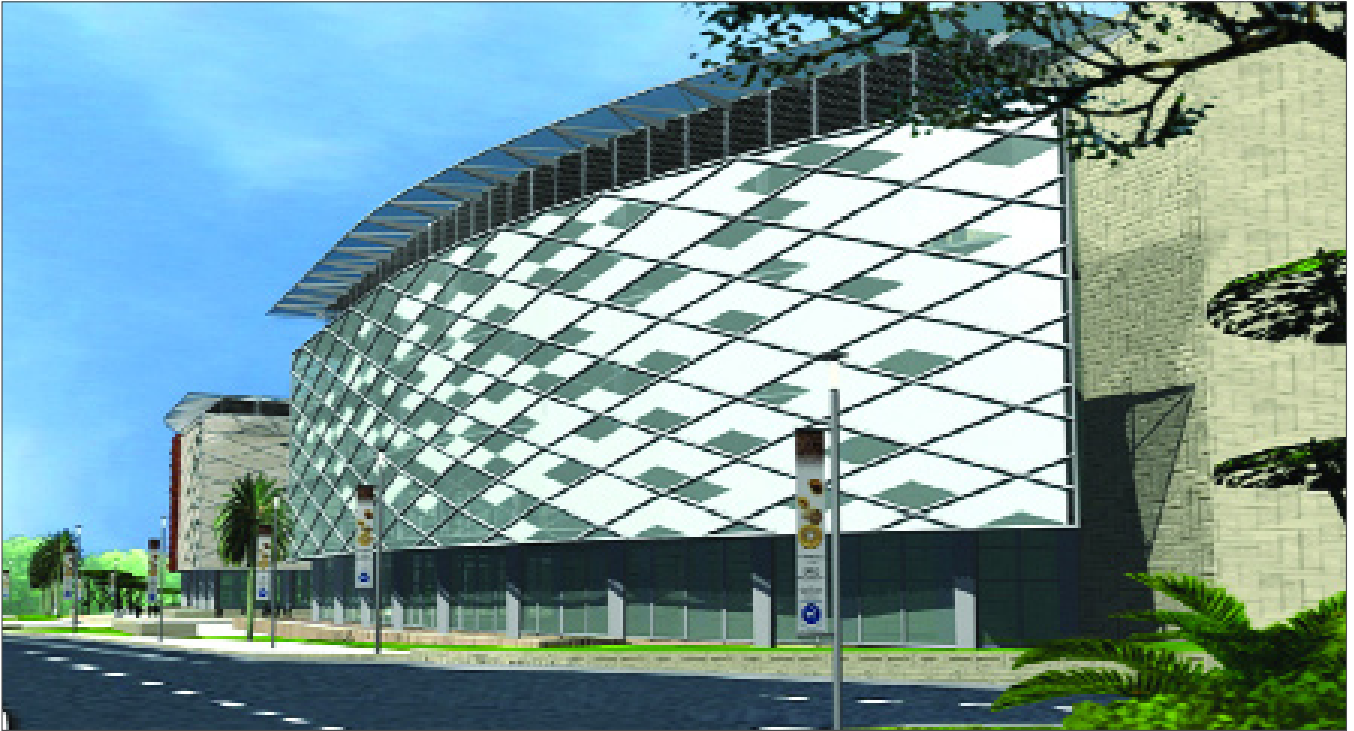


BATTLE McCARTHY ©

Consulting Engineers & Landscape Architects



PROJECT:

The New Bank Negara in Kuala Lumpur, Malaysia

CLIENT:

Bank Negara

ARCHITECTS:

Hijjas Kasturi Associates

BM SERVICES:

Structural, Environmental & MEP Services

CONTRACT DATES:

2000 - Ongoing

VALUE:

RM356 million (£50million approx)

DESIGN BRIEF

Battle McCarthy was appointed by the Bank Negara to undertake a full multidisciplinary appointment. The client requested a state of the art internationally renowned building to the latest European standards.

DESIGN INITIATIVES/ACTIONS UNDERTAKEN

Structural

Battle McCarthy has taken the project from conceptual design through to detailed construction information. Battle McCarthy structural designers have considered all construction materials and techniques in the development of a scheme design. The structural solution is a hybrid of steel, reinforced concrete and post-tensioned concrete.

The project has involved some complex structural solutions:

- A five hundred-seat column free auditorium situated directly in the middle of the building under the ground floor slab. The structural solution has been to adopt 2m deep plate girders spanning across the auditorium transferring the six storeys of structure above back to the supporting columns either side.
- The atrium space as shown below has involved the design of a cable tension system to support the vertical glass wall. The tension cables are supported by long span high-level steel beams, which sit on to 40m high steel profiled columns.



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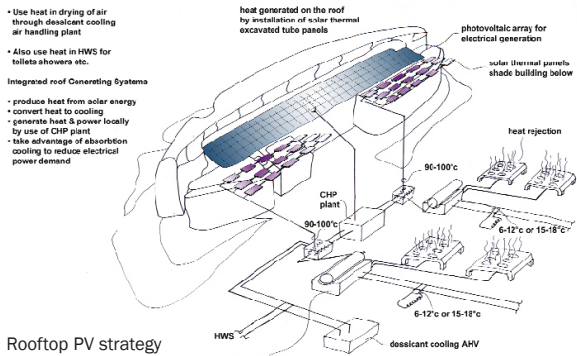
Mechanical, Electrical, Public Health

The key mechanical objective was to influence the environmental approach to internal climate control with sustainability in mind. This includes separation of areas that require controlled climatic conditions from those that are naturally ventilated or free roaming spaces such as buffer zones. Part of this process involved the careful selection of internal comfort control systems with respect to their environmental impact in terms of energy conservation, carbon emissions, comfort levels and practicality.

The brief aims to minimise the use of artificial lighting and create a daylight environment. Although some electric lighting would be required for some areas and time of year, the appearance of the space should remain daylight for the majority of occupied hours.

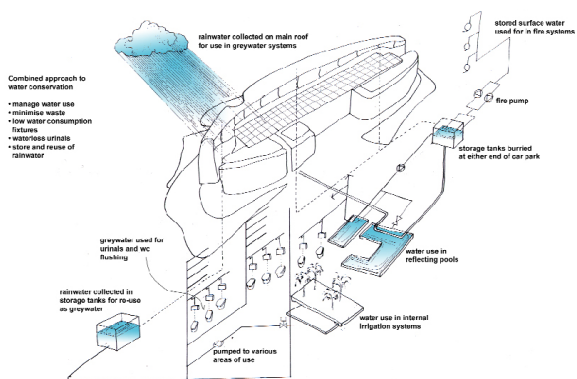
Mechanical Systems will be fresh air ventilation supplemented by perimeter FCU cooling systems in occupied areas. These areas shall be close controlled environments to ensure good internal conditions year round. Systems shall compliment the aesthetic and visual aspects of the space.

One of the key electrical objectives was to incorporate renewable energy systems such as photovoltaic on the roof in order to generate sufficient power to run the basement car park lighting.



One of the key public health objectives regards water conservation:

- Reduce demand or usage
- Recycle water



The rainwater harvesting strategy

- Rainwater harvesting

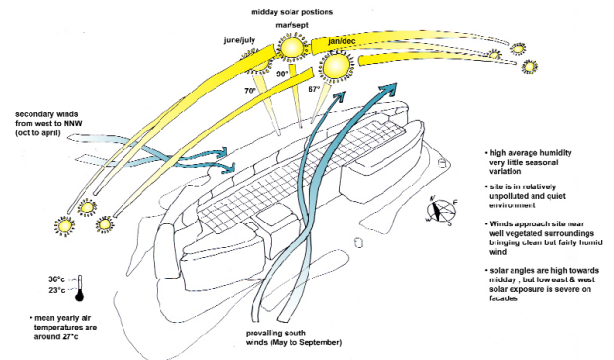
Daylight Strategy

The strategy aims at investigating all possible elements that contribute to the daylight quantity and quality (distribution and glare) in the various spaces throughout the scheme and optimise their effects. The principal issues for side-lit spaces are:

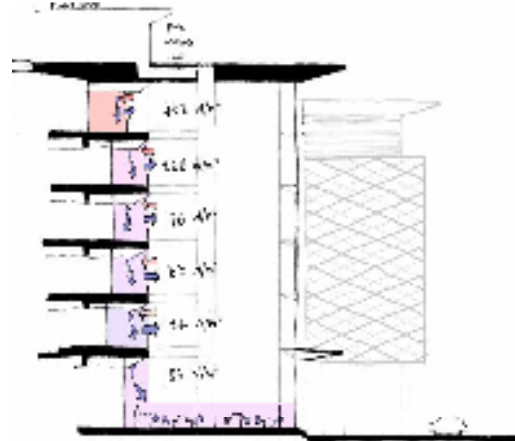
- Control occupied space depth to avoid poor uniformity.
- Maximise height of any overhang to enhance daylight distribution deep in the space
- Maximise penetration of daylight for any fixed shading system
- Use high internal surface reflectances to maximise internally reflected daylight.
- Maximise the use of daylight from walls with non direct solar

Environmental Façade Analysis

The façade governs the interaction between the building's internal environment and the external climatic forces. An environmental façade is designed to deliver high levels of occupant comfort in an energy efficient fashion.



Initial façade concepts have been developed for each of the key elevations. These have each been analysed and tuned to gain an acceptable performance value. Generally a maximum total internal space cooling load i.e. internal casual gains combined with solar and infiltration gains, of 100W/m² has been set for all zones. This serves to limit both the environmental impact from plant and allows a greater degree of freedom in selecting a suitable internal climate control system.



Atrium section

Throughout the analysis high performance solar neutral glass has been considered for the double glazed sections. The atrium areas were analysed for the thermal comfort criteria using TAS computer software. This information was then used to size the plant and deliver the exact cooling load requirements to the atrium floor and adjacent floor spaces.



Excavation of the basement storeys began onsite in 2004.