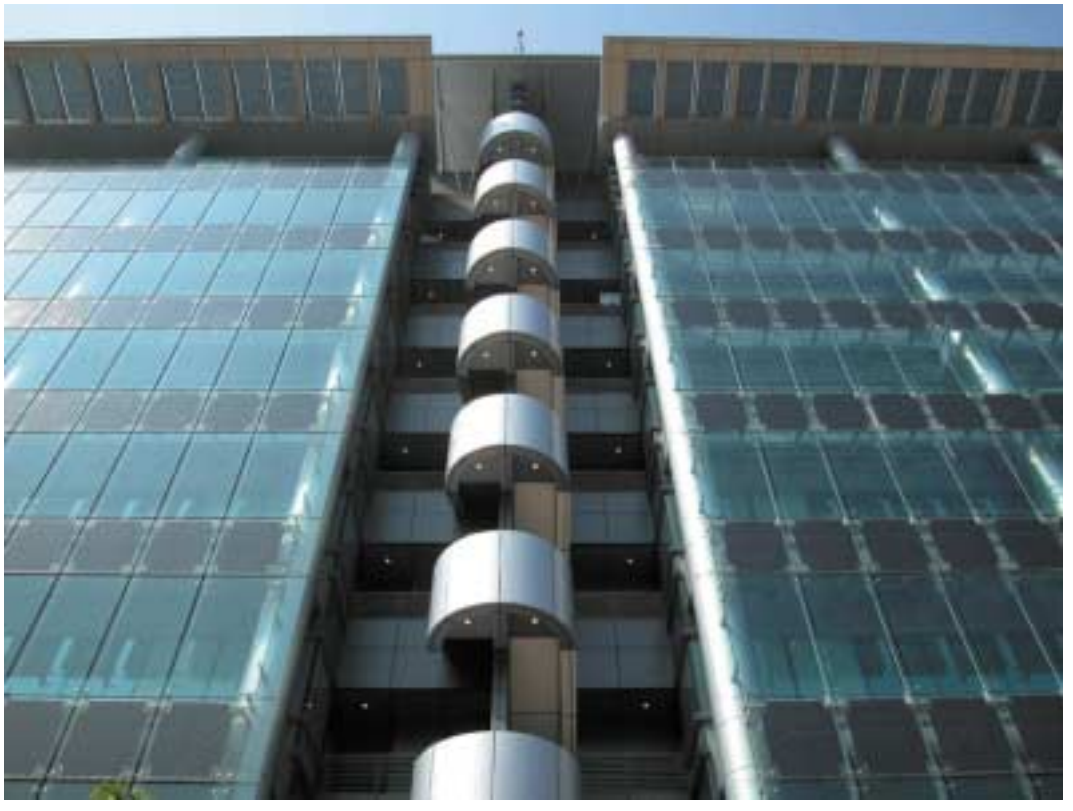
(Continued from page 43)

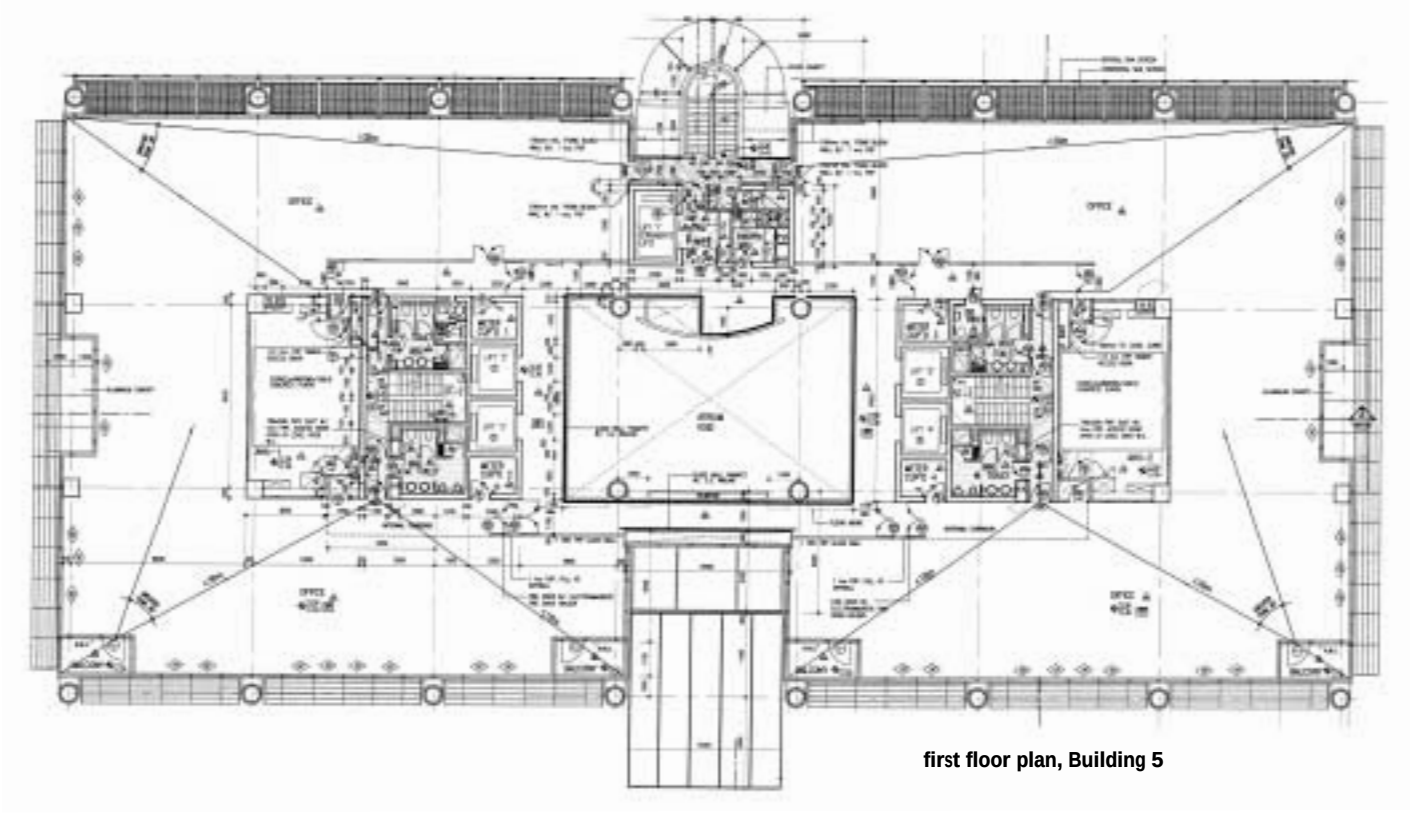
Building 5

Building 5 of Phase 1b is situated at the Western boundary of the Phase 1 development area and is close to Tolo Highway. The building forms part of the campus zone, designated for small- to medium-sized tenants with flexible and easily divisible layout.

The eight-storey building has a total GFA of 10,400 sq m, including basement plant rooms, a service tunnel, upper roof plant rooms and office space. The design features three service cores, two of which are designated for tenant orientated services such as plant rooms for tenants' areas, toilets and passenger lifts, while the remaining core is designated for communal facilities including refuse rooms and a pantry goods lift. This arrangement allows the building to be divided for a wide range of tenant mixes — up to eighty-eight tenants could be housed in Building 5.

A 1.5 m planning grid was adopted in designing the building and the offices are generally 9 m deep from the external wall. This depth, together with the 4.5 m floor-to-floor height (including 200 mm raised flooring), caters for better office layout in terms of primary circulation and efficient configuration, and provides flexible space to accommodate clients with diverse space requirements. Future changes and conversions to suit the changing needs of the tenants and market demands can also be achieved. Design





first floor plan, Building 5

Central management and ancillary support

Buildings in Hong Kong Science Park Phase 1 benefit from centrally controlled management systems and advanced building services. The central control management system in each building provides intelligent control and monitoring over daily operation. The Phase 1 buildings are also linked with underground services tunnels for interconnection of utilities - power cables, IT and telecommunication cables, water pipes and refuse pipes - to allow ease of future maintenance and changes without pavement excavation. Building services signals in all buildings are connected to the central security and management office in Phase 1a - the core location for centralised management to reduce staff and improve efficiency.

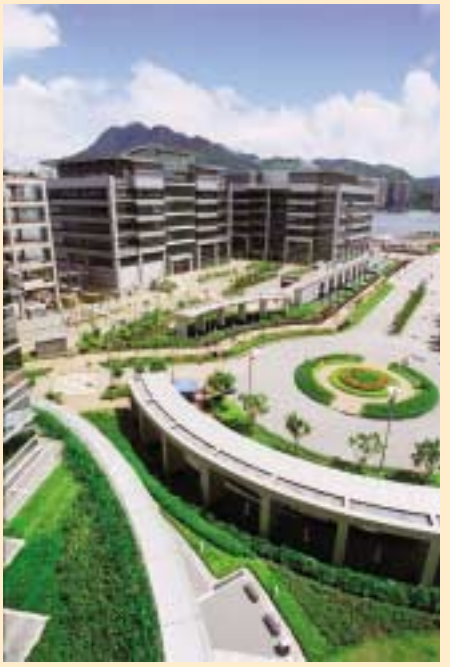
A dual chute Central Automatic Refuse Collection System (ARCS) links all buildings for normal refuse and recyclable waste collection. The ARCS system also eliminates manual refuse collection, improves the environment and avoids odours spreading from accumulated refuse.

considerations have also taken into account the different working hours future tenants would have, including the possibility of 24-hour operations.

The building envelope is designed for an energy efficient and environmentally sensitive treatment. The double skin facade system on the west elevation helps to shield traffic noise from Tolo Highway and reduce solar heat gain, while the double-glazed curtain wall system, sun shading devices and the metal roof also enhance the building's thermal and acoustic performance. Due to its close proximity to Tolo Highway, clear glass has been used throughout the facade to help to reduce the amount of glare that could affect motorists. BIPV panels used on the outer

skin of the west facade and roof canopy not only contribute to the energy efficiency of the building, but also give the building its unique character. Clerestory glazing was specified for the building to present a transparent image in line with the rest of Science Park Phase 1 and to reduce the apparent bulk of the building.

The building form is enhanced with a lightweight and sculptural roofscape that adds interest to the Science Park's skyline. Elsewhere, projecting columns reinforce the building's presence and give a sense of rhythm and a modular effect to otherwise long elevations. Besides these features, aluminium spandrel cladding, a suspended cable structure and a point-fixed frameless glass wall system have also



Green development

The design of the buildings in Hong Kong Science Park follows Architectural Services Department's environmental policy and the environment and energy measures set for its buildings. The architects' stargets aim to achieve sustainable, environmentally friendly and energy efficient designs with less disturbance to the environment, less consumption of natural resources, less dumping, less emissions to the atmosphere, optimum energy efficiency and the use of new and clean energy technology.

Building materials wherever possible were selected with the criteria of durability, maintenance, environmental friendliness and recyclability considered. Examples of green materials selected are recycled glass ceiling tiles and insulation boards, low-VOC paint and flax core timber doors.

For water saving features, water taps and urinals are operated by infra-red sensor control. For healthy growth of plants and reduction of water used for irrigation, a computer-controlled automatic irrigation system with local rain sensors will be provided for effective control of the water supplied to landscaping areas. This will provide suitable micro-environments for different types of plantings and avoid unnecessary irrigation during wet days.

The use of building integrated photovoltaic (BIPV) panels at the curtain wall of Building 4 and the double skin wall at Building 5, as well as the roofs of both buildings, pursue new clean energy technologies, reduce consumption of natural resources and cut emissions to the atmosphere. Buildings 4a, 4b and 5 have achieved the "Excellent" rating under HK-BEAM (Hong Kong Building Environmental Assessment Method).

During the construction stage the contractors were also encouraged to pursue environmentally friendly approaches in construction methods and waste management. Techniques including the use of recycled water for wheel washing facilities and the use of metal formwork and scaffolds were adopted during construction to reduce the need for timber, thus leading to less consumption of resources and reducing dumping.

been used to keep the presentation as lightweight-looking as possible.

Inside Building 5, open plans and high ceilings create a spacious, relaxing office environment, enhanced by built-in building services such as solar and occupational sensing light and air-conditioning controls. The atrium maximises natural light penetration into common areas and major circulation is centred on it. The atrium is also furnished with landscaped sitting areas for small gatherings between tenants. As in Buildings 4a and 4b, balconies can be reached from the offices for outdoor access and views.

Bickson Construction Co Ltd
Building 5 main contractor

China State Construction Engrg. (Hong Kong) Ltd
Building 4a and 4b main contractor

Architectural Services Department
architect

Building services and E&M facilities

Stringent energy efficiency codes are being followed in the design of building services at Hong Kong Science Park, and innovative and energy-saving features have so far been incorporated to save approximately 10 to 15 per cent of potential electricity bills. The building services design is briefly described as follows:

a) Electrical System

• Building Integrated Photovoltaic (BIPV) panels provided on the roof and building facade generate clean renewable energy from the sun. Electricity generated will be connected back to the main electric grid.

• T5 Lamps with electronic ballast are used instead of T8s for better light output and to consume less energy.

• Intelligent addressable lighting control systems are incorporated with occupancy sensors, photocells, timers, motion detectors and dimmers for the open plan offices to reduce energy consumption for the lighting system

• Network analysers are installed in LV switchboards to provide continuous data acquisition for monitoring of power consumption and future energy usage.

b) Mechanical Ventilation & A/C System

• Occupancy sensors are installed for air-conditioning control.

• Environmental friendly refrigerant is used for chillers/heat pumps with zero ozone depletion potential.

• Ionizers, chemical filters, UV filters and electrostatic filters are used to provide active treatment for indoor re-circulating air.

• The air-conditioning plants are sized to run at their maximum efficiency according to the load characteristics of the complex.

• High-efficiency motors are selected in the services systems and soft starting of motors will be employed.

• Heat pumps are used to reclaim waste heat from the condensing water for pre-heating hot water for space heating and potable use.

• Variable flow of chilled water distribution system with variable speed drive pumping control is employed.

• Air-to-air total energy heat exchangers are used for pre-cooling/ pre-heating of fresh air intake utilising the exhaust air in the air-conditioning system.

• The variable air volume (VAV) air-conditioning system incorporated with Carbon Dioxide (CO2) sensors (which are installed inside the return air duct of AHUs) can automatically adjust the volume of fresh air supply in accordance with the level of occupancy.

• Demand control ventilation is used in the basement carpark.

c) Lift Installation

• Lighting and fans inside lift cars switch off automatically when lifts are not in use for more than 15 minutes.

• Active harmonic filters with inverter drives are used for lifts.

• Off-peak hour lift control is applied.

Source: Architectural Services Department