The Aga Khan Award for Architecture

Outward Bound Centre

Temburong, Brunei

Architect:

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Client:

Brunei Shell Petroleum Company

Darussalam, Brunei

and

Ministry of Sports, Culture, and Youth Affairs

Darussalam, Brunei

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Outward Bound Centre
Temburong, Brunei

I. Introduction

The Outward Bound Centre in Temburong, Brunei, consists of two facilities, a Logistics Centre and an Operations Centre, located a few kilometres apart. Situated in the heart of a tropical forest beside the Temburong River, the Logistics Centre is reached by road, while the only access to the Operations Centre is via the river. The remoteness of the site and its limited access restricted the design vocabulary, which relied on prefabricated components with minimal wet construction on site.

The design is sensitive to the surrounding terrain. The buildings were fragmented as a series of pavilions with connecting walkways to avoid the felling of trees and to adjust to the existing contours of the site. An intelligent and creative interpretation of the programme has allowed the project to set an important precedent for the region in showing how traditional Malay architecture can be redefined for contemporary needs using a modern approach to design.

II. Contextual Information

a. Historical background

The project was conceived by the Shell Petroleum Company as a gift to the Sultan of Brunei, to celebrate his silver jubilee as ruler of the country. Instead of presenting a gift directly to the Sultan himself, Shell decided to give the people of Brunei a facility for community development, and the Outward Bound Centre was created for this purpose.

The Outward Bound Programme's mission is to encourage the development of young people through experience and adventure training, teaching them personal skills that will enable them to make a contribution to the development of their country. Outward Bound centres are not physical training schools, nor do they impart outdoor and jungle survival skills: they provide training programmes for their participants in natural and isolated settings. They are usually located away from cities or any form of settlement – in this case, in the heart of the tropical forest of Brunei. While Outward Bound does emphasize physical activities such as rock-climbing, canoeing and so on, its essential thrust is to create a sense of community, where people work together to achieve common goals.

For this project, Shell approached Idris Abas to act as architect and asked the Ministry of Culture, Sports and Youth Development (MCSYD) to be the ultimate beneficiary of the gift. The project was therefore initiated and funded by Shell but is run by the ministry. The site within the tropical forest was selected jointly by the architect and the personnel of Shell in concurrence with MCSYD. Before embarking on the search for an appropriate site, the architect visited other Outward Bound centres in Singapore, Taiwan and Malaysia to gain a full understanding of the actual functioning of the Outward Bound Programme.

b. *Local architectural character*

Being an oil-rich nation, Brunei has built extensively in the last couple of decades and, because contemporary functions and typologies are not represented in the local vernacular, has seen a dramatic break from traditional architectural forms. Today, Brunei's landscape, especially in major cities such as Bandar Seri Begawan, is characterized by office and residential blocks five to eight storeys high, with curtain-wall glazing, reinforced-concrete frames and so on.

The only examples of a surviving local architectural typology are the water villages, built on platforms supported by stilts along the coastal edge. These are still occupied and thrive as popular low- and middle-income housing settlements. The buildings are constructed in timber with sloping tiled roofs. Because of their tropical context, space within the units is loosely organized, with many activities taking place outdoors on verandas and decks.

c. *Climatic conditions*

Brunei has a very hot and humid climate, with temperatures averaging 30°C and rain almost throughout the year, falling in tropical afternoon showers. The monsoon season stretches from November to February, when it is likely to rain throughout the day. In a city such as Bandar, the microclimate varies marginally between the coastal areas, hill locations and valleys that comprise the landscape. Within the adjoining tropical forests, humidity levels are extremely high and the penetration of light often limited due to the dense foliage and generally overcast skies.

d. *Site*

The site of the Outward Bound Centre is located in the Temburong region, which is largely covered by tropical forests. As the building programme is broken into two distinct parts – the Logistics Centre and the Operations Centre – the project is actually located on two separate sites. The Logistics Centre is located about 20 kilometres from the nearest township of Bangar.

Access to the Logistics Centre from Bandar Seri Begawan is generally by speedboat (of a type popularly known as 'flying coffins' because of their coffin-like shape), with a capacity of about twelve people. The journey from Bandar to Bangar takes approximately 45 minutes by boat. Bangar is also accessible by road but this involves a much longer journey. From the landing point at Bangar, the Logistics Centre is a 25-minute car journey by road.

From the Logistics Centre, the Operations Centre can be accessed only by travelling upstream along the Temburong River, which is set in dense tropical forest close to the National Forest Reserve. This journey takes between 20 and 30 minutes, depending on the level of the water and the prevailing currents and rapids. Only slender longboats can make the journey, as this stretch of river is too shallow for larger passenger boats.

The sites for both the Logistics and Operations centres are characterized by thick jungle with very varied foliage. To minimize felling, the area with the lowest density of trees was

selected. Another important consideration was to find sites where erosion was minimal and there was the least potential for buildings to be damaged by fluctuations in the river levels.

e. Topography

The site topography is sloping both around the Logistics Centre and the Operations Centre, with the land falling quite sharply down to the river. Some trees have been cleared to accommodate the buildings but the topography has been retained.

III. Programme

The centre is intended to provide survival training in camp facilities targetted – although not exclusively – at teenagers. The aim is not so much to teach outdoor or jungle survival skills, but to provide qualitative training to its participants with an emphasis on teamwork and community participation.

The project is broken down into separate Logistics and Operations centres due to the topography of its location and for functional efficiency. Both centres have residential and other support facilities, such as dining areas, wardens' residences and first aid. The Logistics Centre is the arrival point for the complex and provides accommodation for overnight stays for participants arriving in the night or in conditions where the upstream journey to the Operations Centre by boat cannot be made.

The primary space in the Logistics Centre is the dining hall. This is a loosely organized multipurpose space, which, as well as providing dining facilities, can be used for meetings, mending boats, inflating dinghies, etc. The Logistics Centre also contains a store facility, a warden's residence and a small medical centre in addition to dormitories and toilets, which comprise the residential section on the upper levels.

The Operations Centre, the larger of the two, contains storage areas for boats and general supplies, a large dining facility, meeting spaces, dormitories and toilets (two units: one for men and one for women), a medical centre (a mini-hospital with a clinic as well as beds) and a warden's residence.

Both centres also have services such as water-purification plants, solar-heating facilities and compost toilets that eliminate effluents and waste.

IV. Description

a. Building data

The design of the Outward Bound Centre is based on the concept of free-standing pavilions linked by decks. The accommodation is therefore fragmented as a series of units – a response that facilitates cross-ventilation and a loose spatial arrangement. The different units are independently accessed, except for the dormitories, which are reached through the dining or common facilities. Other buildings – such as the warden's office, the mini-hospital and the administration block in the Operations Centre – can be accessed separately from the landing point on the river.

A series of decks and staircases form a clear circulation system, onto which the various units are attached. The units are arranged in such a way that none is given extra prominence on the site (except because of its sheer size), implying a democratic hierarchy in the different functions. In fact, it is difficult to read the units' functions because they are all similar in character and are extremely loosely configured, suggesting great flexibility and a multiplicity of uses.

The built area of the Operations Centres is 1,800 square metres on a site of 8 hectares. The built area of the Logistics Centre is 1,050 square metres on a site of 1.2 hectares.

b. Design concepts

The design is based on the principles of traditional Malay architecture, which are reinterpreted with a contemporary architectural vocabulary. The structural form of the units, raised on stilts, allows them to make minimal contact with the ground, ensuring that the landscape is kept intact. The levels of the units are staggered so that the complex follows and reflects the contours of the undulating terrain.

The pavilion form allows buildings to be inserted gently into the landscape and the site plan to respond to specific conditions, including existing trees, on the site. The various functions are dispersed over the site, minimizing the concentration of intervention at any one point.

A series of outdoor rooms, decks, patios and verandas reflect the forms and spatial configurations of traditional Malay architecture. Through the use of screens to subtly define spaces, the design successfully blurs the division between interior and exterior, allowing easy transitions between the two.

Due to its remote location, the complex has been designed to be self-sufficient, employing passive cooling and natural ventilation to control temperatures within the units. Double-layered screens allow adjustment of natural lighting, as the quantity of light in the tropical forest varies from very strong sunlight to overcast skies.

c. Structure, materials, technology

Wooden-frame construction is used, with concrete stub-columns as foundations. This construction method is inspired by the traditional stilt structures of the region, which are adapted to the climate, allowing breezes to pass through the structure and providing for flood conditions.

The buildings are constructed entirely in local hardwood, except for the concrete stub-columns of the foundations and the concrete slab of the service areas (the toilet and the kitchen). Internal partitions are largely made of blockboard (compressed fibre-cement sheets), and the buildings have large glazed areas and double-layered wooden slatted screens. Stability is provided by cross-bracing the main structural members.

The roofing comprises a system of purlin on rafters. For larger spans, simple trusses are employed. The wood has been impregnated with chemicals for seasoning, hence its dark

brown colour, and in the interior areas it is finished with a wax polish. Above the supporting system, a special bituminous lined board forms the final roof covering.

Because of the inaccessibility of the site, the choice of construction method was based on the idea of breaking the buildings into components that could be shipped to the site on barges or small boats and easily assembled by a small number of skilled workers. Over 90 per cent of the units in the complex are built using a dry construction system. The construction technology employed eliminates the use of nails; connections between different structural and architectural elements are made using bolts.

In order to achieve self-sufficiency – particularly important due to its remote location – the complex has its own water-purification system. River water is pumped up to a water storage tank at the highest point on the site and purified through a series of filters before being fed into the buildings. The water is heated by a solar-energy system. When the project was first set up, there was no electricity available on site and generators were employed for lighting and pumping water. Now only a minimal amount of electricity has to be generated on site to supplement the energy from the solar panels on overcast days. As a back-up system, the diesel generator that initially provided electricity before the site was connected to the grid is used to provide supplementary heating when sun penetration is inadequate. The generator is run for a few hours during the day and the power is stored in batteries for later use. This minimizes the noise impact in the forest, especially at night.

Waste is extracted through a compost WC system, which uses solar energy to heat and decompose the waste before it is released into the river. To mitigate the impact of the effluents from the kitchens and bathrooms, grease traps have been introduced to prevent pollution of the river. General waste generated during the normal course of activities is either disposed of at a landfill near the site or barged to the nearest main disposal facility. These sustainable systems of water purification and sewage disposal ensure that the impact on the site in terms of effluents is absolutely minimal.

d. Origin of technology, materials, labour, professionals

The building components were shipped to the site and assembled by a small number of skilled workers. Local labour was employed for hoisting and bringing the parts to their exact position, under the supervision of the contractor's trained staff.

The materials used are local woods from the forest and the surrounding area and large pebbles extracted from the river to construct retaining walls using a 'Gabion' system. The only external material, brought to site from Bandar, was the cement used for laying the concrete piles for the foundations and the slabs for the service cores.

The contractor and the consultants were all from Bandar and commuted to the site daily.

V. Construction Schedule and Costs

The project was formally commissioned in 1992 by the Shell Petroleum Company to celebrate twenty-five years of rule by the Sultan of Brunei. The architect was appointed in the same year and was requested to study the Outward Bound centres in other Asian countries

and to assist in the selection of the site. After this process was complete, design work commenced in 1993 and construction in 1994. The project took nearly two years to build and was ready for occupation in 1995.

The total project cost was BND 4,500,000 (USD 3,000,0000, with a cost per square metre of approximately BND 1,500 (USD 1,000). It is difficult to ascertain whether this is an economical proposition as the splendid situation of the site and the many constraints in terms of transportation of materials must be considered. Maintenance costs are also difficult to ascertain accurately, although it is clear that no major repair or maintenance issue has emerged over the last five or six years.

The project was totally financed by the Brunei Shell Petroleum Company Sdn Bhd and the maintenance and running costs are borne by the MCSYD, who were the beneficiaries of the gift and now own the centre.

VI. Technical Assessment

a. Functional assessment

The fragmentation of the complex into different units for each function has enabled the different buildings to be placed in the most appropriate location on the site. This also allows a range of activities to take place independently of each other so that, when the complex is not in use, the dormitories, dining facilities, etc., can be literally shut down while the office areas, wardens' residences, etc., continue to function. This fragmentation of the programme also allows for future additions to be made, say to the residential area, without impinging on other functions located on different parts of the site.

The use of a standard construction technique with a modular system is not visibly evident due to the variation in spatial configuration and size of the buildings. The buildings therefore appear to be different according to the varying nature of the spaces contained within them. The architectural vocabulary of the buildings, their details, materials and configuration, lend themselves extremely well to their uses.

One of the most successful aspects of the scheme in functional terms is the fact that the spaces are extremely flexible and really serve as containers for the multiple uses that the programme demands. In the Operations Centre, for example, the arrival deck is not only a reception area – a social space – but also a place where canoes, tents and other equipment can be mended, dried or organized. Similarly, the dining room in the Operations Centre can be used for meetings as well as for a multiplicity of other uses. The areas with more specific uses, such as the residential quarters and the health facilities, are inevitably less flexible, but the rooms themselves are configured to be easily reorganized to accommodate, for example, bunk beds, or single-bed units. The architectural vocabulary reinforces this flexibility: the transparency of all the vertical surfaces allows for a multiplicity of orientations and arrangements in response to the most preferable vistas or the direction of the light and wind.

In short, both the Logistics Centre and the Operations Centre function extremely well and fulfil the requirements of flexibility and looseness of organization that centres such as these demand.

b. *Climatic performance*

Traditionally, buildings in the area are built on stilts and arranged to allow air to pass through them. They really work as disaggregated pavilions in order to facilitate incremental growth and respond to the climate in the most appropriate way. The pavilion form of the buildings that comprise both the Operations and Logistics centres picks up on these traditional prototypes. The buildings' design facilitates cross-ventilation, with generous use of verandahs and screens which control the light while allowing breezes to pass through. In the residential units, glass louvres are used to control the breeze while bathing the rooms in light.

c. *Choice of material and level of technology*

The choice of materials was governed by the inaccessibility of the site and the decision to focus on locally available materials. The buildings were configured using a series of modular components for supporting systems, infill panels, railings, screens, etc. Made in local wood and lightweight in nature, these components were easily transportable to the site on barges up the Temburong River.

The level of technology was basic: components were simply bolted together on site, minimizing the scope for error and the amount of nails used. Very little concrete work was carried out on site: this material was used only for the stub-columns of the foundations and for the service cores, which had to be waterproof. These concrete cores and stub-columns form barely 10 per cent of the materials used in the project.

The wooden columns that rest on the foundation stubs were kept flexible and adjusted to the right level on site, where the exact length required could be determined.

d. *Ageing and maintenance*

As the buildings are largely built in a single material – wood – maintenance is easy to implement. The centre is extremely well maintained given the nature of the climate – heavy rainfall, high humidity and minimal light, which means that the wood dries very slowly after rain. Dripping rain has been taken into account in the detailing of the floors and decks, where gaps have been incorporated between planks to allow rainwater to drain and air to circulate around the wood. The only rotting visible was on some of the wooden floor planks in the external deck, which have been replaced at regular intervals. The replacement visible was in the range of about 2 to 4 per cent of the original timber plank. A very small amount of splitting is evident on wooden railings and other components.

Some of this visible damage has resulted from two or three floods that have actually swept land from beneath the buildings and might have caused some settling in the structure. During the flood of 9 February 1996, the water level reached the window-sills of the first-floor level of the Logistics Centre. Even though the ground-floor level was totally submerged, there are no visible reminders of the flood, except a small plaque marking the high flood level!

These defects are extremely negligible and perhaps not even worth noting. The centre has adjusted remarkably well to its site and the existing trees. The proximity of trees to the buildings has not caused any damage from the point of view of maintenance.

The buildings are extremely sparsely furnished, demanding very little maintenance.

VII. Users

The users of the centre are generally groups who attend short-term programmes for three days to a week. These programmes usually involve people from urban areas in Brunei, ranging from teenagers to middle-aged executives, who come for training programmes. A staff of two or three members is permanently stationed in the vicinity of the centre, supplemented when bookings require by employees from the nearest town.

The user response is extremely good as the centre provides a comfortable and secure shelter within an otherwise hostile tropical forest. The architecture safeguards its occupants against rain, incorporates ways to control lighting, facilitates extremely good cross-ventilation and measures have been taken to screen some areas from insects. Given the constraints of the site, the complex is elegant and comfortable while also having a basic outlay and rustic quality which means that it is not out of sync with its tropical forest setting. Because the buildings are not made of urban materials or discordant with their surroundings, users feel that they have actually experienced living within the tropical forest. This feeling of being comfortable (but not pampered) while taking part in an adventure is the single most important factor in evoking such positive responses from most users.

VIII. Project Personnel

The project was sponsored by the Shell Petroleum Company on the understanding that it would be handed over to the MCSYD, who would be responsible for its management. The key personnel involved were the architect, Idris Abas, who was hired for technical input; the structural engineering company, Baharuddin PMS Associates, which helped to develop the modular structural system and also handled all the services; and the quantity surveyor, Latif KPK, whose contribution in quantifying materials precisely and tendering accurately was crucial in ensuring the success of the prefabricated construction method.

The contractor, A T H Naiga bena Sdn Bhd, played an extremely important role in orchestrating the logistics of building on a site inaccessible by road, as well as in evolving the final construction system. His constant feedback and ideas about what was possible in terms of transportability and eventual assembly influenced the design of the buildings. This was particularly important because the project clearly stands apart from others designed by the architect, which are far more commercial in nature and use standard building components. (Subsequent to this project the architect set up a resort company with the structural engineer.) The architect readily acknowledges the innovations brought to the project by the contractor, although he has not specifically identified what these were, and the contractor himself died a few years ago. However, it is safe to assume that the contractor had a great input into the evolution of the design components from the point of view of their assemblage on site.

Rahul Mehrotra, May 2001