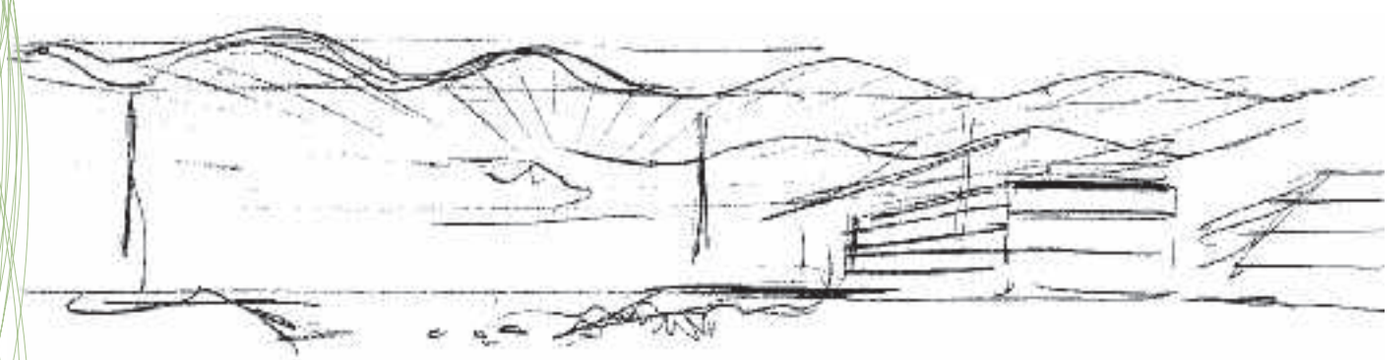
University of Technology Petronas

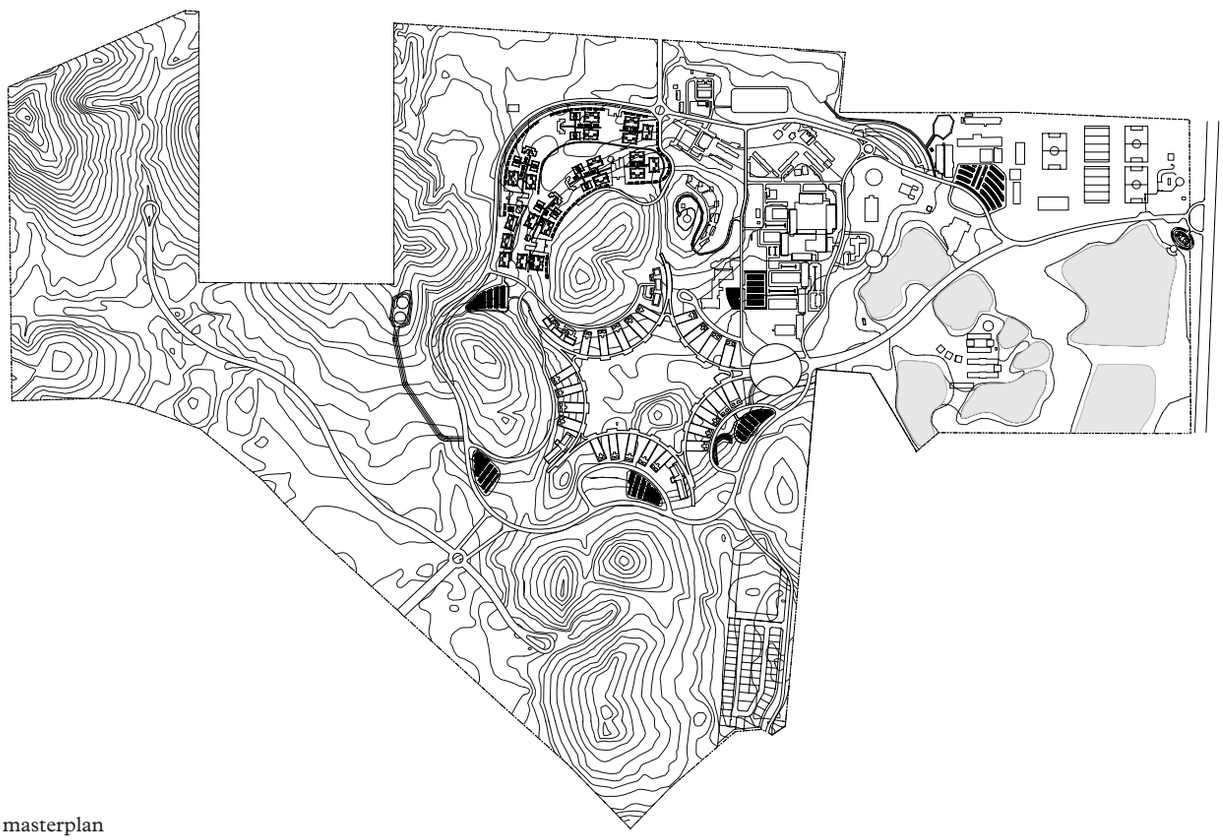
Bandar Seri Iskandar
Malaysia

Foster + Partners and
GDP Architects



Introduction

Malaysia's sustained growth in recent decades is due in large part to the development of a strong education sector, one that aims especially to contribute to advances in the fields of science and technology. In support of this ambition, the government invited the petroleum company Petronas to set up a private university that would nurture technically qualified, well-rounded graduates who could direct the development of key industries in Malaysia. Blending academic training with hands-on experience, the University of Technology Petronas is conceived as an environment that will encourage creativity and innovation, 'a place to learn and not a place to be taught'.



masterplan

Jury Citation

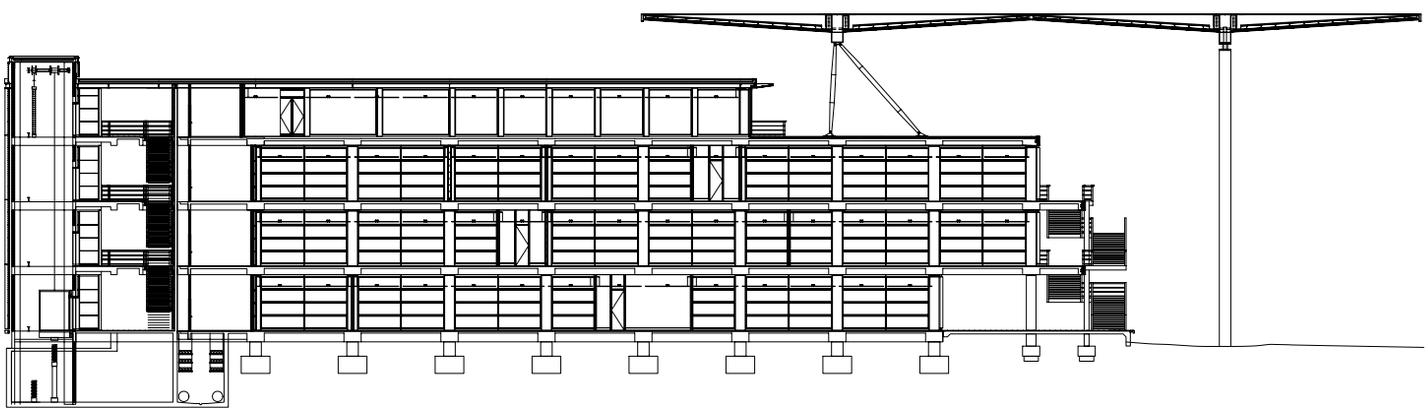
The project's significance lies in a number of aspects.

First, its prototypical built configuration, consisting of an all-encompassing shaped canopy with functional boxes inserted underneath, is a contemporary reinterpretation of the classic metaphor for tropical architecture – an umbrella that offers protection from the sun and rain.

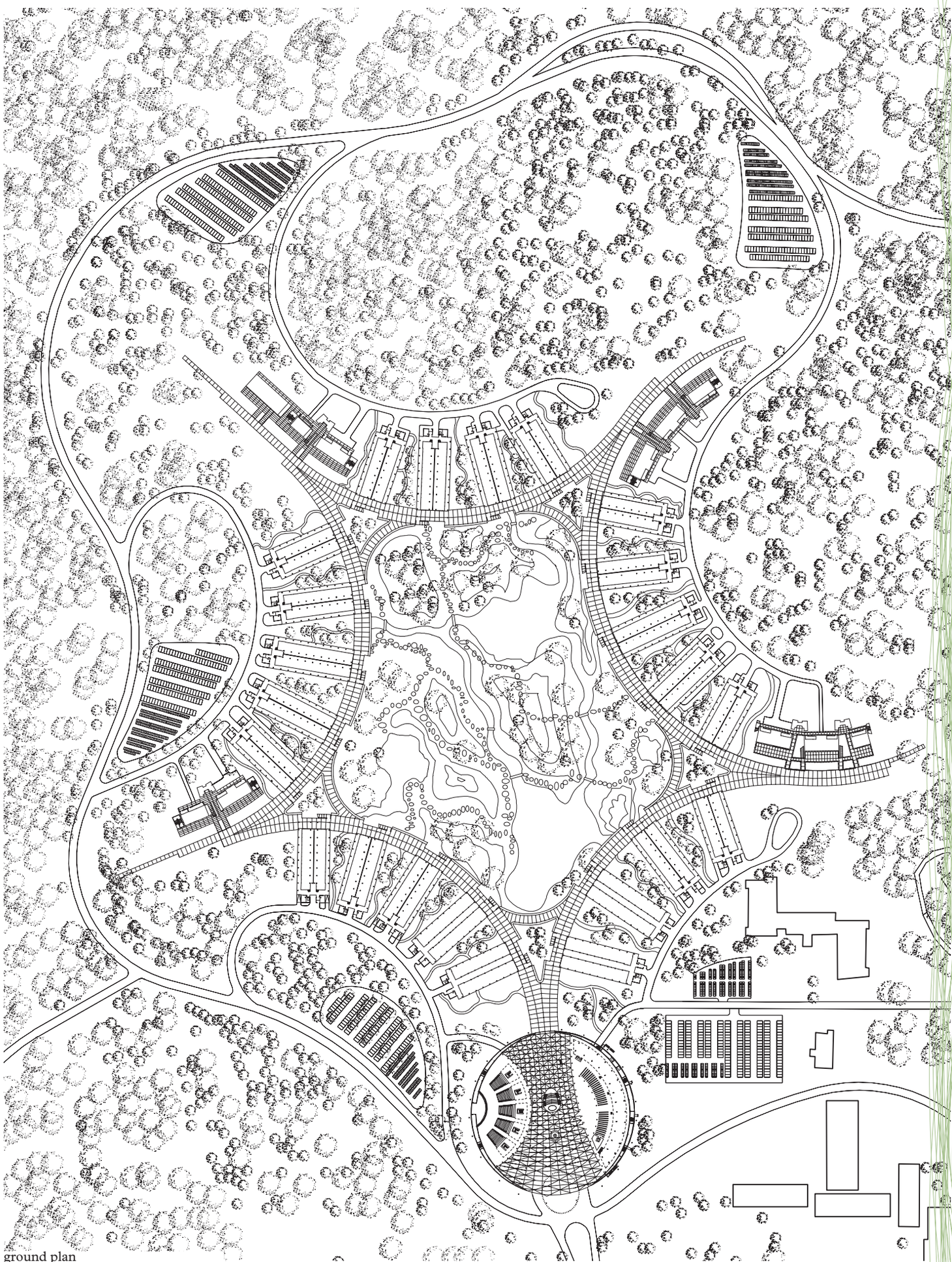
Second, the building provides a defined shaded zone for social interaction and circulation under an overhead enclosure. This is a high-tech, emblematic architecture appropriate for a scientific university in a rapidly developing nation.

Third, the careful physical integration of a complex educational structure with the existing landscape is achieved in an ingenious way, by wrapping the built forms around the base of a series of knolls.

And fourth, this is an exemplary use of a performance-based approach to architectural design that goes beyond the diagram. The design has been carried through to completion with meticulous detail, rigour and persistence. It sets new standards in the quality of construction without significant cost premiums. In aggregate, the jury found the design to be instructive, aesthetically satisfying and technologically novel.



section



ground plan

Project Description

The University of Technology Petronas (UTP) campus is set in a dramatic landscape at Bandar Seri Iskandar, 300 kilometres north of Kuala Lumpur. Around two-thirds of the 450-hectare site is hilly and forested terrain, while the remainder is a plain dotted with dunes and man-made lakes formed by flooding disused mines.

The design responds both to the physical landscape and to the weather patterns in this part of the Malay Peninsula. It can be intensely hot in the sun, but during the monsoon season the skies open every afternoon to torrential rain. A soaring crescent-form roof covers the pedestrian routes that wind around the edge of the site, providing protection from the sun and rain while offering the comfort of cross-ventilating breezes. The steel columns that support the roof are slender, to maintain views, and from a distance the canopy elevation seems integrated with the tree canopy around the site.

To preserve the natural topography, the core academic buildings are laid out in a radial manner, skirting around the base of hills to form five 'crescents' that enclose a central landscaped park. These buildings are generally four storeys high and contain faculty offices, engineering laboratories, workshops and associated teaching facilities such as computer labs and tutorial spaces.

Tucked beneath the edges of the canopies, at four of the nodes where the crescents meet, are 'pocket buildings' containing lecture theatres, shops, cafes and student support facilities. At the fifth node, by the main entrance, is the social hub of the campus, the chancellor complex. This drum-like building, 21 metres high and around 150 metres in diameter, is formed of two crescent-shaped halves connected by a covered public plaza. One half of the building accommodates the resource centre with the library: the curve of the crescent is filled with four storeys of library stacks, visible through a vast glass and steel facade. The other half of the building houses the chancellor hall, a 3,000-seat auditorium with five tribunes, retractable seats and an excellent acoustic performance.

Given the acreage of the site, there would appear to be unlimited land on which to build. Yet for the campus to function well, the academic facilities had to be placed in close proximity to each other, especially in light of the varied topography and the warm climate. The distance a student can walk in the 10-minute break between classes – 800 metres – was used as the basic module of measurement for the pedestrian campus.

With a capacity of 6,600 students, UTP is the largest academic centre for the study of civil, mechanical, chemical and electrical engineering in the region. In terms of scale, the project is more consistent with town planning than with conventional building. The radial geometry of the scheme uses the topography of the site to locate five major axes along which the components of the university are organised. Several axes are kept open to provide the flexibility for long-term growth. Future phases of development include the completion of a sports stadium and a mosque (facilities that will be shared with the residents of a proposed new township) as well as additional student housing and research facilities.

The star configuration – a 'symbol of excellence' – originated in the very early stages of the planning for the university and was used as a template to zone various activities and initiate the preliminary design. When Foster + Partners and GDP took on the project they refined the concept. The masterplan was completed in March 2002. The challenge then was to deliver the project by August 2004.

Since the brief was to be developed in parallel with the design, the architects devised a loose-fit design strategy with generic laboratory types that would tolerate and accommodate more detailed functional requirements as they became known.

The construction technology in general took account of the capabilities of local contractors. The innovation lies in the rigour, detailing and quality of the work. The circular chancellor complex is formed using reinforced concrete slabs supported on steel columns. A double-curved steel structure roof clad in Kalzip covers its two halves. External elevations are curved pre-cast concrete with ceramic tiles, while internal elevations are glazing systems suspended by cables.

The academic buildings are predominantly flat-slab (pre-stressed) concrete, modularised bays supported by reinforced concrete columns. External elevations are modular single-skin glass panels organised in translucent and transparent finishes to respond to programme.

The roof canopy is insulated metal decking supported by tubular steel columns. The floor deck follows the roof plan, floating slightly above ground level with coloured pre-cast panels supported on steel frames.

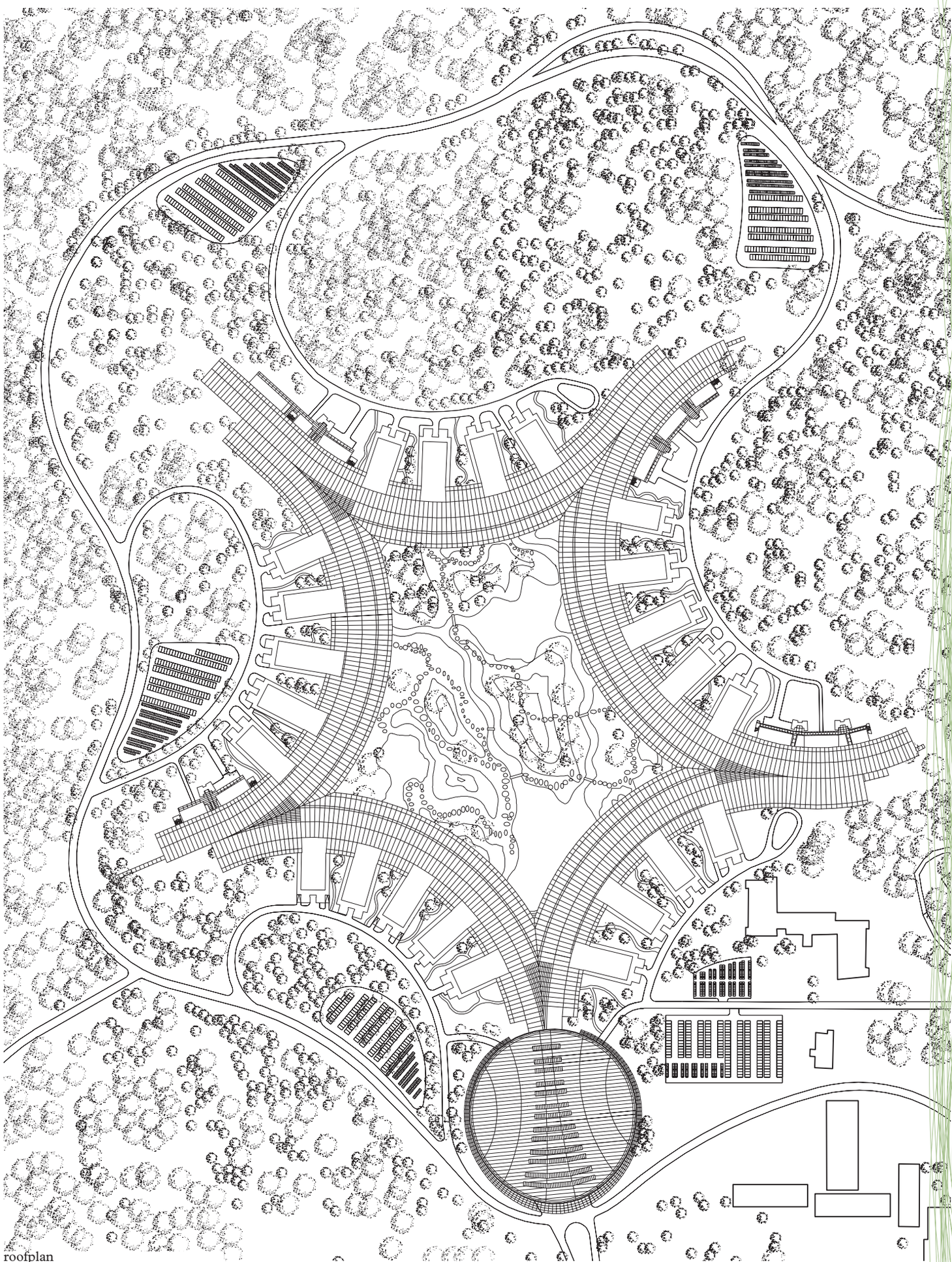
Colour is used to blend the man-made with the natural; industrial methods with traditional materials. The local earth has a red hue that is replicated in finishes throughout the building. The exterior cladding is made of locally sourced ceramic tiles, on pre-cast panels, which form an iridescent pattern with varying matt and shiny finishes. In the chancellor complex, the interior cladding is mostly formed of silk panels that are woven to create rich patterns, using a traditional process integrating gold and silver threads.

Wherever possible the design has taken a holistic approach to using low-energy concepts. Whilst maintaining a harmony with the site, the blocks are separated by central passages that encourage airflow. The canopy acts as a very effective shading device for pedestrians and buildings alike. It is pierced with rooflights and edge louvres that allow daylight to filter through the interiors of the buildings. Cantilever passive shading and opaque glass reduce solar glare. Gas-fired centralised chilled water systems are used for cooling, and water is collected from the roof to be used for irrigation. Natural ventilation has been adopted wherever possible, for example in the support facilities and offices, but it is backed up by two types of mechanical ventilation.

The project has engendered an important transfer of knowledge, process, technology and confidence. The quality of the building reflects the fact that the designers were given the opportunity not only to conceive but also to deliver the project. Through working together, the two practices taught each other a lot about benchmarking, prototyping and meticulous detailing, and they are now collaborating on other projects. Similarly, the local contractors, who had not previously undertaken projects of this nature, have developed new skills and gone on to win new high-profile commissions in the region.

UTP provides a new 'prototype' of practice that links concept and expectation, creating an environment for an ambitious and progressive model of education.

Text adapted from a report
by Hanif Kara



roofplan

University of Technology Petronas
Bandar Seri Iskandar, Tronoh, Malaysia

Client
Institute of Technology Petronas, Malaysia

Architects
Foster + Partners, UK: Lord Norman Foster, chairman; David Nelson, head of design. GDP Architects Sdn Bhd, Malaysia: Kamil Merican, CEO and principal designer

Project Manager
KLCC Projects BHD, Malaysia

Engineers
Meinhardt Pte Ltd, Ranhill Bersekutu Sdn Bhd, Wimsa HSS Integrated and Majid & Associates Sdn Bhd, structural engineers, all in Malaysia; Roger Preston & Partners, UK and Majutek Perunding, Malaysia, mechanical engineers

Consultants
Research Facilities Design, USA, landscape consultant; Sandy Brown Associates, UK, acoustic consultant; Marshall Day Acoustics, Malaysia, acoustic consultants; BDG McColl, Malaysia, signage; Jurukur Bahan Malaysia/KPK, quantity surveyor; Shah PK & Associates, Malaysia, Gillespies, UK, landscape architects; Lightsource International (Asia), Hong Kong, lighting designer; PMP Consultancy, UK, planner

Project Data
Built area: 104,000 m²
Site area: 85,000 m²
Cost: US$ 174,816,000
Commission: January 1998
Design: January 1998–January 2002
Construction: January 2002–January 2004
Occupancy: August 2004

Websites
www.utp.edu.my
www.fosterandpartners.com
www.gdp.my

Foster + Partners was founded in London in 1967 and is a worldwide practice with project offices in more than 20 countries. Over the past four decades the company has been responsible for a strikingly wide range of work, from urban masterplans, public infrastructure, airports, civic and cultural buildings, offices and workplaces to private houses and product design. Norman Foster, founder and chairman, was born in Manchester in 1935. After graduating from Manchester University School of Architecture and City Planning in 1961 he won a Henry Fellowship to Yale University, where he gained a Master's degree in architecture. He became the 21st Pritzker Architecture Prize Laureate in 1999 and was awarded the Praemium Imperiale Award for Architecture in 2002.

David Nelson began working at Foster's in 1976 and, since becoming a partner in 1991, has worked on many projects including Stanford University Laboratories in California and the new Supreme Court in Singapore, in addition to the University of Technology Petronas. He was awarded an Honorary Fellowship of the RIBA in 2002, and now assumes a broader role within the practice, sharing the overall design direction as a lead member of the design board. He became senior executive head of design in 2007.

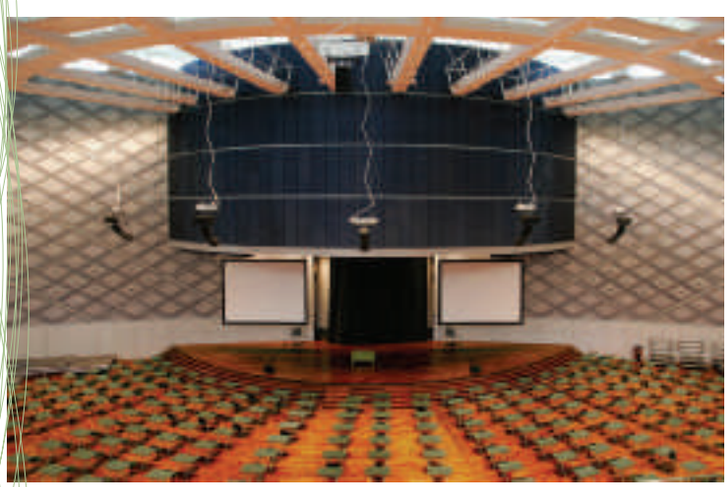
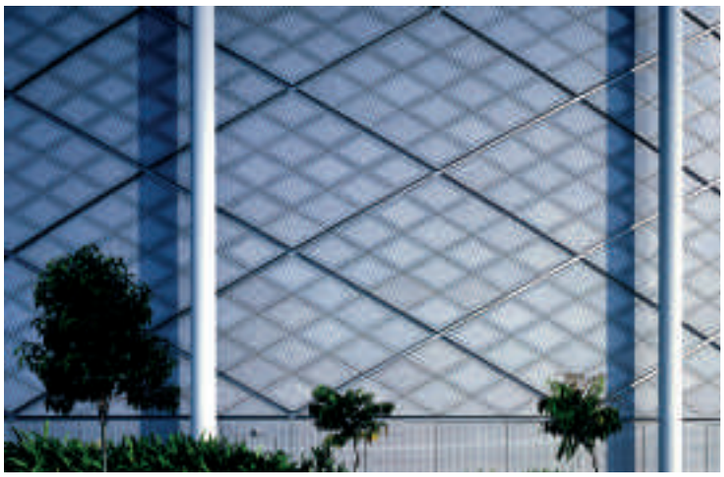
Group Design Partnership was established in the year 1990. From an initial staff of eight, it has grown to become the largest architectural practice in Malaysia, with a staff of almost 250 people. In 1994, the firm was incorporated as a private limited company and has since come to be known as GDP Architects Sdn Bhd or simply GDP. Aside from architectural services, GDP provides consultancy services in numerous areas of design and management such as master-planning, interior design, graphic design, feasibility studies and project management. GDP take the stand that design that addresses environment and culture creates its own culture and environment.

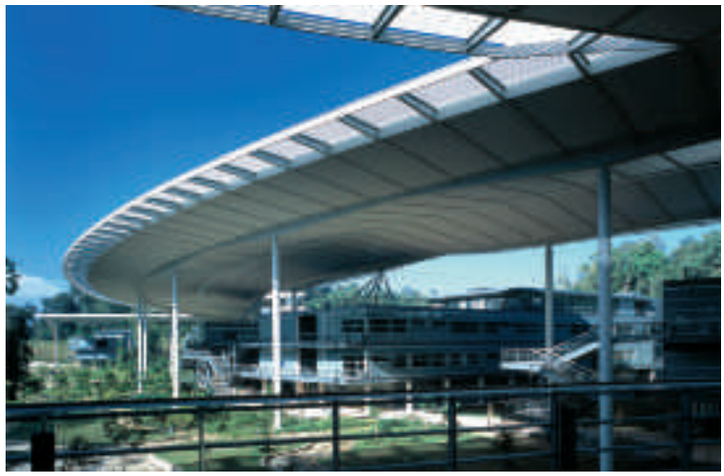
Kamil Merican is principal designer and CEO of Group Design Partnership (GDP). He studied architecture at Universiti Teknologi Malaysia (UTM) and the Architectural Association in London. He has worked with various established architectural firms including Farrell and Grimshaw & Partners in London and BEP Architects in Malaysia. Merican has participated in all manner of architectural and masterplanning projects ranging from commercial and corporate buildings to institutional, hospitality and industrial projects. He remains actively involved with architectural education and serves as a guest critic at most universities in Malaysia. He has been an external examiner for UTM and Universiti Malaya (UM) for over a decade.











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