

Mirambika New Delhi

Many issues facing architectural design today are explored in this ongoing project — an educational research and teacher training centre along with its attached school. The Mirambika Research Centre for Integral Education and Human Values of the Sri Aurobindo Education Society, Delhi, is set up with the specific aim to develop 'free progress' education based on Sri Aurobindo's vision of an on-going evolution of consciousness. The school practises the concept of learning by participation in a competition-free environment.

In order to retain the flavour of the different minds at work in thinking out the building, this article has been put together as a sort of indirect dialogue between the two authors, representing two people who were closely involved with the building — a recapitulation of the evolution till completion of the first phase of Mirambika.

Matthijs Cornelissen, Sanjay Prakash



Photos Sanjay Prakash

Free Progress and Participation

Matthijs The basic aim is, to use a phrase from Sri Aurobindo, to lay 'a bridge twixt heaven and earth'. In educational terms this means that we focus on a very systematic development of all the faculties of the outer nature, but look at them as instruments for the inner nature, the soul, if we may use the word. In research it means that we do make use of the latest developments in methodology, psychology, and education. But we extend the scope of our research effort to the much profounder insights into the aim of human life and the workings and possibilities of human nature which we find in the work of Sri Aurobindo and the ancient Indian tradition.

In the small pilot school the concept of integration has led to the abolishing of fixed-period subject teaching. Instead, learning

The entrance courtyard

takes place in integrated projects which the children generally choose, plan, execute and evaluate themselves in a kind of informal interaction with their teachers. It has also led to a close integration of the teacher training wing with the children's wing. Most of the training of teachers takes place in the form of a kind of apprenticeship between more and less experienced teachers.

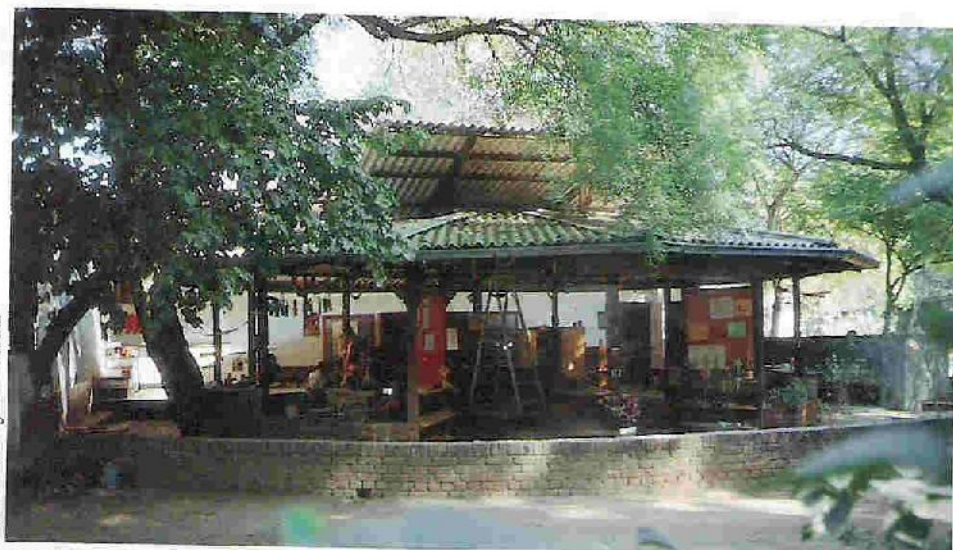
Sanjay The concept of participation has been extended to the designing of the structure itself with the professionals acting as guides. At the physical level, and in keeping with the nature of the institution, an attempt has been made to design a structure which allows for user flexibility; both in terms of multiple use of space, as well as in terms of implementing

physical changes to the layout. This is, of course, the kind of option that every buyer of commercial space also gets, but in this case the design concepts, details, evaluation and execution also originated from the users, and the spaces are not as featureless as the typical saleable office halls in commercial centres — quite the contrary. Further, the building is planned in a manner that construction can proceed continuously even as portions that are ready are moved into.

The Origin of the Design

Matthijs The present design of Mirambika originated during a visit to Kashmir in the summer of 1980. At the source of the Jhelum, Jehangir had erected a beautiful structure guiding the water through a crystal clear octagonal pond, lined by bath houses and some rooms for pilgrims to spend the night in.

Photo courtesy Mirambika



Old Mirambika: a temporary classroom in the form of the Ashram symbol.

I realized that at least part of the enchantment of this place was due to the almost magical harmony between the strict mathematical symmetry of the manmade structure and the rugged profile of the mountains around. The Taj Mahal has a kind of unearthly perfection, but it always gives me the feeling of floating a few feet above the ground. From its enclosed fairy garden one gets a shock if one looks out over the river to the dilapidated environment it has to contend with. But here was a wonderful harmony between rough, untampered nature, and a rigorous, symmetrical design.

Next winter we designed and built, together with the children, one of the temporary classrooms of Mirambika in the form of the Ashram symbol. The almost round classroom was perfect for larger gatherings, but did not have enough enclosed corners with the intimacy needed for project work with small children. However, it gave us the courage to insist on a *mandala*-like layout for Mirambika's permanent building.

Sanjay By the end of '82 Mirambika was quite effectively functioning out of a cluster of such 'temporary' classrooms, designed and built by a variety of people.

Matthijs In the beginning of '83, we realized that we needed professional help with the design. A three-day workshop was convened with the German architect, Helmut Schmidt (now practising in Auroville), and an engineering student from the Indian Institute of Technology, Delhi, Aromar Revi, whom we knew from theatre classes he had conducted at the school. Aromar later introduced Sanjay, whose firm, Studio Plus, coordinated the architectural work. We all brought in very different sets of ideas and bits of expertise and started off with often diametrically opposite design concepts. Helmut had worked with Frei Otto and brought the concept of a

continuous grid and of fixed and flexible zones from his experience with high-rise office buildings. Sanjay had mainly worked on energy conserving buildings and systems design, and Aromar brought, if I remember well, mainly a lot of ideas on the natural environment and the gardens. I came with my long list of demands.

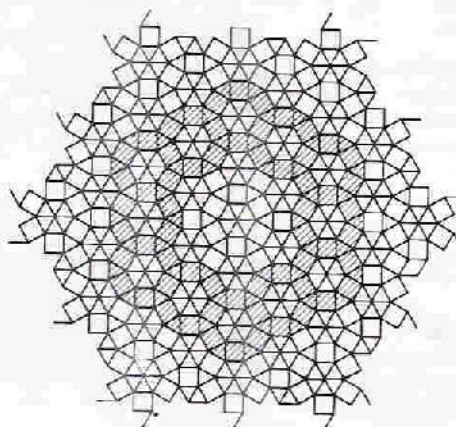
Sanjay The brief contained, besides a detailed list of area requirements, sentences like:

'We have to design a framework that is at once definite enough to be submitted and built, and at the same time flexible enough to be adapted to future changes in consciousness, purpose and usage';

'We should use as far as possible, natural and honest materials';

'As a whole there should be a continuous integration of vegetation and structure . . . (and) . . . subtle transitions from space to space in harmony with their functions';

'From every work-space some portion of the sky and some vegetation should be visible, but otherwise no two rooms need be the same: the harmony should stem from a unity



The initial space-filling grid with each side of 7.2m. The hatched portion shows the covered spaces leaving 12 small and 1 large courtyard.

in style and atmosphere and not from uniformity'.

Matthijs On the last evening of the workshop, Helmut came up with the master idea which seemed to fit all our requirements. This consisted of a grid of squares and equilateral triangles in a space filling tessellation, a subset of which was used for the built-up areas. When he left next morning for Pondicherry to set out the first conceptual drawings, we were all sure that this was it and that it would work out fine. In fact, we were so sure about it that from that first sketch (of 1:500 scale) we immediately set out the corner points of the building on site, and even before any further details had been worked out, tree planting around the building — or rather, the void where the building was to be — had started.

Sanjay Many people ask me now if the process was inspired by the writings of Christopher Alexander, Habraken, or Christopher Jones. Though I had not started reading these authors at that time, I can say in retrospect that what we were doing was applying a generative process, a simple one, to formulate a design that would be relatively inflexible and repetitive at one scale in order to allow variation and flexibility at another scale. I have come to believe more and more that, projects like Nriyagram notwithstanding, the only way to get idiosyncrasy and variety in design is to use a strong (but maybe invisible) system to tie it together.

In terms of my personal inspiration at that time, I can only recall as a mental model the Golconde Hostel of Antonin Raymond at Pondicherry (1936-48) (which I had visited as a child), with its harmonious lines, horizontal stress, and feeling of serenity. But even this (because I had no plans and obtained a photograph only in 1986), was no more than a childhood image of a certain type of quality of space that I would have wished to emulate. It is not even important, seeing that our clients and many colleagues have contributed equally in the generation of the space.

Matthijs Actually, though we're comparing notes on this only now, we had Golconde in our minds as well! A first set of sketches was made while I stayed at Golconde. One of these elevations actually looks amazingly close to the final design.

Sanjay Anyway, most of the people at the Ashram were happy that the layout provided twelve courtyards, each of which would be rendered differently. (Actually, since two of the spaces were large halls, there are only ten courtyards.) Seeing their enthusiasm, we insisted that the initial idea of having a straight open staircase in each court be abandoned in the interests of openness and ease of planning the courts.

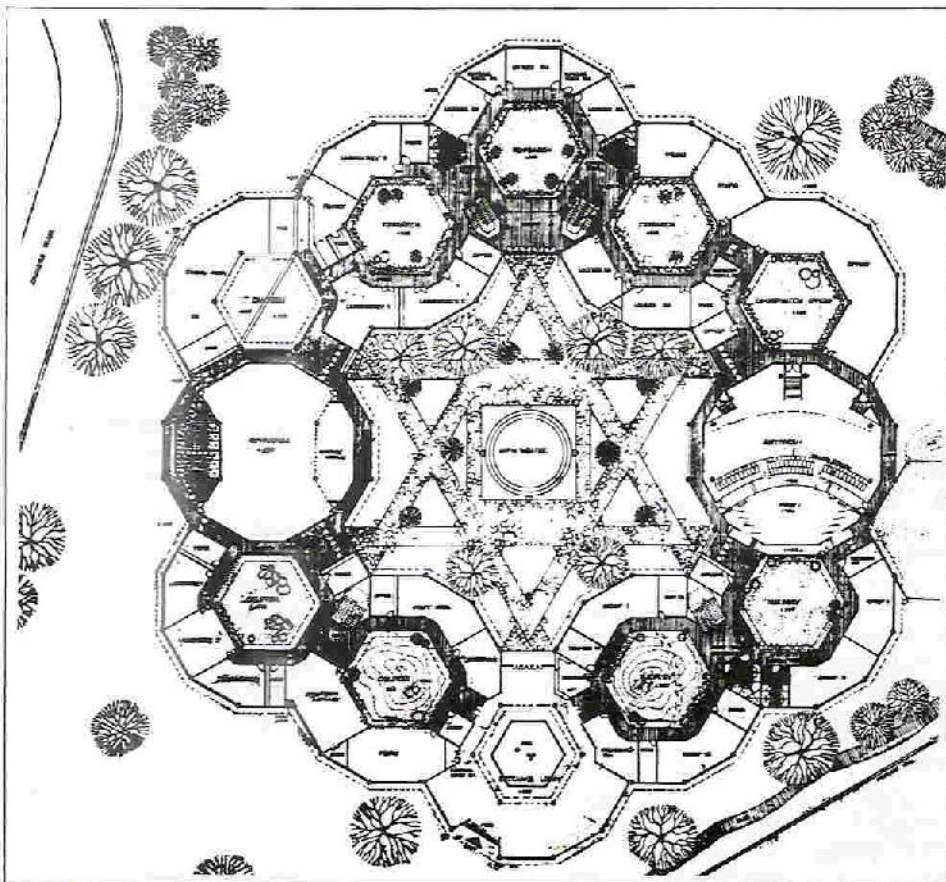
The users had their names for various areas and courtyard groups, based on the Mother's enumeration of human virtues such as Courage, Aspiration, and the like. These were too difficult for us 'outsiders' to remember, so seeing the 12 part clock-like layout of the building, we started using a shorthand convention, naming such courtyards according to the clock position, with 12 o'clock standing for the courtyard on the north (as yet not built) position.

Development of Design

Matthijs At an early stage of the conceptual design we made a block model. As the grid contains only two elements, a square and a triangle, it was easy to make a large number of each and pick up as many as represented the total floor area of our design brief. Together with some of the teachers and even some casual visitors we spent a few cosy evenings on the carpet of the Ashram meditation hall, trying out various possible combinations of different floor heights. This simple exercise led to a number of major decisions. Besides the basic massing of the design, it resulted in detailed guidelines as to where the terraces should come, and how they should be delineated. It made us avoid all 60° or even 90° angles anywhere on the outside of the building. It imposed on us the necessity to stress the horizontal lines in all the facades. This, in turn, led to the acceptance of continuous planters on all the floors, all around the building (altogether some 2 km of them). The wooden blocks are still used regularly in the school whenever a mapping or modelling project is taken up.

Sanjay This exercise also confirmed that the total covered area would be some 9,000 sq m. After this, we were very happy to see some committed Mirambika people, mainly under Matthijs's guidance, prepare a 1:100 scale model of the structure with transparent windows and all internal walls. This activity acted as a vehicle for collaboration between various people designing the building. Since the building is so transparent, there was no need to lift the roofs to see what was happening inside. This helped all the participants in clarifying their minds regarding the spaces, their proportions and relationships. Thick plywood cut-outs represented the RC slab, rib, and beam system; 6 mm diameter GI wires punched through these represented the columns, while opaque and transparent perspex sheets represented the corresponding partitioning surfaces inside and on the facade.

The model was made by the ashramites even as we simultaneously drew the Corporation drawings, and then submitted them for the municipal sanctions. To my mind, the model, made by amateurs (but a good one nevertheless), represented the whole process of the building itself, but the sanctioning authorities did not find this acceptable.



The variety of spaces and details obtained within the grid can be seen in the ground floor plan.

The Sacred and the Profane

Matthijs While almost all visitors are somehow enchanted by the beauty and transparency of the building, many professional architects who got involved with Mirambika's design reacted in the first instance with a sort of emotional revolt against the symbolic nature of the layout, and especially against the strict symmetry. In fact, the Urban Art Commission received the proposal with a rather embarrassing torrent of protest.

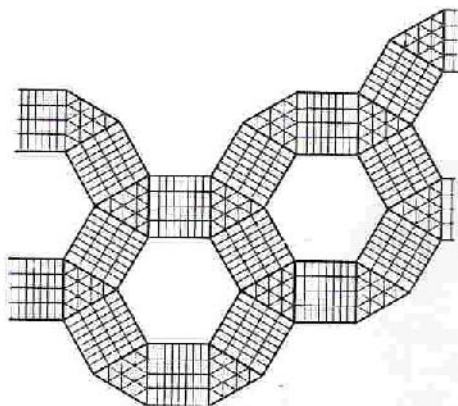
I think this initial negative reaction of many professionals has to do with the deep chasm between the sacred and the profane which is typical for our times. Temples have always been based on symbols and are built to evoke a mood of contemplation and devotion. But we somehow accept an environment for working and living as one which breathes arbitrariness and lack of direction.

Sanjay The entire project almost died in gestation, taking as many as twenty-five months and a large number of revisions before getting the nod of official approval. I must honestly state that the revised form in which the building was sanctioned (and was even complimented by the Commission), being much more symmetrical in its room layouts and massing, represented a departure from the ideas that we started with of using the

grid strictly as a generating system while being free to dispose internal spaces as required and conceived by various users. In this respect, some of the functional relationships in the approved design are poorer than the one built up initially, and the participation of the users in laying out the spaces within the grid has been reduced in effectiveness. Also, by implication, the elevation built up cannot legally be altered in the future as internal walls change, and this adds a very difficult constraint to the user flexibility provided in the initial design.

The Structural Grid

Sanjay Helmut divided the standard grid length of 7.2 m into six equal parts, which at first seemed a good approach (1.2 m units to plan specific elements), implying clear coffer dimensions of a little over one metre. But this meant over-sizing both corridor and door widths to more than 2 m. Therefore, we tried out the subdivision of eight parts, giving a nominal planning dimension of 0.9 m and finally a clear planning dimension of 0.84 m. Two such bays (less wall thickness) came to a little over 1.5 m, required both for corridors as well as doors. Three such bays (less wall thickness) offered us our minimum 2.45 m wide room for individual study or office. And so on. So while the design changed, the overall grid remained the same.

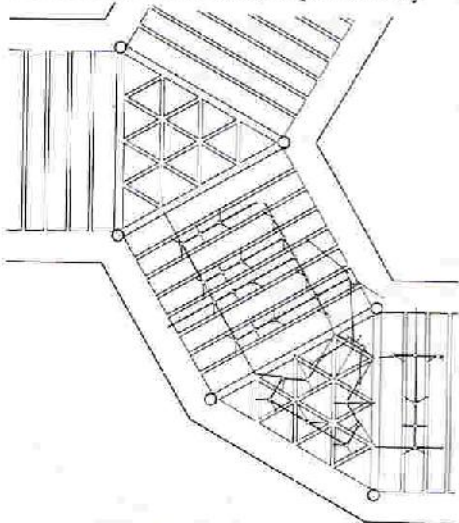


The planning grid explaining where the system would allow partition placements. The users occasionally worked on such sketches to indicate their preference in the layout of spaces.

Matthijs A disadvantage of dividing the 7.2 m grid into eight parts is that six windows in a row are still more or less acceptable, while eight begins to look like an amorphous row. This was one reason to break the grid slightly in the final window design. For all other purposes, the 0.84 m grid has worked fine. Even furniture is designed in multiples of 0.84 m and in 1.5 times 0.84 = 1.26 m.

As far as subdividing the triangle was concerned, this passed through many iterations and settled down to three ribs segmenting the main 7.2-m-sided triangle to 4 congruent triangles.

Sanjay At this stage we brought in a small team of young engineers to structurally 'optimize' the grid. Would coffers be economical? Or ribs? Or flat slabs? I am afraid this exercise didn't work very well, primarily because the 'science' of the structural engineer is not as deterministic as it might seem to the outsider. But we did conclude that, despite the very



A portion of the ceiling plan with the structural grid and the electrical network. Both grids determine the flexibility and variation that is possible in wall configurations.

high degree of repetition implied in the structure, we would use *in situ* construction with shuttering that would be repeated as long as it would last, in preference to the more cumbersome precast sections lifted in place by mechanical means.

Matthijs We were more or less forced by the bye-laws into a permanent structure which implied concrete slabs and beams. To retain at least a memory of the more human wooden structure that Mirambika had started in, we made a rough wooden shuttering, which leaves the texture of the wood embossed in the concrete. Heavy reuse of the same wood also gives us the 'honesty' of exposed concrete at more or less the cost of second-class steel shuttering. The rough texture adds some warmth and naturalness to this otherwise harsh material.

Sanjay I am guilty of commissioning a futile structural study for the system. How much cost could we save by introducing a column at the midpoints of all external faces, so that a one-way span of 3.6 m would be formed? The result, now buried beneath many papers, was a reduction of RC cost by 10% to 15%, by no means unsubstantial. But we knew that the grid and its openness would be the victim of this cost saving alternative. In fact, in retrospect, I know now that flexibility of window disposition would have suffered too.

So the eight-ribbed square (actually seven ribs with four edge beams) finally used for Phase 1 (that is, 4, 5, 6, 7 and 8 o'clock areas) wasn't strictly the most economical method for the spanning. For instance, the



The staircase mummy and the water tank of the 7-8 o'clock block.

ribs could have been less deep than the main beams. But the system was sub-optimized for structural economy in order to gain other functional flexibility and aesthetic advantages. The soffits of all ribs and beams are kept at the same level, and the planters on the external faces 'spring' outwards from this level with their soffit lines curving slightly upwards, providing spaces (in my opinion) with the feeling of openness, serenity and light. (In blander technical terms, the daylight characteristics of such a ceiling are considerably better than those of a ceiling with a drop at the inside-outside transition.)

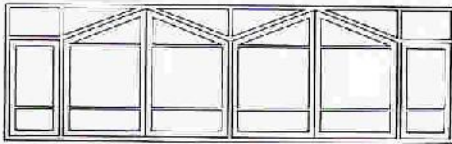
Symmetry and Climate

Matthijs The width of the *chajjas* was exactly calculated for shade and sun in different seasons on the south-facing windows, but their slight upward curve was literally a stroke of architectural genius emanating directly from a late evening sketch on a scratch pad. Together with the continuity of all the beam soffits they contribute to the natural fluidity of the inside-outside transition.

Sanjay I had always been uncomfortable with the idea of a symmetrical building, not from the point of view of providing a variety of spaces, but primarily because my own work in energy-conscious architecture told me that it was 'wrong' to plan thus and then correct the openings by fenestration treatment. Nevertheless, the insistence of the people in the client group could not be resisted. For most of them, this form symbolized an ideal building. If I were to disregard heating in the summer, I must admit I also liked the window treatment. Therefore, while detailing, we tried to minimize west-facing glass by placing opaque walls as far as possible on these faces. We also managed to place the two large halls required (the gymnasium and the auditorium) at 9 o'clock and 3 o'clock, thereby slashing the heat from the worst faces in one stroke.

Due to a niggling feeling of being dishonest to my professional training, I also worked hard on a system of variegated window materials, details, and treatment to respond to different orientations and room use, which was not implemented in the finished building. I spent all my working hours at the site for about two weeks to be able to do this in peace, and so, while the results were not fruitful, the experience was personally enriching.

Matthijs In the final design there are only a handful of windows facing straight east or west despite the otherwise symmetrical layout. Initially, we had designed a complicated system of extra shutters and recessed *chicks* (matted blinds), but eventually, all this was not needed. A bunch of curtain creepers from the planters above, or some well placed trees and bushes provide all the shading one could wish for, and if one gets too much shade there



Study corner in the library. The window elevation was designed and implemented by the users.

are always the garden scissors. In fact, plants can do much more than only adorn a building.

Sanjay Yes, I must admit that I was being too technocratic while working out the windows and ignoring the micro-climate moderating effects of vegetation. I was also being too strict in trying to strengthen the heat resisting capabilities of the external facades, when in fact, the internal facades (facing the small courtyards) are transparent to heat and dust exchange, having no windows and only a parapet wall. I can now testify that, contrary to my expectations, the thermal moderation of the courtyards and the vegetation is so good that Mirambika has turned out to be a thermally acceptable building for most of the year. And the dust levels in the campus are low despite the ongoing construction.

Actually the real heat in Delhi comes in from the roof top. We went in for terrazzo finished terraces without the mud *putuska* insulation: I computed that the overall heat transfer for this surface with no shading (and for such an open building) was lowered sufficiently by the light colour to compensate for the lack of insulation, and this seems to be subjectively corroborated in the completed sections which are in use.

I must honestly record that I personally find the window elevation finally adopted quite unaesthetic. But then this was the

decision of everyone, and they find it beautiful.

We have not talked about detailing the structural grid for flexibility of current and future partition placement, modularized but variable furniture, standardized electrical infrastructure and many such technical details. These are essential to a systems based approach, and in fact a lot of effort went into making details almost uniform everywhere, thereby allowing for maximum future variation.

Matthijs It is amazing how much variety in room shapes and skyline could be achieved while adhering strictly to the ongoing grid. So far no two rooms are alike.

Sanjay This is a very relevant kind of design exercise missed in our architectural schools—detailing of a multi-purpose support system to allow for maximum partition flexibility (including water and electrical service detailing). Instead, we concentrate on doing inflexible, custom designed architectural exercises. The pretence that such custom designed spaces can in some way better fit the user is a denial of the user's creativity and his right to use it.

Stewardship

Matthijs There were a number of design workshops held with teachers, children, and



The Mirambika model made by the children.

parents contributing ideas. It was not necessary that all or even a majority of ideas would get implemented, but it created a feeling of stewardship amongst the people participating. Those of us who helped build portions of the building, however small, also have a feeling of ownership about it. Children who have laid just one brick now identify that portion of the building as theirs.

The north-south alignment of the building on the site was accomplished by the children, together with one of the teachers. One clear October evening they pointed the theodolite at the Pole Star and next morning the final bench mark was made on the boundary wall!

Sanjay In the 8 o'clock courtyard there is a spiral concrete slide designed 'on popular demand' and much loved by the current users of the space.

Matthijs Another interesting feature is a floor plan of the entire building used as a floor pattern in one of the corridors, which can be used as a guide map or as an introduction to the concept of recursion. Pointing to the corresponding square in the design one can have interesting discussions: 'We are standing at that spot. There could be another, smaller pattern in that area, in which there could be yet another, smaller pattern, in which . . . ' and what about the other direction? Could we be the pattern in a corridor of a still bigger world?

There are also some very fine details executed by many friends, such as various murals and landscapes which contribute to the overall delight in the building.

The concrete slide—designed 'on popular demand'.



Sanjay Actually, our team's involvement in the design and construction workshops has slackened, partly because of many decisions having already been implemented, but partly also because of commercial pressures. It is interesting to note that there were not many working drawings needed for the project (since we had standard RC system details, without exception), and even these were largely made at the Ashram by the ashramites. At one time, there were two architectural students who helped in this work. Even so, many of the working drawings have come from Matthijs's pen (or rather, mouse), and it may be useful in diverse architectural projects to discover how much can be accomplished by self-help.

Matthijs The story of the external finish is interesting. The marble stone-on-edge work, which seems to be an expensive finish, is the result of scavenging worthless waste strips, spending a lot of time to sort them, and then obtaining a permanent finish at the cost only of transport, labour and mortar. We had only catered for an external plaster initially.

Sanjay While on the subject of costs, I can anticipate people wanting to know how much Mirambika cost to build. This is a difficult question for a number of reasons. One, the project is slowly built up, so one cannot add cost figures over different years. Second, in an ongoing project, one does not know what floor space to divide by to get a cost per unit area. And finally, subsidies and self-help can skew cost statements considerably. So I would only say that this building is probably of lower cost than other buildings of equal quality.

Evaluation

Sanjay To try and sum up some of the philosophical underpinnings implicit in the project, we wanted Mirambika, the structure, to be like a dynamic cultured landscape. We wanted it to grow and evolve naturally, and not be installed too suddenly on a site. It would then mirror the major characteristics of Mirambika, the institution, itself.

Matthijs It is important to say that the quality of space in any building definitely affects its user response. So, for instance, a square building might create a certain kind of conformity, while an open building creates a certain openness in the attitude of the users. So it was imperative that Mirambika, being a 'different' institution, create spaces that would engender the creativity required of its users.

Sanjay Ironically, the best part of Mirambika for me, in aesthetic terms, is the fact that the spaces cannot easily be captured in two-dimensions through a rectangular picture frame. We had an inkling that something of



Mirambika as seen from the approach road.

the kind would happen when we tried — unsuccessfully — to capture the feel of space with drafted perspective views of the structure before it was built. So one has to rely instead on a physical model, or better still, on being there, to enjoy the building. The geometry generated by the system is sufficiently non-orthogonal so as to make it quite unphotographable. Nevertheless, remove the viewfinder, and the spaces surround you with their charm.

Matthijs At least as beautiful as the shape of the building is the process by which it slowly arises out of endless trucks of grit, sand and cement. The masons, carpenters and labour who have worked on it from the beginning have slowly got used to our peculiar demands on dimensional accuracy and the quality of the concrete mix. We have learnt to appreciate their gentle characters and their tremendous skills. The furniture carpenter, who in the beginning, rather reluctantly condescended to fabricate our shuttering, has now become our main contractor and is rightly proud of 'his' building.

It is not easy to combine such an amount of lay participation with the professionalism required for the design and erection of a fairly sophisticated and large institutional building, but it seems to have succeeded here.

Sanjay I must mention that the quality of RC work cast in Mirambika is very good. This has been done at no extra cost, at least no extra cost for the 'care' required to cast good concrete. This is an obvious lesson for other projects: quality cannot be ensured only by incurring greater cost, but by ensuring greater care. But it gets frustrated in a system where the person who constructs is more or less selected on the basis of cost, not care, mainly because the former can be quantified while the latter cannot.

In my opinion, the structure has been built to a high quality at low cost because of user involvement in the form of a highly motivated construction team. The structure, almost by the nature of the process, comes up slowly, and this can be both good and bad depending on the point of view. Other strong gains generated by the process are the understanding and love of the users for the

structure, leading to good maintenance and repair, and an integration of the designers into the children's group and other members of the user community.

Matthijs Whenever we could not actually help in the construction, we kept the site clean in weekly work sessions. Without having been to site, no one can gauge the extent to which this single activity alone contributed to the morale of the workers, the quality of the construction, and the 'liveability' of the place even during construction.

Sanjay If I were to be involved at the start of a Mirambika-like process all over again I would spend more time on technology. In Mirambika, I felt that we lost a lot of participation potential because, ultimately, RC is not a people's material. It has many technical constraints which are not sufficiently well understood by the lay people and even the workers. But then, it allowed us to fulfil the spanning of the type of spaces we required in this case, so may be this would become a chicken-and-egg situation.

Besides technological simplicity, what needs to be ensured is that the process of participation does not end up in being a lopsided amateur design. For example, Mirambika very nearly became climatologically a poor design. Personally, I also feel that there was not enough variation tried out by the users, though this may still happen in the future.

Matthijs What also needs to be ensured is that there is sufficient communication at all stages for continuity in the process, so that to some extent, the project can outlive the existence of its individual personalities and rise above them.

Sanjay It is not possible here to acknowledge the large number of individuals who contributed to Mirambika. Many professional colleagues and consultants have given their time and ideas. In design and execution the contribution of the Ashram group has been critical. Likewise, the large number of children, parents, teachers, workers, visitors, and passers-by who have worked and are working as amateurs for and with Mirambika. I would go so far as to say that this is a building that they have really designed, with the architects and engineers enabling them to do so. This is not to disclaim the responsibility of the professionals for shortcomings and failures, but to credit the users for consciously exercising their creative powers and using their selective judgment regarding all technical and non-technical matters. ☛

The above is based on a correspondence between Dr Matthijs Cornelissen and Sanjay Prakash. Dr Matthijs, a psychiatrist, currently guides the construction activities at the Sri Aurobindo Ashram, Delhi Branch Campus.