VIE/89/035

HỘ TRỢ ĐÊ XÂY DỰNG LẠI Ở TỈNH THANH HÓA

CONTRIBUTION TO REHABILITATION IN THANH HOA PROVINCE

AUSTRALIA

REHABILITATION ACTIVITIES IN THANH HOA PROVINCE FOLLOWING TYPHOON IRVING

Project No: VIE/89/035.

REPORT OF MISSION TO THANH HOA

M. Mitchell.

28th MARCH to 25th APRIL 1990.

Development Workshop

Viện Thiết kế Nhà ở-Công trình Công Cộng-Bộ Xây dựng
Xí nghiệp Thiết Kế Khảo Sát Xây Dựng, Thanh Hóa

GRET

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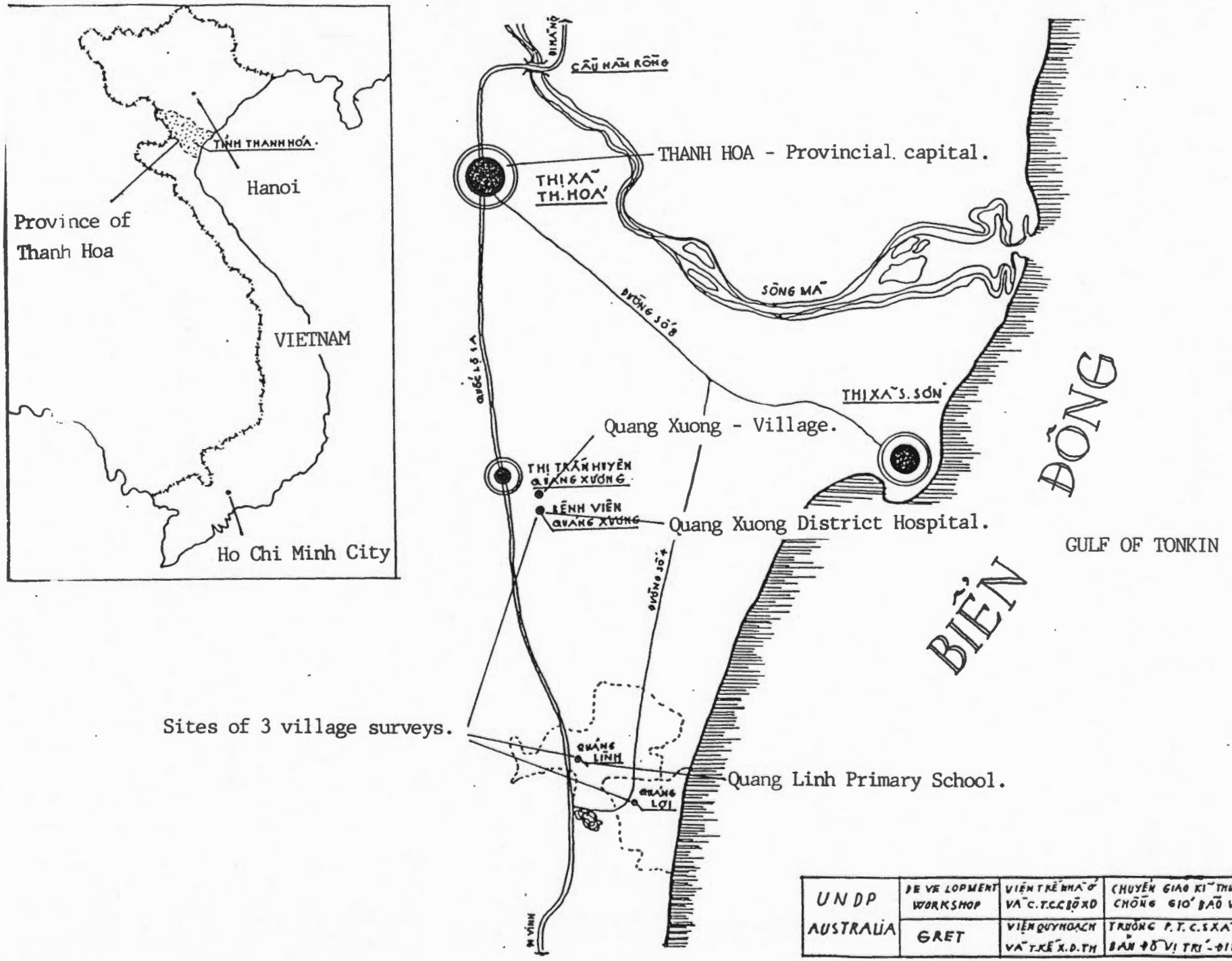


Fig. 1 Map of Thanh Hoa Showing the Location of the Hospital, Primary School, and Villages Surveyed.

1.00 TERMS OF REFERENCE:

1.01 The Project.

Terms of reference for the project are laid out in the document (VIE/89/035/A/13/56) signed by the Vietnamese Government, The Peoples Committee of Quang Xuong District and the UNDP on 19th February 1990 entitled:

> 'Rehabilitation Activities in Thanh Hoa Province following Typhoon (No 6) Irving.'

The budget for this project was in two parts:

(a) Emergency funds directly from UNDP for the running of two training workshops and the construction of Quang Linh Primary School.

(b) Funds provided by the Australian Government for the reconstruction of Quang Xuong District Hospital.

1.02 The Mission.

My own terms of reference were as follows:

(a) To supervise the running of two training workshops in Thanh Hoa Province, one for technicians and the other for builders to be run consecutively for 23 days from 30th March 1990. The programme and content of the technicians workshop had already been set out by DW/Gret using experience and course material from their project (VIE/85/019) for Disaster Preparedness in Binh Tri Thien Province. During the technicians workshop the design od new hurricane resistant classrooms for Quang Linh Primary School were to be produced for approval by UNDP prior to construction.

(b) To monitor the work of the Institute of Planning and Public Building Design Thanh Hoa Province (IPBD/Thanh Hoa), which was preparing designs and costings for the construction of three new wards at Quang Xuong District Hospital using hurricane resistant techniques. The construction of these wards was to be funded by UNDP/Australian Government. These designs, as seen previously had not been considered satisfactory by DW/Gret.

(c) A proposal was to be prepared for the expenditure of funds remaining in the UNDP/Australian Government budget for the repair of other cyclone damaged buildings at Quang Xuong District Hospital.

(d) I was to make recommendations to UNDP in consultation with DW/Gret regarding stage payments to The Quang Xuong District Peoples Committee from the project budget.

1.03 Objectives.

It is important to note that the Government of Vietnam had turned down the UNDP's proposal to have its own specialists prepare drawings and contract documents for the buildings proposed and that the objectives of my mission were therefore twofold:

(a) To provide a training element which would disseminate the 10 key principles of cyclone resistant design via the workshops and demonstration buildings to as wide a part of the provincial population as possible.

(b) To ensure that the relevant construction schemes prepared by Vietnamese professionals met with hurricane resistant standards acceptable to UNDP and the Australian Government.

Appendix B shows a diary of the activities of the mission. Below I set out a summary of each of these activities.

Fig. 2 Mr Que (architect) [left] and Mr Long (engineer) trainers on the course workshops.

Fig. 3 Technicians Workshop: course participants.

Fig. 5 Traditional house surveyed during the Technicians Workshop.

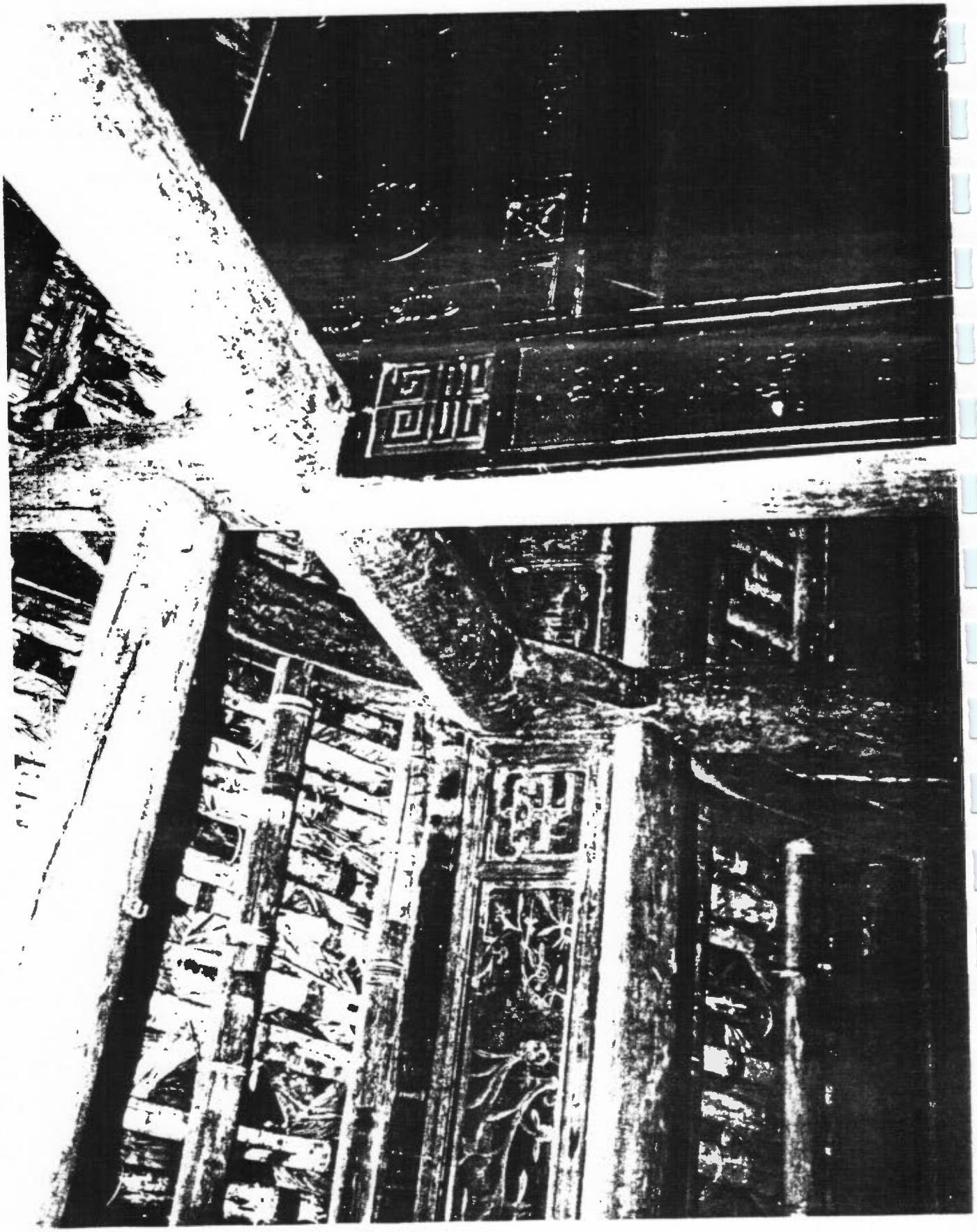


Fig. 4 Two chickens, awarded as prizes to the winner of the second competition held during the Technicians Workshop.

2.00 THE TECHNICIANS WORKSHOP.

2.01 Introduction.

The Workshop was held at the IPBD/Thanh Hoa, with Mr Bich, the Director of the Institute as host. It lasted for 13 days from 30th March to 11th April. There were 20 participants (see appendix C). Apart from Dr Hong, the Director of Quang Xuong District Hospital, there were 11 civil engineers, 5 construction technicians, 2 quantity surveyors and 1 architect participating. 10 participants came from the two provincial construction companies; 2 from IPBD/Thanh Hoa; 3 were technical staff from the Quang Xuong District Peoples Committee and 4 more were technical staff from other districts of the province of Thanh Hoa.

Mr Man, Technical Director, Institute of Housing and Public Building Design, Ministry of Construction, Hanoi (IHPBD/Hanoi) gave an introductory lecture on the 10 key principles of cyclone resistance. The remainder of the training for this workshop was carried out by Mr Long, Chief Engineer, IHPBD/Hanoi, and Mr Que, architect, IPBD/Thanh Hoa.

2.02 The Survey.

With the objective of getting to know the different forms of local house construction, assessing their cyclone resistance and proposing their improvements, the participants were divided into three groups for days 2, 3 and 4 of the workshop, each group being asked to survey the houses in one of three local villages. For days 7 to 13, half the participants took the results of this survey a step further by:

(a) classifying the house types in the district;
(b) proposing ways in which each house type might be made more cyclone resistant.
(c) assessing the cost implications of reinforcement.

The results of this survey have been submitted separately to the UNDP, IHPBD/Hanoi and IPBD/Thanh Hoa. A summary of the results is given in appendix D.

Fig. 6 Quang Linh Primary School; existing classroom building.

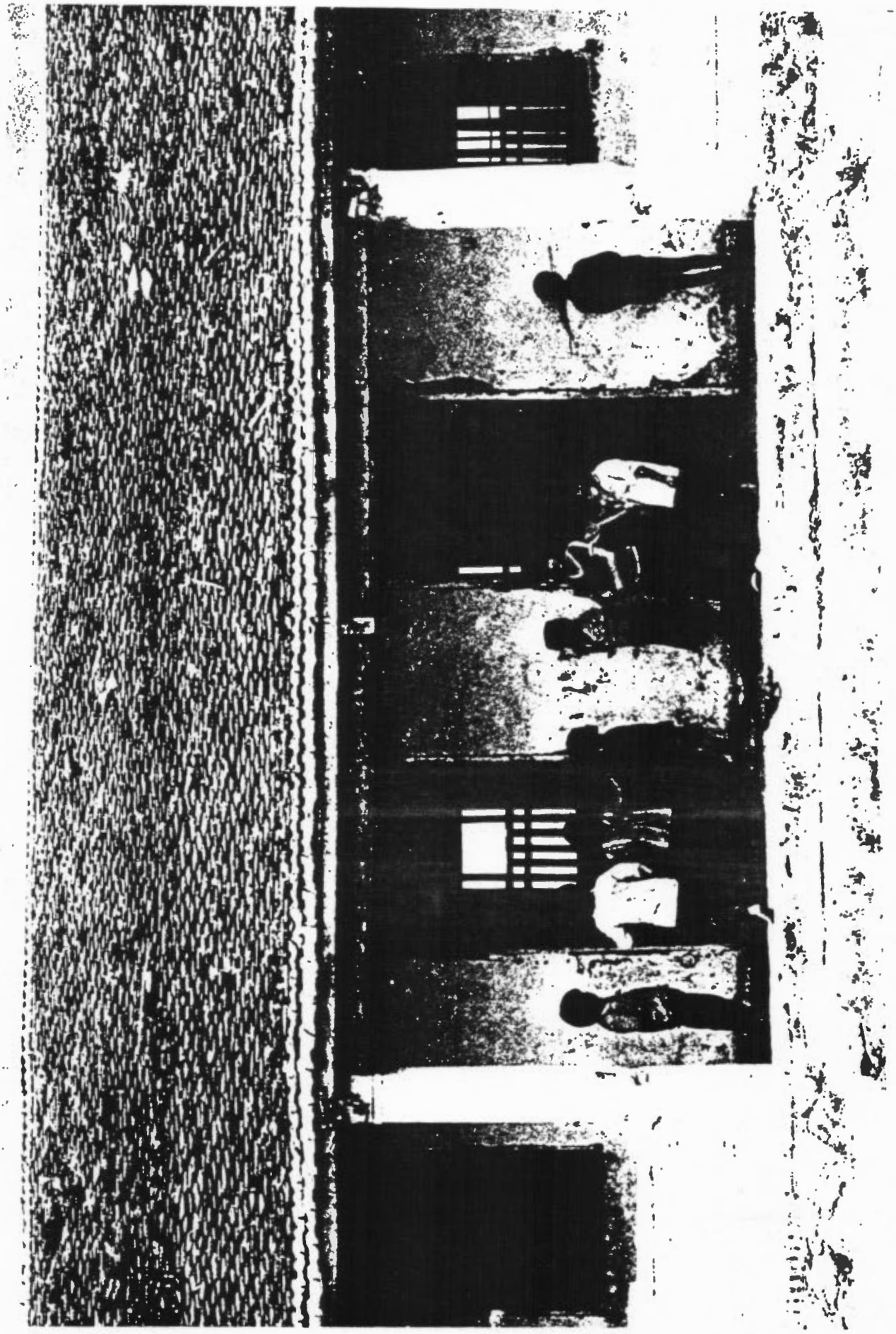
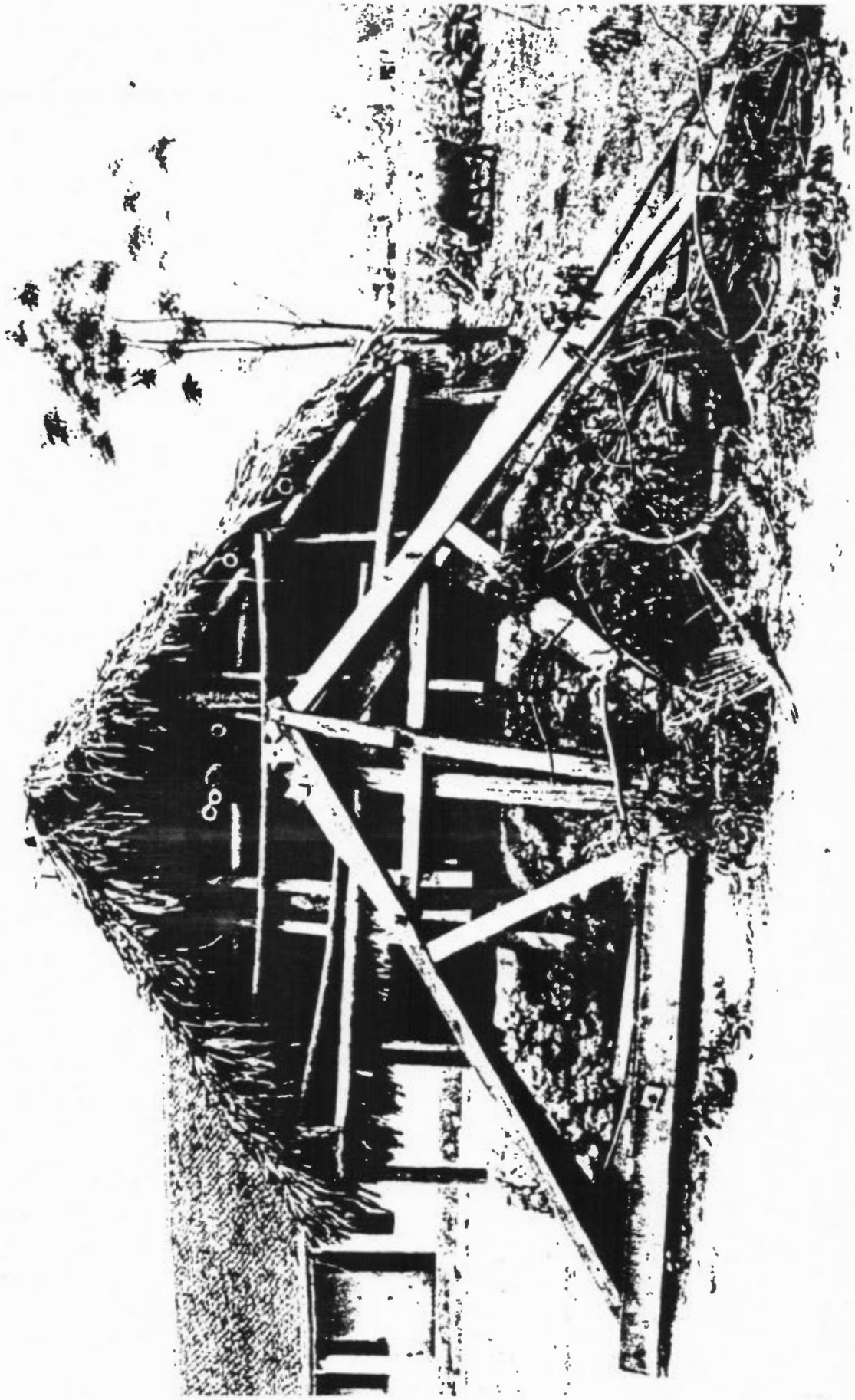


Fig. 7 Quang Linh Primary School; existing buildings and trusses saved from classrooms destroyed by cyclone Irving.



2.03 Design of Quang Linh Primary School (QLPS).

With the objective of introducing cyclone resisitant techniques into new construction, the participants were asked to design a set of new classrooms for QLPS within the budget set aside by UNDP for the reconstruction of a classroom block at QLPS which had been totally demolished by cyclone Irving.

(a) Sketch Design: [COMPETITION No 1].

For days 5 and 6 of the workshop, the participants, in their original 3 groups, were asked to produce competitive sketch designs for QLPS. They were particularly concerned with siting, orientation,and building shape at this stage. A briefing meeting was held at the school during which a discussion was held about why the remaining school buildings had survived and others had not. The Headmaster, teachers, the village head and the village party secretary were present at both the briefing meeting and the discussion which followed the presentation of the three competitive schemes. Below are some notes made at the time, on the discussion which followed:

(1) Siting: It was generally agreed that the new building(s) could divide the existing open space into two as in the future the school would be divided into two age groups each with an associated open space.

(2) Orientation: The present classroom blocks are oriented east/west, i.e. facing north/south. It is assumed that storms come from the east so that the narrow end of the block faces the wind. It was clear to me that the direction of the storm which destroyed the last set of classrooms came from the north east. No schemes based on a 45 degree geometry were proposed however and it appeared that the precise direction of future cyclones was just as likely to come from the east as north east.

(3) Roof shape: All participants proposed brick gables rather than the more streamlined hipped gable. I insisted on comprehensive cross bracing in the roof structure to protect the vulnerable brick gables.

The scheme presented by Mr Hung's team was unanimously voted the best and a small prize was awarded.

Fig. 8 Quang Linh Primary School; temporary classrooms.

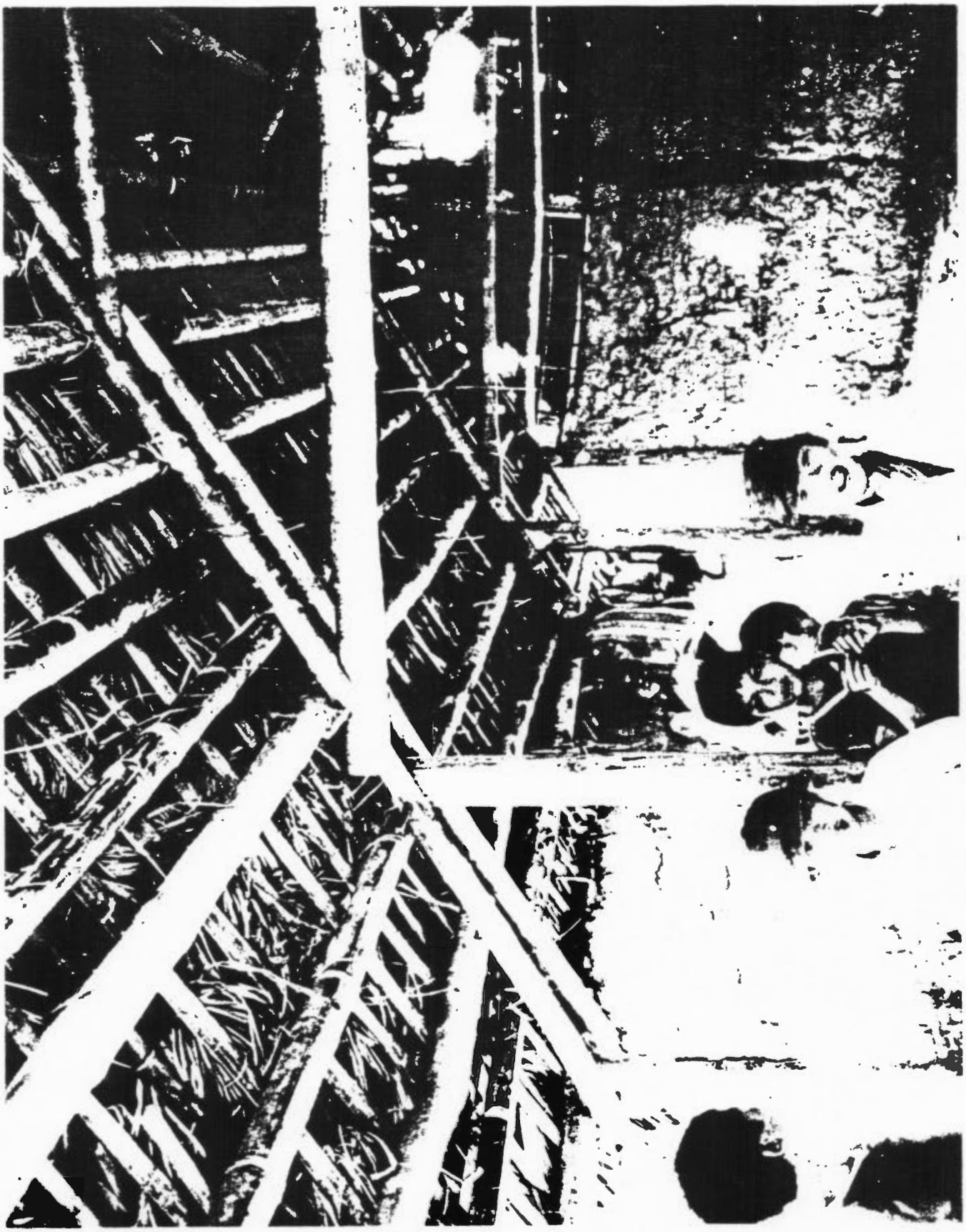


Fig. 9 School children at Quang Linh.

Fig. 10 Teachers at Quang Linh Primary School.

(b) Detail Design:

For days 7-13 half the participants took the winning design and developed a full set of working drawings together with bills of quantity for materials and labour. It had been possible to save a considerable quantity of building materials from the destroyed classroom block. These were listed and officially handed over to the project by the school and village authourities. By taking the value of these materials into account it was found possible to propose 5 classrooms rather than the expected 3 or 4 which had originally been expected within the UNDP budget.

It was felt by both the participants and the training staff that the drawing skills of the participants were not equivalent to those in the Hue Institute where the manuals for the Binh Tri Thien had been produced. It was agreed that all drawings would be done in pencil and that draughtswomen from the IPBD/Thanh Hoa would be employed at the end of the course to trace the drawings. At the same time the costings were completed by Mrs Hien, a course participant, employed by IPBD/Thanh Hoa.

The cyclone resistant features included in the QLPS design included the following:

(1) Reinforced concrete tie beams at eaves level, over gables and at ground floor level to brace the brick walls.
(2) Brick and reinforced concrete ribs over roof tiles attached to tie beams.
(3) Diagonal bracing in roof connecting gables, trusses and cross walls.
(4) Strong metal connections of roof members to wall tie beam.
(5) Wire fixing to underside of 30% of roof tiles.
(6) Separate verandah roof.
(7) 5 layer bamboo matting ceilings to classrooms; 2 layer to verandahs.
(8) Doors and windows balanced and protected with storm bars.
(9) Appropriate tree planting was recommended to protect the buildings.

When completed, the dossier was approved by The Peoples Committee of Quang Xuong District and myself on behalf of UNDP. 80% of the cost of the building materials was advanced by UNDP so that building work could start. The construction work is discussed in 5.00 below. Copies of the drawings are shown in appendix E.

2.04 Repairs to Pharmacy and Polyclinic at Quang Xuong Hospital.

[COMPETITION No 2].

On day 12 of the workshop, the participants were divided into 10 groups of 2 and asked to assess the damage to the pharmacy and polyclinic (outpatients) block at Quang Xuong District Hospital (QXH). Covering all of the ten key principles of cyclone resistant design they were then asked to make proposals for the repair and strengthening of this building. These proposals formed the basis for the practical work undertaken subsequently in the builders workshop. The results were assessed out of a maximum of 55 points. Mr Tien's team gained 53/55 points, the other teams obtaining between 20 and 45 points each. A prize of two chickens was awarded to Mr Tien on the last day.

Two videos developed as course material for the Bien Tri Thien project were shown during the course of the technicians workshop.

Certificates were presented to all participants.

Fig. 11 Builders Workshop: opening session.

3.00 THE BUILDERS WORKSHOP.

3.01 Introduction.

The Workshop was held at the Quang Xuong District Hospital (QXH), with Mr Hong, the Director of the Hospital as host. It lasted for 10 days from 12th to 21st April. There were 30 participants (see appendix F). The participants consisted of 8 carpenters and 22 masons. 20 participants were from Provincial Construction Company No 2 which was also working on the reconstruction of the hospital; 5 participants from the Quang Xuong District Construction Company which is building the Quang Linh Primary School and 5 participants from the Quang Vinh Construction Cooperative, a private company operating in Quang Xuong District.

The in country training staff consisted of Mr Long, Chief Engineer IHPBD/Hanoi and Mr Nyen, an engineer on the staff of the Quang Xuong Peoples Committee and a past participant of the technicians workshop.

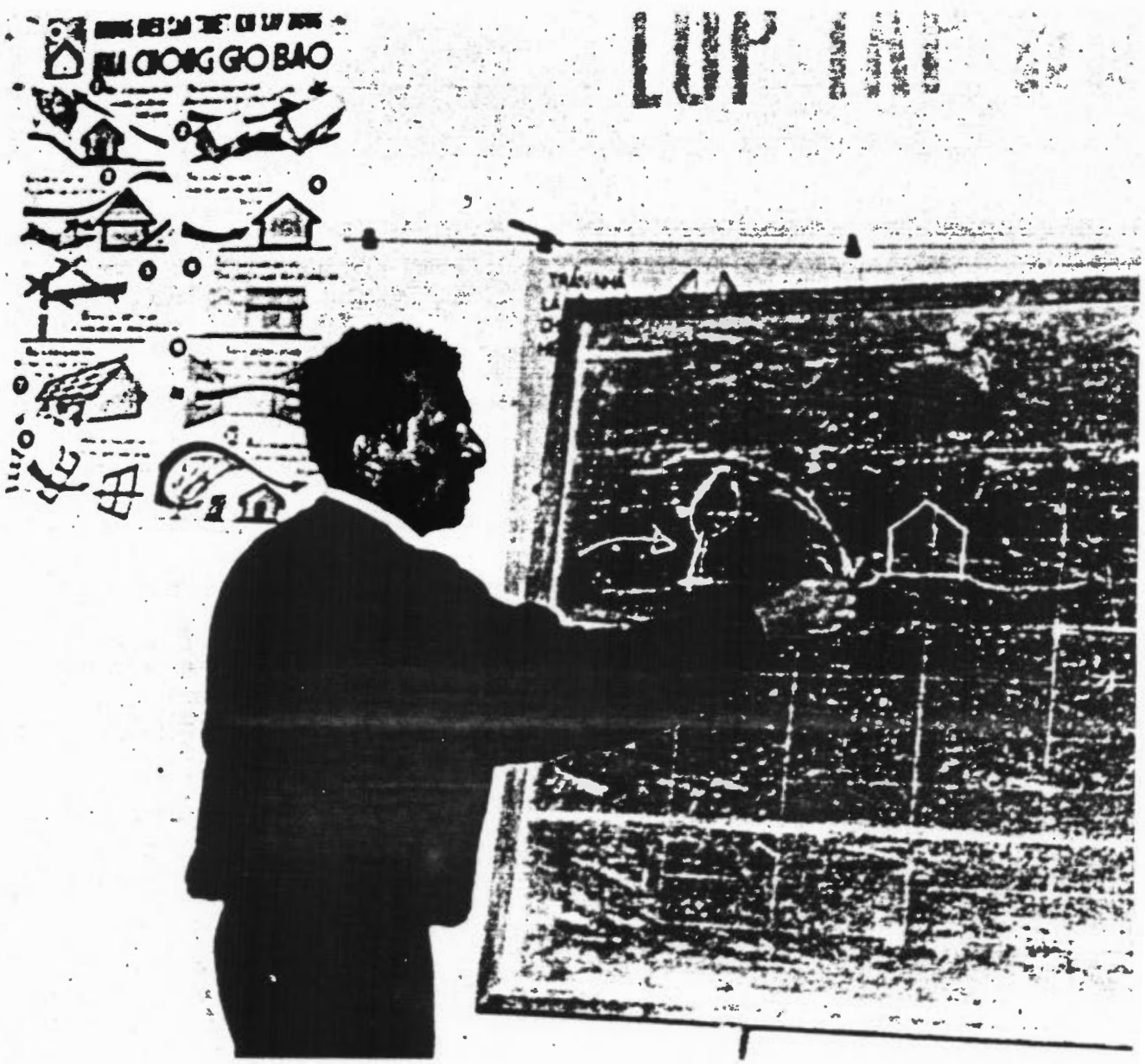
3.02 Seminars/discussions.

At the start of each day of the workshop, a general session was held, usually on the site of the building work, in which the lessons from the practical work of the previous day were discussed. The daily topics were as follows:

day (1): The ten key points of cyclone resistance.
day (2): Hipped roofs: a bamboo model was made to illustrate the strength of hipped roofs and diagonal bracing.
day (3): Quality of building materials and their relationship to the expected life of the building. Recent deterioration of the quality of tiles related to the life expectancy of bamboo.
day (4): Progressive collapse: the need to have adequate redundancy built into the structure of the building.
day (5): Strengthening and balancing openings.
day (6): Joints in iron: tension forces in cyclone resistant construction.
day (7): Best use of building materials available in Thanh Hoa.
day (8): Role of builders in spreading the message of cyclone resistance.
day (9): Quality of construction: quality control on the building site.

Fig. 12 Builders Workshop; course participants.

Fig. 13 Teaching during the Builders Workshop.



3.03 Practical Work.

The remainder of each day of the workshop consisted of practical construction work on the pharmacy and polyclinic (outpatients) building at QXH. The starting point for this work were the recommendations during competition No 2 in the technicians workshop. During the builders workshop techniques were developed and demonstrated which resulted in improved cyclone resistance for roof and walls. Techniques for improving the junction between the wall and the foundations were observed in the new hospital construction work which had then commenced.

Continuation of the work on the pharmacy and polyclinic is covered below under 6.02.

3.04 Competition No 3.

On day No 9 of the workshop, competitions were held separately for carpenters and masons. The carpenters competed in two groups in completing the highest quality repair and reinforcement of an existing window in the hospital. The mason, in three groups, competed to produce the most carefully constructed reinforced concrete stitch required to reinforce the corners of the thin 100mm thick brick walls in the pharmacy rehabilitation. Two prizes each of a chicken and a cock were given to the winning groups.

Two videos developed as course material for the Bien Tri Thien project were shown during the course of the builders workshop.

Certificates were presented to all participants.

Fig. 14 Damaged ward at Quang Xuong Hospital.

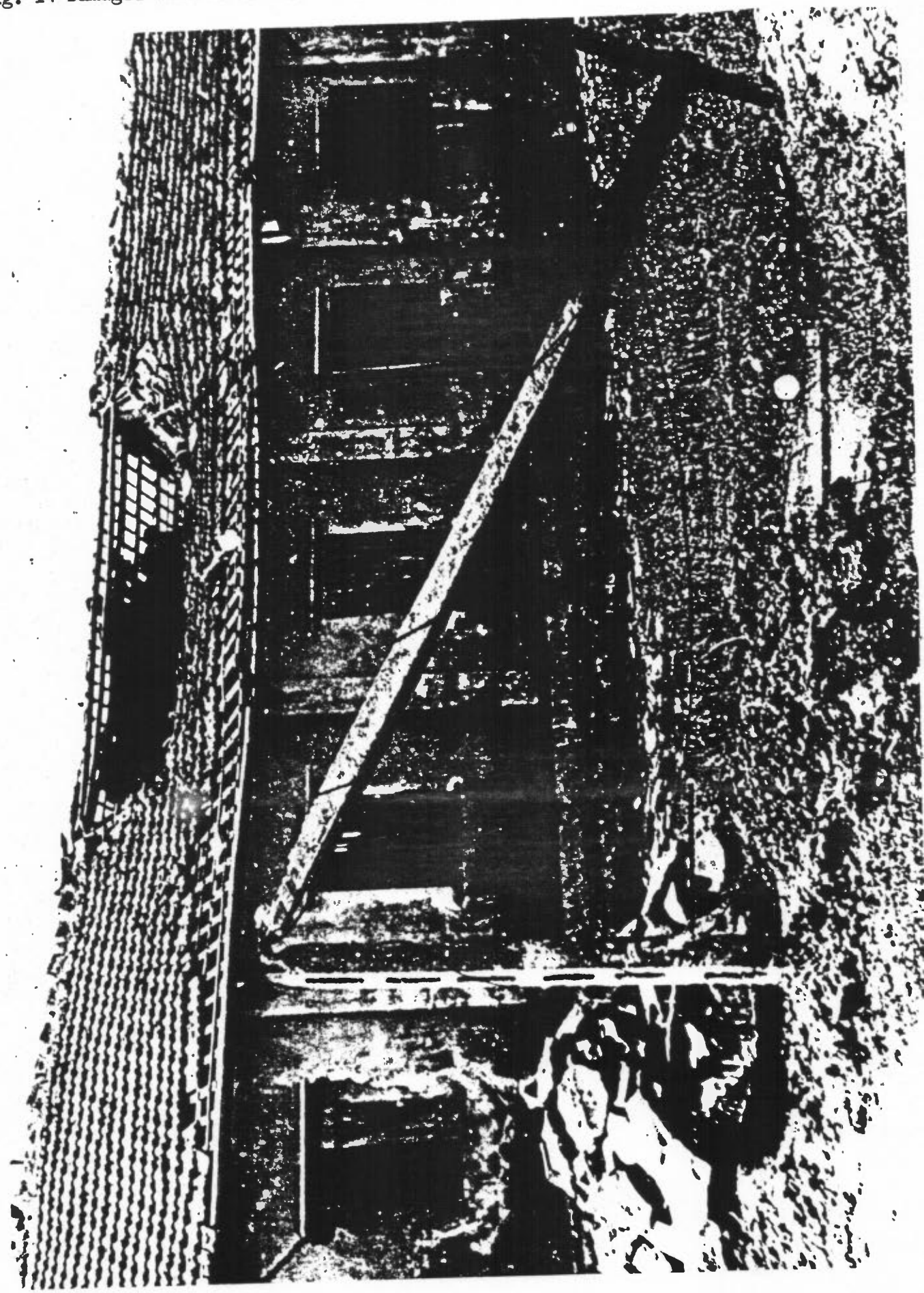
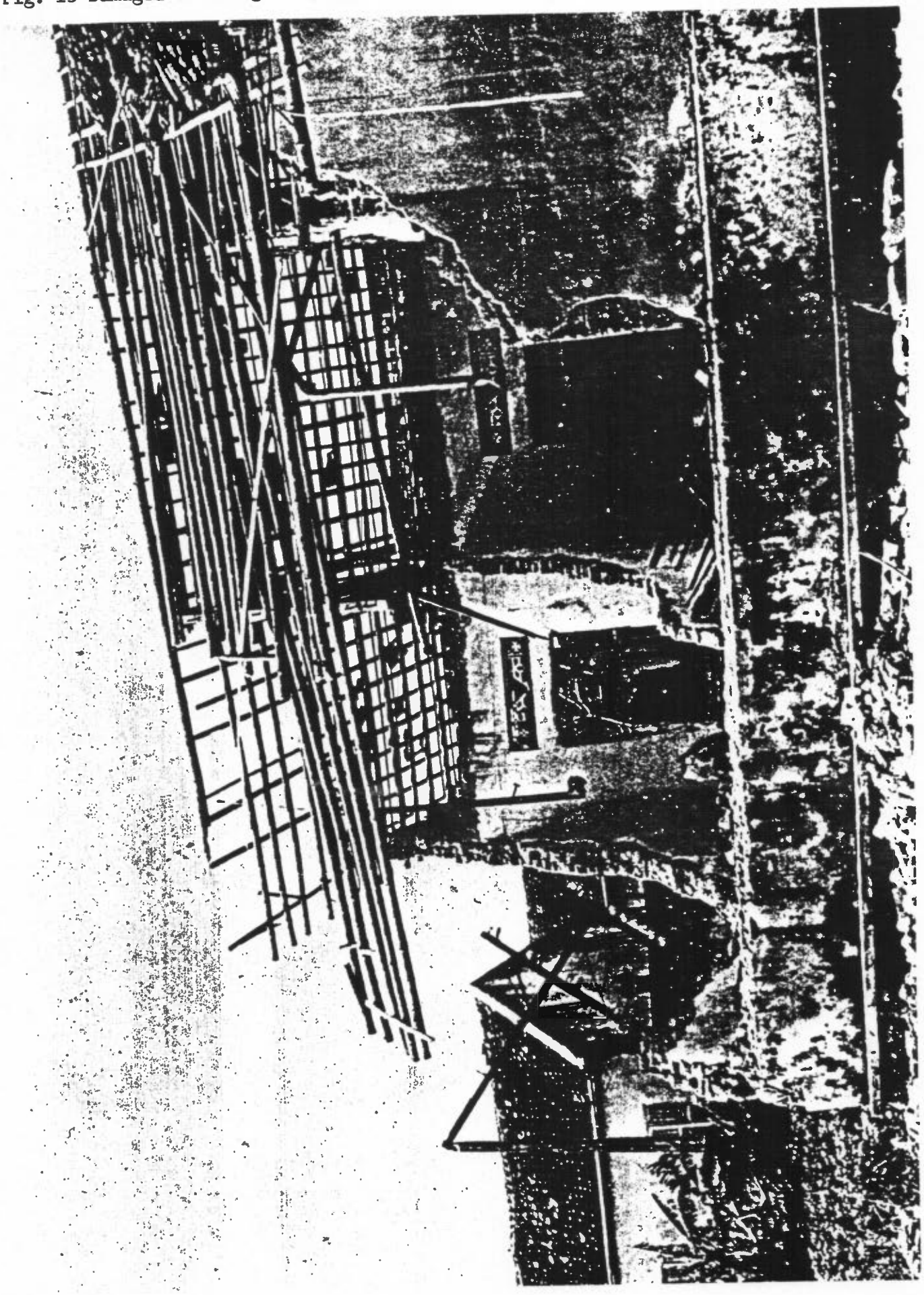


Fig. 15 Damaged building at Quang Xuong Hospital.



4.00 CONSTRUCTION OF NEW PAEDIATRIC, MATERNITY AND ISOLATION WARDS AT QUANG XUONG HOSPITAL.

4.01 Completion of Hospital Dossier:

It was made clear prior to arrival at Thanh Hoa that the drawings for the construction of these three new wards at Quang Xuong Hospital were unacceptable to Development Workshop/Gret and therefore to Ms Spezzati at the UNDP. John Norton had written a list of items with which he was concerned. It was required that the drawings should be improved at least to the extent recorded by John Norton before work started. John Norton and Guillaume Chantry had requested amendments in the past to these drawings from Mr Bich of IPBD/Thanh Hoa on several occasions and had not been satisified with the results. On arrival at Thanh Hoa on 28th March a meeting was held with Mr Bich, Mr Que (architect), Mr Thanh (engineer), Mr Long (IHPBD/Hanoi) and Guillaume Chantry, at which continued dissatisfaction was expressed. On 31st March a further meeting was held during which it was agreed that 2 draughtswomen would be made available to work continuously under the direction of Mr Que until the drawings were satisfactorily completed. During the course of the week following, daily discussions between Mr Que and myself were held concerning John Norton's list of concerns with the design. Further changes were made, albeit reluctantly, in my opinion sufficient to allow the work to proceed. The list of detailed changes agreed are as follows:

(a) No w.c.'s were intended, translation error.
(b) Walkways ending in blank walls; drawings altered.
(c) Holding down of roof to gables improved using tie beam at eaves level continued across gable at same level; five purlins to be of timber rather than bamboo; timber cross bracing; purlins held down with mild steel bars through brickwork to tie beam.
(d) Tiles to have wire ties underneath and to be No 1 grade from Mai Chu factory.
(e) All joints in bamboo to be both nailed and tied with wire.
(f) Reinforced concrete ribs over cross walls with further brick ribs between.
(g) Connection of columns to foundations improved by taking reinforcement lower into concrete pad footing.
(h) Verandah roof separated from main roof structure.
(i) Flat ceilings in wards (5 mats thick) and walkways and verandahs (2 mats thick).
(j) Shading devices over windows reduced in size, made of plastered brick, severely weathered to avoid water penetration.

Fig. 16 Marylene Spezzati (UNDP) and Doris Ross (Australian Embassy) during their original fact finding mission to Quang Xuong Hospital.

One of my major concerns was the proposed use of a mixture of precast and in situ concrete to form a continuous beam and tie beam configuration considering the difficulty of obtaining an adequately stiff junction between the two on site. It was understood that the precasting of free spanning elements was used because of the shortage of shuttering timber, but nevertheless Mr Que accepted that combining precasting and in situ concrete was unsafe and agreed to cast all tie beams in situ.

Final approval to the dossier was given on the evening of 7th April at a meeting with Mr Bich, Mr Ung, Mr Hai, Mr Thanh and Mr Hung (for a glossary of names and positions see appendix G). Provincial Construction Company No 2 was appointed to carry out the work.

The start of construction on 9th April was marked by an impressive ceremony with speeches, firecrackers and the attention of the local press.

4.02 Work Planning and Cash Flow.

Mr Hung, a participant in the technicians workshop and a staff member of Provincial Construction Company No 2, produced a well presented work programme for the construction work on the 3 wards which was revised to speed up construction work so that recommendations for a further interim payment could be made in time for the visit of Ms Spezzati on 16th April. Mr Hung's work programme has been incorporated into the overall project work programme shown in appendix H.

Difficulties in making suitable arrangements for the transfer of payments from Hanoi were experienced and whilst these were resolved it was necessary for Mr Hinh to make arrangements to finance the start of the construction work. The first cheque covering 40% of the cost of the building work arrived on 12th April and no further problems regarding cash flow have been experienced during the course of the mission.

Fig. 17 Laying the foundation stone to the new maternity ward, Quang Xuong Hospital.

4.03 Site Work.

Since the start of building work, progress has been very rapid with usually more than 60 builders working on site at any one time. When I left Thanh Hoa on 22nd April the foundations for all three wards had been completed, the brickwork was up to window sill height on two wards and door lintel height on the third. Problems have not been with speed but with quality of construction. The following are some of the more important observations made during the daily site inspections:

(a) Pads for concrete columns cast out of sequence with rest of foundations requiring additional cutting out to maintain the continuity of the foundation.
(b) Concrete blinding layer under stone foundation consisting of a weak brick aggregate/lime/cement/sand mix was not mixed before puring into the trench but was laid as a mortar over a layer of broken bricks. This work had to be redone.
(c) Certain footings to existing walls had not been cut out destroying the continuity of the foundations. This was remedied.
(d) Stone foundation/plinth walls had been laid in inadequate mortar. These walls had to be demolished and twice as much mortar used.
(e) Hot weather required persistant watering of concrete, mortar and bricks in order to ensure adequate curing of cement.
(f) Inadequate quantities of cement in the mortar.
(g) Slaking of quicklime used in the mortar carried out too quickly with inadequate quantities of water.
(h) Insufficient 'header' (cross binding) courses in the brickwork.
(i) Inadequate and insufficient scaffolding.
(j) Corner reinforcement bars tieing brickwork to reinforced concrete columns not carefully inserted or missing.

4.04 Site Management.

Responsibility for site supervision lies in the first instance with the site management of Construction Company No 2 under Mr Hung but much more fundamentally with the inspection team from the Quang Xuong People's Committee led by Mr Hai.

Regular meetings were held with Mr Hung and Mr Hai, usually in the presence of Dr Hong, the hospital Director to develop procedures for site inspections appropriate to the work and to give confidence to the supervisors to reject unsatisfactory work. The following methods were discussed and agreed.

(a) The keeping of a regular site diary in which inspection points were noted together with the action required by the builders and the signature of the supervising officer when the corrections had been approved.

(b) The development of a list of points by Mr Hai, which would be used by him to check the work, building element by building element before carrying out his inspection. Deciding in advance how he would measure the quality of work and what would constitute an acceptable standard.

(c) The use of instruments such as plumb line and level to check the quality of construction.

(d) Daily site inspections by Mr Hai and twice weekly inspections by Mr Que (architect) from IPBD/Thanh Hoa following the inspection procedures listed above.

Mr Hung said that he had made many changes as a result of the observations listed in 4.03 above and would make any further changes required by Mr Hai.

Since these arrangements have been in force some brick walls, condemned by Mr Hai, have been demolished and rebuilt.

Representations were made to Mr Ung, the Director of the project in the presence of Dr Hong regarding the need for rigorous site inspection and the rejection of substandard work on all construction sites associated with the project. It was agreed that the system described above would be reviewed at the time of Mr Long's next visit and further changes made if found necessary by Mr Long.

A supervision and payment authourisation programme for the remainder of the project was agreed. This is shown in appendix I.

5.00 QUANG LINH PRIMARY SCHOOL.

Construction began on the five classrooms designed during the technicians workshop on 19th April. There was a formal opening ceremony with all the school children and teachers present, chaired by Dr Hong on the site. The local press were present; firecrackers were let off and foundation stones were laid.

The new classroom drawings are shown in appendix E. The scheme comprises two buildings, one of two and the other of three classrooms, both with verandah. The buildings are constructed of 200mm wide brickwork on stone plinth foundations. The roof of tiles on bamboo battens and purlins is supported by timber trusses and brick gabled crosswalls. Apart from shape, siting and orientation, which are covered under 2.03, the technicians workshop above, cyclone resistant features include the following:

(a) Best quality tiles with at least 30% tied down with wire, an old method which was reintroduced for this project.
(b) Separation of main roof and verandah roof.
(c) Bamboo purlins rafters and battens joined with both nails and tied with wire.
(d) Reinforced concrete ring beams at eaves, over gables and at floor level with purlins and roof trusses fixed with iron reinforcing rods into the tire beams.
(e) Reinforced concrete and brick parapets over tiles to hold down tiles.
(f) Building length to breadth ratio kept to below 3:1.
(g) Doors and windows fitted with storm bars.
(h) Balanced openings.
(i) 5 mat thick horizontal ceilings in classrooms and two mats thick over verandahs.
(j) Planting of wind breaks.

Construction is scheduled to be completed by 10th June (see programme in appendix H). The construction work has been given by Mr Ung to the Quang Xuong District Construction Company under the direction of Mr Toi. Five members of this construction company attended the Builders Workshop. Mr Nyen, a construction engineer under Mr Hai, is supervising the work for the Quang Xuong People's Committee. Mr Nyen attended the Technicians Workshop.

6.00 EXPENDITURE OF THE REMAINING AUSTRALIAN BUDGET.

6.01 Allocation of remaining budget.

Expenditure of the funds remaining from the Australian Government's contribution after the construction of the 3 new wards at Quang Xuong District Hospital was discussed with Dr Hong and Mr Ung on 13th April. The following priorities were agreed (refer to appendix for hospital plan):

(1) Rehabilitation of Pharmacy and Polyclinic (Outpatients) Block.
(2) Purchase of essential medical equipment.
(3) Reconstruction and strengthening of walkways.
(4) Reconstruction and strenghtening of perimeter walls.

Dr Hong prepared a list of medical equipment and Mr Tiet, construction engineer under Mr Hai for QXPC, who was a participant in the Technician's Workshop, prepared drawings and bills of quantity for items (1), (3) and (4) above. In the event it was only possible to recommend proceeding with items (1) and (2) together with the part funding of item (3) due to the sums available.

6.02 Rehabilitation of Pharmacy and Polyclinic.

This work was begun by the Builders Workshop and consisted of replacing the existing weak, damaged roof and strengthening the brick wall structure beneath. This large, originally C shaped building will now be divided into three sections with a new hipped roof over each section. The construction techniques required to construct a hipped roof were of major interest during the builders workshop. Other cyclone resistant features include:

(a) The thin cross walls have been strengthened with reinforced concrete stitches.
(b) Tie beams have been inserted at eaves level and carried over gabled cross walls.
(c) The roof structure and covering has been strengthened to the same specification as the primary school.
(d) Storm bars are to be added to the doors and windows.
(e) New ceilings.
(f) Separated verandah roofs from main roofs.

The completion of the construction work on this building following directly on from the end of the Builder's Workshop has been given by Mr Ung, the project director, to the Quang Vinh Construction Cooperative who are a private construction company operating in the Qang Xuong District. Five members of this cooperative attended the Builders Workshop, including Mr Kinh, the head of the cooperative.

6.03 Reconstruction and Strengthening of Walkways.

A contribution was available towards the reconstruction of the walkways. These will be to the same design as those proposed for the three new wards (see item 4 above) and will be an extension of that contract carried out by Provincial Construction Company No 2.

The walkways consist of double pitched tiled roofs on timber trusses (bamboo purlins, rafters and battens) on reinforced brick columns. At junctions with existing buildings where a double pitched walkway is impracticable, sections of reinforced concrete flat roofed walkway will be inserted.

7.00 RECOMMENDATIONS.

7.01 Recommendations regarding future Technicians Workshops.

To enrich the workshop debate on the strengths and weaknesses of traditional materials and forms of construction and to more easily assess the influence which new materials such as steel rods and Portland Cement have on the building industry and hence cyclone resistance, it is recommended that:

(a) The survey of local villages should include interviews with local house owners and builders to assess their attitudes and policy to both traditional and modern techniques and materials.

(b) Literature covering the history of building in the area of the workshop should be assembled and an attempt should be made, from an examination of this literature, to assess the recent history of changes in building techniques, materials and design.

(c) In order to put this policy into effect, especially if other expatriate staff are involved, and to facilitate the dissemination of results, at least one other interpreter should be available for the programme. In the Thanh Hoa programme there was really too much work for just one interpreter.

7.02 Recommendations regarding future Builders Workshops.

It is clear that the availability of building materials varies considerably in both type and quality from one province to another. For example, in Thanh Hoa, whilst there are good supplies of cement and brick; timber is in short supply, expensive and vulnerable to termites. In Bien Tri Thien however, more timber is available, but cement is more difficult to obtain. This has an effect on building form, techniques and skills. For instance, hipped roofs are common in Bien Tri Thien, but were strongly resisted in Thanh Hoa because of different attitudes to the timber needed for their construction. Solutions to jointing, wall construction and diagonal bracing are also different.

It is therefore difficult to predict the effect of these differences on the vocabulary of built form and jointing techniques which need to be developed specifically to meet the needs of cyclone resistance in any particular locality. I therefore propose that, in order to to attempt to overcome this lack of prior knowledge of any locality, that future Builders Workshops be organised in two stages as follows:

(a) A small group of say five tradesmen should form a preliminary workshop lasting seven days where alternative building techniques could be explored and where a vocabulary of building form, joints and skills could be developed.

(b) These 5 tradesmen should then be joined by 25 other tradesmen to form the main workshop of 10 to 12 days during which the vocabulary of building form, joints and skills for cyclone resistance can be disseminated and further developed.

7.03 Recommendations regarding 'Secondary' considerations and cyclone resistance.

The ten points of cyclone resistance form a good primary theoretical basis for teaching cyclone resistant construction throughout Vietnam, however there are other (secondary) considerations which effect cyclone resistance which are mostly concerned with the quality of building materials and site construction which are particular to each locality. From the experience of the Thanh Hoa workshops and the construction work associated with them, it is clear that an attempt should be made to improve this quality. This might involve the following work:

(1) The development of site checking procedures.

(2) Clear measuring techniques and guidelines for site inspections to determine acceptable and unacceptable quality to give confidence to inspection personel.

(3) The improvement of the skills of tradesmen as part of the Builders Workshop.

Sites are very labour intensive and quality control is therefore very much a question of the management of people. Processes which in Europe might be carried out in a factory under carefully controlled conditions are here carried out on site under much less rigorous circumstances (e.g. slaking of lime, mixing of concrete, curing of concrete, quantity of mortar used). Thus an examination of site organisation methods used and recommendations for improvement would be a way forward.

There is also a variability in the quality of locally produced materials with no clear method of checking or guaranteeing quality (e.g. differences in brick sizes, poor quality clay used in tile manufacture, firing temperature of bricks and tiles too low). This often leads to a lack of confidence in the life of locally produced materials, lowering expectations and increasing tolerance for short life, low value buildings.

Many professionals in Thanh Hoa regard reinforced concrete as the only really cyclone resistant material, that is despite the many problems associated with it (excessive cost, lack of match with comfort criteria, degeneration of concrete, leaking roofs, discolouration and mould growth on exterior finshes). It is in this context that tiles, timber and bamboo have to compete.

7.04 Recommendations regarding services to Quang Xuong Hospital.

Whilst most of the destroyed or badly damaged buildings of Quang Xuong hospital are now in the process of being rebuilt or repaired, the condition of the electrical installation, sanitation and water supply are still inadequate for a District Hospital of this size.

(a) Electrical Installation:
The transformer station and mains supply have been restored but the wiring within the hospital which was badly damaged does not function. An intermittent supply is maintained to a few buildings such as the recently completed operating theatre with a 6 KVA generator.

(b) Water Supply:
Brackish water with a high iron content is available from 7 wells on site, including 2 which have hand operated lift pumps installed by UNICEF. This water is only suitable for washing. In addition, rainwater is collected in a 20 cubic meter brick and concrete tank from the roof of the main pharmacy building (see plan appendix J). This wateris used on site for drinking and some is distilled for medical purposes.

(c) Sanitation:
There are 4 toilet blocks along the perimeter of the site, each consisting of about 5 toilet cubicles. These block have no septic tank connections and appear to discharge directly into the paddy fields. There are no washing facilities other than the wells.

It is recommended that a proposal be drawn up to provide:

(d) Complete power and lighting wiring circuits to be connected to the existing mains supply.

(e) A clean water supply consisting of pump, water tower, filtration and piped distribution system.

(f) Adequate washing and sanitary facilities draining to a high quality septic tank arrangement.

It would be useful, in my opinion, if such a proposal were prepared with the help of consultants specialising in such services. If this is not possible the Peoples Committee of Quang Xuong, who have their own engineers, should be invited to submit a proposal directly to UNDP.

Ms Spezzati indicated during her visit on 16th April that she would be prepared to circulate such a proposal to governments and NGO's who might fund such a project.

LIST OF APPENDICES.

APPENDIX A: ARTICLE IN THANH HOA NEWSPAPER 7th April 1990.

Thanh Hóa

NĂM THỨ HAI MƯƠI TÁM

THỨ BẢY

7-4-1990

Số 2903

CƠ QUAN CỦA ĐẢNG BỘ ĐẢNG CỘNG SẢN VIỆT NAM TỈNH THANH HÓA

TRỤ SỞ TÒA SOẠN: SỐ 1 NGUYỄN DU – THỊ XÃ THANH HÓA DÂY NÓI 242

TẬP HUẤN KỸ THUẬT XÂY DỰNG NHÀ CHỐNG GIÓ, BÃO

TỈNH ta vừa mở lớp tập huấn về kỹ thuật xây dựng nhà chống gió bão lần thứ 2 cho 20 cán bộ kỹ thuật của 5 huyện vùng biển và 2 công ty xây dựng, theo dự án 89/035 của Tổ chức UNDP và Đại sứ quán Ô-xtrây-li-a tại Việt Nam viện trợ.

Đồng chí Lê Hữu Hinh, Phó Chủ tịch thường trực Ủy ban Nhân dân tỉnh, ông G.Chăn-tri, ông M.Mit-sen, đại diện Tổ chức UNDP, dự khai giảng lớp tập huấn.

Lớp tập huấn được tổ chức trong 13 ngày do ông M.Mit-sen, kiến trúc sư Luân Đôn; ông Trương Nguyên Mân, kỹ sư, Phó Viện trưởng Viện Thiết kế nhà ở và công trình công cộng, chủ nhiệm đề tài chống bão của Nhà nước; ông Nguyễn Đình Long, kỹ sư Viện Thiết kế nhà ở Bộ Xây dựng, làm giảng viên, chỉ đạo nội dung khảo sát các ngôi nhà đã xây dựng ở huyện Quảng Xương và thị xã Sầm Sơn để rút ra kinh nghiệm xây dựng nhà cổ truyền của nhân dân ta; từ đó đề ra các biện pháp gia cố các ngôi nhà đã có của Bệnh viện Quảng Xương và thiết kế trường phổ thông cơ sở Quảng Lĩnh, có từ 4 đến 5 phòng học.

Trần Chương

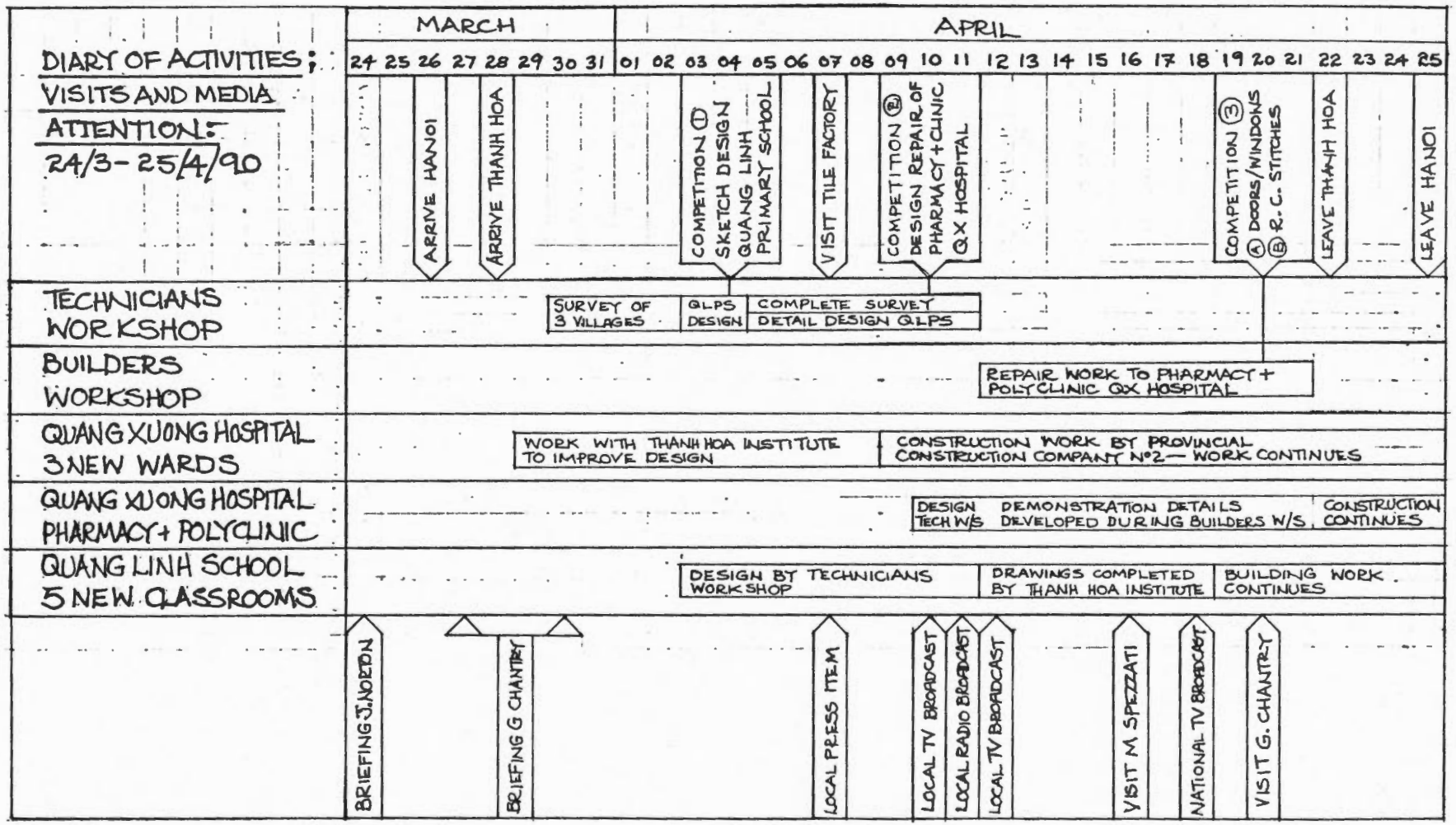
THE CYCLONE RESISTANT BUILDING TECHNIQUES, TECHNICIANS WORKSHOP.

Our province has just opened another cyclone resistant building workshop for 20 technicians from 5 coastal districts and construction companies according to project VIE/89/035 financed by UNDP and the Australian Embassy in Vietnam.

Mr Le Huu Hinh, vice chairman of the standing peoples committee of Thanh Hoa, Mr Chantry and Mr Mitchell, representatives of UNDP were present at the opening day.

The Technicians Workshop will last 13 days. Mr Mitchell, architect from London, Mr Truong Nguyen Man, construction engineer, deputy head of the Institute for Housing and Public Building Design, Director of the state project of Typhoon and Flood Preparedness, Mr Nguyen Dinh Long, construction engineer of the same institute are the lecturers. They will also instruct the participants to survey houses in the Quang Xuong District and in the Samson area thus to gain experience of traditional building and then to recommend ways to reinforce the existing houses; to repair Quang Xuong hospital and to design Quang Linh Primary School with 4 or 5 classrooms.

APPENDIX B: DIARY OF MISSION ACTIVITIES.



APPENDIX C: LIST OF PARTICIPANTS; TECHNICIANS WORKSHOP.

LIST OF OFFICIAL PARTISIPANTS
for the Technicians Storm-resistant building demonstration workshop
from March 30 th to 11 April 1990
in THANH HOA

N°	Names	age	Occupation	Rank	From
1	NGUYEN VAN HUNG	35	Civil eng.	deputy head of technical bureau	Construction Company N°2
2	LE VAN TUAN	32	"	head of building team	"
3	TRAN VAN SANG	40	"	"	"
4	LE MINH COI	40	Cons;technician	"	"
5	NGUYEN NGOC CHINH	40	"	"	"
6	NGUYEN VAN SON	25	Civil eng.	menber	"
7	NGUYEN HONG CHIEN	30	Cons.tech	"	"
8	VU VAN TIEN	30	Civil eng.	head of tech.bureau	Cons.Com.N°1
9	DO VAN VAY	32	Cons.tech.	head of building team	"
10	QUAN TIEN DUNG	30	Civil eng.	menber	"
11	HAN VAN THANH	32	"	"	Ins.for planing and building design
12	LE THI HIEN	30	Finance account	"	"
13	HA MANH HONG	54	Doctor	Director	QUANG XUONG-district hospital -
14	DOAN QUANG THIET	40	Civil eng.	menber	Q.XUONG district
15	NGUYEN NGOC KHANH	34	Quantities surveyor	"	"
16	NGUYEN THANH NHAN	30	Civil eng.	"	"
17	NGUYEN XUAN HONG	32	"	"	HAU LOC distric
18	HOANG VAN LUAT	40	Arcbitect	"	HOANG HOA dis.
19	PHAM VAN HOACH	46	Cons.tech.	"	NGA SON dis.
20	NGUYEN HUY TUONG	48	Civil eng.	deputy head of cons. bureau	TINH GIA distr

There are 3 more persons who serve the workshop

THANH HOA - March 29, 1990

Signed

QUY HOACH VA THIET KE XAY DUNG

TRINH NGOC BICH

APPENDIX D: SUMMARY OF VILLAGE SURVEY RESULTS.

VIE/89/035 | HỖ TRỢ ĐỂ XÂY DỰNG LẠI Ở TỈNH THANH HÓA
CONTRIBUTION TO REHABILITATION IN THANH HOA PROVINCE | AUSTRALIA

SUMMARY OF THE WORK OF GROUP ONE: SURVEY OF EXISTING HOUSES IN QUANG XUONG DISTRICT

(A) OBJECTIVES:

(1) SURVEY EXISTING HOUSES IN QUANG XUONG DISTRICT BUILT BY LOCAL PEOPLE.
(2) CLASSIFY THESE HOUSES AND ASSESS THEIR STRONG POINTS AND WEAK POINTS.
(3) PROPOSE WAYS IN WHICH THESE HOUSES COULD BE MADE MORE RESISTANT TO CYCLONES.

(B) NAMES OF PARTICIPANTS IN GROUP ONE:

(1) VU VAN TIEN — CIVIL ENGINEER
(2) NGUYEN NGOC CHINH — CONSTRUCTION TECHNICIAN
(3) NGUYEN HONG CHIEN — CONSTRUCTION TECHNICIAN
(4) TRAN VAN SANG — CONSTRUCTION TECHNICIAN
(5) PHAM VAN HOACH — CONSTRUCTION TECHNICIAN
(6) NGUYEN NGOC SON — CONSTRUCTION ENGINEER.
(7) DOAN QUANG THIET — CONSTRUCTION ENGINEER.
(8) QUAN TIEN DUNG — CONSTRUCTION ENGINEER.
(9) LE DUY KHANH — CIVIL ENGINEER.

(C) LOCALITIES FOR HOUSE SURVEYS:

(1) QUANG LOI VILLAGE (A COASTAL VILLAGE)
(2) QUANG LINH VILLAGE (SITE OF PRIMARY SCHOOL RECONSTRUCTION).
(3) QUANG XUONG VILLAGE (NEAR QUANG XUONG DISTRICT HOSPITAL).

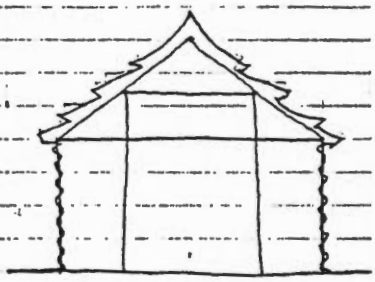
Development Workshop | Viện Thiết kế Nhà ở-Công trình Công Công-Bộ Xây dựng
Xí nghiệp Thiết Kế Khảo Sát Xây Dựng, Thanh Hóa | GRET

Appendix D cont. Summary of Village Survey Results.

(D) CLASSIFICATION OF HOUSES

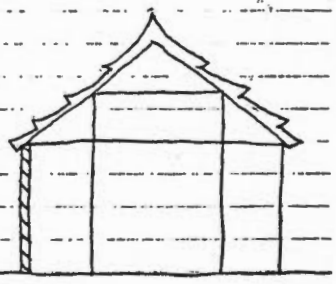
(1) TRADITIONAL SHORT LIFE:

THATCHED ROOF
BAMBOO ROOF FRAME + PILLARS
TORCHE WALLS
NO SEPARATE VERANDAH



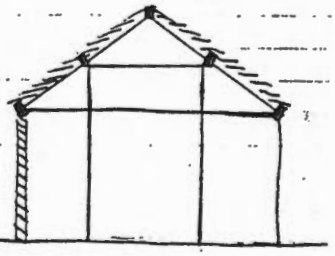
(2) THATCHED TRADITIONAL LONG LIFE:

THATCHED ROOF
BAMBOO ROOF FRAME
TIMBER OR BAMBOO TRUSSES AND PILLARS. (N.B. NO TIMBER PURLINS).
PLASTERED BRICK WALLS
TIMBER OR BRICK VERANDAH COLUMNS.
NO SEPARATE VERANDAH



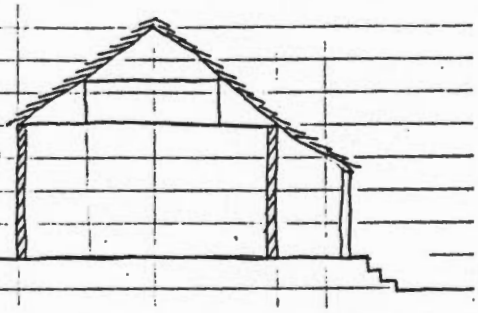
(3) TILED TRADITIONAL LONG LIFE:

TILED ROOF
TIMBER TRUSSES, PILLARS + 5 PURLINS
BAMBOO REMAINING PURLINS, RAFTERS AND BATTENS.
PLASTERED BRICK WALLS
NO SEPARATE VERANDAH.



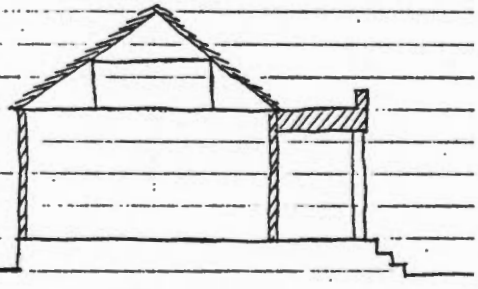
(4) TRANSITIONAL

TILED ROOF
TIMBER (OR BAMBOO) TRUSSES
NO PILLARS
BAMBOO PURLINS, RAFTERS, BATTENS.
PLASTERED BRICK WALLS
SEPARATE TILED VERANDAH AS CONTINUATION OF MAIN ROOF.
STEPS UP TO ENTRANCE.



(5) SEMI MODERN

TILED ROOF
TIMBER TRUSSES
NO PILLARS
BAMBOO PURLINS RAFTERS BATTENS
PLASTERED BRICK WALLS
SEPARATE VERANDAH OF REINFORCED CONCRETE ROOF AND BRICK COLUMNS WITH CENTRAL REINFORCING ROD.
STEPS UP TO ENTRANCE



(E) SUMMARY OF SURVEY AND RECOMMENDATIONS

QUANG XUONG IS A COASTAL DISTRICT IN THANH HOA PROVINCE. IT WAS HIT BY VARIOUS TYPHOONS AND SEA FLOODS. THERE IS A LACK OF KNOWLEDGE IN THANH HOA OF CYCLONE RESISTANT BUILDING TECHNIQUES. MOST OF THE HOUSES SURVEYED WERE UNABLE TO RESIST SEVERE TYPHOONS. IN PARTICULAR TYPHOON 'IRVING' (No6/1989) DID A GREAT DEAL OF DAMAGE TO QUANG XUONG DISTRICT, CAUSING HEAVY LOSS OF LIFE AND DAMAGE TO PROPERTY.

(i) GOOD POINTS OF THE EXISTING HOUSES IN QUANG XUONG DISTRICT:

(1) HOUSES ARE BUILT CLOSE TOGETHER. THERE ARE MANY TREES PLANTED AROUND THE HOUSES AND THESE, TOGETHER WITH PERIMETER WALLS HELP TO REDUCE THE FORCE OF THE WIND. IN ADDITION HOUSES ARE GENERALLY ONLY ONE STOREY HIGH.
(2) THE RATIO ON PLAN OF THE LENGTH TO BREADTH OF THESE HOUSES IS USUALLY LESS THAN 2.5
(3) SOME HOUSES ARE WELL PUT TOGETHER, FOR EXAMPLE:
(a) PILLARS BUILT INTO THE GROUND (APPROX 1 METRE)
(b) TIE BEAMS FIXED TO PILLARS WITH BOLTS
(c) PURLINS TIED STRONGLY TO THE RAFTERS + BATTENS WITH WIRE AND NAILS.
(d) PURLINS FIXED TO PRINCIPAL TRUSSED RAFTERS BY MEANS OF BAMBOO PEGS AND WIRING.

(ii) WEAK POINTS OF THE EXISTING HOUSES IN QUANG XUONG DISTRICT:

(1) THE TREES AROUND THE BOILDINGS ARE CHIEFLY FRUIT TREES WITH BIG LEAVES AND WEAK ROOTS.
(2) MOST FIXINGS AND JOINTING ARE NOT CYCLONE RESISTANT, FOR EXAMPLE:
(a) THE VERANDAH ROOF IS CONTINUOUS WITH THE MAIN ROOF.
(b) THE TILES ARE NOT TIED TO THE BATTENS.
(c) THE PURLINS, BEAMS, TRUSSES AND PILLARS ARE LOOSELY FIXED TOGETHER.
(d) OFTEN PILLARS SIMPLY REST ON STONES.
(3) THE SURROUNDING STRUCTORE IS WEAK, FOR EXAMPLE:
(a) DOORS OFTEN MADE OF THIN BAMBOO MATTING.
(b) WALLS MADE OF TORCHE WITH NO DIAGONAL BRACING
(4) OPENINGS IN FRONT AND BACK WALLS ARE NOT BALANCED. IN MANY HOUSES THERE ARE ONLY OPENINGS ON THE COORTYARD (USUALLY SOOTH) SIDE.

(iii) RECOMMENDATIONS FOR STRENGTHENING THE HOUSES IN QUANG XUONG DISTRICT:

IT IS NECESSARY FOR EVERYBODY, EVERY HOUSEHOLD AND EVERY OFFICE IN QUANG XUONG DISTRICT TO REINFORCE THE EXISTING HOUSES AND TO BUILD NEW HOUSES APPLYING CYCLONE RESISTANT BUILDING TECHNIQUES INCLUDING THE FOLLOWING:

(1) PLANTING TREES WITH NEEDLE LEAVES AND FIRM ROOTS AROUND THE HOUSE.
(2) USING TILES, AT LEAST 30% OF WHICH, HAVE A HOLE ON THE UNDERSIDE ALLOWING THEM TO BE FIRMLY WIRED TO THE BATTENS. RIDGES SHOULD BE BUILT AT REGULAR INTERVALS ON TOP OF THE TILES TO FORM PARAPETS, PARTICULARLY OVER CROSSWALLS AND GABLES.
(3) STRONG FIXINGS USING, NAILS, BOLTS AND WIRE SHOULD BE USED IN THE ROOF STRUCTURE.
(4) SIMILARLY, BEAMS SHOULD BE FIRMLY FIXED TO WALLS AND PILLARS.
(5) PILLARS SHOULD BE BURIED DEEP IN THE GROUND OR BOLTED INTO A CONCRETE BASE.
(6) VERANDAHS SHOULD BE SEPARATE FROM THE MAIN ROOF AND SHOULD HAVE A BAMBOO MAT CEILING.
(7) THATCHED ROOFS SHOULD BE SECURED WITH BAMBOO RIBS.
(8) THE ROOF FRAME AND END GABLE WALLS SHOULD BE DIAGONALLY BRACED TOGETHER USING MILD STEEL ANGLE IRON OR TIMBER.
(9) WHERE POSSIBLE REINFORCED CONCRETE TIE BEAMS SHOULD BE INSERTED AT EAVES AND GROUND LEVELS TO STIFFEN BRICK WALLS. TORCHE WALLS SHOULD BE DIAGONALLY BRACED WITH BAMBOO.
(10) DOORS AND WINDOWS SHOULD BE TIGHT FITTING WITH STRONG HINGES, BOLTS AND STORM BARS.

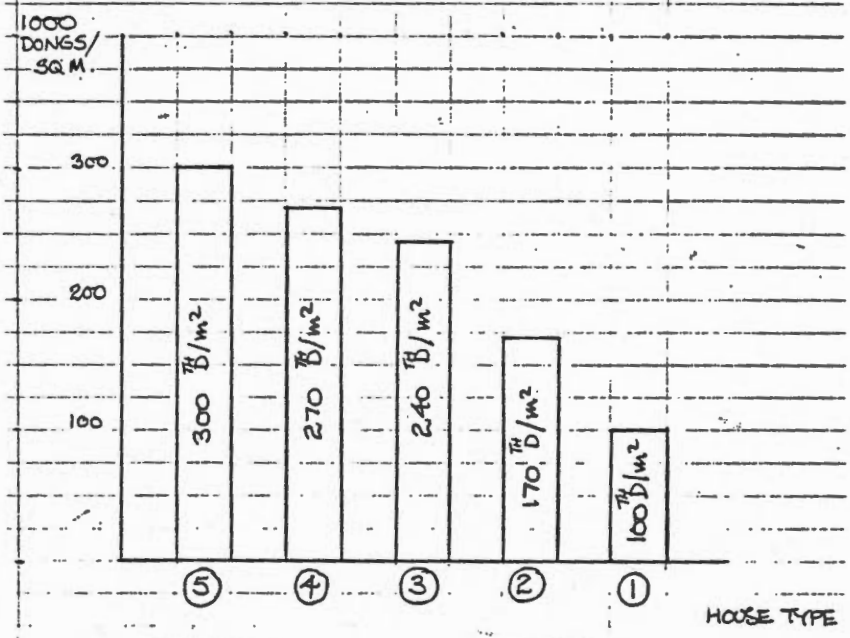
Appendix D cont. Summary of Village Survey Results.

(F) PRICES OF BUILDING MATERIALS IN QUANG XUONG (EARLY APRIL 1990)

	DONGS	UNIT	
BIMSON CEMENT	260	KG	
YELLOW SAND	16,000	m^3	
GRAVEL (SMALL 10 mm x 20 mm)	27,000	m^3	
GRAVEL (LARGE 40 mm x 60 mm)	18,000	m^3	
BUILDING STONE	14,000	m^3	
BROKEN BRICKS	2,000	m^3	
MACHINE MADE BRICKS (60x110x220 mm)	84	EACH	
LIME	95	KG	
MACHINE MADE TILES (22 TILES/m^2)	250	EACH	(NO HOLES)
RIDGE TILES	400	EACH	
TIMBER GRADE 2	600,000	m^3	
TIMBER GRADE 3	480,000	m^3	
TIMBER GRADE 4	350,000	m^3	
STEEL 6 mm ϕ - SOVIET	1,600	KG	
STEEL 6 mm ϕ - VIETNAMESE	1,250	KG	
STEEL 8 mm ϕ - SOVIET	1,400	KG	
STEEL 8 mm ϕ - VIETNAMESE	1,150	KG	
STEEL 14-16 mm ϕ VIETNAMESE	1,000	KG	
BAMBOO GRADE 1	4,200	EACH	
BAMBOO GRADE 2	3,800	EACH	
BAMBOO $\geq$ 8m	2,500	EACH	
GLAZED BRICKS	400	EACH	
3mm GLASS	30,800	m^2	
BAMBOO MATTING SHEET (5 LAYERS)	5,000	m^2	
SCRENS	50	EACH	
NAILS	3,000	KG	
NUTS + BOLTS (ϕ 14 mm ; LENGTH $\geq$ 200 mm)	1,200	EACH	
LOCKS	3,000	EACH	
LATCHES	500	EACH	
BARREL BOLTS	500	EACH	
L-SHAPED IRON BRACKETS	100	EACH	
HINGES	600	EACH	
COLOUR POWDER (VIETNAMESE)	6,000	KG	
COLOUR POWDER (FOREIGN)	5,000	KG	
ELECTRICAL WIRE (1 mm ϕ)	250	m	
LIGHT BULBS (220V x 75 W)	1,400	EACH	
ELETRICAL SWITCHES	500	EACH	
ELECTRICAL SOCKETS	200	EACH	
FUSE WIRE	200	EACH	
PRICES OF BUILDING LABOUR:			
UNSKILLED LABOUR	5,000	DAY	
SKILLED LABOUR	10,000	DAY	

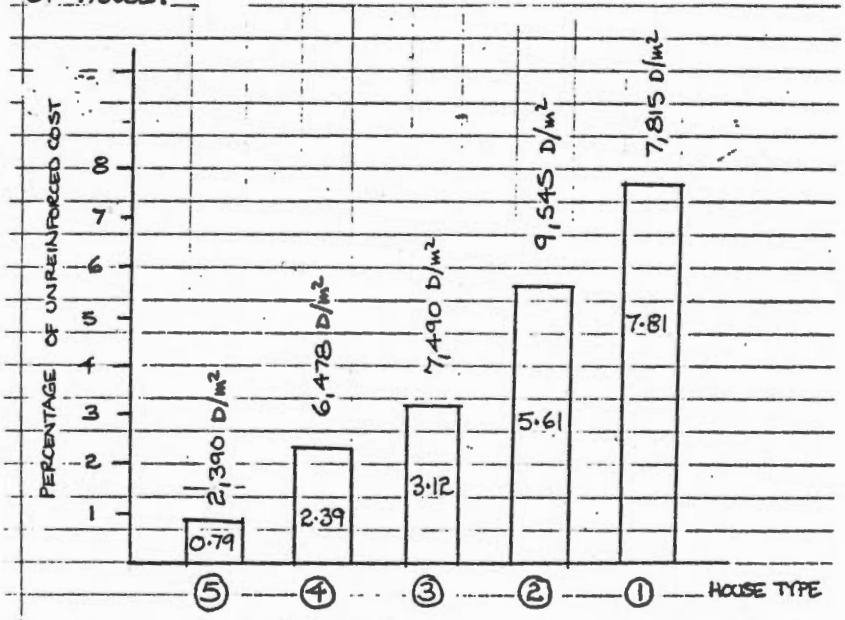
(F) CONT. THE COST OF EACH CLASS OF HOUSE:

BASED ON THE RESULTS OF OUR SURVEYS, TALKS WITH CONSTRUCTION EXPERTS AND VILLAGERS WE ESTIMATE THE COST PER SQ METRE FOR EACH OF THE 5 CLASSES OF HOUSES TO BE AS FOLLOWS:



(F) CONT. ESTIMATED EXTRA COST FOR CYCLONE RESISTANT REINFORCEMENT FOR EACH HOUSE TYPE.

BASED ON OUR KNOWLEDGE OF CYCLONE RESISTANT BUILDING TECHNIQUES AND ON OUR SURVEYS WE HAVE CALCULATED THE EXTRA COSTS TO IMPROVE THE 5 KINDS OF HOUSE.



THE RESULTS SHOW THAT THE SIMPLER THE HOUSE IS THE HIGHER THE COST OF REINFORCEMENT BOTH AS A PERCENTAGE OF THE ORIGINAL COST AND. (EXCEPT FOR TYPE (1)) IN ABOLUTE TERMS.

APPENDIX E: DRAWINGS OF QUANG LINH PRIMARY SCHOOL; PRODUCED BY TECHNICIANS WORKSHOP.

(1) SECTION AND ELEVATION SHOWING CYCLONE RESISTANT FEATURES.

(2) EXISTING SITE PLAN.

(3) PROPOSED SITE PLAN.

(4) 3 CLASSROOM BLOCK: PLAN AND ELEVATION.

(5) 2 CLASSROOM BLOCK: PLAN AND ELEVATION.

(6) LONGTITUDINAL SECTION AND DETAILS.

(7) FOUNDATION PLAN AND DETAILS.

(8) ROOF PLAN AND DETAILS.

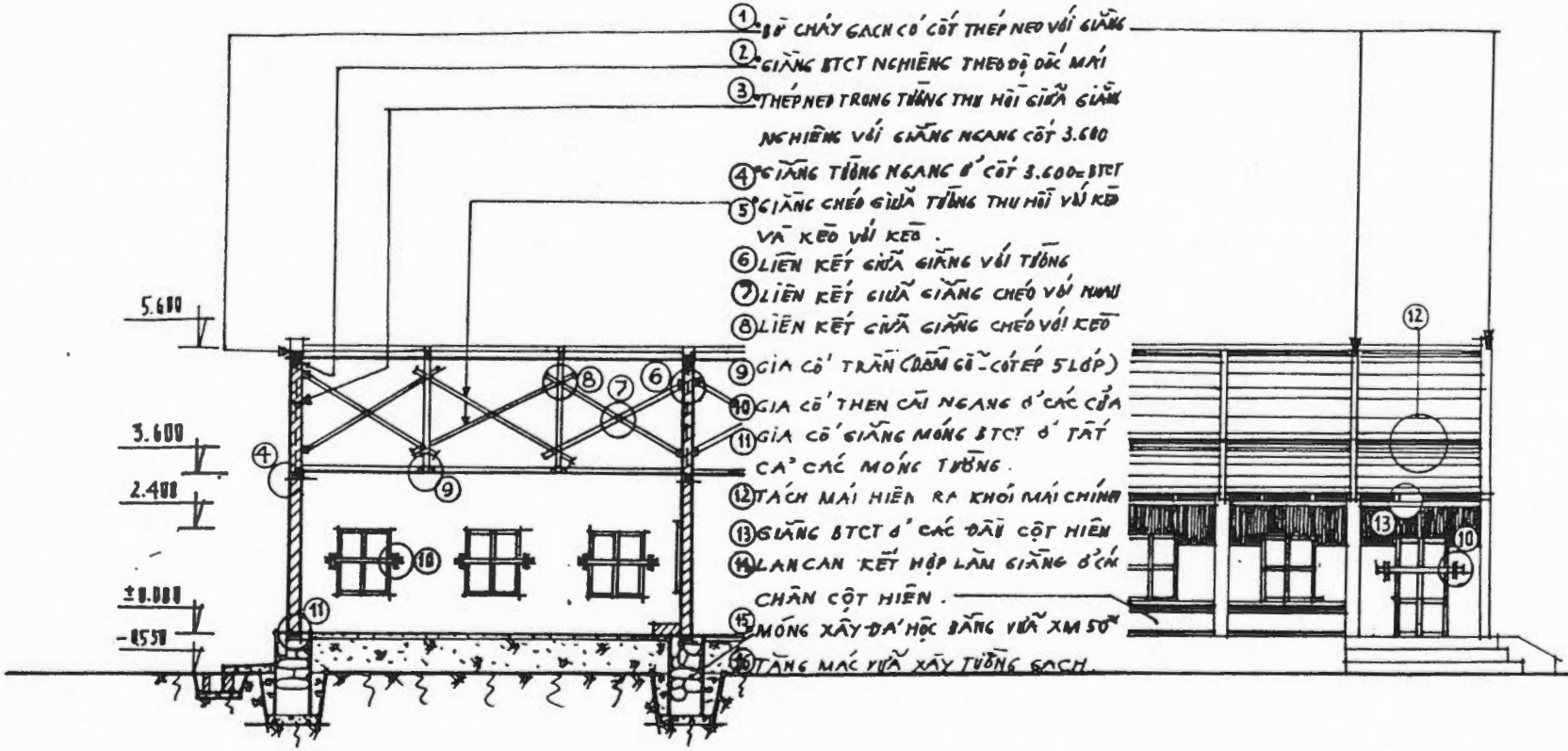
(9) CROSS SECTION THROUGH ROOF AND DETAILS.

(10) DOOR AND WINDOW DETAILS.

(11) REINFORCED CONCRETE ELEMENTS.

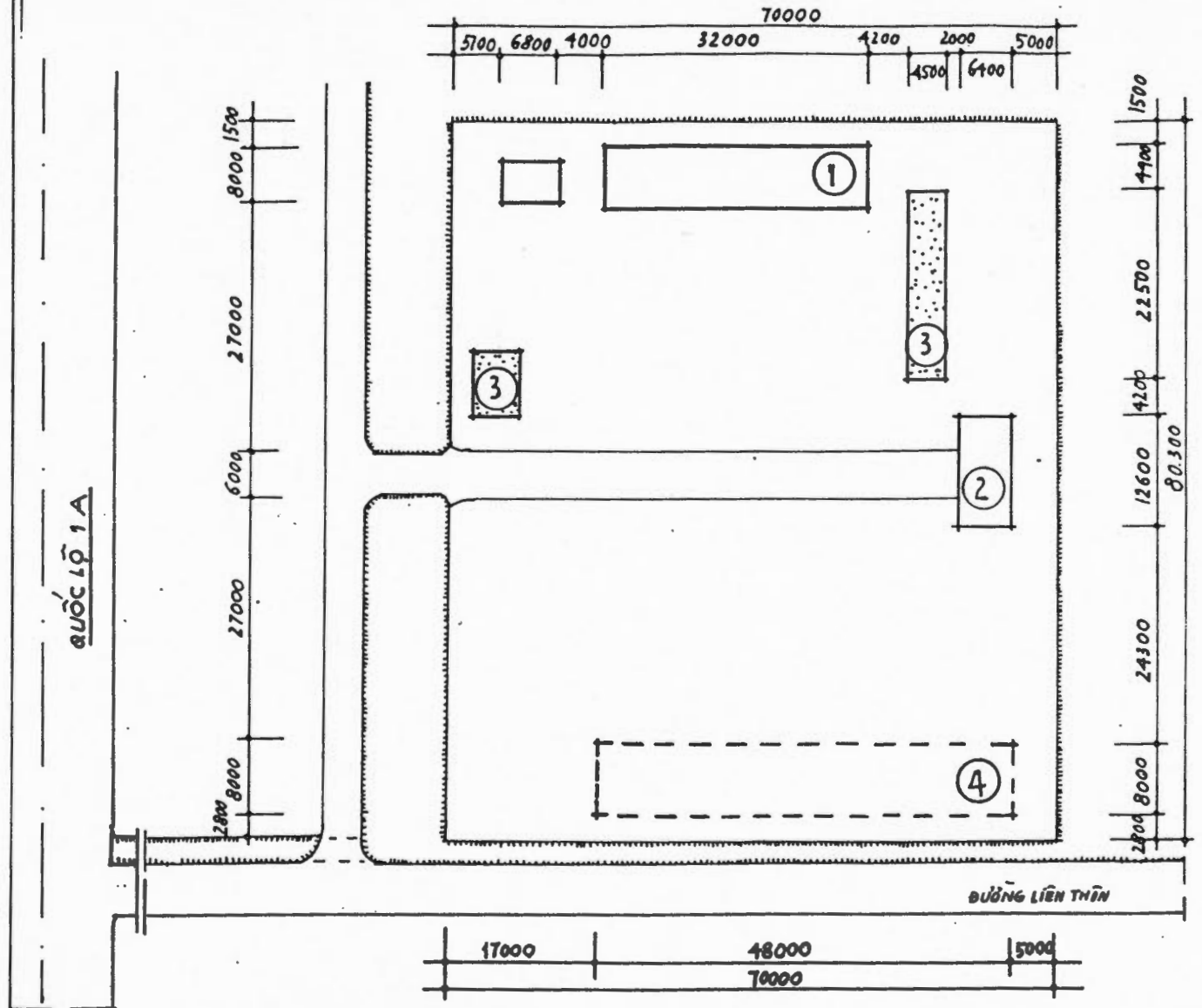
(12) TIMBER TRUSS DETAILS.

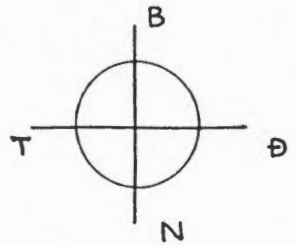
(1) SECTION AND ELEVATION SHOWING CYCLONE RESISTANT FEATURES.



1. BỜ CHẢY GẠCH CÓ CỐT THÉP NEO VỚI GIẰNG
2. GIẰNG BTCT NGHIÊNG THEO ĐỘ DỐC MÁI
3. THÉP NEO TRONG TƯỜNG THU HỒI GIỮA GIẰNG NGHIÊNG VỚI GIẰNG NGANG CỐT 3.600
4. GIẰNG TƯỜNG NGANG Ở CỐT 3.600= BTCT
5. GIẰNG CHÉO GIỮA TƯỜNG THU HỒI VỚI KÈO VÀ KÈO VỚI KÈO.
6. LIÊN KẾT GIỮA GIẰNG VỚI TƯỜNG
7. LIÊN KẾT GIỮA GIẰNG CHÉO VỚI NÓC
8. LIÊN KẾT GIỮA GIẰNG CHÉO VỚI KÈO
9. GIA CỐ TRẦN (CHẤM CỠ - CỐT ÉP 5 LỚP)
10. GIA CỐ THEN CÀI NGANG Ở CÁC CỬA
11. GIA CỐ GIẰNG MÓNG BTCT Ở TẤT CẢ CÁC MÓNG TƯỜNG.
12. TÁCH MÁI HIÊN RA KHỎI MÁI CHÍNH
13. GIẰNG BTCT Ở CÁC ĐẦU CỘT HIÊN
14. LAN CAN KẾT HỢP LÀM GIẰNG Ở CHÂN CỘT HIÊN.
15. MÓNG XÂY ĐÁ HỘC BẰNG VỮA XM 50#
16. TẦNG MÁC VỮA XÂY TƯỜNG GẠCH.

UNDP AUSTRALIA	DEVELOPMENT WORK SHOP	VIỆN T.KẾ NHÀ Ở VÀ CTCC BỘ XD	CHUYỂN GIAO KĨ THUẬT XÂY DỰNG NHÀ CHỐNG GIÓ BÃO VIE/89/035 THANH HOÁ
	GRET	VIỆN QUY HOẠCH VÀ T.KẾ XD.TH	TRƯỜNG P.T.C.S XÃ QUẢNG LIÊM ĐẠI CƯƠNG CÁC BỘ PHẬN CHỐNG BÃO — A0 4-90





GHI CHÚ

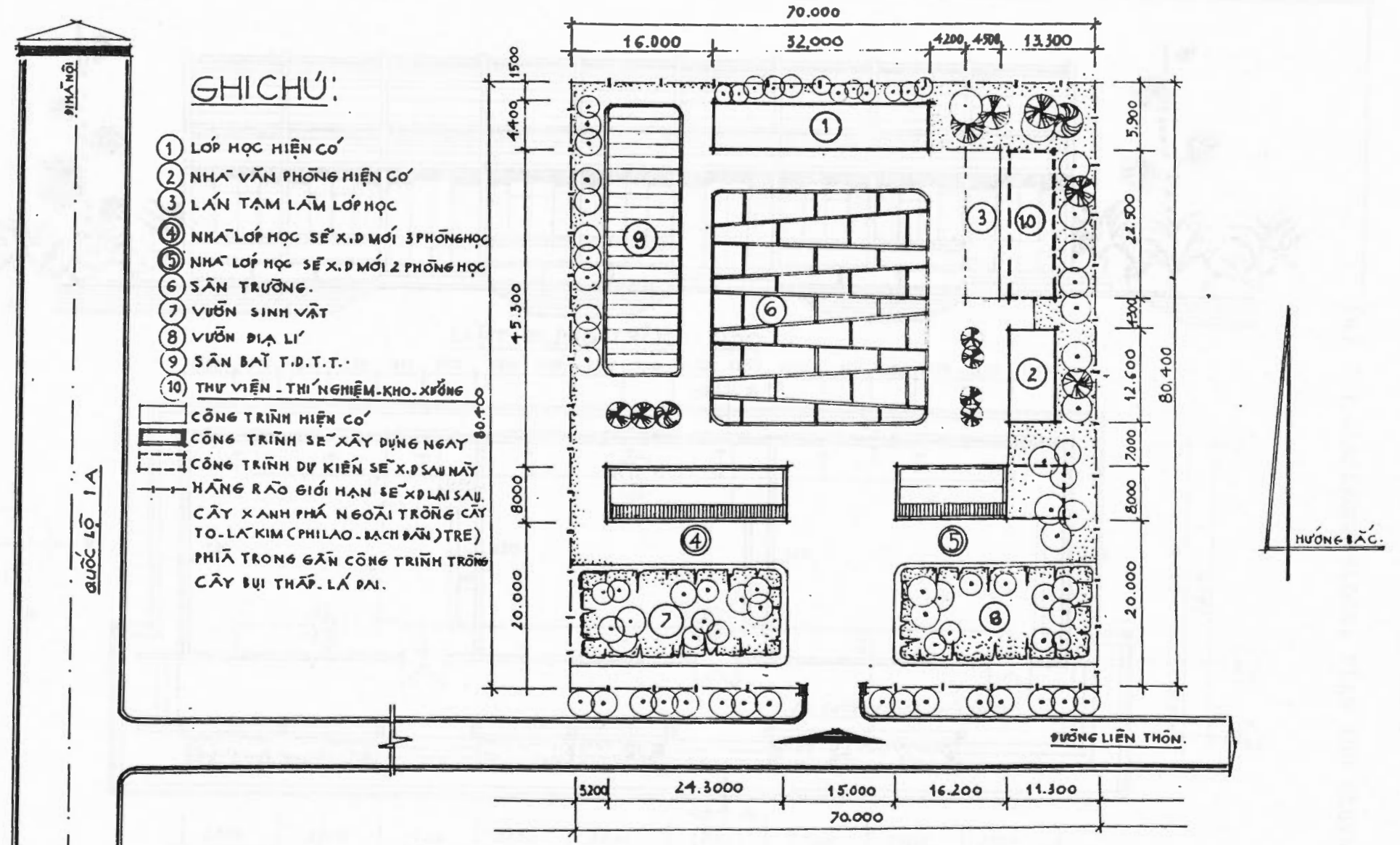
① NHÀ LỚP HỌC MÁI NGÓI
② NHÀ LÀM VIỆC VĂN PHÒNG
③ NHÀ TRANH VÁCH ĐẤT
④ NHÀ LỚP HỌC BỊ ĐỔ

(2) EXISTING SITE PLAN.

MẶT BẰNG HIỆN TRẠNG T.L: 1/500

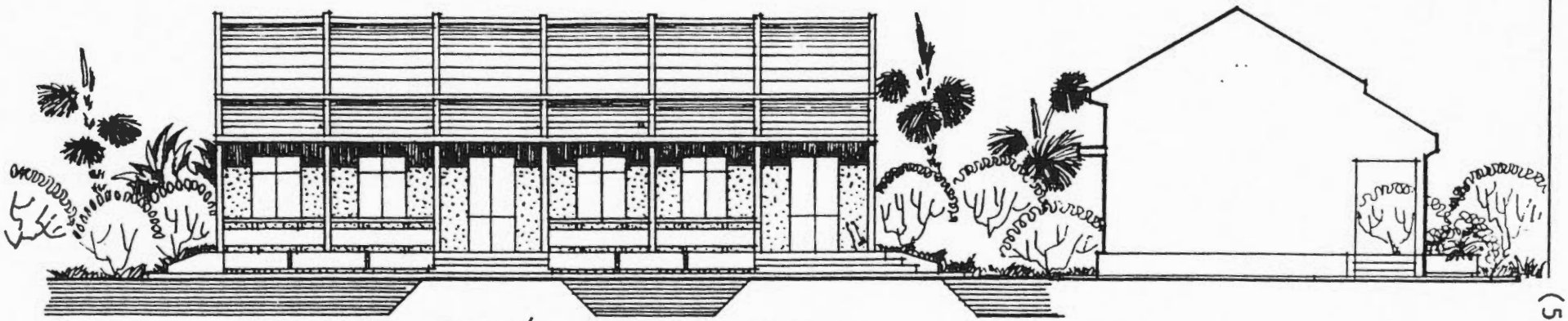
TRƯỜNG PHỔ THÔNG CƠ SỞ XÃ QUẢNG LĨNH

UNDP AUSTRALIA	DEVELOPMENT WORKSHOP	VIỆN T. KẾ NHÀ Ở VÀ CTCC HÀ NỘI	CHUYỂN GIAO KĨ THUẬT XÂY DỰNG NHÀ CHỐNG BÃO VIE - 83/035 THANH HÓA	
	GRET	VIỆN QUY HOẠCH VÀ T.K XÂY DỰNG	TRƯỜNG P.T. C.S XÃ QUẢNG LĨNH MẶT BẰNG HIỆN TRẠNG	Q.2 4-90



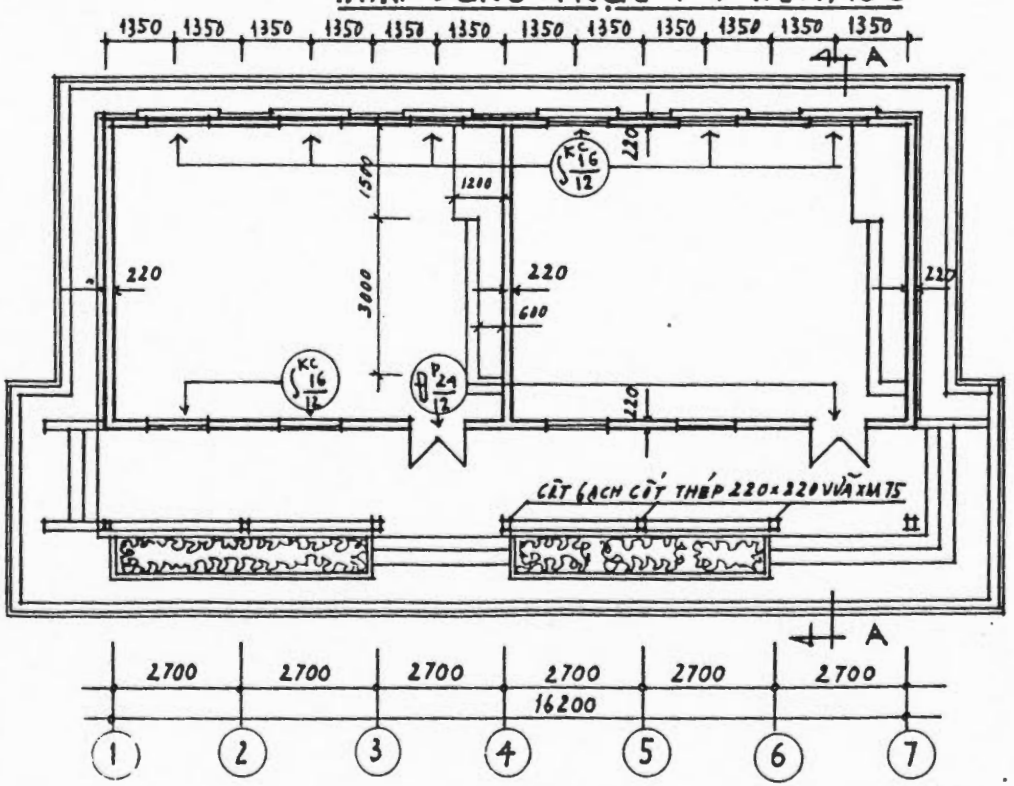
UNDP AUSTRALIA	DEVELOPMENT WORKSHOP	VIỆN T.K NHÀ Ở VÀ C.T.C.C ĐỂ X.Đ	CHUYỂN GIAO KĨ THUẬT XÂY DỰNG NHÀ CHỐNG BÃO VIE-85/005 THANH HÓA
	GRET	VIỆN Q.H VÀ THIẾT KẾ XÂY DỰNG	TRƯỜNG P.T.C.S XÃ QUẢNG LĨNH MẶT BẰNG TỔNG THỂ	Đ.3 4-90

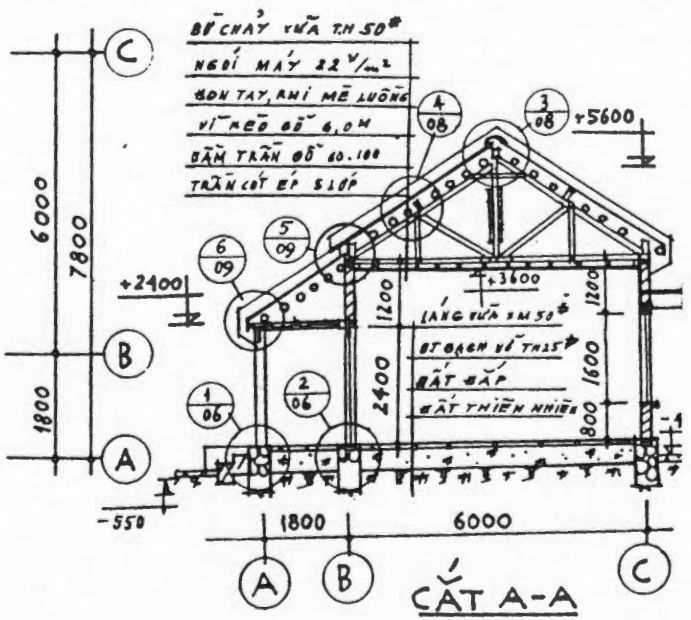
(3) PROPOSED SITE PLAN.



MẶT ĐỨNG TRỤC 1-7 T.L:1/100

MẶT ĐỨNG TRỤC:C-A



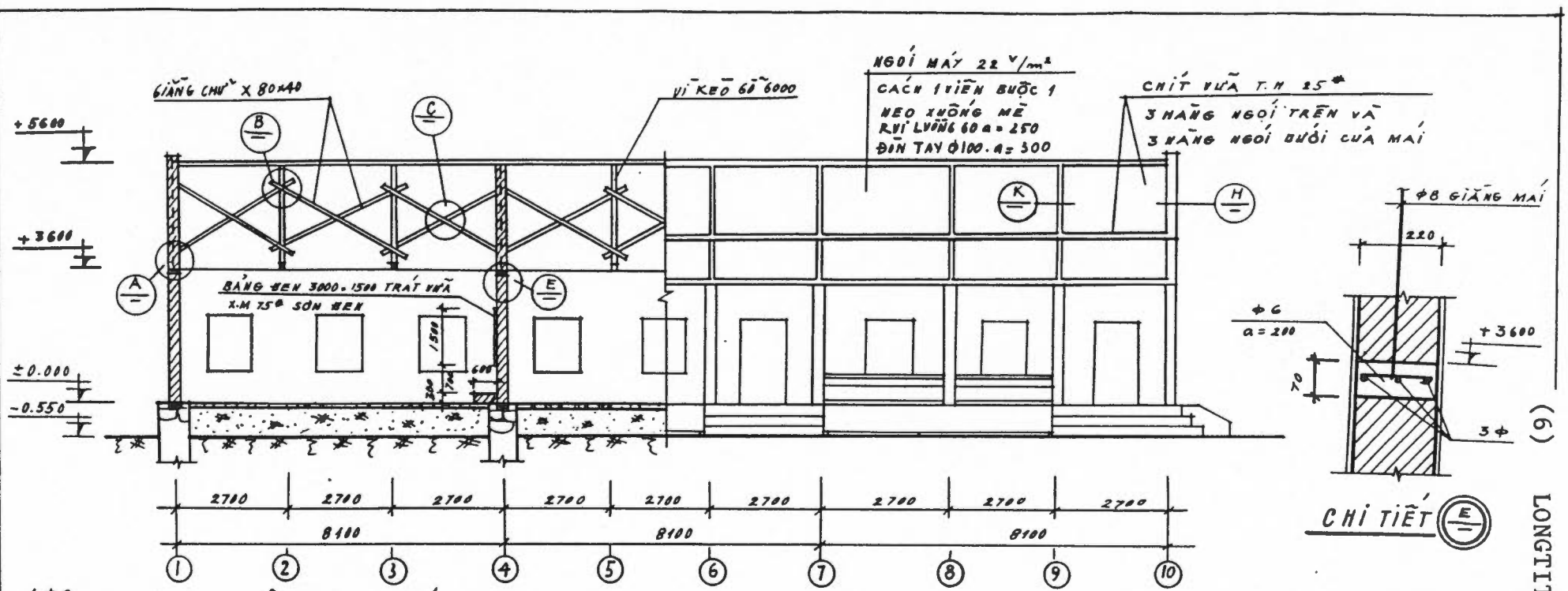


CẮT A-A

MẶT BẰNG T.L:1/100

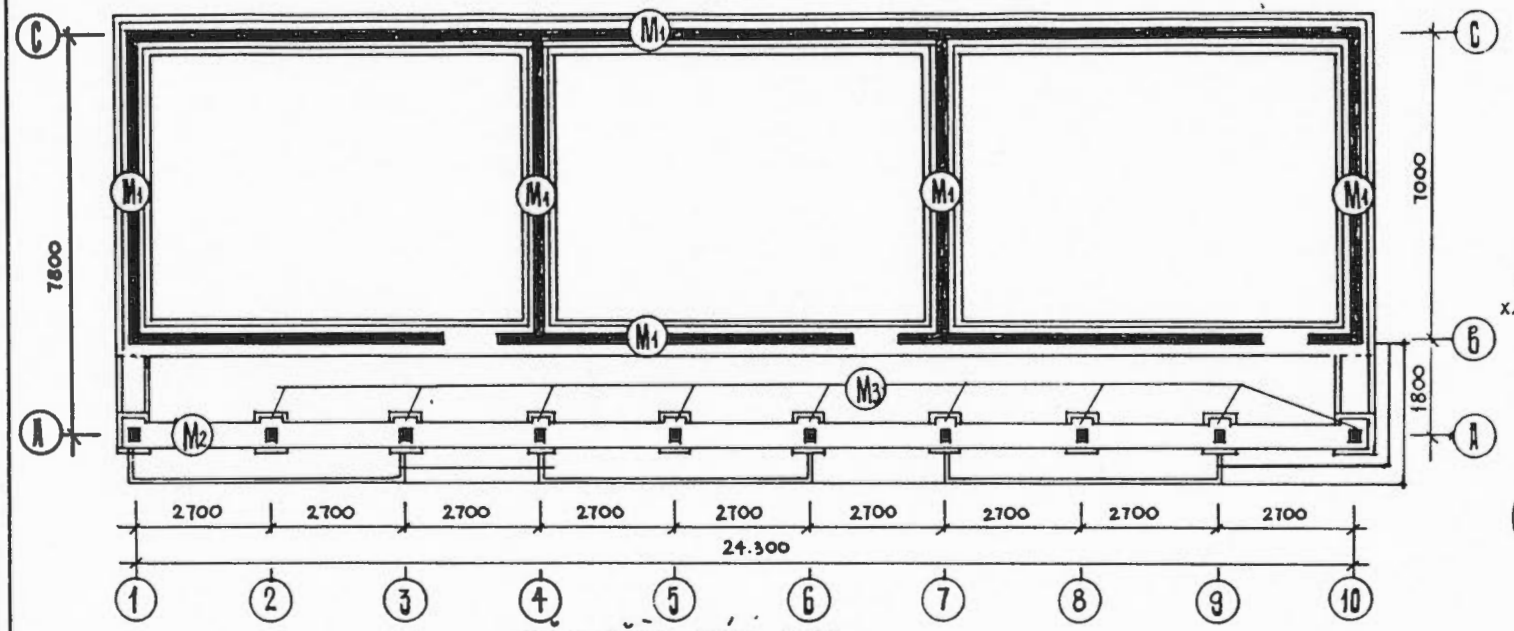
U.N.D.P AUSTRALIA	DEVELOPMENT WORKSHOP	VIỆN T.K NHÀ Ở VÀ C.T.C.C BỘ X.D	CHUYỂN GIAO KĨ THUẬT XÂY DỰNG NHÀ CHỐNG BÃO VIỆT - ĐỨC/035 THANH HOÁ
	CRET	VIỆN Q.H VÀ THIẾT KẾ XÂY DỰNG	TRƯỜNG P.T.C.S XÃ QUẢNG LĨNH M. BẰNG, M. ĐỨNG, M. CẮT 05 4.90

(5) 2 CLASSROOM BLOCK: PLAN AND ELEVATION.

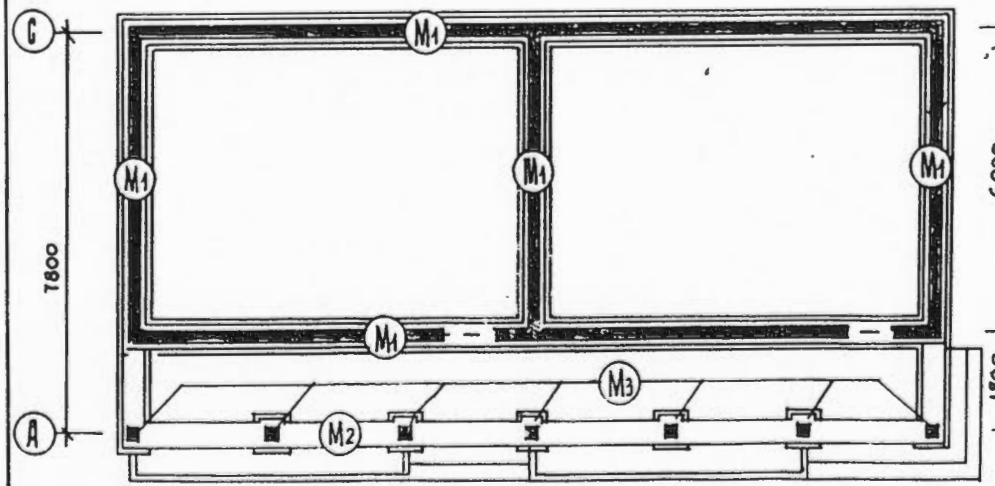


(6) LONGITUDINAL SECTION AND DETAILS.

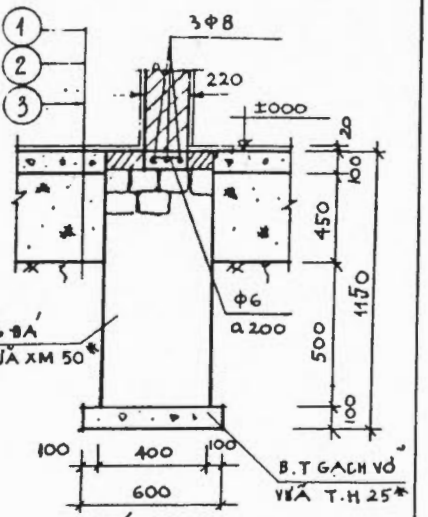
UNDP AUSTRALIA	DEVELOPMENT WORKSHOP	VIỆN T.K NHÀ Ở VÀ CTCC BỘ X.D	CHUYỂN GIAO KĨ THUẬT XÂY DỰNG NHÀ CHỐNG BÃO VIE-83/035 THANH HÓA
	GRET	VIỆN Q.H VÀ THIẾT KẾ XÂY DỰNG	TRỤ SỞ P.T.C.S XÃ QUẢNG LĨNH MẶT CẮT DỌC VÀ CÁC CHI TIẾT 107 4900



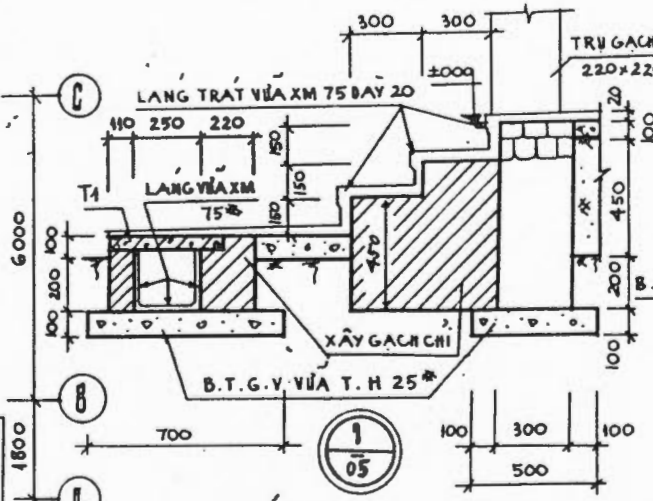
MẶT BẰNG MÓNG 1:100



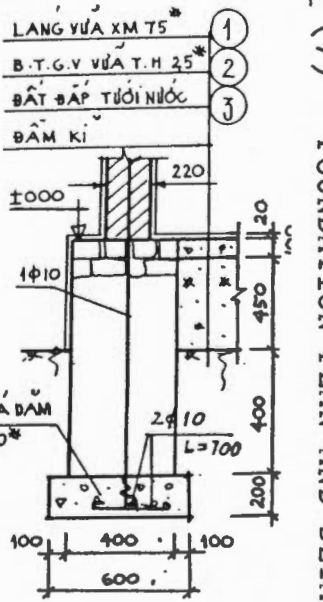
MẶT BẰNG MÓNG 1:100



MÓNG M1



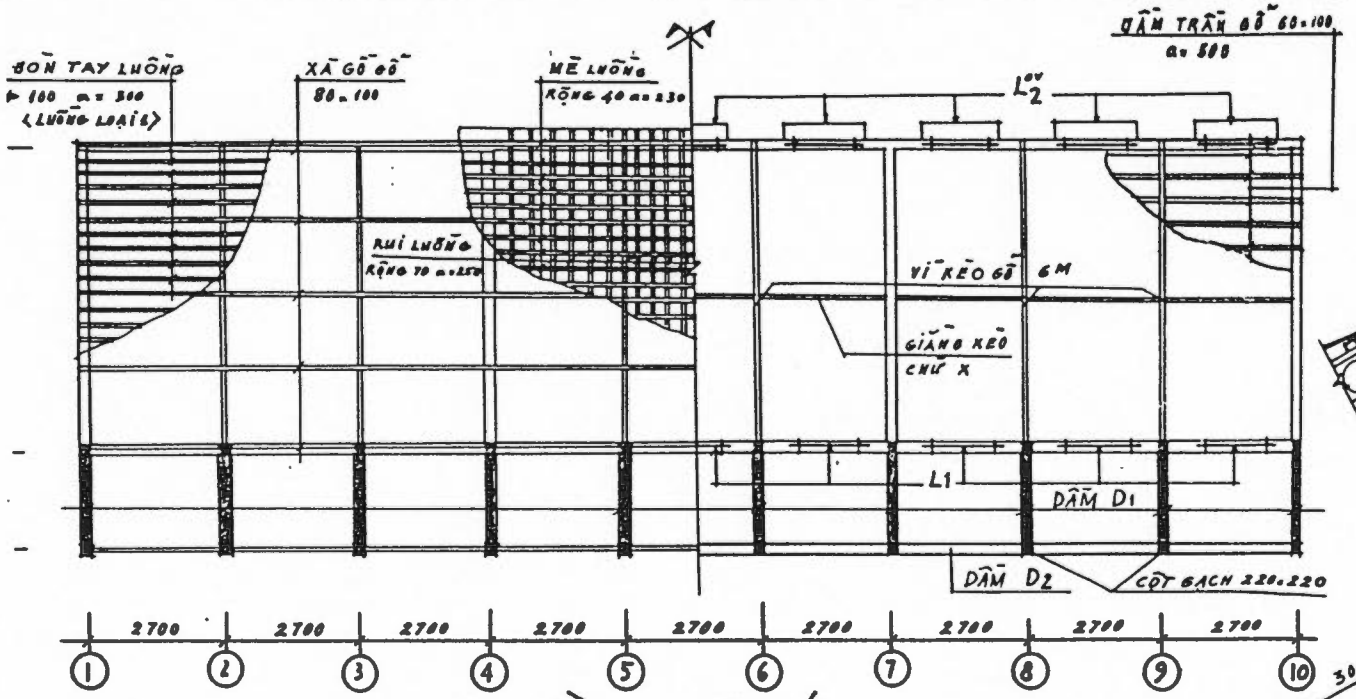
MÓNG M2



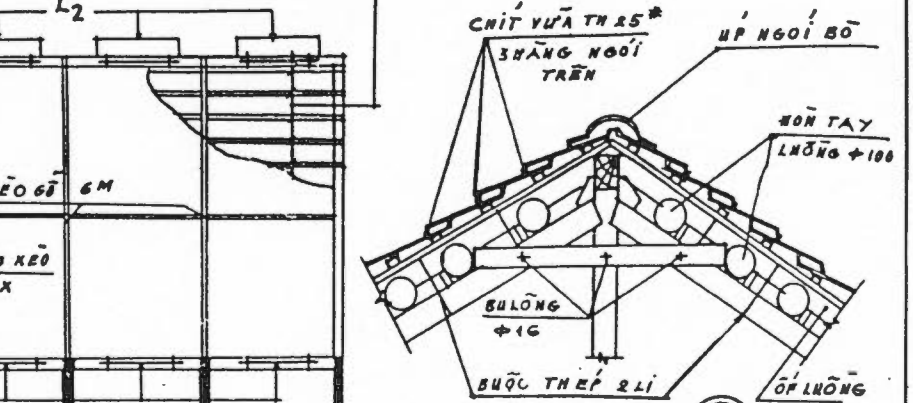
MÓNG M3

(7) FOUNDATION PLAN AND DETAILS.

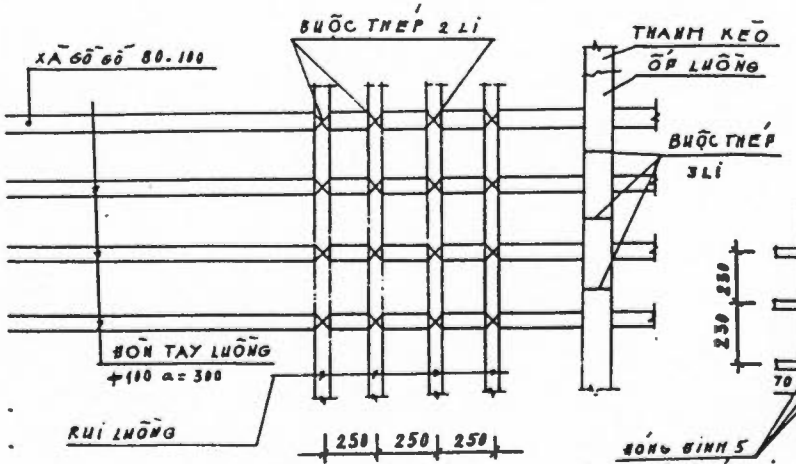
U.N.D.P AUSTRALIA	DEVELOPMENT WORKSHOP	VIỆN T.K NHÀ Ở VÀ C.T.C.T ĐỘ X.D	CHUYỂN GIAO KĨ THUẬT XÂY DỰNG NHÀ CHỐNG BÃO VIE-85/035 THANH HOÁ
	GRET	VIỆN QH VÀ THIẾT KẾ XÂY DỰNG	TRƯỜNG P.T.C.S HÀ QUẢNG LĨNH M.S MÓNG VÀ CHI TIẾT — 06 — A-93



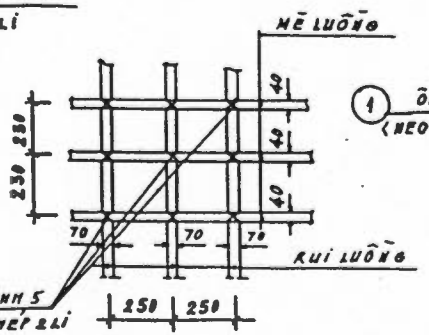
MẶT BẰNG SƯỜN MÁI



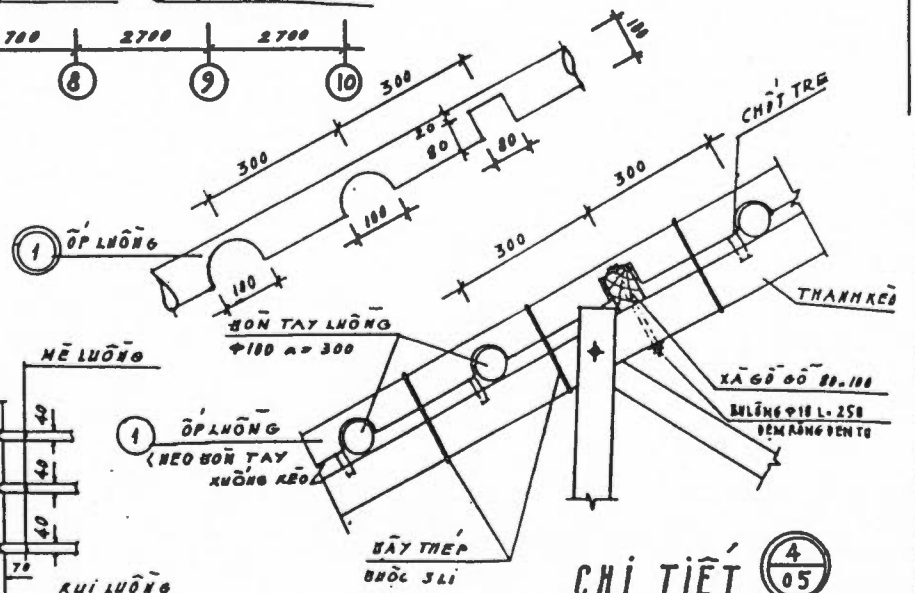
CHI TIẾT 3/05



KẾT XÀ GỒ, BON TAY VÀO TƯỜNG, KÈO



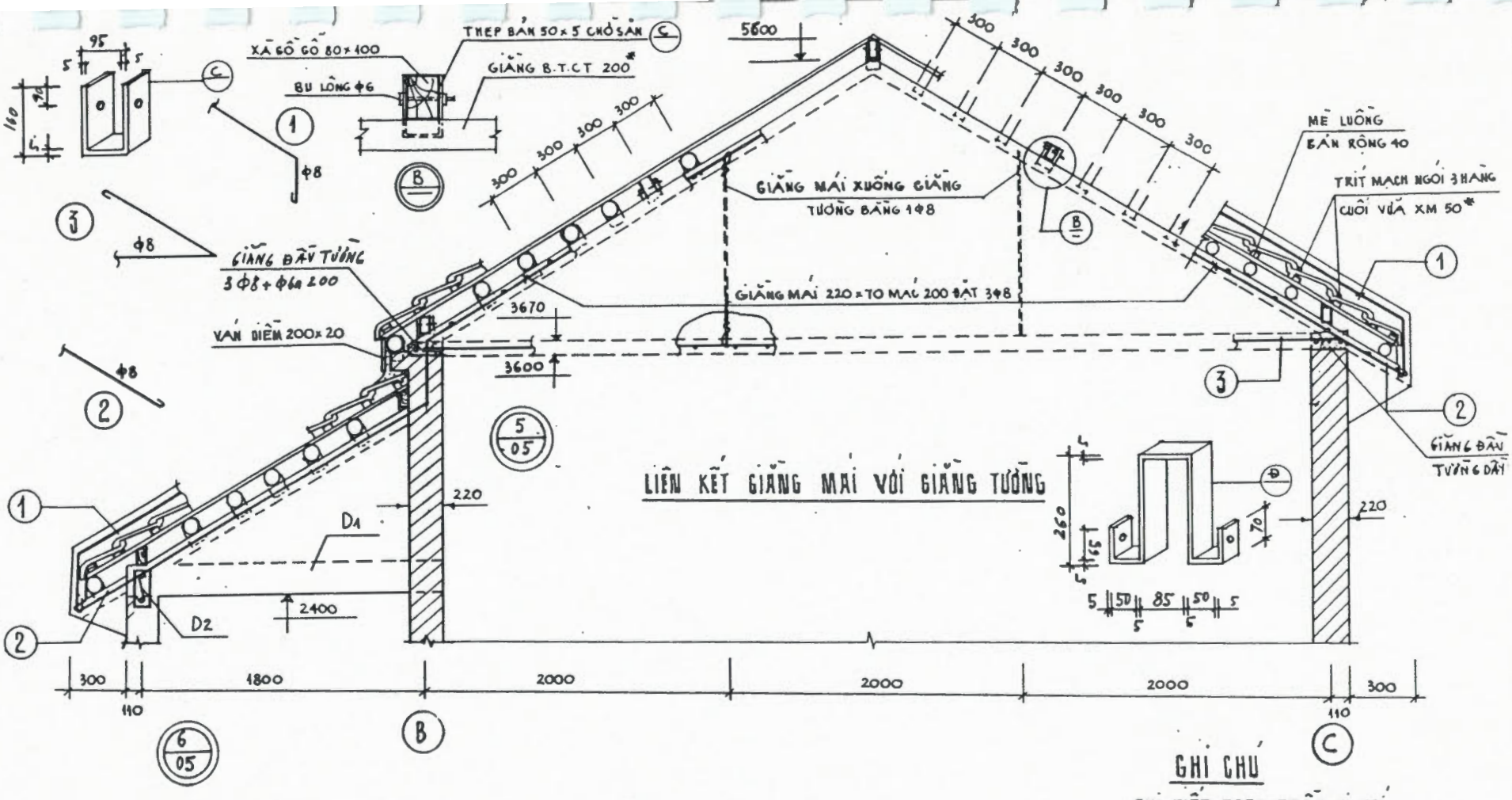
LIÊN KẾT
RUI MÈ LUONG

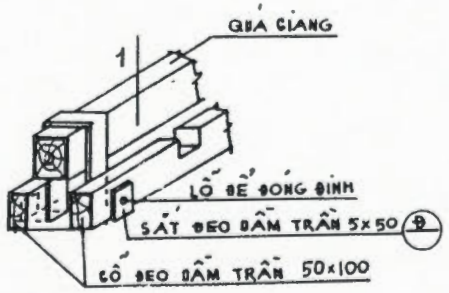


CHI TIẾT 4/05

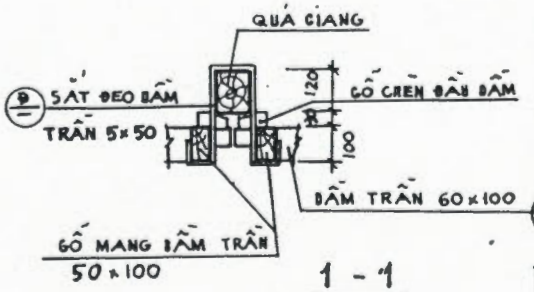
UNDP AUSTRALIA	DEVELOPMENT WORKSHOP	VIỆN T.K NHÀ Ở VÀ CTCC Đỗ X.D	CHUYỂN GIAO KỸ THUẬT XÂY DỰNG NHÀ CHỐNG BÃO VIE - 85/005 THANH HÓA
	GRET	VIỆN Đ.H VÀ	TRƯỜNG P.T.C.S XÃ QUẢNG LINH 088

(8) ROOF PLAN AND DETAILS.

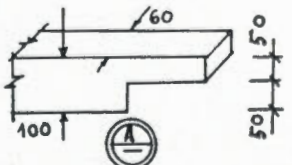




CHI TIẾT TREO TRẦN VÀO KÈO



1 - 1



GHI CHÚ

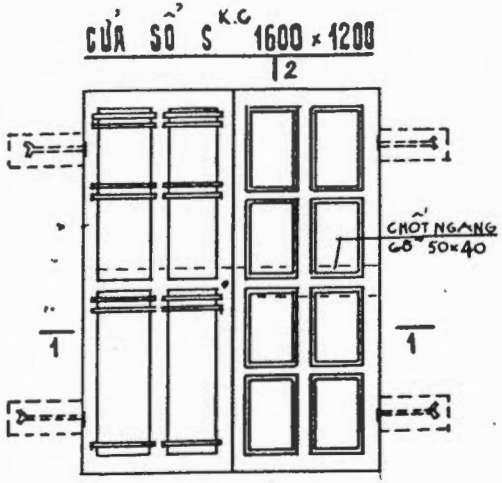
CHI TIẾT TREO TRẦN VỊ TRÍ Ở TẠI CHỖ CÓ VÌ KÈO GỖ

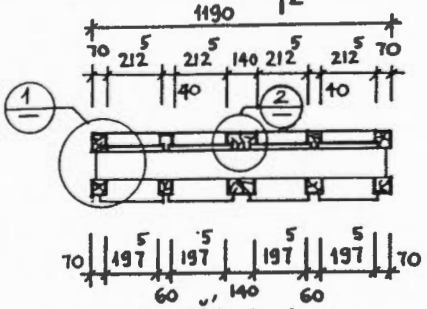
TRẦN CÓT ÉP 5 LỚP

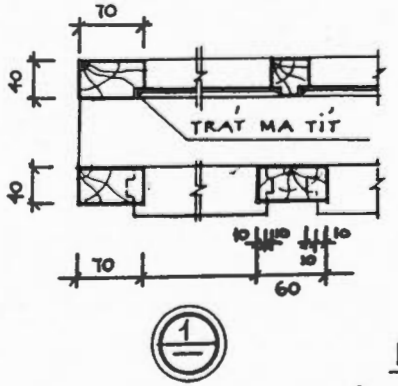
ĐÓNG NẸP GỖ 10 x 40 KHOẢNG CÁCH a = 400

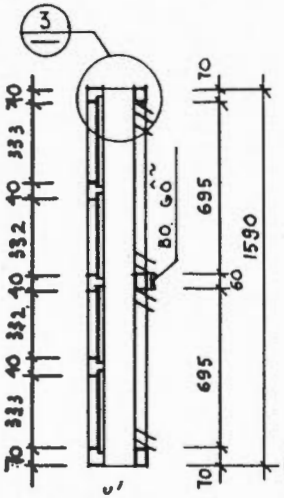
UNDP AUSTRALIA	DEVELOPMENT WORKSHOP	VIỆN THIẾT KẾ NHÀ Ở VÀ CTCC BỘ XD	CHUYỂN GIAO KĨ THUẬT XÂY DỰNG NHÀ CHỐNG BÃO VIE/89/035 THANH HÓA
	GRET	VIỆN QUY HOẠCH VÀ T.KẾ XD T.H	TRƯỞNG P.T.C.SỞ A QUẢNG LINH — LIÊN KẾT GIẰNG MÁI VỚI GIẰNG TƯỜNG — 09 4.90

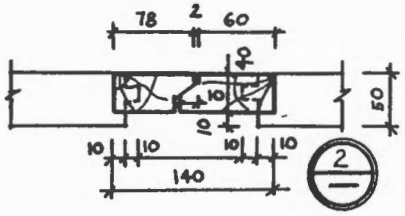
(9) CROSS SECTION THROUGH ROOF AND DETAILS.

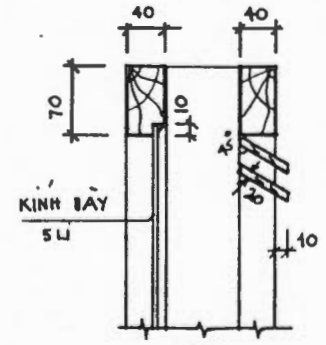


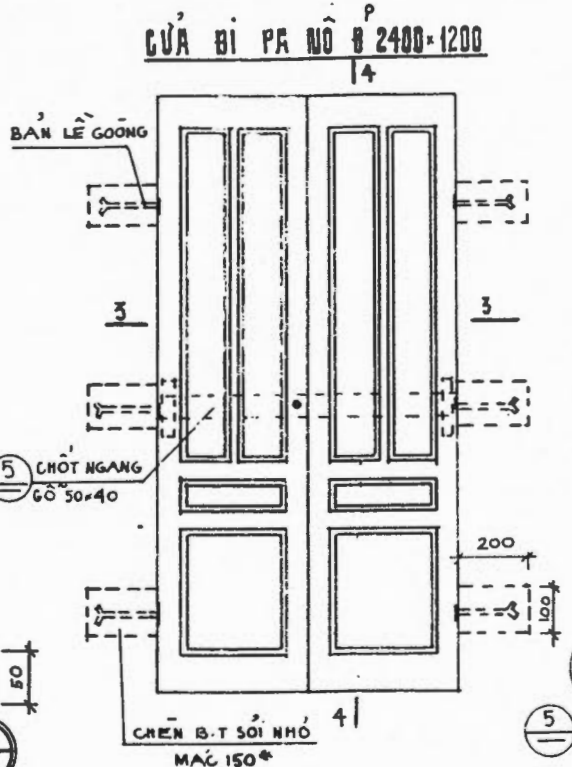


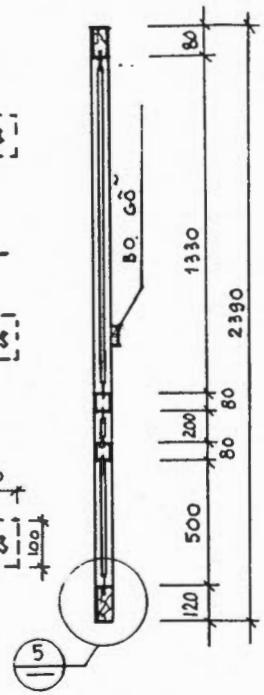


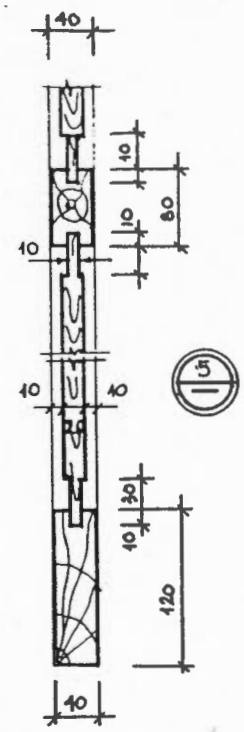


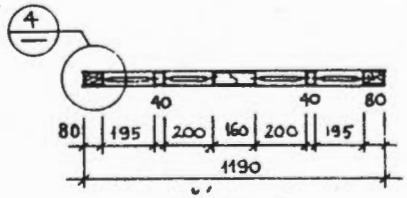


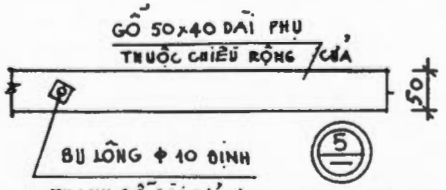


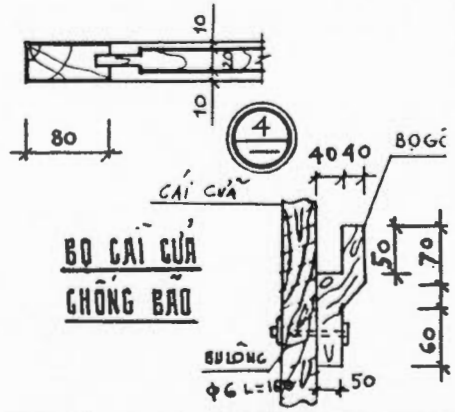












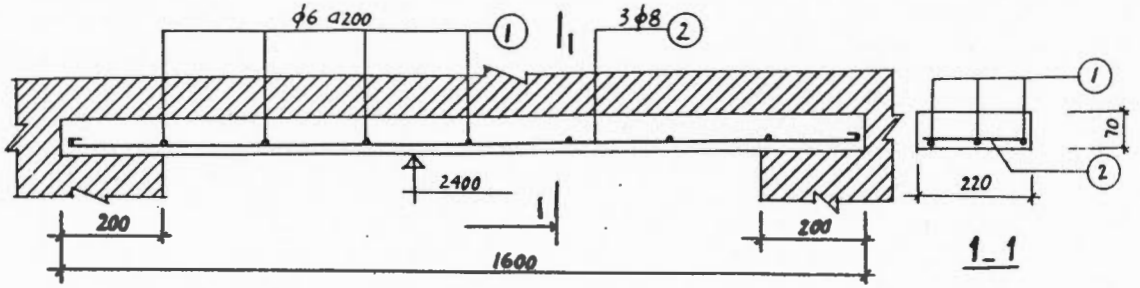
BỌ CÁI CỬA CHỐNG BÃO

GHI CHÚ

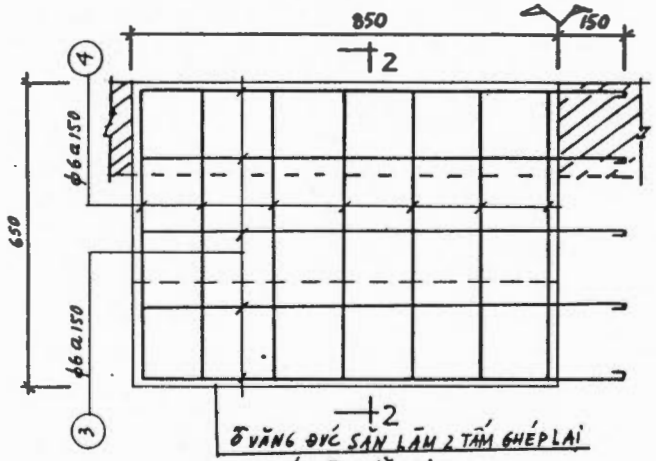
CỬA SỔ VÀ CỬA ĐI DÙNG HOÀN TOÀN BẰNG GỖ LIM

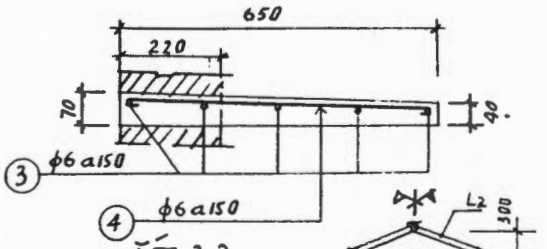
UNDP AUSTRALIA	DEVELOPMENT WORKSHOP	VIỆN T.K NHÀ Ở VÀ C.T.C.C ĐỘ XÂY DỰNG	CHUYỂN GIAO KĨ THUẬT XÂY DỰNG NHÀ CHỐNG BÃO TIE-88/035 THANH HÓA
	GRET	VIỆN QUI HOẠCH VÀ T.K XÂY DỰNG	TRƯỜNG P.T.C.S XÃ QUẢNG LĨNH — CỬA ĐI, CỬA SỔ — 12 — 4-90

(10) DOOR AND WINDOW DETAILS.

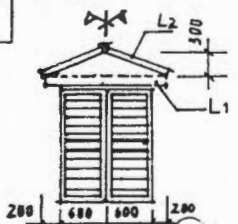


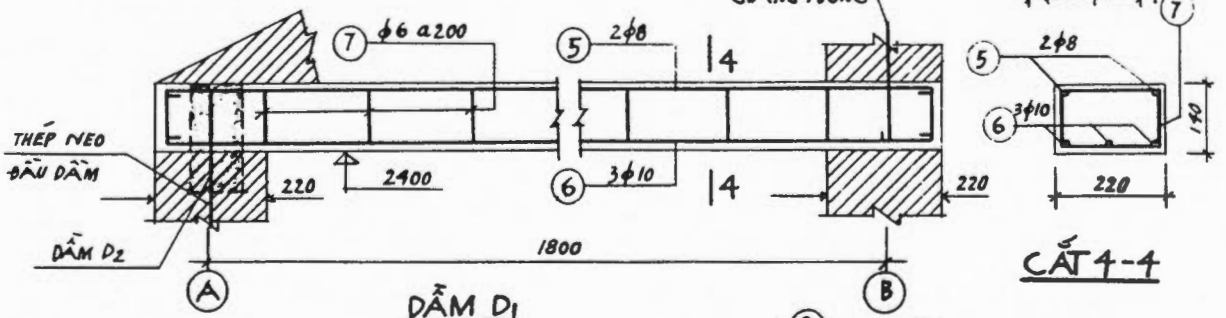
LANH TÔ L1





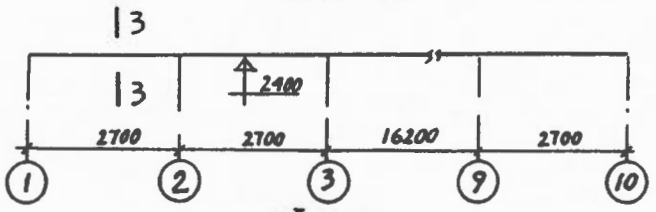
Ô VĂNG L2 + L1



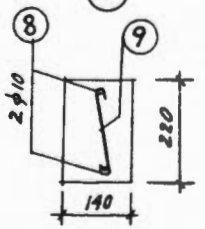


DẦM D1

CẮT 4-4



DẦM D2



3-3

BẢNG THỐNG KÊ THÉP

TÊN C.K	HÌNH DÁNG KÍCH THƯỚC	SỐ HIỆU	ĐƯỜNG KÍNH	SỐ LƯỢNG	CHIỀU DÀI 1 THANH (mm)	CHIỀU DÀI TỔNG CỘNG (m)	TRỌNG LƯỢNG (KG)
LANH TÔ L1	40 200 40	1	6	9	280	2,52	
	40 40	2	8	3	1640	4,92	
Ô VĂNG L2	610 (40 40)	3	6	7	670	4,69	
	960 (40 40)	4	6	5	1040	5,2	
DẦM D1	40 2160 40	5	8	2	2040	4,08	
	50 2160 50	6	10	3	2060	6,18	
	190 40 190	7	6	11	680	7,48	
DẦM D2	50 24500 50	8	10	2	24600	49,2	
	40 200 40	9	6	122	280	107,5	

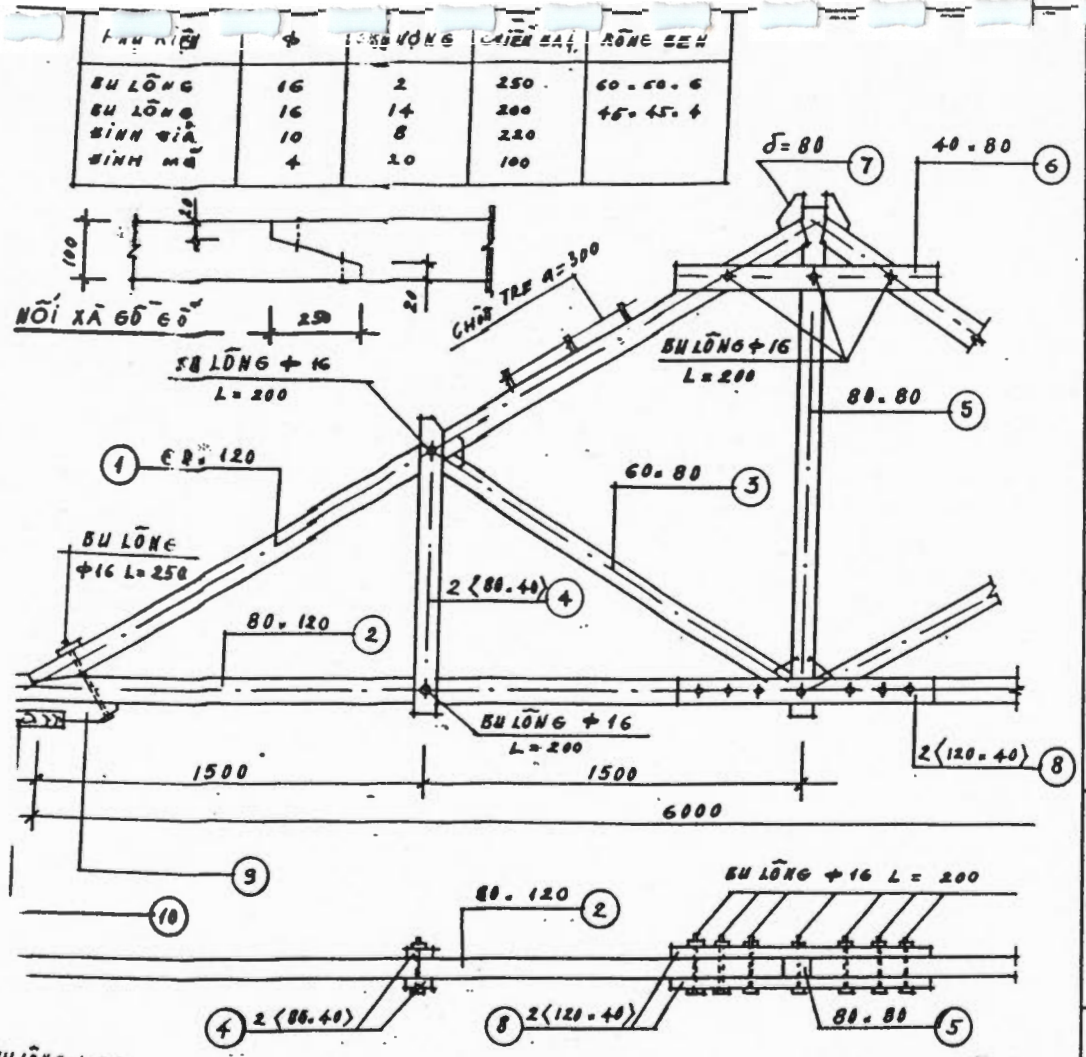
GHI CHÚ:

TOÀN BỘ LANH TÔ, Ô VĂNG, DẦM D_1, D_2 LÀM BẰNG BÊ TÔNG CẤT THÉP MÁC 200, THÉP CT3 NHÔM AI, ĐÁ 1×2 RỬA SẠCH. BẢNG THỐNG KÊ TÍNH CHO 1 CẤU KIỆN

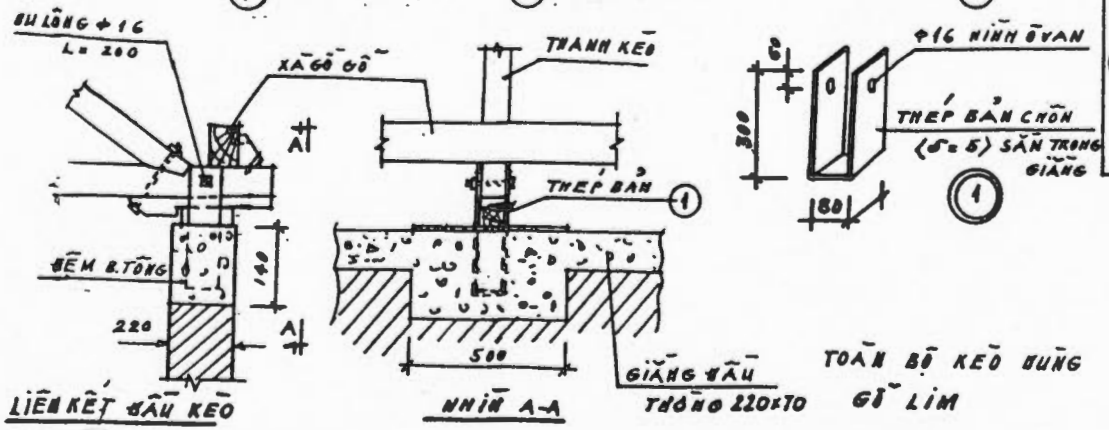
UNDP AUSTRALIA	DEVELOPMENT WORKSHOP	VIỆN T.K NHÀ Ở VÀ CTCC BỘ XD	CHUYỂN GIAO KĨ THUẬT XÂY DỰNG NHÀ CHỐNG GIÓ BÃO VIE/89/035 THANH HOÁ
	GRET	VIỆN QUY HOẠCH VÀ THIẾT KẾ ĐÔ THỊ	TRƯỜNG P.T. C.S XÃ QUẢNG LĨNH — LANH TÔ Ô VĂNG, DẦM D_1, D_2 — 10 4-90

(11) REINFORCED CONCRETE ELEMENTS.

TÊN GỌI	Φ	SỐ LƯỢNG	CHIỀU DÀI	KÍCH THƯỚC
BU LÔNG	16	2	250	60 × 60 × 6
BU LÔNG	16	14	200	45 × 45 × 4
ĐINH ĐỈA	10	8	220	
ĐINH MÃ	4	20	100	



KÝ HIỆU	SỐ LƯỢNG	HÌNH DẠNG & KÍCH THƯỚC	KÝ HIỆU	HÌNH DẠNG & KÍCH THƯỚC	SỐ LƯỢNG
⑩	2	300, 200	③		2
⑨	2	240, 100, 70, 410	④	1105	4
⑦	2	160, 100, 60	⑧	1000	
①	1	1610, 160, 140, 1980, 30, 30, 3390			
②	1	205, 30, 140, 3100			
⑤	1	1910, 250			



LIÊN KẾT ĐẦU KÈO — NHÌN A-A — TOÀN BỘ KÈO BUNG GỖ LIM

UNDP AUSTRALIA	DEVELOPMENT WORKSHOP	VIỆN T.KẾ NHÀ Ở VÀ CTCC BỘ XD	CHUYỂN GIAO KĨ THUẬT XÂY DỰNG NHÀ CHỐNG GIÓ BÃO VIE/89/035 THANH HOÁ
	GRET	VIỆN QUY HOẠCH VÀ T.KẾ XD T.H	TRƯỜNG PTCS XÃ QUẢNG LĨNH — VÌ KÈO GỖ GM - LKẾT KÈO TRỤC — 11 — 4-90

(12) TIMBER TRUSS DETAILS.

APPENDIX F: LIST OF PARTICIPANTS; BUILDERS WORKSHOP.

LIST OF OFFICIAL PARTICIPANTS FOR THE BUILDERS WORKSHOP.PROJECT VIE 89/035 AT QUANG XUONG DISTRICT HOSPITAL THANH HOA

N°	NAMES	AGE	OCCUPATION	RANK	FROM
1	Nguyễn văn Thanh	33	CARPENTIER	4/7	CONST.COMPANY N° 2
2	Lê văn Tới	27	"	3/7	"
3	Lê văn Thu	35	MASON	4/7	"
4	Lê văn Chung	22	"	4/7	"
5	Lại văn Hai	22	"	3/7	"
6	Hoàng văn Minh	35	"	5/7	"
7	Lê thị Đông	30	"	3/7	"
8	Trần quang Hợp	30	"	4/7	"
9	Nguyễn văn Minh	27	"	3/7	"
10	Lê văn Phòng	25	"	3/7	"
11	Hồ văn Thiệu	30	"	4/7	"
12	Lê trọng Cương	35	CARPENTIER	3/7	"
13	Lê văn Minh	25	MASON	3/7	"
14	Phạm văn Mừng	28	"	4/7	"
15	Lê văn Sắc	28	"	3/7	"
16	Nguyễn văn Tuấn	27	"	4/7	"
17	Phạm văn Tường	28	"	4/7	"
18	Nguyễn văn Hạnh	35	CARPENTIER	4/7	"
19	Nguyễn văn Toàn	35	"	3/7	"
20	Lê văn Hùng	26	"	3/7	"
21	Lê huy Bình	40	MASON	4/7	QUANG"XUONG
22	Nguyễn văn Bằng	42	"	4/7	"
23	Nguyễn ngọc Điều	43	"	4/7	"
24	Nguyễn văn Bắc	44	"	5/7	"
25	Lê đình Nhi	38	CARPENTIER	4/7	"
26	Lê quang Kính	30	MASON	4/7	"
27	Lê quang Lưu	28	"	3/7	"
28	Trương duy Nhơ	32	"	4/7	"
29	Nguyễn văn Cần	35	"	5/7	"
30	Vũ đình Dũng	29	CARPENTIER	4/7	"

Signed

ĐỖ ĐÌNH UNG

APPENDIX G: GLOSSARY OF NAMES AND DIAGRAM OF RELATIONSHIPS:

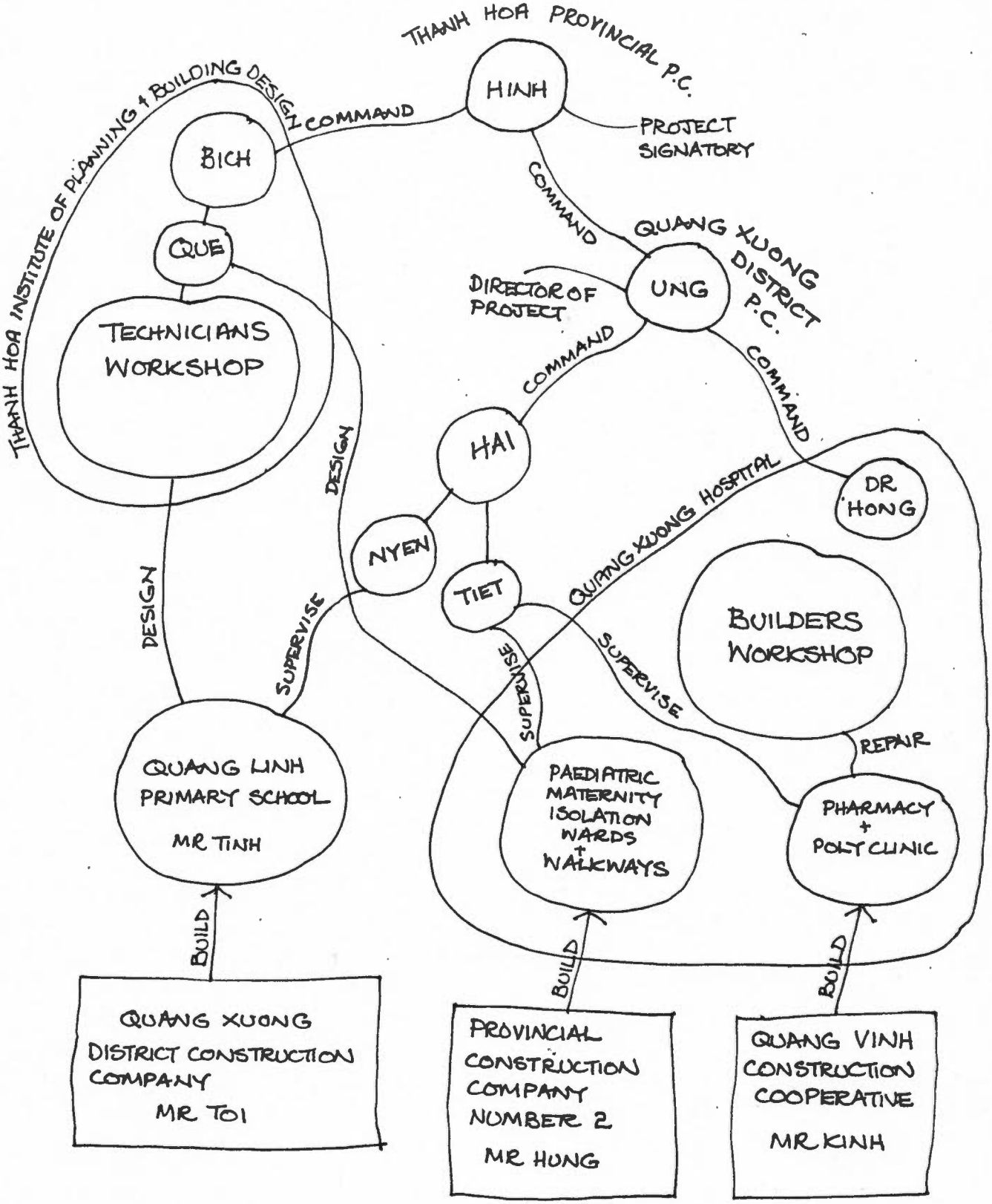
People:

Mr Bich:	Director, IPBD/Thanh Hoa.
Mr Chantry:	Engineer, GRET.
Mr Hai:	Chief Technical Supervisor, QXPC.
Mr Hinh:	Vice Chairman, THPC.
Dr Hong:	Director, QXDH.
Mr Hung:	Site Engineer, PCC2.
Mr Kinh:	Head, QVCC.
Mr Long:	Chief Engineer, IHPBD/Hanoi.
Mr Man:	Deputy Director, IHPBD/Hanoi.
Mr Norton:	Architect, DEVWKS.
Mr Nyen:	Site Supervision Engineer, QXPC.
Mr Que:	Architect, IPBD/Thanh Hoa.
Mr Tiet:	Site Supervision Engineer, QXPC.
Mr Tinh:	Headmaster, QLPS.
Mr Toi:	Head QXDCC.
Mr Ung:	Vice Chairman QXDPC and project Director.

Institutions:

Institute of Housing and Public Building Design; Ministry of Construction, Hanoi:	IHPBD/Hanoi.
Institute of Planning and Building Design, Thanh Hoa:	IPBD/Thanh Hoa.
Quang Xuong District Peoples Committee:	QXDPC.
Quang Xuong District Hospital:	QXDH.
Thanh Hoa Provincial Peoples Committee:	THPPC.
United Nations Development Programme:	UNDP.
Development Workshop:	DEVWKS.
GRET:	GRET.
Provincial Construction Company No 2:	PCC2.
Quang Xuong Construction Company:	QXCC.
Quang Vinh Construction Cooperative:	QVCC.
Quang Linh Primary School:	QLPS.

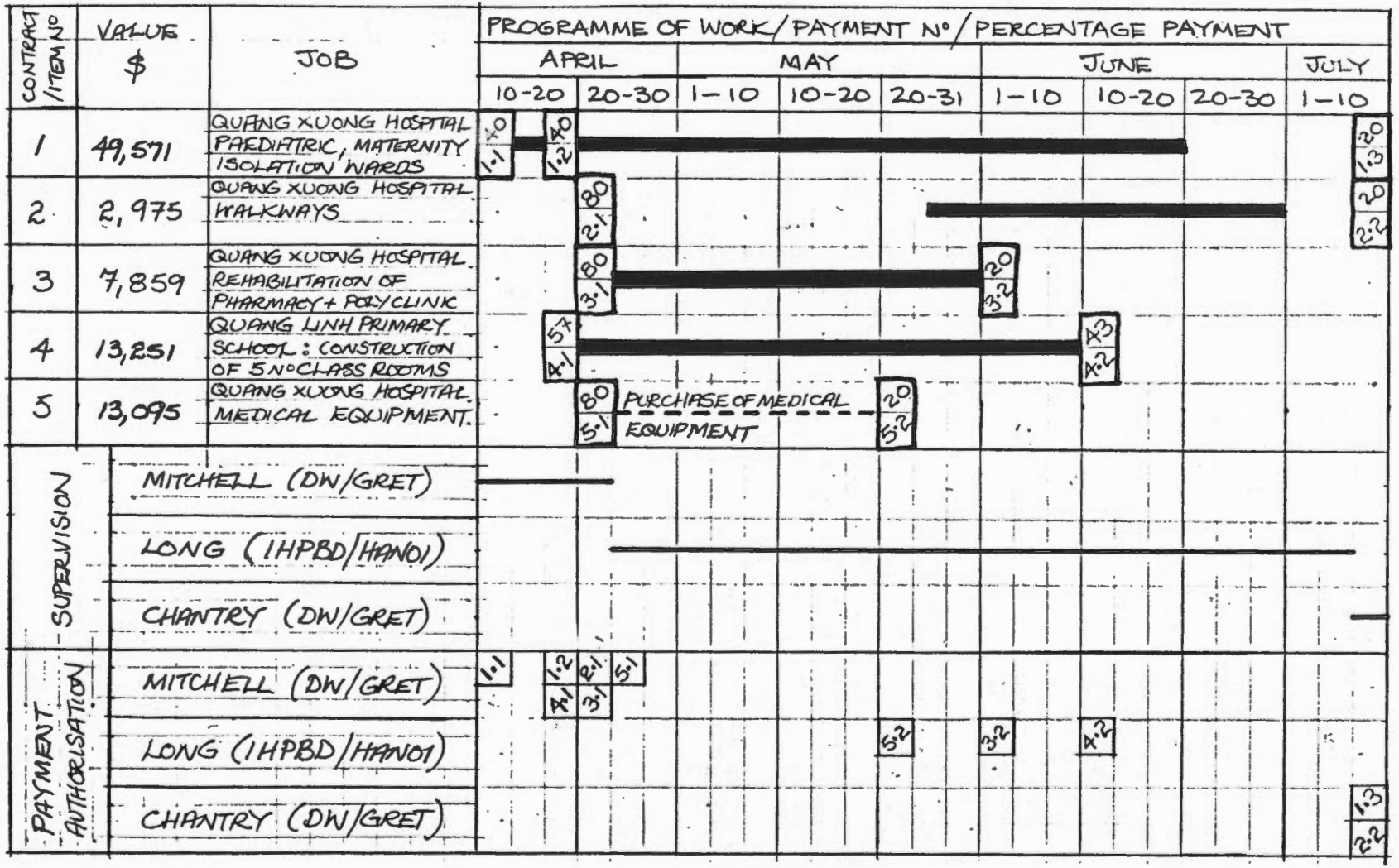
Appendix G cont: Diagram of Relationships.



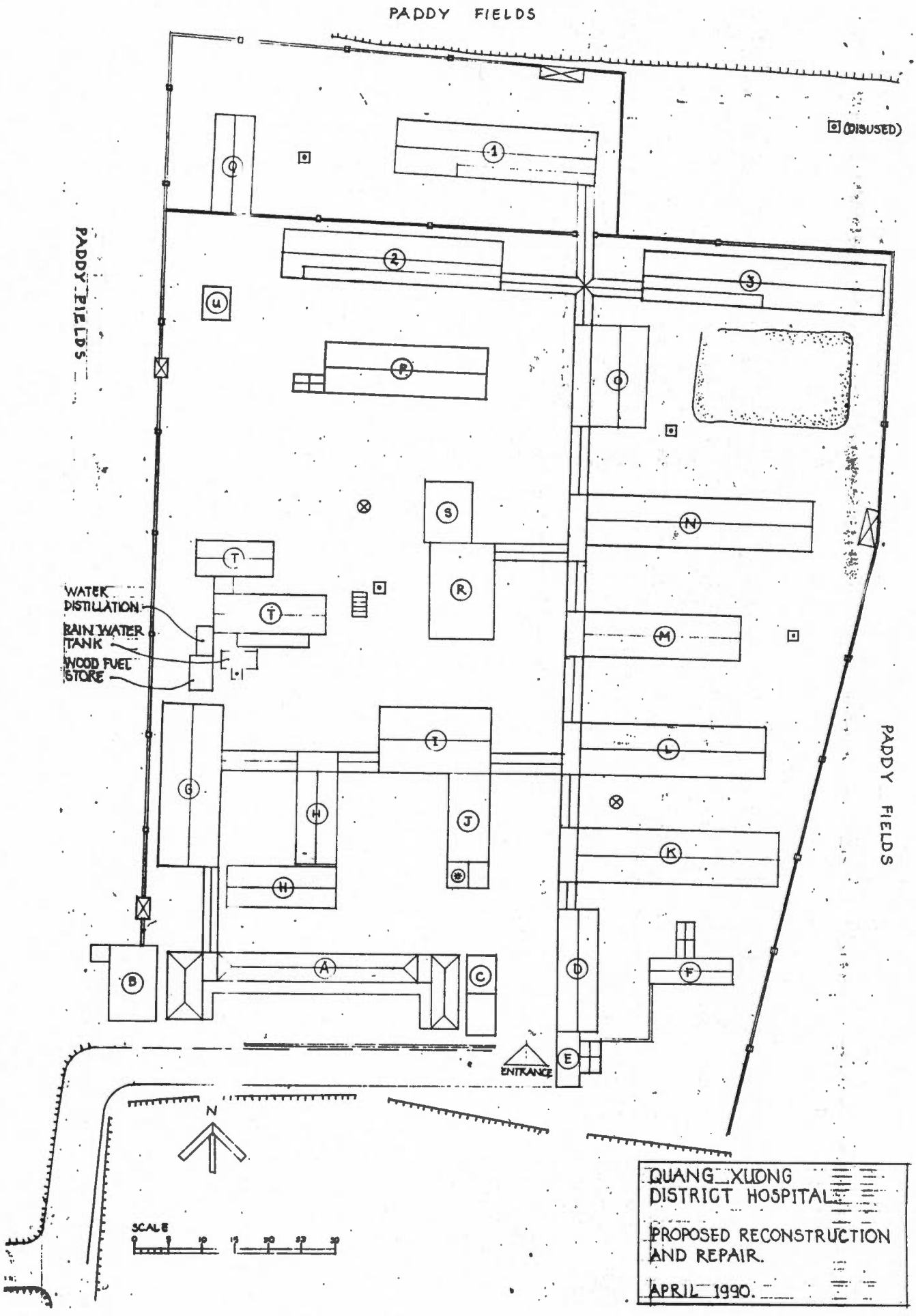
LINES OF COMMAND, SUPERVISION, DESIGN AND BUILD FOR PROJECT VIE/89/035

APPENDIX H: PROJECT WORK PROGRAMME.

APPENDIX I: PROJECT PAYMENT AND SUPERVISION PROGRAMME.



APPENDIX J: SITE PLAN OF QUANG XUONG HOSPITAL.



Appendix J cont.: Key to plan of Quang Xuong Hospital.

QUANG XUONG DISTRICT HOSPITAL

PROPOSED RECONSTRUCTION AND REPAIR APRIL 1990

SCHEDULE:

(1) NEW ISOLATION WARD.

(2) NEW MATERNITY WARD.

(3) NEW PAEDIATRIC WARD.

(A) OUT PATIENT CLINIC AND PHARMACY. (POLYCLINIC)

(B) FAMILY PLANNING CENTRE.

(C) GUARDS HOUSE.

(D) ADMINISTRATION.

(E) SHOP/RESTAURANT.

(F) STAFF ACCOMMODATION.

(G) XRAY BLOCK (TEMPORARY STAFF ACCOMMODATION).

(H) LABORATORIES.

(I) ASSEMBLY HALL.

(J) CASUALTY RECEPTION.

(K) EXISTING PAEDIATRIC WARD : PROPOSED PRIVATE WARD.

(L) MEDICAL WARD (GENERAL).

(M) SURGERY WARD.

(N) MATERNITY WARD - TEMPORARY (FUTURE STORE FOR MEDICAL EQUIPMENT).

(O) BUILDERS' ACCOMMODATION (PREVIOUSLY STORE HOUSE, FUTURE WASH HOUSE).

(P) TRADITIONAL MEDICINE/PHYSIOTHERAPY ACUPUNCTURE.

(Q) MORTUARY.

(R) OPERATING THEATRE.

(S) POST OPERATIVE WARD (SIX BEDS).

(T) PHARMACY.

(U) ELECTRICITY TRANSFORMER.

WELL.

PUMPED WELL.

6KVA GENERATOR.

TOILET BLOCK.

KITCHEN.

BATHROOM.

APPENDIX K: PRESS AND MEDIA ATTENTION.

(a) An article appeared in the Thanh Hoa newspaper on 7/4/90; see appendix A. A further article was in preparation for the same paper when I left Thanh Hoa.

(b) The local Thanh Hoa television station broadcast two news items covering the opening of construction work on Quang Xuong Hospital. These were seen on the evenings of 10th and 12th April.

(c) Ms Spezzati of the UNDP visited the project on 16th April and brought along a Vietnamese national television crew who prepared a broadcast for national television which went out on 18th April. This news film was to be sold to international news networks and it was expected that it would be shown in north america.