



1992 Technical Review Summary
by *Abbad Al Radi*

1352.IDA

Bandung Islamic University

Bandung, Indonesia



Architect

PT. Birano - Mr. Achmad Noe'man
Bandung, Indonesia

Client

Islamic Education Foundation
Bandung, Indonesia

Completed

November 1989

I. Introduction

By 1987, *Universitas Islam Bandung* (UNISBA) had grown to the point where it required a proper campus to accommodate its 5'000 students. A ten year programme for the development of the campus had been prepared and stage I, which contains the classroom facilities, had to be constructed in the very short time span of four months. The project comprises four blocks, three of which have been completed and are built around a central square or plaza. The colourful buildings are 3-4 storeys in height and have pitched roofs. The site is relatively small and slopes sharply in certain parts. The brief required rapid construction of the campus with a low-budget. It should be noted that UNISBA is a private institution with no government funding.

II. Context

a. *Historical Background*

Indonesia is a very extensive archipelago which contains some 180 million people scattered over hundreds of islands and with a wide variety of cultures and sub-cultures. The most important of these islands is Java, with a population of some 75 million. Although easily the most populous of the Indonesian islands, it is by no means the largest in surface area.

Bandung is the capital city of West Java, with a population of about 4 million. The city grew very rapidly after Indonesia gained independence in 1945. According to Mr. Noe'man, the architect of UNISBA, this was primarily because of rebel (guerilla) activity in the surrounding countryside. Over a period of eleven years, between 1947-1958, there was a continuous influx of refugees from surrounding hinterlands. The population of Bandung has a very large proportion of Muslims.

UNISBA was established on November 15th, 1959, as an institute of advanced Islamic studies. According to UNISBA, it was established to serve the needs of the people of West Java for an institute of advanced studies with an Islamic orientation, as several universities of a variety of persuasions had already been established. The formation of the institute was recommended by the provincial parliament of the time. UNISBA was initially located on two different sites. In 1972, it was moved to the new campus at No.1 Jalan Tamansari in the heart of Bandung. This new campus was built in stages on an area of 10'808 m² made available by Bandung City Council. UNISBA is not government funded and through donations received from the Islamic community, semi-permanent buildings were built for classrooms, offices, a library, associated academic facilities, a Mosque and an auditorium.

As the number of students increased and the needs of the academic programme grew, a second campus was established at Ciburial in Dago, some 7 km from the Tamansari campus. In 1987, due to a variety of factors, above all that of inefficient transport facilities, all student and academic activities were returned to the campus in Jalan Tamansari, where redevelopment had commenced.

To complete the historical context, UNISBA is a part of the Islamic Education Foundation of Bandung, a non-profit organisation. The late brother of the architect had been its chairman, and Mr. Achmad Noe'man has been an active member since 1959. He is at present chairman of the Executive Board. In principle, the client is "the Foundation"; however, the architect's contract was with UNISBA, and it was essentially the UNISBA rector's idea, together with the Foundation, to have a new campus.

b. *Local Architectural Character*

Throughout the Indonesian islands, traditional architecture comprises a post and beam system of construction with heavily pitched roofs; however, in the case of 4-storey university buildings, there is no direct precedent.

The main feature to be abstracted from vernacular architecture is the pitched roof. In 3-4 storey educational buildings, there would seem to be little excuse not to adopt tiled, pitched roofs in reaction to extensive monsoon rains.

Prevalent materials are concrete, concrete block, brick and timber, and clay tiles for roofs. In many cases, clay tiles are substituted by more readily available glazed concrete tiles.

c. *Climatic Conditions*

Although Indonesia has an extensive surface area, the Indonesian islands stretch from east to west rather than north to south. As such, the climate is consistent and tropical throughout Indonesia with a wet and a dry season, typical of monsoon climates. Bandung has an extensive wet season, as it is situated well above sea level. It is located in West Java, Indonesia, on 6°57' south latitude and 107°37' east longitude. The *qibla* is 64 degree 82' from north to west. The local climate is very humid and warm, equatorial, with an average temperature of 23°C. Heavy annual rainfall or monsoons tend to be grouped in the wet winter season, normally ending in April, and precipitation totals approximately 3'250 mm a year.

d. *Immediate Surroundings of the site*

The UNISBA site is located in a very high-density area with an access road on one side. There is another university - UNPAS - in front of the UNISBA campus on the other side of the access road in a more elevated location. The rear portion of the campus is surrounded by low-income housing, traditional in nature with steep-pitched ceramic tile roofs. This area extends down to the river. The latter area is not a planned area. The backdrop to the site in the distance, but visible on a clear day, comprises a mountain range steeped in local folklore and known as "Upside Down Boat Mountain".

e. *Topography*

The site slopes toward the river. As can be seen from the topographic map, the site itself slopes down sharply from the access road, Jalan Tamansari, and is bounded by a retaining wall 6 m in height. The central portion is relatively flat from where the land again slopes. Beyond the site to the west and south-west, the land continues to slope down to the river. Across the access road to the north-east, the land slopes upwards.

III. Description

a. *The Conditions That Gave Rise to the Programme*

It is clear that the main impetus for the redevelopment of the site from 1987 onwards was the increase in demand and the increase in student numbers. The university, which began as a college of *Sharia* (Islamic Law), Comparative Religious Study and *Tarbiyah* (Islamic Teaching) between 1959 and 1962, soon grew with new faculties to become a university:

- Faculty of Law established in 1971;
- Faculty of Psychology in 1973;
- Faculty of Technology in 1973;
- Faculty of Economics in 1979;
- Faculty of Communication Science in 1982.

In 1991, out of a total student population of 5'091, only 730 were enrolled in the original three faculties concerned with Islamic law and religious studies. The largest faculty is the Faculty of Economics.

b. *General Objectives and Functional Requirements*

In 1987, UNISBA established a Master Plan for the succeeding ten years. The following extract from a recent UNISBA brochure defines the goals and objectives for the years 1987 to 1997:

"By reference to its historical background, philosophy, and basic policies and considering its present condition, the development of UNISBA was divided into two phases. The first phase - 1987 to 1992 - emphasises programmes related to consolidation and stabilisation of quality which are needed as the basis for the next level. There are four targets to be achieved in this phase:

- *standard or quality, productivity, effectiveness and efficiency of education*
- *firm educational management*
- *fulfilment of physical and non-physical needs of education*
- *stabilisation of the view and system of higher Islamic studies with the aim to fulfill the needs of the Indonesian people."*

The second phase - 1992 to 1997 - is the growth stage, directed towards increasing ability in terms of quality and quantity, and broadening the rôle, function and responsibility of UNISBA. Three targets were selected for development in the second phase:

- The ability to effect research and development as a service to the public;
- Form the basis for post graduate studies and the development of science and technology;
- Demonstrate the ability to fulfil the rôle of reformer for the nation and the people.

The campus facilities had to be completed to allow the development of the first phase - 1987 to 1992 - and in order to provide the education, research and service to the public aimed at in the second phase. The plan for this physical development was focused toward the construction of the campus at No.1 Jalan Tamansari, Bandung, to replace most of the existing, semi-permanent constructions covering 4'750 m². The building programme projected to increase the capacity of the campus two-fold. In line with scale of priority, the campus building programme was scheduled as follows:

- | | | |
|----------------|---------|---|
| - First Stage | Block 1 | Classroom buildings |
| - Second Stage | Block 2 | Library, laboratories and lecturers' lounge |
| - Third Stage | Block 3 | Mosque and auditorium |
| - Fourth Stage | Block 4 | Rector's offices |

The buildings of the first to third stages have been completed and it is hoped that UNISBA will be able to house the academic activities of 7'000 students. Floor space already completed on campus totals 11'226 m². Floor space yet to be constructed totals 3'090 m².

Functional requirements can be defined as follows:

Block 1

- | | | |
|----------------|---------------------------|---|
| - First Floor | Original Plan
As built | Parking area
Classrooms
Urban planning studio
Multi-purpose room |
| - Second Floor | | Classrooms |
| - Third Floor | | Classrooms |
| - Fourth floor | | Classrooms |

<i>Block 2</i>	Original Plan	Laboratories for every department Library
	As built	Administration office Department office Language laboratory Chemistry laboratory Library
- Total 3 floors		

Block 3

- First floor	Auditorium Guard room Ablutions room - <i>Wudhuh</i> room
- Second floor	Mosque

Evolution of the Design Concept

The evolution of the design as defined by the architect is as follows:

- In designing the UNISBA campus there were certain criteria and constraints that had to be seriously considered. The most important criteria were that the university had urgent need of new classroom facilities and had limited financial resources with which to enact their construction programme. The main planning constraint was that the ground floor area should cover no more than 60% of the land area, and a maximum of 4 storeys was allowed by the building code for the area. It should be noted that this is also the maximum number of storeys allowed for buildings without elevators. Based on the brief and these criteria and constraints, the campus was designed in four blocks and in four phases, so that UNISBA could use the first block while awaiting the completion of further blocks. The highest block is the classroom building (block 1) which is four storeys in height.
- Bandung is surrounded by mountains, and the background of the UNISBA campus visible on clear days is a mountain that has a legend - Upside Down Boat Mountain. Its flat top and sloping sides gave inspiration to the architect in the design of the UNISBA campus.
- The overall design concept is one of an inner court or plaza for use as a communal area with the buildings oriented around the plaza. This area is intended as a meeting place for the students and for car parking. It constitutes the focus of the campus design.
- The layout is composed of irregular masses. For example, block 1 combines three rectangles. This approach was followed to enrich the façade and to create visual interest. The play of shadow enhances the mass and forms of the blocks. This form was also preferred for simplicity of construction - curved forms which follow the line of the site would have involved greater expenditure. A similar principle was followed with block 2. Both block 1 & block 2 have a central corridor which steps with the building line and gives access to rooms on both sides.
- As block 1 was constructed on the steepest area of the site, the use of stilts at lower level was considered appropriate. The lower level was planned for use as parking. The upper levels contain classrooms.
- The use of round windows represents a design feature and acts as an end-stop for each rectangular block. This feature also makes the façade more interesting. As Bandung is often known for its Art-Deco style architecture, this feature is not uncommon in the region.
- Architectural principles typical of tropical regions have been adopted in the design of the campus. The use of steeply pitched roofs and wide eaves minimises solar gain and protects

from heavy rainfall. The position of the gutter is highly unusual. It is not, as one might normally expect, on the outer edge of the pitched roof which overhangs the main façade by approximately 2 m, but forms a groove in line with building façade. This detail is intended to reduce costs and the complication of the connection between the gutter and the rain-water downpipe. It is also a distinct architectural feature which allows a clean line without the otherwise obtrusive gutter connection to the downpipe. The end view of the exposed roof tiles gives an interesting rippled effect that differs from the more normal straight lines of the traditional gutter detail.

- The architect used glazed concrete roof-tiles as opposed to traditional, natural clay tiles because of their availability in quantity. The relatively large size of concrete roof-tiles facilitates and speeds the construction process. Clay tiles are less readily available in large quantities and may lose the consistency of their colour through time. The superposition of the various roof planes represents one of the most interesting features of the project.
- As the construction budget was extremely limited, the use of air conditioning equipment was considered an inappropriate luxury. Instead, high ceilings and large openings on façade have been used to facilitate cross ventilation. The main openings are always to the north and south, since this also provides the best natural light for classrooms. All openings on façade are protected by roof overhangs.
- The use of rich colours represents a powerful design element. It seems that the architect had some conflict with the university, some students, and religious scholars (*Ulema*) on the use of bright colours during open presentations of his design proposals. Mr. Noe'man convinced those in disagreement of the value of different colours. Colour should not be limited to green, he argued, by his interpretation of Koranic verse: "colour" is not against the teaching of Islam. In addition, he argued that Indonesia, West Java in particular, is very colourful. In villages, people wear colourful clothing and Bandung itself has another name which may be interpreted as Flower City. The orange steel pipe work and timber infill used to support the roof overhangs further enhance this aspect of the façade.

In the words of the architect, *"for UNISBA, it is believed that the mosque will be the main symbol of the campus. For a Muslim, the mosque should be the centre of everything. So in the campus design, the mosque has to be at the front entrance, so that it becomes not only the focus of the campus but also the gateway and the bridge between normal life outwith the campus and scholarly activities"*. The architect was unable to persuade the University and religious scholars to maintain the same style for the mosque design. In opposition to his design proposals, the mosque as constructed features arches and colour is limited to green. The architect refused to incorporate a dome in the design of the mosque as was requested by some faculty members.

There are two main grid orientations (refer to the site plan). According to the architect an error was made in the survey which was discovered only after the completion of block 1 - classroom block. The required orientation of the mosque and the need to relate the blocks to the mosque orientation resulted in block 1 being constructed at a slight angle to blocks 2 to 4.

d. Structure, Materials and Technology

Block 1

- Steel structural frame, chosen because the building had to be in use within 4 months. It was constructed during the summer holiday period.
- Floor system of permanent steel shuttering and concrete slab with a ceramic tile floor finish - 30 x 30 cm.
- The external wall infill is of brick, which is less expensive than concrete blockwork, and is finished with local marble, whereas the concrete blockwork is exposed and painted.

Block 2

- Reinforced concrete structural frame and one-way rib slab with cross beams was used. It should be noted that concrete structures are cheaper than steel in Indonesia.

Block 3

- Due to the large span involved, a concrete frame structure with pre-stressed beam roof structure was used. The two-way waffle slab on the first floor takes the live load of people praying in the mosque.
- Ceramic tile floor finish 30 x 30 cm.
- Infill is a combination of brick and concrete block. The brick infill is finished with cement plaster whereas the concrete block is exposed and painted.

For Block 1 - 3

- Aluminium windows and door frames;
- Wooden door panels;
- Wooden partitions;
- Jalousie - movable louvre - windows;
- 6mm painted plywood suspended ceilings together with open timber strips;
- Steel trussed rafters;
- Glazed concrete tile roofing. This was chosen because it is available in large quantities. The delivery of clay tiles would have involved delays which would affect the implementation of the construction programme, and they are more readily installed because they are larger in size. Clay tiles are also less consistent in dimension and lose their colour through time;
- Stone slate was used for the retaining walls;
- Overhangs were used over all window openings. The support structure for the roof overhangs is made of steel pipework with some timber infill;
- Interlocking paving blocks were used for the plaza;
- Steps around the plaza - used by the students to congregate - were finished with slate;
- With the exception of steel, which is imported, all other technology, materials and professional's involved were local.

IV. Construction Schedule and Costs

a. Construction Duration and Period

Block 1

The classroom block 1 was required within a very short time span. The design and tender documents took 4 months to prepare and block 1 was also constructed in 4 months between May and August 1987. The construction contract for this block - which has a steel structural frame - was let to a "professional contractor".

Block 2

The laboratory and library block which uses a more traditional structural system was constructed in ten months, between October 1987 and July 1988. This block, together with block 3 was built on a more co-operative, self-help basis. The construction of this block and block 3 was organised and administered by Dr. Suhud, who is an active member of the Islamic Education Foundation and a lecturer in concrete and steel structures at the Institute of Technology in Bandung (ITB). This approach was followed not only to reduce costs, but also to increase participation by the younger, active members of the Foundation, to further educate them, and to ensure the use of a better quality of material.

Block 3

The mosque and auditorium block was constructed in sixteen months, between August 1988 and November 1989. It was constructed using a similar project management technique as employed for block 2.

b. Total Costs and Main Sources of Finance.

The following table is self explanatory. As can be seen, the majority of funds - 48% - were obtained through bank loans.

c. Comparative Costs and Qualitative Analysis

Costs per m² for blocks 1 to 3 (1):

First Stage, Block 1

Classroom building (May 1987 - August 1987):

- Total Area	4'821 m ²	
- Total Costs	IDR 1'727'209'300	USD 863'604
- Cost per m ²	IDR 308'000	USD 154

Second Stage, Block 2

Laboratory and library building (October 1987 - July 1988):

- Total Area	4'270 m ²	
- Total Costs	IDR 1'353'279'455	USD 676'650
- Cost per m ²	IDR 219'000	USD 110

Third Stage, Block 3

Mosque and auditorium (August 1988 - November 1989):

- Total Area	2'124 m ²	
- Total Costs	IDR 1'471'289'527	USD 735'650
- Cost per m ²	IDR 366'000	USD 183

These costs are considerably lower than government guidelines of IDR 450'000 (USD 225) per m² for typical 4 storey buildings (1987-88).

(1) USD = IDR 2'000, Indonesian Rupiahs

There is a very slight difference in total costs between the figures used here (source the Architect) and those recorded earlier in the table - source UNISBA.

The architect attributed the lower costs to the self-help contract approach and to Dr. Suhud's efforts at construction management and organisation. However, even Block 1, which was constructed by a regular contractor, has a very low square metre price. This could also be due to the fact that the building has some very simple open spaces at ground level and the limited number of services required for classroom accommodations.

USD = IDR 2'000, Indonesian Rupiahs.

d. Maintenance Costs

No information is available.

V. Technical Assessment

a. Functional Assessment

The campus has a certain warmth and lightness, partly due to the use of colour and stepped plan forms.

Block 1 is a straightforward classroom building which functions well, with the majority of rooms served by a central corridor flowing from one part of the building to another. It is not clear whether the two staircases are sufficient to avoid congestion at periods when large numbers of students are required to change from one teaching room to another.

Block 2 also functions well. However, no special design provision has been made in the form of an organised services channel or network to cope with the requirements of laboratories or computer rooms. In a number of cases, for example, the computer room, cables were laid across circulation passages at finished floor level to feed banks of computers.

Block 3 functions well.

b. Climatic Performance

This aspect has been well organised. The possible exception is that blocks 1 and 3 have a north to south orientation, whereas block 2 (and block 4 when it is built) will both have an east to west orientation. However, this is inevitable if one follows the principle of grouping buildings around a central plaza.

c. Choice of Materials and Technology

It is difficult to fault the architect, as all materials were selected on a functional, practical and low-cost basis. The use of glazed concrete roofing tiles as opposed to the warmer traditional clay tiles was well explained.

d. Ageing and Maintenance Problems

No specific problems could be seen, the one exception being the staircase areas, particularly in block 1, where the heavy traffic of students has resulted in the deterioration of the wall finish of plaster and paint. Perhaps a washable, more durable finish, such as ceramic tiles, would have been a more astute choice.

e. Design Features

The mass and volume, articulation of spaces and integration into the site are all very logical and functional. The project is also aesthetically pleasing, with a skyline that is segmented in a very natural manner. The extensive use of colour adds much charm and lightness. Grouping the different blocks around a central plaza is also very good in both functional and aesthetic terms.

In the context of design and layout there are a number of points to note:

- Whereas the original design envisaged car parking throughout the ground level of block 1, the implemented scheme converted these spaces into classrooms and student assembly space. The result is that the central plaza is used as a car park. This detracts from its value as a public space.
- The mosque building is to an extent untrue to the design features of blocks 1 & 2 and, to some extent, reverts to the more common tradition with the use of arches and green colour. However, this was the result of pressure from the client - the Dean and religious scholars- who also asked for the incorporation of a dome in the mosque design. The architect's original design was more harmonious with the overall design of the campus and he did well to limit the extent of traditional mosque features - as imported from the Middle-East and India- to its present form.
- As can be seen from the site plan, block 4, the construction of which may commence this year, will considerably reduce the size of the central plaza. It will, however, ensure that the plaza is not used as a car park. This problem will then be aggravated as there will be very little provision for car parking (2). This is not the case for the bicycle and motor-bike park which follows the curve of the access road and is very well organised and integrated.

VI. Users

Little information is available on the socio-economic and cultural profile of the teachers and students. The university has over 600 teachers, of whom 70% are part-time, and over 5'000 students. According to Mr. Noe'man, the university started off with low-middle income students; however, this has changed, particularly after completion of blocks 1 to 3, which has enhanced the aesthetic presentation of the campus to middle and upper-middle income students.

VII. Persons Involved

Principle Architect
Client - Rector of UNISBA
Structural Engineering/Construction Management

Achmad Noe'man
H. Achmad Tirtosudiro
Dr. R. Suhud

Abbad Al Radi
Bandung, May 1992

- (2) The university hopes to purchase further land around the campus extending down to the river, which will not only allow for further expansion but also provide more land to relieve the parking problem problem.