

## REPORT ON THE FIRST DHAKA WORKSHOP ON TESTING OF FULL-SCALE VERNACULAR STRUCTURES, 6TH FEBRUARY 1999

*This Workshop was hosted by Sheltech Ltd at their Sheltech Chateau development site in Gulshan where BUET's programme of testing of full-scale non-engineered houses was taking place. Participants could inspect the two full-sized village houses which had been constructed under cover by rural builders. One would be tested under static lateral loading and the second had been constructed within a tank so that the effects of inundation could be observed.*

Proceedings were inaugurated by Jamilur Choudhury at 11 am. Mehedi Ansary's technical paper is included in Section 1 (Page 21) of this volume. The following notes summarise the other presentations which were mainly informal.

Salek Seraj welcomed participants. He explained that the objective of the day was to share our experiences. These buildings had been made by ordinary builders from Comilla using their everyday skills.

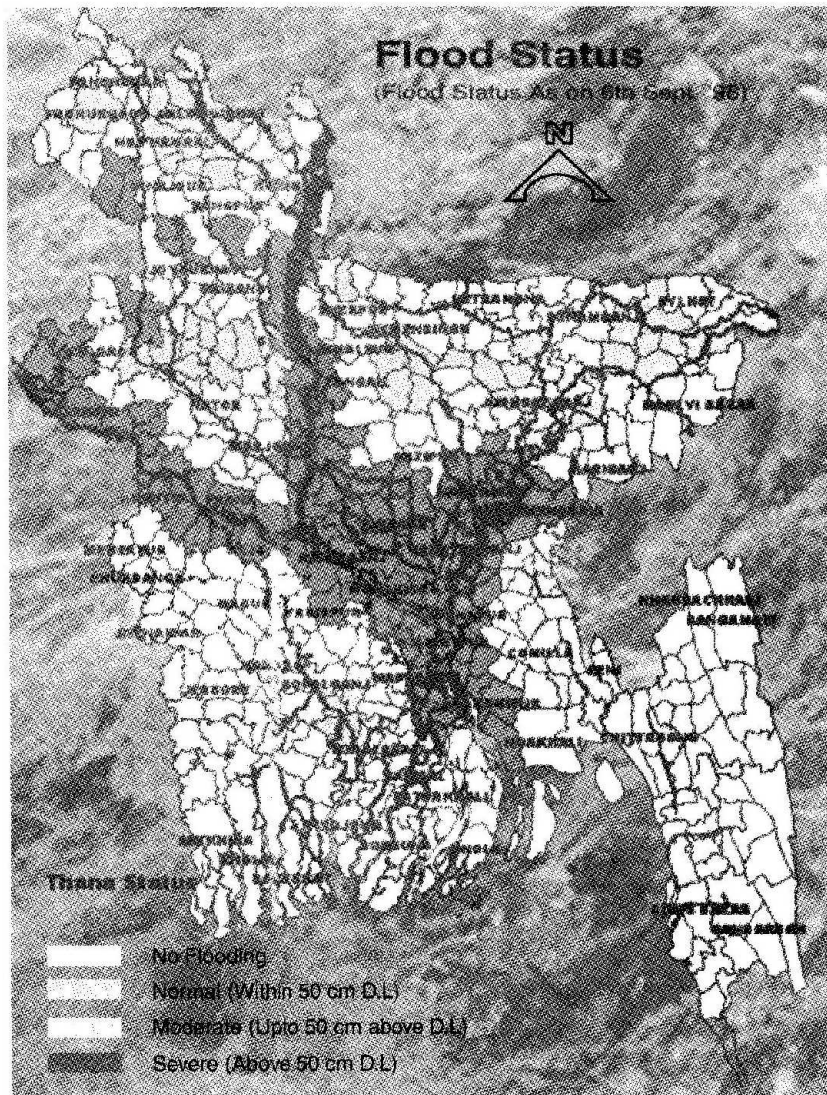
### BUET'S PROGRAMME OF TESTING OF VILLAGE HOUSING

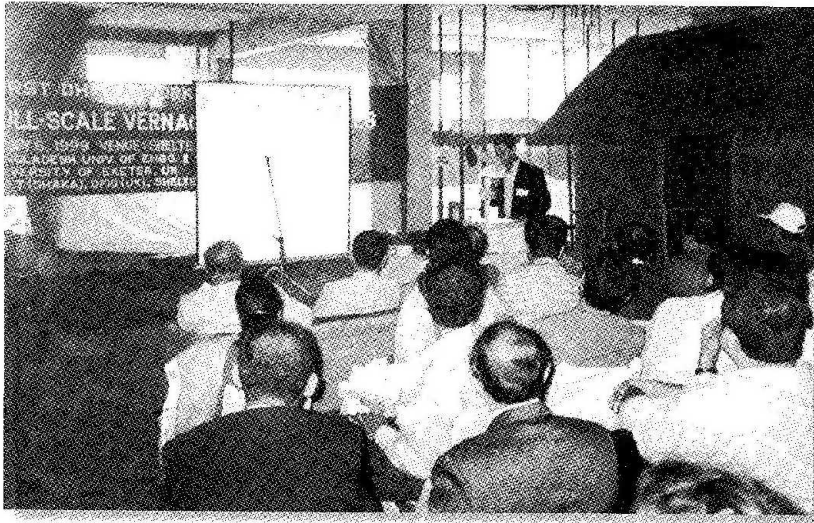
Presented by S M Seraj

The BUET test programme is described in more detail in the contribution by Roy et al. on Page 29. The following points were also made.

This volume includes several photos of the typical houses of a rural Bangladeshi family. Although such people will never be able to afford a palace, we can help them to improve even the poorest huts. This is an obligation; we rely on the poor everyday for construction, transport, basic foodstuffs and so on. We even live side by side with them in places like Uttara and central Dhaka. The 1998 floods (see opposite) affected much of the country and predominantly they destroyed the homes of the poor. A house like this takes two weeks to rebuild and, when they are under financial hardship, few people will want to, as they see it, "waste" money on improvements. One of our difficulties, as engineers, is to convince people that improvements can save money in the long run.

BUET's research programme has started to look at various possible appropriate additives to the mud used in the construction of the house base or plinth.





Rice husk ash can strengthen mud and improve resistance to abrasion but the effect is limited and does not help much with inundation;

- a. Addition of straw, rice husks or jute fibre helps to stabilise the mud but does not much reduce the effects of floods;
- b. Addition of 5% of cement was tested on samples from many places. This gave significant flood resistance with many samples surviving 20 days of inundation but could add around Tk 1,700 (\$38) to the cost of a typical home. Research is continuing.



A separate programme has been examining the strengths of frames made from bamboo. Bamboo is a resilient material provided that the joints are well made. Some of the initial results are given in the paper by Rouf et al. When these tests are completed, the results will be disseminated through a series of leaflets designed for NGOs and local builders.

In our programme, we can make only static loading tests. It is important that we also understand the dynamic effects of the predominant hazards and therefore we are initiating a programme of wind-tunnel testing in collaboration with the University of Exeter as outlined in Mehedi Ansary's paper.

#### Discussion:

Jamilur Choudhury suggested that a relatively small structure such as these might be mounted on a trailer and towed along a runway to simulate wind loading. This idea had practical merits but there was some concern that unquantifiable vertical dynamic loads might also be generated unless the runway was very smooth. Another option might be to use a jet engine thrust. It was suggested that it is not necessary to cement-stabilise the whole of a house plinth; provided the external walls were strengthened, the building would be protected. Several participants agreed, saying that it's most important to keep moisture out of the mud plinth. Anything that reduces cost while maintaining the benefit must be considered. Samantha Magne reported that her field work had indicated that this approach had been favoured by her respondents.

Jamilur Choudhury pointed out that spraying an asphalt/kerosene mix onto the mud also had this effect; some research had been done some time previously and he would look out the results.

Amir Khan commented that the Roorkee CBRI in India was working in this field and produced regular updates which participants might find useful. One of their ideas was to create a ring-beam of cement-stabilised laterite to reinforce mud-walled structures. Perhaps something similar might be done in Bangladesh. The Grameen Bank had considered cement stabilisation but usually opted for brick-walled plinths. This contributor thought that an additional cost of Tk. 1,500 to 2,000 would be acceptable to many of their clients.

In response to another query, Salek Seraj said that the programme would be considering the fire-resistance of natural materials. Toufiq Seraj said that some research had been done recently in Sweden and Amir Khan reported that Roorkee CBRI were also working on it.

Soil blocks can also be strengthened by pre-compression. The National House Builders research Institute in Dhaka had tested the CINVA ram block making equipment and the NGO CARI had also reportedly tried this method. However, the results had not been conclusive.

#### Closing Remarks

Toufiq Seraj commented that companies such as his could not readily cater for the rural poor as there was not sufficient supply of credit to make good

homes affordable. However, Sheltech was keen to be involved and would support progress where possible.

Jamilur Choudhury said that improving the homes of the rural poor was a subject which had interested him for many years but it was not accorded a very high status by his profession. Kutcha construction was even lower on the scale than "non-engineered", sometimes. One would think that folk-wisdom would by now have resulted in a resilient structure but that was plainly not so. These typical houses had no bracing. The 1996 workshop had recommended a review of knowledge; we had a big challenge to implement the recommendations from 1996. Dr Choudhury was pleased to see so many young engineers present and he felt confident that the results of this on-going research would be applied effectively.

*Gratitude was expressed by all to Toufiq Seraj and to Sheltech Ltd for hosting this event and for the excellent workshop luncheon which then followed.*

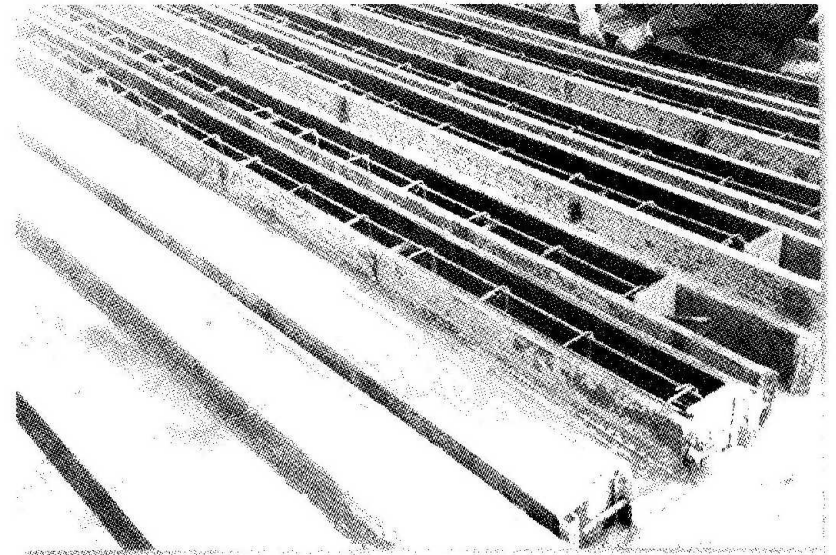
## REPORT ON FIELD VISIT, 8TH FEBRUARY

Grameen Bank hosted a visit to their programme at Dhanbrai, to the north west of Dhaka. Participants were able to inspect typical Grameen Model houses. Many had been inundated in the recent floods and had survived largely thanks to



their concrete pillar supports. Neighbouring homes showed some signs of influence by the Grameen programme with the addition of plastic sheet to weather-proof roofs, for example. It seemed that householders were willing and able to pay a reported Tk.10 (\$0.22) per yard for plastic sheeting for this purpose.

A nearby blacksmith attracted much attention. Working over an open hearth, he was making hoes and other agricultural implements for sale to a shop-keeper at the main road-side. He had learned his trade by apprenticeship and had no formal training. This scene seemed to sum up many of the factors which affect rural housing development.



Participants then visited the nearby Grameen Bank RCC pillar casting yard where work was seen in progress before lunch. Discussion ranged widely but, sadly, was unreported