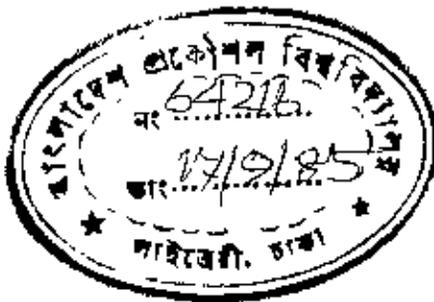


A STUDY OF
TRADITIONAL HOUSE FORMS IN RURAL BANGLADESH

by

DEWAN MAHBUB HASAN



A thesis submitted to the
Department of Architecture in
partial fulfilment of the requirements
for the degree of
Masters of Architecture.

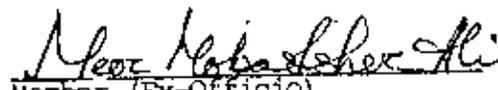
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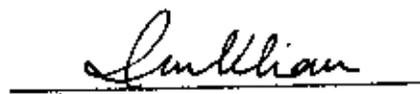
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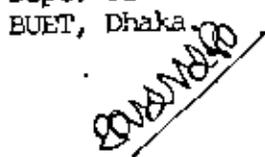
Department of Architecture
Bangladesh University of Engineering and Technology
Dhaka, Bangladesh

On this day, the 24th day of August 1985, the undersigned hereby recommended to the Academic Council that the thesis entitled 'A STUDY OF TRADITIONAL HOUSE FORM IN RURAL BANGLADESH', submitted by Dewan Mahbub Hasan is acceptable in partial fulfilment of the requirements for the degree of Masters of Architecture.


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CHAPTER - I

INTRODUCTION, DESCRIPTION OF THE PROBLEM,

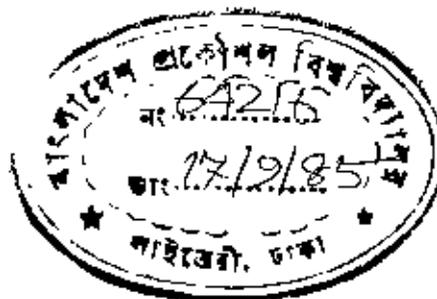
AIMS AND OBJECTIVES OF THE STUDY AND THE METHODOLOGY

1.1 Introduction

1.2 Description of the Problem under Study.

1.3 Aims and Objectives of the Study

1.4 Methodology for Investigation and Presentation.



CHAPTER I

INTRODUCTION, DESCRIPTION OF THE PROBLEM, AIMS AND OBJECTIVES OF THE STUDY AND THE METHODOLOGY

1.1 INTRODUCTION

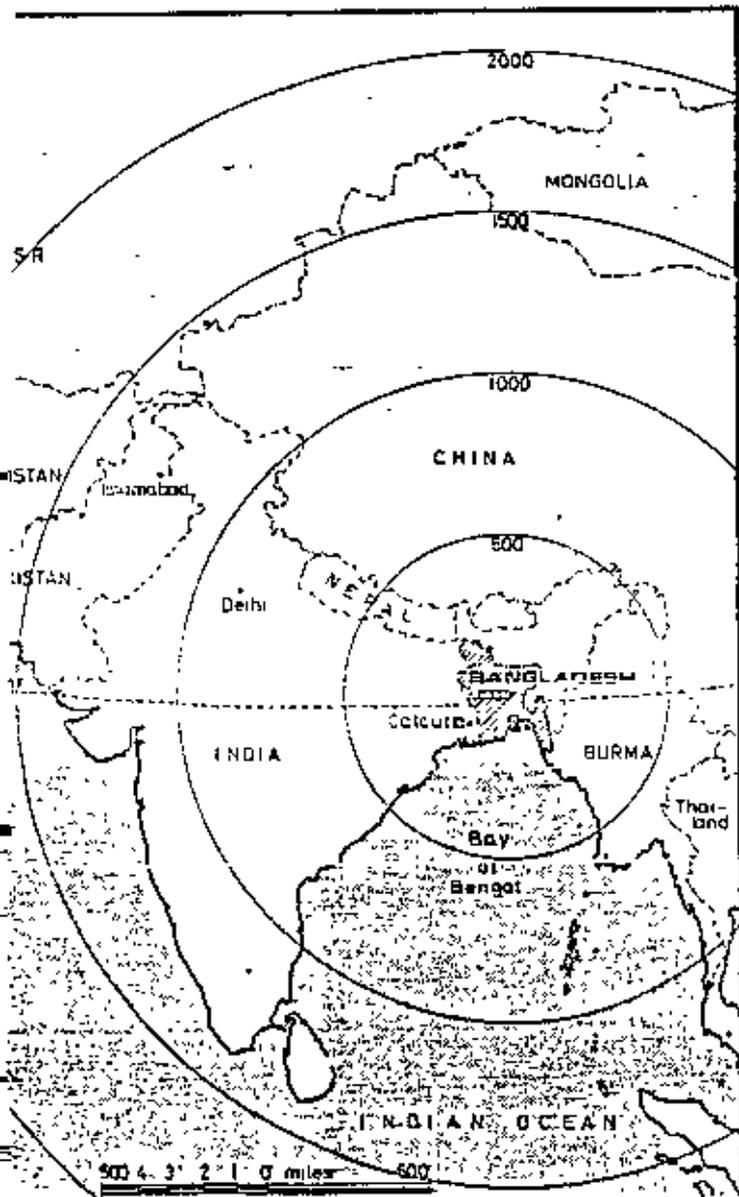
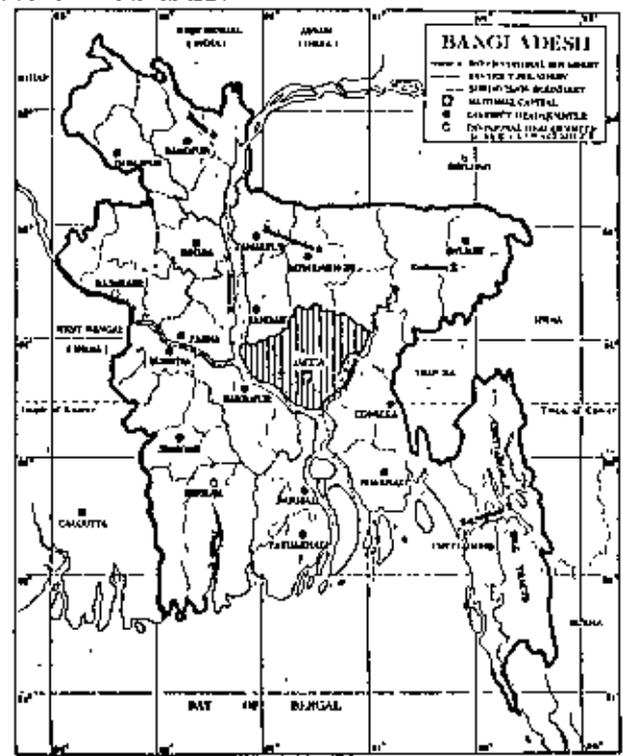
Bangladesh, though a newly independent and sovereign nation, can be proud of a very old culture and civilization. Its history can be traced long before Christ. The writings of the Greeks, Chinese and the Arab historians show that it had a very rich cultural heritage. The Bengali language, rich in literary heritage, played a vital role in motivating and activating nationalism.

Located around the intersection of 90°E Meridian and the Tropic of Cancer i.e. approximately between 20°N and 27°N latitudes, Bangladesh has an area of 55,598 Sq K.M.). Lying south of the Himalayas, it is a fertile extensive deltaic plain and its southern shores are washed by the Bay of Bengal. The land frontier is almost totally shared with the Republic of India, except for a small portion in the south-east, which touches the Republic of Burma. The soil is formed of old and new alluvium, carried by three of the mightiest rivers of Asia - The Ganges, The Brahmaputra, and The

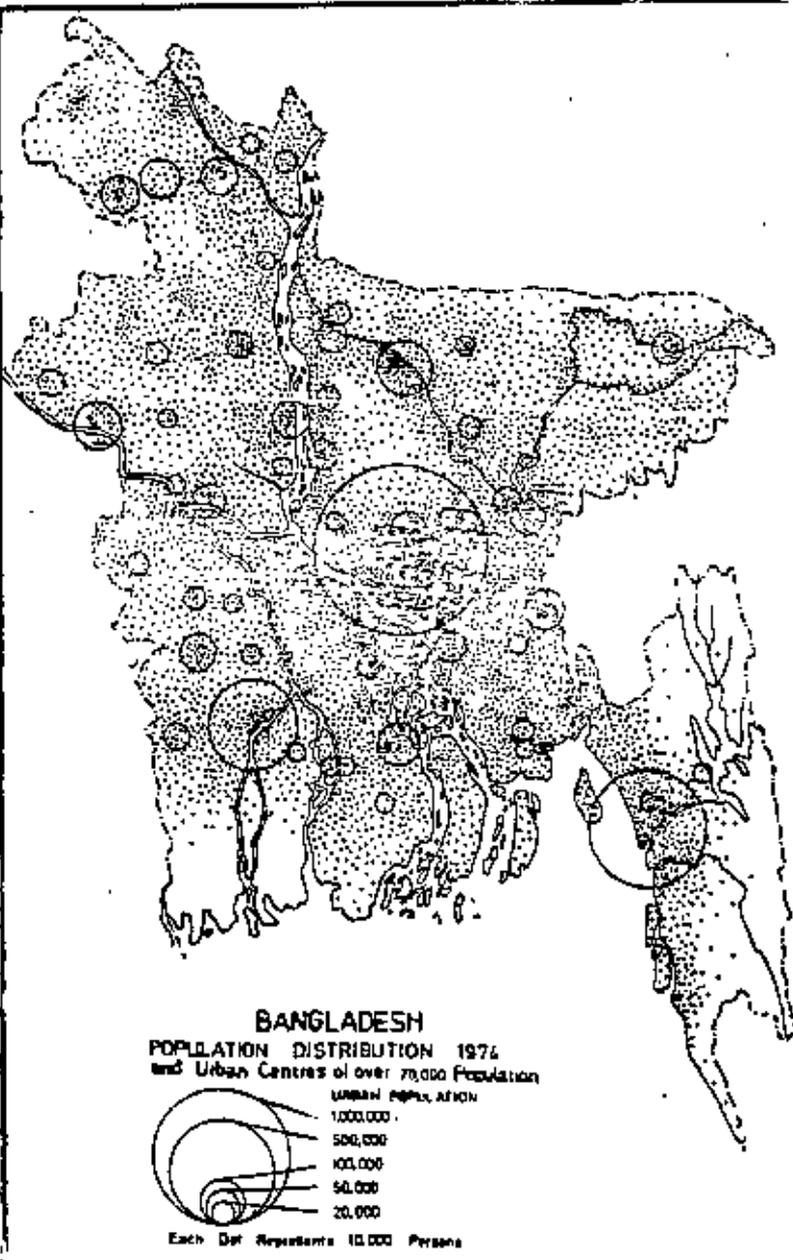
BANGLADESH

AREA — 143,978 Sq.KM (55,598 Sq.M)
 POPULATION — 90 MILLION (1981 CENSUS)
 POP. GROWTH RATE — 2.5% PER ANNUM
 87% PEOPLE LIVE IN VILLAGE
 80% DEPEND ON AGRICULTURE
 CAPITAL CITY — DHAKA

SOURCE — STATISTICAL YEAR BOOK — 1981
 GOVT. OF BANGLADESH.



LOCATION MAP REGIONAL CONTEXT.



Meghna, together with their innumerable tributaries and distributaries. Bangladesh in general falls under wet tropical monsoon climate characterized by high temperature during the summer, heavy rainfall during the monsoon and a short winter. The climate of the region is warm-humid. The mean Maximum Temperature during the Summer and Monsoon months starting from March and continuing upto October varies between 29°C and 32°C . In the winter months, from November to February, temperature may occasionally fall below 7°C or 8°C but the Mean Minimum Temperature remains in the region of 12°C to 15°C throughout the winter months. The rainy season begins with the advent of the Monsoon in June and lasts until October. The rain fall is about 1400 mm in the mid-west central part, over 5000mm in the north-east, over 2500mm in the southern and eastern regions and around 1600mm in the central part.

Bangladesh is basically a land of villages. According to the 1981 census, the population of the country stands at 90 million, the percentage of rural and urban population being around 87% and 13% respectively. Agriculture is the main occupation of the people employing 80% of the labour force. This sector directly contributes 54% to the gross domestic products. But like other developing countries, the problems of urban areas are receiving increased atten-

tion which has resulted in rapid urbanization trend, but relatively little has been done to date for the improvements of the Rural Sector. Improvements of the country and the living conditions of its teeming millions of inhabitants are essentially tied up with improvements in the various sectors of its rural scene including housing and the community facilities and this is generally recognised by all concerned. Lack of housing, as with the lack of food and clothing, diminishes the dignity of the individual. The absence of secure shelter prevents him from being either socially or economically productive. Housing is not therefore just a physical requirement for the changing living pattern, growing population and industrialization of the country; the behaviouralists have even suggested provision of proper housing as a panacea for social, political and economic problems.

In any society, 'Housing' is a basic social need and a prerequisite to socio-economic and cultural progress. It is influenced by many factors working simultaneously - the land, people, climate, cultural traditions and the socio-economic conditions, all these determine the form and character of housing in a society. According to Amos Rapoport - 'The house is an institution, not just a structure, created for a complex set of purposes. Because building a house is a cultural phenomenon, its form and organization are

greatly influenced by the cultural milieu to which it belongs. If the provision of shelter is the passive function of the house, then its positive purpose is the creation of an environment best suited to the way of life of a people - in other words, a social unit of space".⁽¹⁾ Rural Housing is a major problem area in our national life and there is hardly any dispute on that. The dispute lies on the question of an appropriate approach towards its solution. Improvements of the quality of rural housing is an important part of any improvement of overall living standards for the people of rural areas. But in attempting to achieve this, there is the danger of replacing arbitrarily the traditional houseform and traditional house construction with new forms, materials and techniques which may be inappropriate to our local conditions, customs and needs. It is therefore necessary that studies and investigations be continued in this area with a view to enhancing the knowledge and understanding concerning the various aspects of the complex problem of rural housing in Bangladesh so that any effort directed towards its improvements can be based on knowledge and information and not merely on notions and intuitions.

1. Amos Rapoport - 'House Form and Culture' p-46

1.2 DESCRIPTION OF THE PROBLEM UNDER STUDY

The traditional houseform in rural Bangladesh has been evolving rather slowly through countless generations by way of interactions of physical, socio-cultural and economic factors. In the last half of a century or so changes in the rural societies and settlements in Bangladesh have been rather fast and substantially large and this has affected the age old peace and tranquility of the rural scene in Bangladesh. Rural settlements and rural living in Bangladesh is becoming increasingly difficult and degraded from socio-cultural, economic and environmental view points. 'House-form' as a 'social unit of space' is also under heavy pressure for transformation and change which often seems to be short sighted taking into considerations only the immediate need of the individual or the family and with little or no consideration for the present and future of the community. The housing stock of rural Bangladesh is not increasing adequately and does not keep pace with the tremendous population explosion, resulting in overcrowding (within the houses) and deterioration of the standard of living. The quality of housing in respect of space organization, allocation of space, technique of construction and hygienic, sanitary condition has come to a very low level. Also the indiscriminate growth of rural habitat results in inefficient landuse and

complexities in services and utility layouts. In spite of the long period of evolution through trial and error of the rural house structure, there still exists deficiencies in the process of construction of the traditional house structure. As a result rural housing in Bangladesh is not only failing to perform its desired role in the building and growth of communities and promoting social progress and prosperity but also it appears to be heading towards an eventual social crisis. It is therefore essential that the housing problem of over 80% of the people of Bangladesh who live in the rural areas must be given due importance and considerations at the national as well as local levels. But before attempting to initiate any improvement effort in this problem area of our national life it is imperative that an adequate enough understanding of the various aspects of the problem be acquired so that we may not have to indulge in the 'trial and error' approach so far as planning and design decisions are concerned. It has already been stated that rural houseforms in Bangladesh have evolved through ages under the influence of physical, socio-cultural and economic factors. No systematic study is, however, available concerning these interactions and no well documented case-studies are available so far as the different aspects of the rural houseforms in Bangladesh and their roots of origin

and subsequent determinants are concerned. Knowledge and understanding in this area of the problem is important in order to be able to understand the likely trend of future development and also the extent of tempering or controlling of the scene which may be possible without upsetting 'social acceptability'. It is therefore on this back ground that the proposed study has been undertaken which will concentrate on the rural houseforms in Bangladesh in their different aspects and elements and the factors that act as determinants for them .

1.3 AIMS AND OBJECTIVES OF THE STUDY

In rural Bangladesh, houses and community facilities are largely built through self-help or aided self-help methods. Generally speaking the traditional rural houses in Bangladesh are fairly well adapted to the local environment and resources but none the less, they also suffer from serious deficiencies. Thus the traditional rural dwellings are usually small, insanitary and suffer from the absence of many of the basic amenities of daily life. The rate of population growth is very high and the living pattern of rural people is being changed slowly and increased modernization are also influencing the rural life. Owing to very low incomes, unemployment and rampant poverty in the rural areas of Bangladesh, the rural populace has little choice but to continue to stick to the indigenous materials, methods and designs not only because of their low cost but also because of their responsiveness to the socio-cultural and climatic requirements.

A very pertinent question in this context can be whether the traditional layouts, designs, indigenous materials and methods have the potentials to be improved and adopted to meet the growing needs of today and to-morrow. The present study is concerned with this question.

The specific aims and objectives of the study may be stated as follows:

Firstly, to identify and investigate the roots of origin and the subsequent determinants of the different aspects of the traditional houseforms in rural Bangladesh;

Secondly, to study the relative importance given to the various aspects of the houseforms in rural Bangladesh through history;

Thirdly, to study the trend of transformation and change affecting the traditional houseforms in rural Bangladesh; and

Fourthly, to assess the potentials of the indigenous materials, methods and design, for meeting the growing needs of today and to-morrow and the diversity and degree of change that may be introduced without making it impractical cost wise and without upsetting 'social acceptability'.

1.4 THE METHODOLOGY FOR INVESTIGATION AND PRESENTATION

The proposed study and investigation will involve a number of different areas. Firstly, a physiographic study of the 'Settlement Pattern in Bangladesh' will be undertaken using published sources, with a view to develop an understanding of the setting of the settlement pattern in the rural habitat.

Secondly, a traditional rural 'Bengali House' will be reviewed and analysed with respect to its spatial organization. Further the major determinants of the traditional houseform will be identified and their effects reviewed and analysed.

Thirdly, house-structures of rural Bangladesh will be described and analysed with respect to types, geometrical properties, major constituent elements as well as materials and construction techniques and this will be done in relation to the influence of physical, socio-cultural and economic factors through history.

Fourthly, a number of case studies will be undertaken on typical rural houseforms from different regions based on personal field investigation with a view to develop a better understanding of the prevalent possibilities and limitations

concerning the rural houseform in its transformation and change.

Finally, in the concluding discussion the adaptability of the indigenous materials, methods and designs for meeting the growing needs and the diversity and degree of change that may be introduced in the houseforms of rural Bangladesh without making it impractical cost wise and without upsetting the 'social acceptability' will be presented.

CHAPTER - II

SETTLEMENT PATTERN IN RURAL BANGLADESH

- 2.1 History of Settlement in Bangladesh.
- 2.2 Physiography of Bangladesh and its effects.
- 2.3 Forms and Characteristics of the Settlement.
Pattern in Bangladesh.

CHAPTER II

SETTLEMENT PATTERN IN RURAL BANGLADESH

2.1 History of Settlement in Bangladesh

Settlement is the functional grouping and distribution of people on space. Kirk H. Stone defined settlement as the distribution of buildings by which people attach themselves to the land. It is not incidental. Rather it is a process of time, space and culture"⁽¹⁾.

In Bangladesh, the process of rural habitation is traditional and mingled with the origin of agriculture and the settlement in this area dates back to the remote past. It is deeply rooted in this sub-continent's past history⁽²⁾.

The earliest settlement in this deltaic plain dates back as early as 30,000 years ago in the late Palaeolithic Age.⁽³⁾ Of course, there is no evidence of any regular settlement in this period. The first regular settlement was in the Neolithic Period around seven to nine thousand years ago. But the first literary evidence of any settlement is from

-
1. Stone Kirk H., 'The development of a focus for the Geography of Settlement. Economic Geography. Vol 41, No. 4, 1965, pp. 346-355.
 2. Bashem, A.L., The wonder that was India, New York, 1959, pp. 11.
 3. Rashid M.H. 1978, Bangladesh Historical Studies. Vol-III.

two epics 'Ramayana' and 'Mahabharata'. In 'Oitoreya Aranyaka' there occurs a reference to a community of people called Banga⁽¹⁾. In most cases the growth of settlement was disorganized and it is not certain when the first settlement took place. Evidence shows that Bangal was settled long ago by people of different ethnic back ground. Evidence of settlement of bamboo and thatched huts of Gupta Period was found at Devidwar of Comilla. Brick houses were also built with mortar joints. Settlement was according to divisions on the basis of castes. From this period upto the Bengal Kingdom and Buddist period of 7th - 12th century B.C., there is enough records to indicate that the pattern of villages and materials and style of buildings and family holdings and land did not change much till the coming of the British.

Bangladesh is predominantly an agricultural country. The economic life of Bangladesh has been characterized by rural settlements as the people settled and organised their land pattern accordingly. The establishment of villages in Bangladesh owe their origin to agriculture which may be traced back to plough culture of development. The beginning of settled

1. University of Dhaka, 'Bangladesh in Maps' p.8

agriculture in Bangladesh dates back to Pre-Arayan history. The early villages were of different sizes and dimensions and was mostly nucleated in pattern which were suited to an indigenous agrarian culture. The process of village formation has been continuous due to the facts of population increase and the movement of people among and within the villages. Thus there are both inward and outward forces at work⁽¹⁾.

1. Aras, Mohammed, "The Pattern of Rural Settlement in Sub-Himalayan Region (East) 'The Geographer' Vol. 6, No. 2, 1954, p.25.

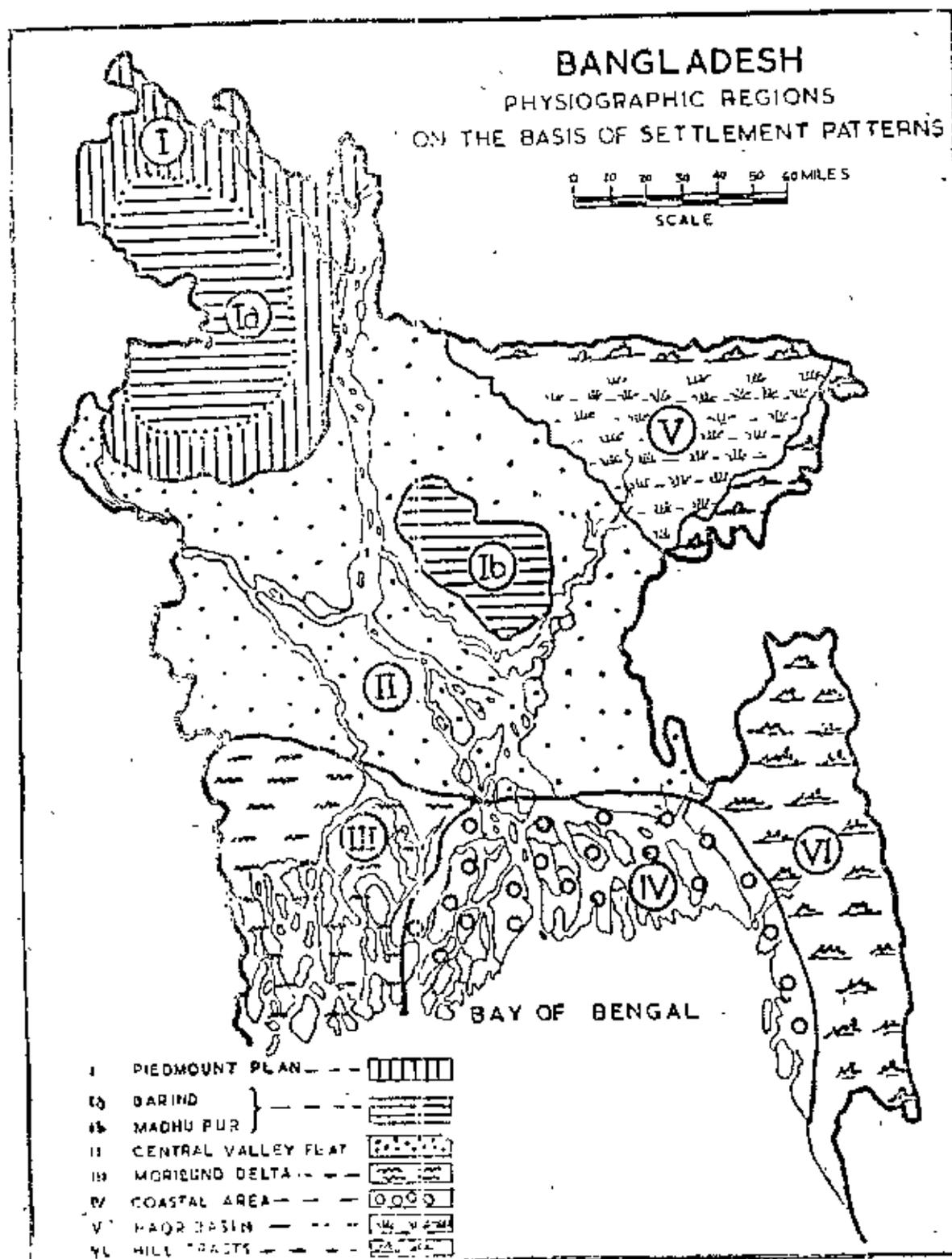
2.2 Physiography of Bangladesh and its effects

With about half the surface of the country below the 7.5 m. contour line (from the mean sea level), Bangladesh is described as a delta or as a flat alluvial plain. Geographically speaking the land can be divided into three broad categories of physiographic regions as Tertiary Hills, the Pleistocene Uplands and the Recent Plains. This tripartite divisions also coincide with a division of the country based on altitude and relief. The Recent Plains can be further divided into Piedmont Plain, Flood Plain, Deltaic Plain, Tidal Plain, and Coastal Plain⁽¹⁾.

Physiographically the country can be divided into six regions:

- (i) The Piedmont alluvial plain in the north-western part and the Barind and Modhupur tracts formed of new alluvium: The piedmont alluvial plain and the old alluvium are located high above the general level plain and the soil is fertile, while the areas of the new alluvium lie to the south of this area in the flood plains of the modern rivers.
- (ii) The central valley flat formed of new alluvium: The central valley flat lying to the east of the area

1. University of Dhaka, Bangladesh in Maps., p.8





of old alluvium and south of the Haor region, is intersected by a network of rivers. This area is covered by recent alluvium and very large in size with compare to other regions. The river bank levees are high and the land gradually slopes inland away from the levees. The tract of land lying between two rivers are shaped into furrows and in many cases form elongated swamps.

- (iii) The south-western region or the Moribund delta area:- The south-western part of the country forms into a high moribund delta and the rivers flowing through it are either dead or dying. The whole area is somewhat dry, bordered by the "Sunderbans" a complex of mangrove swamps on the seaboard.
- (iv) The coastal area and the off-shore islands (the active delta region) formed of saline soil:- The south-eastern part of the country or the coastal area and the off-shore islands is active and a number of rivers flow through it. The land is fertile, but saline water occasionally intrudes through the large mouth of the rivers.
- (v) The Haor region (the area of low depression) in the north-east:- The north-eastern part is occupied by

a large depression commonly known as Haor and extends over a large area. Depressions are also found elsewhere caused by the changes of the river courses or by differential sedimentation.

- (vi) The hilly region to the east of the country:- The eastern part of the country is bordered by hills, with a general north-south alignment but the rivers passing over this tract cut them almost at right angles, suggesting that these are the antecedent drainages. There are very little lands in the valleys for settlement and cultivation.

In Bangladesh, major parts of the country are vulnerable to floods. These are due either to overtopping of the river bank by flood waters, as is the case in most flood effected areas or to impounding of rain waters in low lying areas, as in the haor areas or to tidal inundation of coastal regions. Flood occurs most frequently in the regions in proximity to the confluence of the big rivers and their banks. Floods are less frequent, for obvious reasons, in the areas of relatively higher altitudes i.e. the Piedmont Plain, Pleistocene Uplands, and the hills. Floods are infrequent also in the western part of deltaic Bangladesh.

Although Bangladesh is basically a deltaic flat alluvial plain covering an area of about 144,000 sq k.m., its physiography presents a degree of regional variety, particularly on geomorphology and flooding. The effects of physiographic characteristics of the land can be seen mainly on the settlement patterns rather than on the house structures themselves. With over one-third of the country flooded every year, many of the settlements are sited on available high grounds or on artificial mounds. The settlement pattern is linear along the river levees of the Ganges and the Meghna flood plains, along the central region of the country and in the Haor basins in the North-East region. Linear settlements are also found along the dead or dying river levees in the south-west moribund deltas and along the spring lines of the Chittagong Hill Tracts. In the rest of the country, the settlements are either clustered together and/or scattered individually such as along the old Brahmaputra flood plains, the mature deltas, east and south Sylhet, south Dhaka and the Tippera area in Chittagong lowlands.

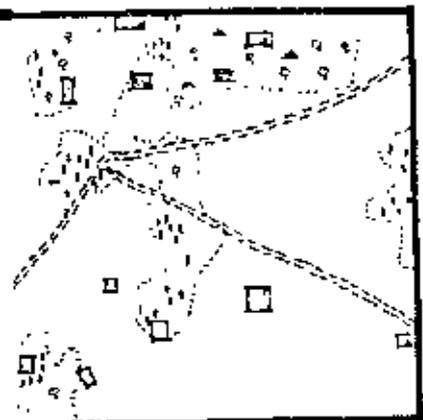
2.3 FORMS AND CHARACTERISTICS OF THE SETTLEMENT PATTERN IN BANGLADESH

In the different physiographic regions with varied characteristics, there have been variations in the settlement patterns in Bangladesh. Different physical, cultural and local conditions also play a great role in shaping distinctive forms and patterns of settlements and in short the following are the different patterns of settlements in Bangladesh:-

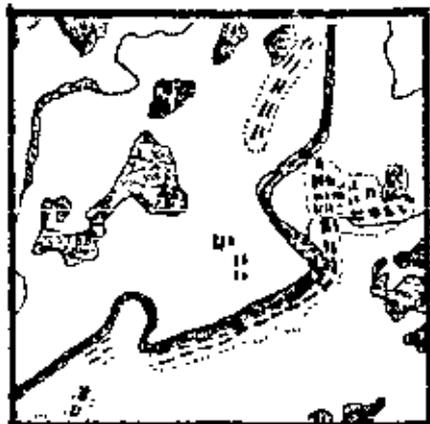
- i) Nucleated settlements in the high flat land
- ii) Scattered and built on artificially raised lands
- iii) Linear along the river levees
- iv) Scattered and isolated in off-shore islands
- v) Highly dense clusters on artificially built mounds
- vi) Sparsely built homesteads in hilly areas

i) Nucleated Settlements in High Flat Land

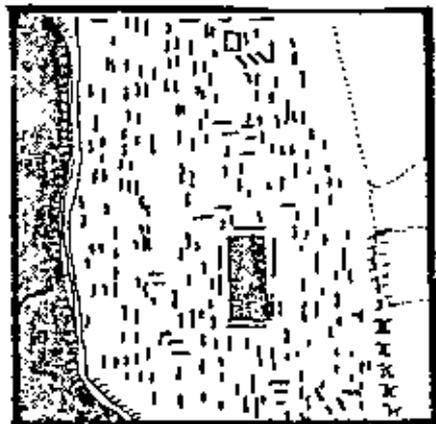
In the high flat land of the north-western Piedmont, Barind and Madhupur tract regions, settlements are nucleated, tends to cluster along the main thoroughfares. The houses are so arranged that they assume a regular village shape, giving a nucleated pattern to the settlement. The houses are comparatively



Scattered settlements on the Rangpur - Dinajpur border. Note the Large number of tanks and the absence of rivers



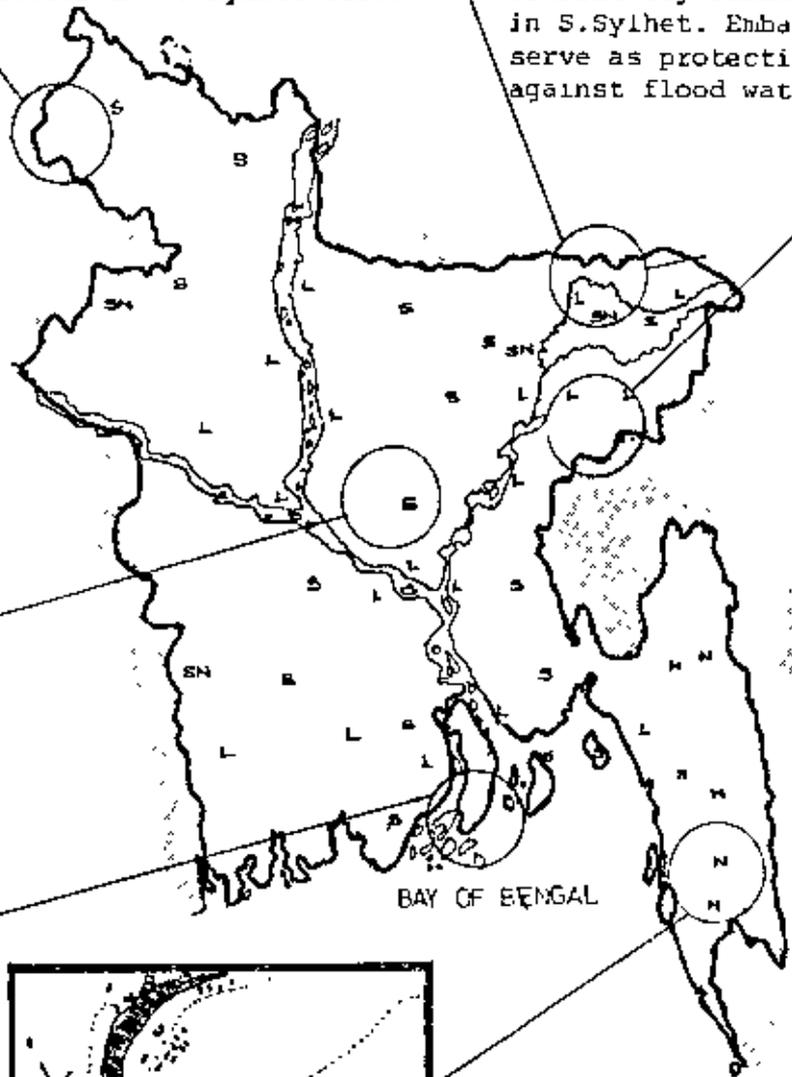
Linear pattern on stream levees in W. Sylhet District.



Large settlement on artificially raised mound in S. Sylhet. Embankments serve as protection against flood waters.



Dispersed settlements in the inundated area of South Dacca District.



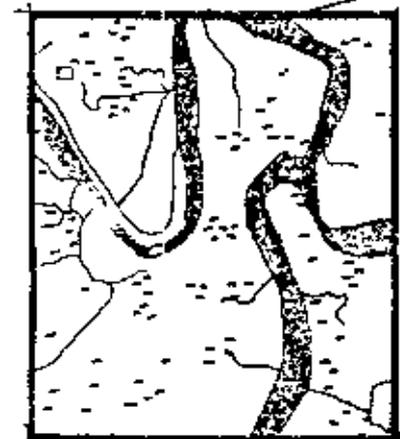
BAY OF BENGAL

- L. = Linear
- S. = Scattered
- S.N. = Semi-nucleated
- N. = Nucleated.

BANGLADESH

SETTLEMENT PATTERNS

SOURCE : AHMED N. "THE PATTERNS OF RURAL SETTLEMENT IN EAST-PAKISTAN" GEOGRAPHICAL REVIEW - JULY 1950 pp 395-397



Widely dispersed settlements on land subject to complete inundation in south east Bangladesh



Nucleated and linear settlements along the Karnaphuli River and its tributaries, Chittagong Hill Tracts

compact and the villages are large. Villages are mostly situated on communication routes and also on river banks.

ii) Scattered and Built on Artificially Raised lands

Most of the deltaic plain of the country, particularly the river valleys and low moist region, are exceptionally fertile and these areas go under heavy inundation during the rainy season. But at the same time, during every flood season, it is renewed by silt and sediment, which adds to the fertility of the soil, making agriculture very productive. People, therefore, hold to these areas and build their houses by raising the homestead land with earth. As a result, scattered clusters have developed in such low lying regions.

iii) Linear Settlements

The linear settlements are found scattered throughout Bangladesh. This type of village developed along the levees of the rivers. The rivers flow sluggishly over flat land, depositing silt and sediment as they go. When in spate, over-bank flow occurs and deposits silt on the current-flow banks gradually rising them high. The sediment also spreads sometimes

far in to the surrounding areas. These sites are linear in pattern and offer good opportunities for establishing settlements. As the river courses changes the settlements, which once grew along the levees continue to remain. In the moribund delta and also in other areas, the linear pattern persists, although there is no active river running by.

iv) Scattered and Isolated in Off-shore Islands

The Islands of the Bay of Bengal formed at the mouth of the Ganges. Brahmaputra delta, are very fertile which attract people to exploit primary agricultural activities and fishing. There off shore islands are subjected to occasional natural disasters like cyclones and storm surges, but the people are hardy and manage to survive these disasters.

After an island (char) appears, a few years pass before it becomes ready for cultivation, for it takes time for the formation of soil profile. The first family then arrives on the island, digs a pond for fresh water for domestic consumption and builds a homestead on the raised land with the mud of the pond. In course of time, more families move in and build their houses in a similar way, near to their agricultural land. Accordingly dispersed

homestead grow up all along the island, which ultimately become small isolated settlements around the ponds. Thus in course of time the whole island becomes covered with despised and isolated primary clusters, developing a pattern of their own.

v) Highly Densed Clusters on Artificially Built Mounds

In the exceptionally lower depressions such as the 'Haors' of the north-eastern region and part of the south-central zone, the homesteads are built on artificially raised 'mounds', resulting in the formation of highly densed clusters. The mounds' are linear in shape and the houses are grouped one after another, side by side.

vi) Sparsely Built Homesteads in Hilly Areas

Unlike the deltaic plaine region the eastern part of the country is occupied by the low hills with ever green vegetation. The settlement pattern that has developed here is exceptional, influenced mostly by her topography. Agriculture is difficult in such terrain and availability of land for this purpose is also limited. Other economic activities are also not usually promising. Therefore people

have got to depend primarily on agriculture by tilling the hill slopes after terracing. On the flat surface of the hills and also on gentle slopes people adopt shifting cultivation popularly known as 'jhoom'. This means of earning livelihood governs the location of their homesteads and pattern of the settlement. The people generally build their houses on top of low hills, on slopes or in valleys. As the land is limited in each of the hills for cultivation the population is sparse and thin. The settlements, therefore have so developed that they are scattered, isolated and small, generally with a few huts.

Ref - Prof. M.I. Choudhury & Mohd. Asad-uz-Zaman
"Settlement Pattern and Some Special Problems"
National Report on Human Settlements - Bangladesh
HABITAT, United Nations Conference on Human Settlements,
Vancouver, May 31 - June 14, 1976.

CHAPTER - III

A TRADITIONAL BENGALI HOUSE AND ITS DETERMINANTS

- 3.1 A 'Bengali House' - the Traditional House Form and its Organization.
- 3.2 Land and Houseform.
- 3.3 Culture and Houseform.
- 3.4 Climate and Houseform.
- 3.5 Available Resources and Houseform.

Chapter - III

A TRADITIONAL BENGALI HOUSE AND ITS DETERMINANTS

3.1 A 'Bengali House' -- the Traditional Houseform and its Organization

A traditional rural 'Bengali House' is an inheritance from the past, exists in the present and has a potential for the future. The traditional house in its basic form is a cluster of small 'shelters' or 'huts' around a central court-yard called the 'Uthan'. The individual huts may constitute the following categories :

- (i) the outer house (Out-House Or Baithak Ghar)
- (ii) the Inner house (Dwelling Unit Or Ghar)
- (iii) the Kitchen
- (iv) the Cattle-shed

Larger houses may also include the following:

- (v) the Store House (fuel storage, granary etc.)
- (vi) the Rice Husking Shed or the 'Dheki Ghar'.

The huts are usually single roomed, detached and loosely spaced around the central court. An extensive landscaping is done to define the house in the larger landscaping and the surrounding environment. The latrine and bath are never

considered as parts of the main structures and are always kept at a distance. The combination of all the huts is called the 'Bari' or the 'House'. In the traditional system, 'Bari' represents the nuclear, joint or extended family while the huts represent individual households. The Courtyard or 'Uthan' serves to maintain both unity and individual identity of the families in the house. This village model remained essentially unchanged for centuries which is evident from the 19th century description of rural house from the account of Dr. F. Buchanan (1810),

'Among the natives the poor man has one hut for himself and cattle, the richer man increased the number without altering the plan of the building and there is no contrivance by which a person can go from one apartment to the other without being exposed to sun and rain'.⁽¹⁾

The organization of a traditional house in rural Bangladesh is done with respect to the functional uses and activities of various spaces. The functions are broadly divided into two categories:

1) The Family Functions -- those pertaining to the family itself i.e. sleeping, cooking, food preparation, child rearing, recreation, taking care of the cattles, preparation of the agricultural products etc.

1. Dr. F. Buchanan, Op.cit., A.D. King, 1973. The Bunglow, Part 1, Architectural Association Quarterly, Vol. 5. No. 3, p.8.

ii) The Formal Functions -- those pertaining to the family as it reacts with the larger community i.e. socializing, receiving visitors etc.

The house form takes shape largely on the above functional scheme. On the basis of functions and uses, the house is separated into two distinct parts -- the Inner House and the Outer House with respect to family function and formal function respectively. This inner and outer house concept is a special characteristic of the traditional house form in rural Bangladesh. The house, beyond satisfying the functional necessities of the family, embodies an expression of human hopes, aspirations and identity and his relationship with the community and the environment in which he lives. The organization of spaces in the house is not only affected by the functional requirements of the daily life but more importantly from the culturally defined social codes, customs and norms. The traditional house form evolved rather slowly through centuries under the influence of many factors working simultaneously -- the land, the culture, the climate, the available resources and so on. The basic form of a traditional rural 'Bengali House' is essentially a 'Shelter' with respect to its climatic context and a 'Social Unit of Space' with respect to its cultural context.

3.2 LAND AND HOUSE FORM

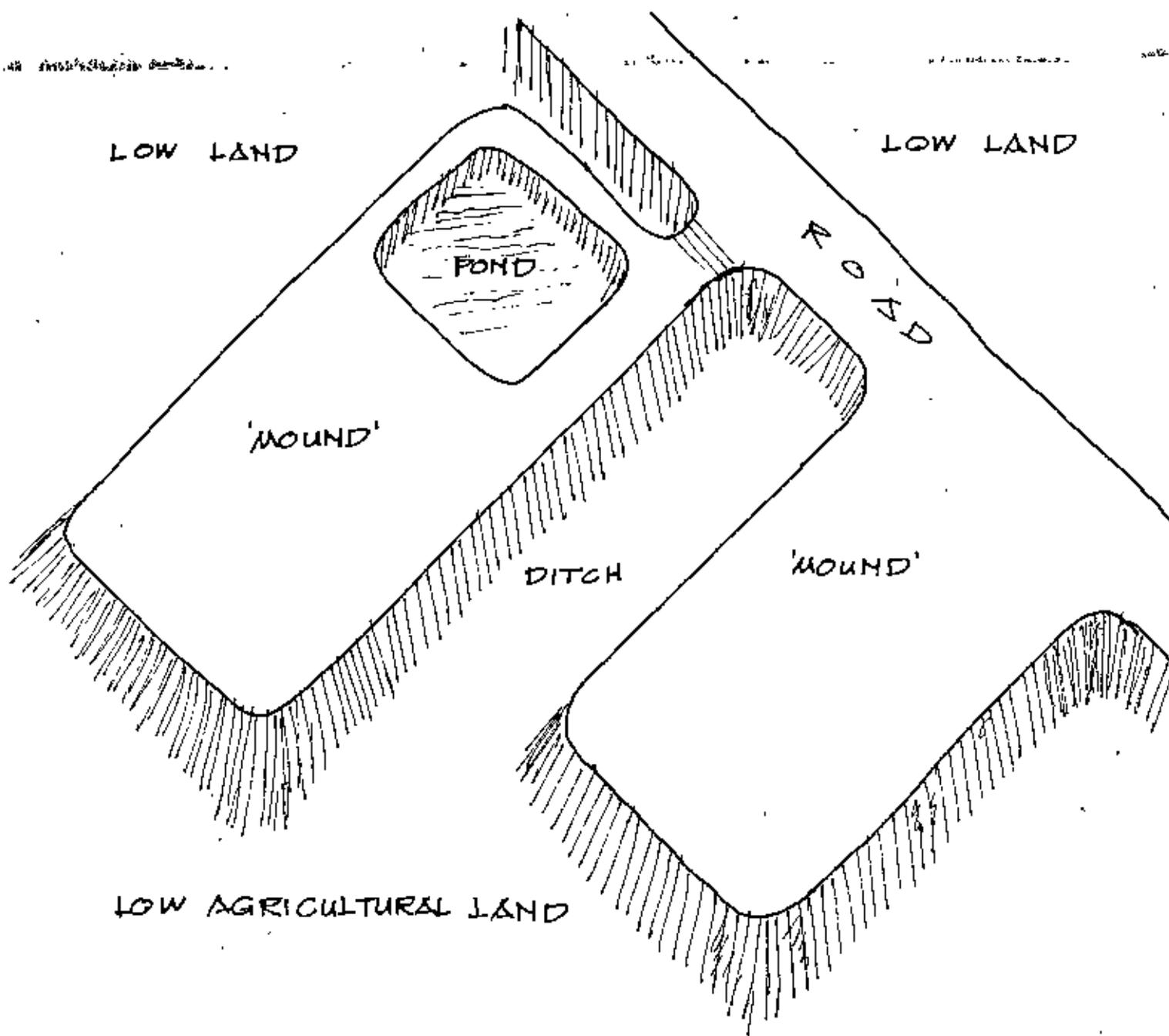
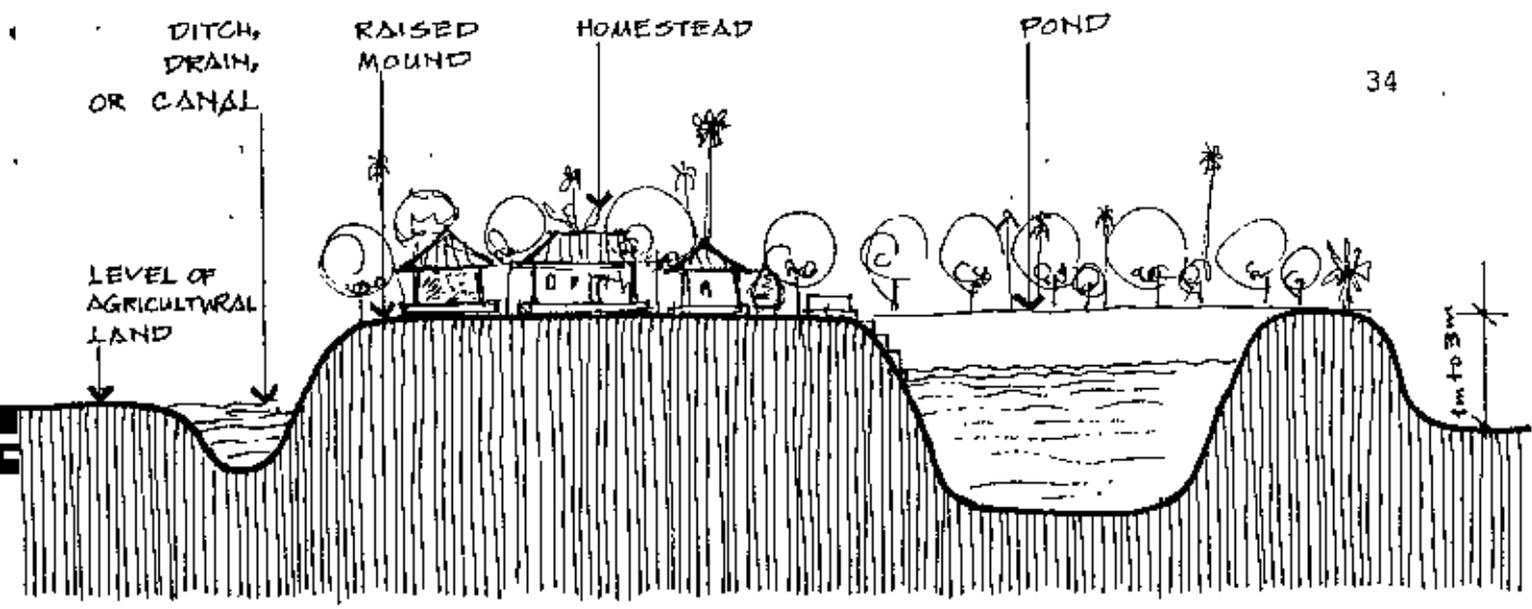
Bangladesh is basically a deltaic flat alluvial plain covering an area of 55,598 square miles (about 1,44,000 sq. k.m.) of land and large rivers flow within its perimeter of 2,928 miles. It is inhabited by over 90 millions people.

Although the land rarely rises above 50 feet (15 m) from the mean sea level, its physiography presents a degree of variety, particularly in geomorphology and flooding. The effects of land can be seen mainly on the settlements. With over one-third of the country flooded every year, many of the settlements are sited on available high ground or on artificial mounds. The settlement pattern is linear along the river levees of the Ganges and the Meghna flood plains in the central region of the country and in the Haor basins in the North-East region. Linear settlements are also found along the dead or the dying river levees in the South-West Moribund deltas and along the spring lines of the Chittagong Hill Tracts. In the rest of the country the settlements are either clustered and/or scattered.

The overwhelming fact about Bangladesh is the progressive imbalance that has been developing between its population and the land which has an indirect effect on house form.

There is hardly any other country which suffers from such an acute land-hunger and where there is such a great need to utilise every acre to the fullest extent. Almost two-third of the area of Bangladesh is an alluvial flood plain except the areas in the north-western region and the south-eastern hilly areas of Chittagong and Chittagong Hill-Tracts. This vast land area invariably needs 3 to 10 feet filling for making flood free and buildable base of the homestead. This puts a heavy constraint on the horizontal expansion of our settlements. Further more, this also results in a double loss of precious agricultural land, as filling up one acre of land means digging up another acre. Again as the law of inheritance permits division of landed property amongst all the children of the deceased person, fragmentation of agricultural holdings and homesteads has been a continuous process. As a result, homesteads are becoming congested and unplanned subdivision into smaller sizes and addition of newer house structures, often without proper planning and layout design, particularly in the totality of the environmental context.

By creating a land (or a 'mound') for the 'house' the act of homesteading in the Gangetic plains starts. The land for the homestead is raised above the flood plains demarcating it from the surrounding agricultural land. The shape,



size and height of the 'mound' varies from place to place. In some places, specially in the high lands of Modhupur and Barind Tract, there is no need to have elaborate raising of the land for the homestead, even though in practice, the homestead is demarcated from the rest of the land by slightly raising it. This also helps to protect it from the surface run off. In most other places, however, large excavation and earth work is done, while creating this 'mound' and also while progressively enlarging a house by creating ponds, tanks, canals, drains etc. in and around the homestead. These are the ecological (service) bases of the house and they also play significant roles in ensuring privacy by creating barriers from the next homesteads and thereby generating the loose, distributed settlement pattern. After the raising of the land for the proposed homestead, various shelters, huts and open spaces are organized on it and gradually the 'house' takes its shape.

3.3 CULTURE AND HOUSEFORM

The traditional house in rural Bangladesh in all of its regional variations is first of all the full material expression of a way of life. It states in a compact and elemental form, the summation of rural culture. All the social and religious energy that is brought to play in the village, finds tangible expression in the form of the house. Each man's attitudes towards life, his family, his place in the community, his religious convictions - the totality of the cultural experience - here makes its most direct and elemental statement. Traditional society is so firmly established in rural Bangladesh, that patterns of pastoral heritage evolved through countless generations remain the greatest single determinant of form.

A 'shelter' is a basic need for human being for protection against hostile natural elements and the 'form' the house takes depends on how the needs for the 'shelter' are defined and perceived by the particular group of people. Here culture in general, directs the interpretation, choice and specific solution to certain needs. The different parts of the house, assume a social meaning according to the nature of individual, social needs and the consequent uses made of such parts. This social meaning of different parts

shapes out a mental image of the parts in the minds of the inhabitants. The traditional houseform in rural Bangladesh is the product of need as felt by the users (the felt need), which is a socio-cultural phenomenon, and quite different from that of the need as out-siders see it (the perceived need). Simultaneously, all the arrangements and uses are structured in the house by the local perception of privacy, which defines appropriacy and dictates necessary measures to secure the space and the result is the inner house and outer house.

Perception of privacy in every culture is performed in their own way, which is again atleast partly affected by the position of women in that particular culture. In Bengali culture, 'Privacy' is achieved through visual perception and male/female separation. Visual Privacy is achieved by using physical devices, which includes organization and orientation of shelters, partition between the Inner and Outer house, indirect entry to the inner house and so on. All these have made the traditional houseform of rural Bangladesh "Introvert type". Within the 'Introvert type' enclosure, all the family functions are performed in covered or open spaces surrounding the courtyard, secluded with visual privacy from outside. There

are examples of 'Introvert House' as traditional houseform in various other cultures from Latin America to China. Though there are considerable uniformities in the form and organization of Interior spaces around a central court, yet the purpose and concept behind their creation and use is different from that of Bengali house type. Again, to achieve domestic privacy, male and female zones are separated in the house and this is a socio-cultural concept. The domestic privacy is concerned with regard to male and female rather than family and nonfamily. The conceptual image of male and female role in the house divides their respective spatial and temporal domain of influence. Male and female have their respective, definite functions and roles to perform with regard to the house. Male will look after the out-door activities such as agriculture oriented works and the female will look after the household activities from child rearing, cooking to preparation of agricultural products - through boiling, drying, husking etc. Socio-cultural rules and customs have confined the female within the boundaries of the house. 'Inner house' corresponds to the 'female domain' and the 'Outer house' corresponds to the 'male domain'. Female and male zones have opposite character to each other. Male zone (outer house) is the buffer or filter between the private inside and public out side. Privacy in a house with respect to male and female is maintained in different ways in addition to the physical

separation of the two domains. These include behaviour pattern, willful avoidance, time zoning etc. Hence the boundary between the male and the female zones is flexible and varies according to time, period and occasion. In the traditional houses in rural Bangladesh distinction between the Inner house and the Outer house is also made on the basis of their functional as well as symbolic values. Spaces with the functional values remain in the inner house and those with symbolic values prevail in the outer house. 'Outer house' is the front part and the 'Inner House' is the back part of the house. What ever the family wants to protect, guard or hide from the public becomes part of the inner house. Outer house which serves as the front part may be referred to as an opening towards the society and the village. The traditional house in rural Bangladesh is a social concept. The nature of it varies with the socio-economic status, and the religious beliefs of the rural populace and these are the two important aspects of culture which affects the traditional house form.

EFFECTS OF SOCIO-ECONOMIC STATUS

Life style is a product of whole series of factors that includes - culture, socio-economic norms, family attitudes etc. which are not static but may change over time depending on the demands made on the family - externally or internally. The type, character, and location of the house depends largely on the kind of life style the family either desires or is compelled to pursue. The 'life style' is the reflection of the family status. There are three distinct status groups of people in rural Bangladesh from the socio-economic view point which is clear from Mr. M.A. Ghani's study on a rural community of Bangladesh. "clear status difference exist among the Muslim Inhabitants of Amtali, who are broadly divided into three hierarchical groups - 'Khandans', 'Girhastas', and 'Kamla' according to social status they enjoy, Formally the basis of ranking in the village was birth and lineage, (Bangshas) which has been replaced now-a-days mainly by wealth. wealth difference now largely account for status difference in the Village"⁽¹⁾. Such social stratification is typical in all parts of rural Bangladesh.

1. Md. A. Ghani - 1982, 'A Bangladesh Village - A study of Rural community in the Active Delta' - Unpublished Master's thesis, Monash University, Australia.

On the basis of socio-economic status, 'Bengali House' can be grouped into three categories:- a) House of the affluent class/wealthy land owners (Khandan Bari), (b) Farmer's House (Girhastha Bari), (c) House of the landless or the poor (Gariber Bari). The basic concept of a 'Bengali House' exists in all these three groups of houses. The sizes of the homestead, number of courtyards, house structures and use of construction materials, construction techniques etc. varies according to the socio-economic status of the inhabitants. Larger homesteads and houses of better construction are more common among the affluent and wealthy landowners than others. Distinct separation between inner house and outer house is there. There must be an Outer House (Baithak Ghar) of good quality in front of the house, which acts as a status symbol for the family. In farmer's house 'Baithak Ghar' is also common but of moderate size and of simple structure. In the houses of affluent class and land lords, out-house is used to entertain visitors, guests and as a group study area for children. Seasonal labours may stay in separate labour shed. In farmer's house, the outhouse is used as guest room, childrens' study area, storage etc and also used by the seasonal labours to sleep there at night. In the houses of landless and poor, 'out house' is not seen, as they can't afford it.

In almost all the regions of Bangladesh, except the high lands of Modhupur and Barind Tract, common indicator of relative wealth can be seen in the fact that the more prosperous landowners have sufficient land to have big ponds in and around the homestead. Inside pond of the house is for the female where they can bath in private and the out side pond is for the male members. In farmer's house, the number and size of the pond is relatively smaller. On the other hand, in the houses of the poorer families, pond is rare and their women have to bath in ditches, or in canals, which are open to the public view and privacy is rarely ensured in such homesteads.

EFFECTS OF RELIGION

The characteristics of a traditional rural 'Bangali House' is firmly based on the religious convictions and the cultural identities of the rural populace. The population of Bangladesh consists of two main religious groups -- the Muslims and the Hindus. The Muslims constitute more than 80% of the total population. The differences between Islam and Hinduism are distinct and fundamental in many ways and these differences contribute to the differences in the socio-cultural outlook and the life styles of the two communities. Some of the major differences stemming from the two different religious doctrines and practices and exerting distinct influences on the houseform may be enumerated as follows:-

- i) In the Muslim religion there is only one God, who deserves all worshipping and who's house on earth is the 'Kaaba' in Mecca which serves as the 'qibla' for prayer of the faithfuls. The Muslim house structures are therefore normally laid out following the cardinal directions so that it is convenient to establish the directions of 'qibla' for prayer. The direction of the 'qibla' also determines the orientation of the sleeping mats and the toilets which in turn affects the organization of the spaces and their use. In the Hindu

religion, on the otherhand, there are many 'Gods' to be worshipped and the worshipping or the 'puja' as it is called is highly ritualistic in nature.

The Hindu homesteads do not exhibit any such concern for the cardinal directions. In particular, although the East is considered a sacred direction because the sun rises in the East.

- ii) The Muslims do not identify particular places of ritual purity within the house or the homestead. The 'shelters', or 'huts' and the 'open Spaces' or 'yards' receive degrees of importance depending on the hierarchy of their use only. The Hindu homesteads, on the other hand, are organized on the basis of particular places of ritual purity -- both indoor and outdoor. Thus, a corner of the inner courtyard is marked as a place of ritual purity -- the 'Tulsi Tala' with an alter. The living quarters provide a separate area or atleast a secluded corner indoor for installation of the images of the Gods and for worshipping them. The kitchen and also the cowshed receive considerable importance because of the cultural out look in respect of fire and in respect of the cow. As a result, unlike a typical Muslim house, a typical Hindu house reflects almost equal care and concern for all the structures of the household and this

makes the house much more neat and tidy looking. Further, since the 'puja' rituals require fresh flowers, a Hindu homestead often provides for a flower garden which also adds to the quality of the Hindu homestead environment.

iii) Hindu women in the household are responsible not only for the daily and almost ritualistic cleaning of the house and coating the floors, but they are also responsible for taking care of the cattle, feeding and milking them. Moreover cows are sacred to the Hindus. Muslim women involve themselves less in such daily chores. Besides, they do not have to look after the cattles because the cattles are the responsibilities of the men folk. Hence the cow shed in a Hindu house is normally located in the inner quarters with ease of access for the women folk who are responsible for looking after the cattle. In a Muslim house, on the other hand, the cow shed is normally a part of the outer quarters.

iv) Muslim kitchens have multi-purpose use such as preparation of raw food stuff for cooking, the cooking itself, eating of the prepared meal and a certain

amount of washing and cleaning, although the bulk of the washing and cleaning of the dishes and pots and pans are done outside the kitchen. This tends to leave the kitchen untidy. Hindu kitchen on the otherhand, are used for cooking only and all other related activities are kept away. Since washing and cleaning must be done away from the living quarters, a Hindu homestead often has a pond or washing space in the inner quarter of the homestead but reasonably seperated from the main living areas.

- v) Both in the Muslim and in the Hindu religions, the dominance of male over the female is clearly recognized. In both the communities the women are generally confined to the inner quarters. The seclution of the women from the passers by or male visitors is more stringent in Muslim households because of the specific religious sanctions and the degree of importance attached to it in Islam. Accordingly a traditional Muslim homestead maintains the seclutions of the women by basically an introvert layout of the huts around an inner court. Usually all the huts with the exception of the 'outer house' open to the inner court while the 'outer house' borders one side of the inner court with its back and faces the road or the approach-way

to the homestead. Entry to any of the huts other than the outer one is essentially from the inner court which is visually screened from the outer quarters by staggered partitions or screens at the entry corner. A Hindu homestead has more or less similar introvert layout with the difference that a corner of the inner court, the 'Tulsi Tala' is maintained as a place of ritual purity and the entry to the inner court has usually more ceremonial or symbolic character given to it.

- vi) Islam sanctions polygamy and it is commonly practiced particularly in the richer sections of the rural Muslim populace. Hinduism does not forbid polygamy but monogamy is the generally prevalent social custom in the Hindu community of rural Bangladesh. The practice of polygamy results in a larger and more complex family set up in a rural Muslim family compared to a monogamous Hindu family of similar social standing. Consequently the Hindu family is often better off financially and so the children of the Hindu family can be better looked after and given better education. This eventually results in better job opportunities for the Hindu youths who can thus afford to spend more on the maintenance and improvement of the homestead than its Muslim counterpart. This is why a Hindu homestead is usually more impressive than a Muslim homestead of equivalent class.

3.4 CLIMATE AND HOUSE FORM

The predominant characteristics of the climate of Bangladesh are high solar radiation and heavy annual rainfall. In such a warmhumid climate thermal comfort in the built environment is extremely important and protection from rain and wetness is of high concern in the design and construction of the house structures. The traditional house form in rural Bangladesh responds quite well to such climatic needs. Thus the traditional house structure is rectangular in plan with the length varying from 4.5m to 7.5m and the width varying 3m to 4.5m normally. It is built on ground with the floor or the plinth raised about 0.3m to 1.2m from the ground level in order to safeguard it from the effects of temporary water logging of the site or heavy surface runoff due to torrential downpour. The plinth is made of mud. The walls of the house structure are made from bamboos plaited into diamond or squared patterns or from mud. In the low lying areas and amongst the very poor, jute sticks and various types of local reeds are used as wall materials, often with mud plastering on both sides. The walls have small window openings and receive considerable climatic protection from the sloping, stooping and overhanging roof structures above. The roof is usually thatched with Chhon,

Ulu, Khari, Dena grass, Gol patta, Tal leaves, Coconut leaves, or with rice straw. Those who can afford do prefer corrugated iron sheets (C.I. Sheet) for roofing and also for walls, because of its relative permanance. The climatic demands minimization of heat gain by the house structure from insolation and maximization of heat loss through cross ventilation. This in turn call for a linear layout for the house structures recognising the favourable orientation which is the South. But as we have already seen, this has been sacrificed in favour of certain socio-cultural preferences which generated a court yard layout with orientations of the huts in all the cardinal directions. Because of the low height of the house structures and an abundance of trees available for shading, the ill effects of solar radiation owing to wrong orientations of the structures is considerably reduced. The porousness of the bamboo plaited walls, the inherent coolness of the shaded mud walls and also the low thermal capacity of the roof structure contribute to the excellent thermal character of the rural house.

3.5 AVAILABLE RESOURCES AND HOUSEFORM

In rural Bangladesh, villagers like to build houses using materials which are familiar to them. Such familiarity, is evolved through a process of trial and error over a long period of time. The trial and error in their folk experience relates to aspects of availability, utility, workability, durability, net cost and similar other factors. Further, in this process of trial and error, ideas of prestige and a sense of beauty (both defined in strictly local terms) might have played their part leading to acceptance and popularity of certain materials which relates to aspects of factors such as availability, utility and workability. 'Availability' for instance, from the view point of the villagers, corresponds to the ease with which a raw material can be bought with the local mode of transactions, the facility to use the conventional and prevalent specialised skill at hand to process it for use and a self-awareness of his ability to appreciate by sequence the process of raw materials being converted into a finished component of the house. The meaning of the term 'Utility' is often similarly enlarged to convey characteristic folk attitude towards a material possession which serves different needs. 'Workability' to illustrate the folk meaning attached

to a third term, refers to the ease with which a material can be worked upon by local hereditary specialist, or through the conventional methods.

'Available resources' refer to the indigenous and popular materials that are readily available and are traditionally in use for generations. Discussion of these materials may conveniently be undertaken with reference to the major elements of the traditional rural house structure, namely, the plinth, the walls, and the roof.

Sandy clay soil is preferred which may be clayey silt or silty clay. The plinth is locally called the 'viti' of the house and it is usually the most stable and durable component of the traditional house form. Apart from its relative permanence, the 'viti' has a sentimental value to the rural populace. The last thing a family would be ready to part with is the 'viti' of their forefathers.

The 'walls' of the traditional rural house structures can normally be of two types: Firstly, the walls may consist of panels of bamboo plaited into diamond or squared patterns. They may also be of jute sticks or some local reeds formed into panels and held into position in between split bamboo strips on either side of the panel at close intervals.

The panels are arranged vertically to form the walls and they are fastened to the bamboo poles or timber logs already erected in position and with the cross members at the top serving as a structural frame for receiving the wall panels. Occasionally these wall panels of organic materials are provided with mud plaster on both sides to make them non-porous, longer lasting and also to improve their neatness and visual look. Doors and windows in these walls are just punched holes and are kept as small as possible. Wood is rarely used in doors and windows and most often bamboo frames and panels suffice. In some cases, the walls may consist of wooden panels, gaps filled with popular material C.I. Sheets keeping some gaps for windows and doors. It is fixed to the wooden poles or timber logs already erected in position and with the cross members at the top and bottom serving as a structural frame for receiving wall panels. In this cases, wood is used in doors and windows.

Secondly, the walls may consist of monolithic mud layers or of mud blocks or sun dried mud bricks. Window openings are kept very small so that they can be just punched holes. The door opening, being slightly wider, may require a lintel at the top. A timber log or pum tree planks often

serve the purpose. To increase the cohesive strength of the preparation, various fibrous organic materials such as dried grasses, straws etc. are sometimes added to it.

The roof is the most important and expensive component of the traditional rural structure. Firstly, the roof structure is framed in bamboo, the members being tied together with coir rope, jute ropes or G.I. wires forming close rectangular or square grids. A thick layer of thatch or other types of leaves are then woven on this supporting roof frame. Secondly, the roof structure is framed in wood, the members being tied together with joints and iron nails, forming close rectangular grids. Then C.I. sheets or hand made burnt clay tiles are fixed or tied up to the wooden frame with nails or G.I. wires. The roof slopes at an angle, usually on each of the four sides, to facilitate the flow of rain water and reduce the risk of a leaking roof. In some cases, to keep down the cost of the roofing, the roof is sloped only in two directions along the shorter span.

CHAPTER - IV

THE TRADITIONAL HOUSE STRUCTURES

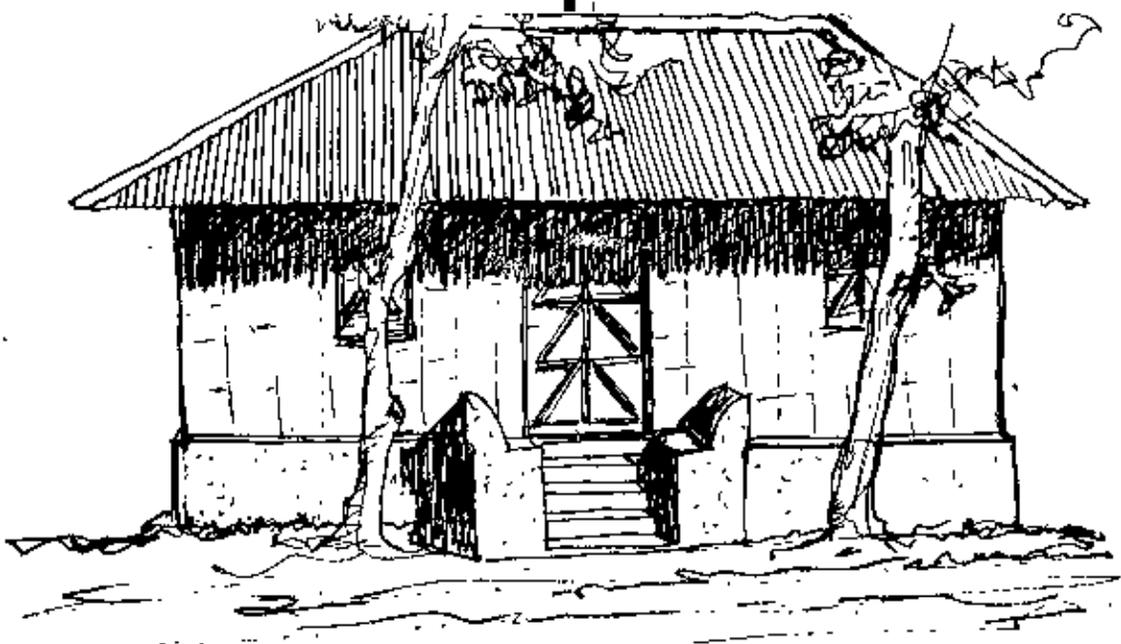
4.1 Types and Geometrical Properties.

4.2 Elements, Materials and Methods of construction.

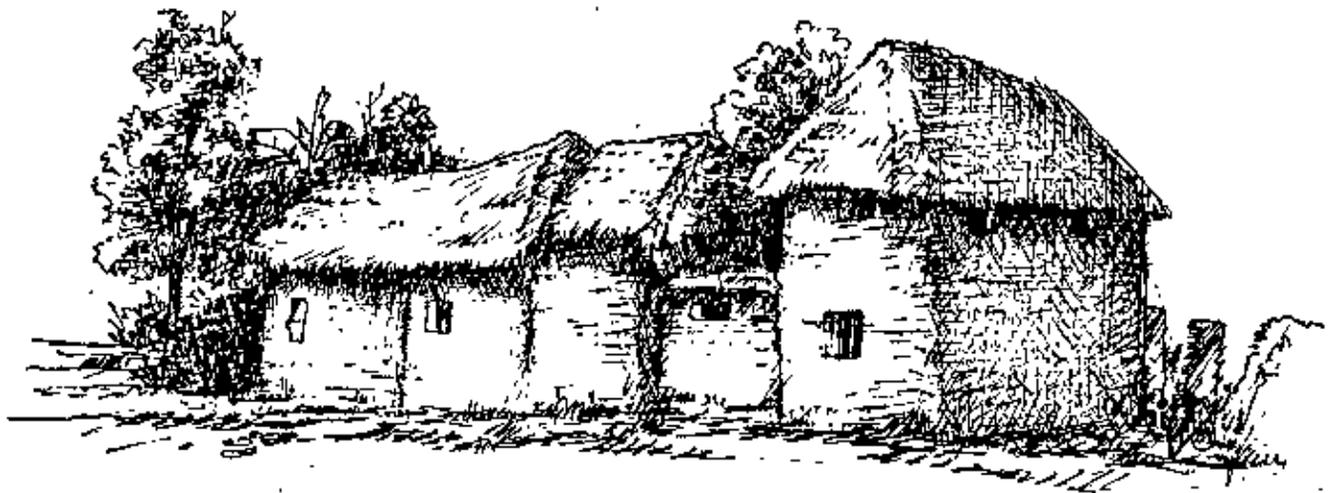
4.1 TYPES AND GEOMETRICAL PROPERTIES

Rural Bangladesh offers an interesting variety in traditional house types in terms of floor, wall and roof. In terms of floor, they are single storied and double storied, although single storied structure is the most common all over Bangladesh. In terms of roof shape, houses are single pitched (EK chola), double pitched gabled (do chala), hipped (char-chola), double hipped (aat chala) and semicircular type. In terms of roof covering type, houses are 'Thatch house,' 'Tin house' and 'Tile house'. With respect to wall, house types are 'Mud house', 'Bamboo house', 'EKra house', 'Tin House'. But with all its variations, traditional houses are commonly recognized as 'Mud House' (irrespective of roof type), 'Thatch house'. 'Tin house' or 'Tile house'.

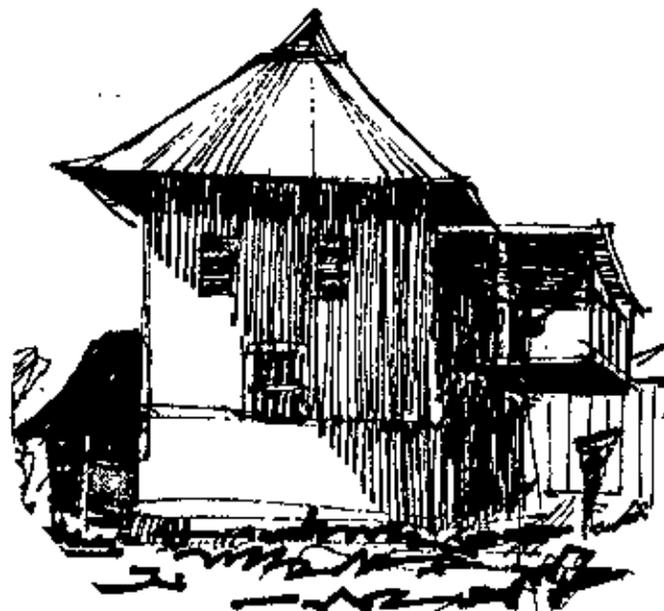
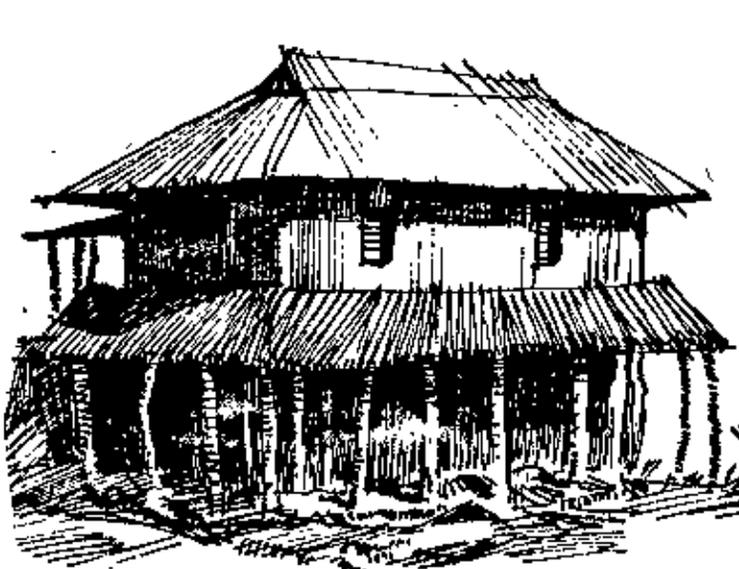
i) Mud House -- Houses with mud walls are commonly known as 'Mud House' irrespective of the structure and material of the roof. Roofing materials may be of thatch, G-I-Sheet (Tin) or clay tile. Mud house is also seen as double storied structure. Three types of wall construction methods and techniques are seen -- solid Mud type, wattle type with post inside the walls and of sun dried brick. Most common is solid mud type. Mud walls are vulnerable to rain by surface wearing and unstable during flood. Exposed surfaces require



MUD HOUSE (G.I. SHEETROOF)



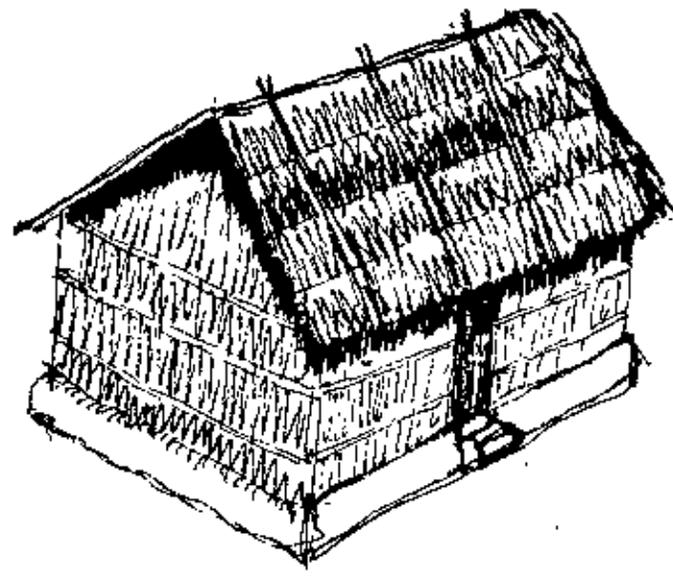
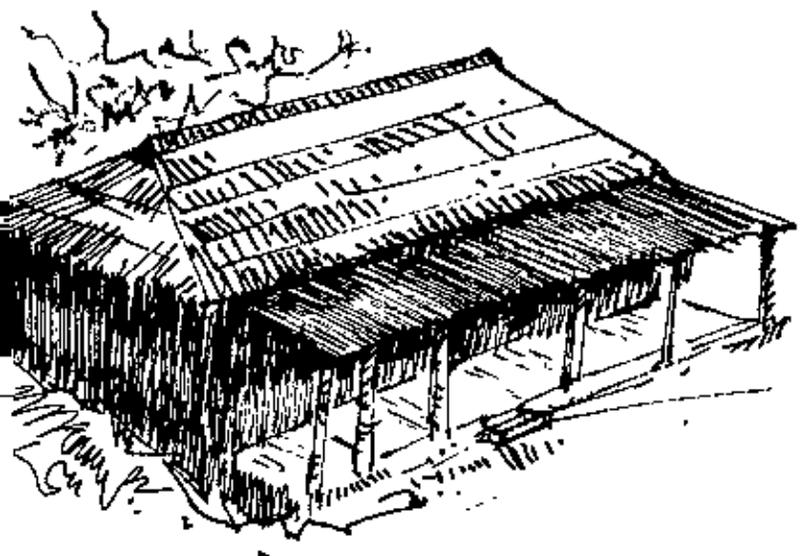
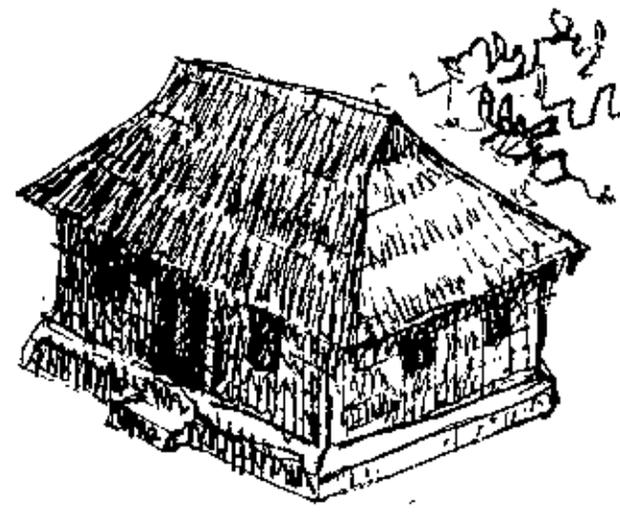
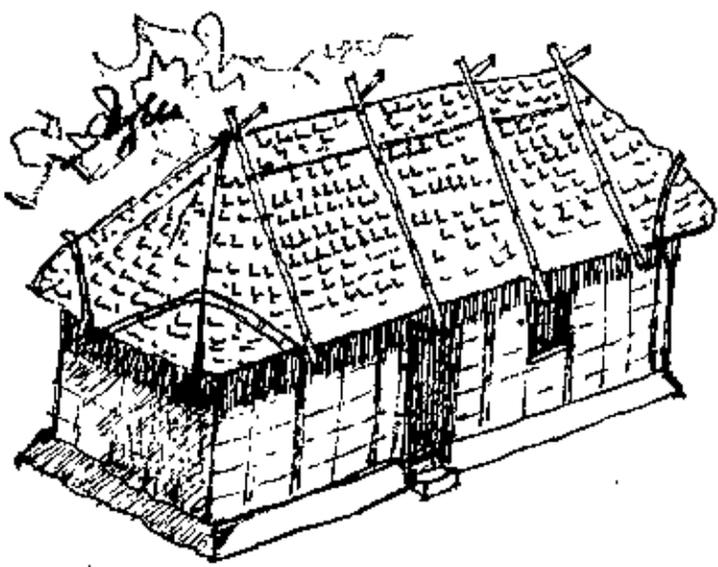
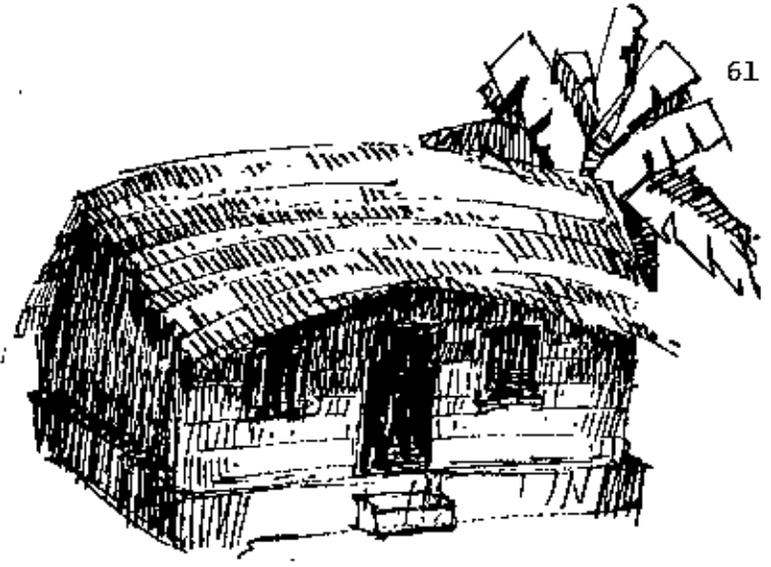
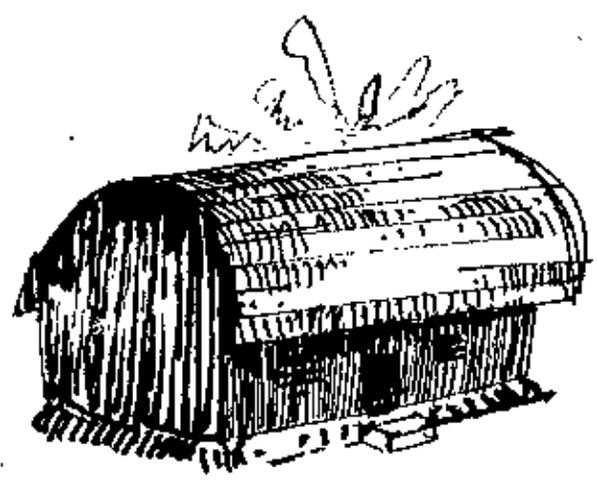
MUD HOUSE (SINGLE AND DOUBLE STOREYED)



MUD HOUSE (DOUBLE STOREYED)

routine (3-6 months) application of mud slurry mixed with cowdung and more frequent attendance is required in rainy season. This type of houses are most common in the high flood free regions, specially in Piedmond region, Bariud and Modhupur Tracts and in the eastern part (Plain area only) of Bangladesh. In the flood plain region mud house is rarely seen as the mud walls are not suitable for flood area unless the 'Viti' is sufficiently raised above the heighest flood level. In the areas having shifting river courses, Mud House are not in practice because no dismantling and salvage of material is possible. Though ventilation is poor, the insulating effect of thick and cool walls keeps the interior comfortable. Mud walls with thatched roof is an ideal combination for keeping the interior cool.

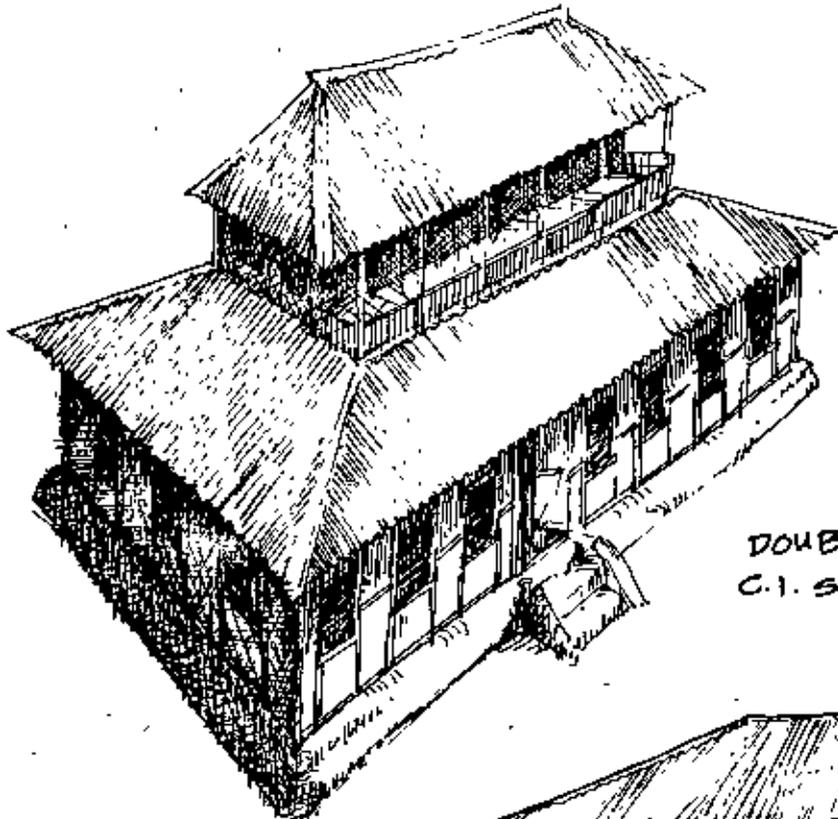
ii) Thatch House -- This is the basic traditional house for its extensive use all over rural Bangladesh. Here various kinds of thatched materials are in use for walls and roofs. For walls various materials are used starting from the cheapest type of jute sticks, reeds, various leaves (Gol pata, coconut leaf, palm leaf etc) to the more expensive and durable bamboo matting. All these walls are non-load bearing and strictly speaking, are wall covering panels used in conjunction with frame structure of the house, jute sticks, reeds and rice straw are usually used with mud plastering on one or both



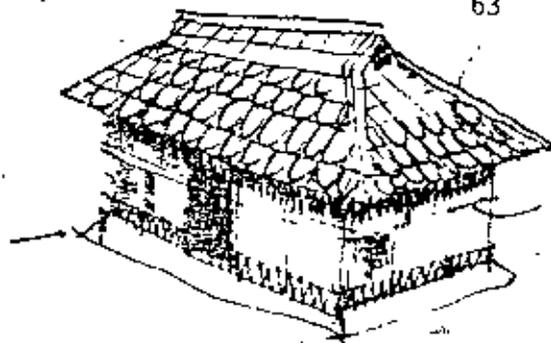
VARIOUS TYPES OF THATCH HOUSES

sides. Roof is framed by bamboo members and is covered by various kinds of thatch like jute sticks, rice straw, chhon, ulu, reed, bamboo matting and leaves (like Golpata, coconut leaf or palm leaf etc.). The durability of the thatched roof is very short. Generally such roofs have to be re-done once a year specially the covering. They are also easily vulnerable to strong winds and fire. All types of roof shapes are seen but the gabled with humped type roof is typical of thatch house.

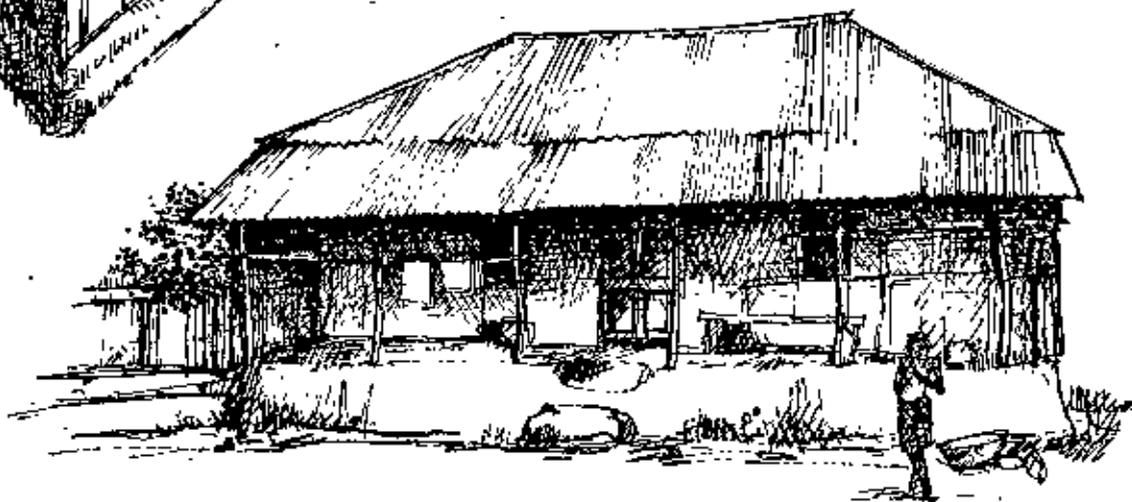
iii) Galvanized Iron Sheet House -- This type of house consists of timber frame structure of post and beams. Wall consists of timber frame of rectangular grid filled with plain or corrugated G.I. Sheet, wooden planks, door and windows etc. Roof structure consists of timber frame or purlins, rafters and battens etc. The roof configuration may be single pitched, double pitched gabled, hipped or double hipped. Roof is covered by galvanized C.I. Sheets or in some cases old C.I. Sheets resalvaged, cut in to shape after flattened. Corrugated G.I. Sheet despite of its thermal disadvantage, is socially preferred, because of its relative permanence, and its 'utility' character. Some houses of this type is seen as double storid structure. The life span is known to be over 60 years. This type of houses are seen all over Bangladesh. However its cost makes it accessible only to the well to-do families.



DOUBLE STOREYED
C.I. SHEET HOUSE

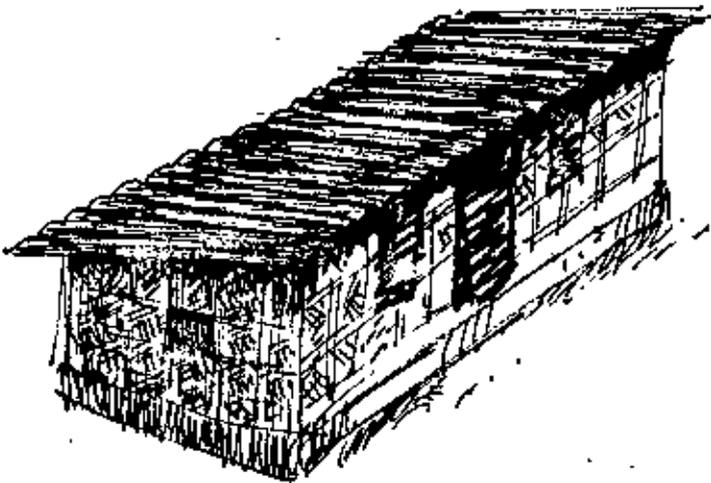


OLD SHEET
ROOF HOUSE

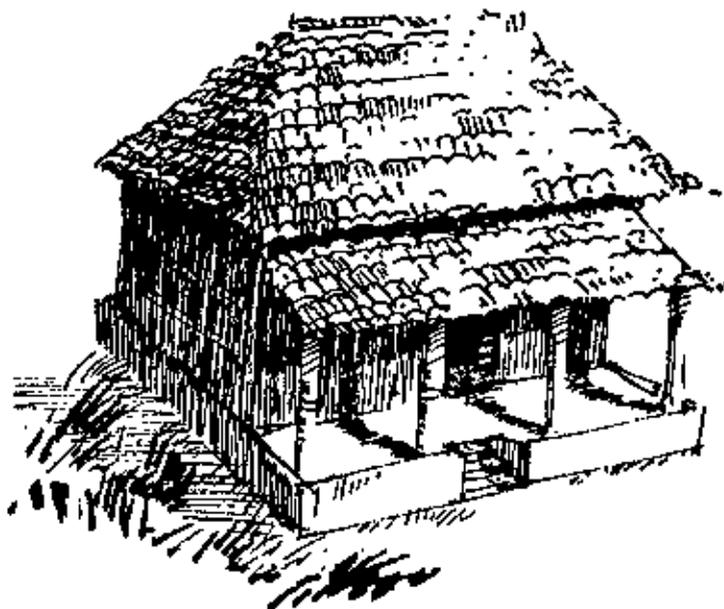


C.I. SHEET HOUSE
(SINGLE HIPPED)

642/6



SINGLE SLOPE C.I. SHEET ROOF
HOUSE. (BAMBOO MATTING WALL)



CLAY TILE HOUSE

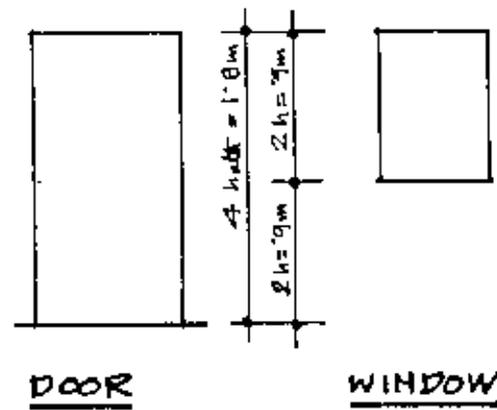
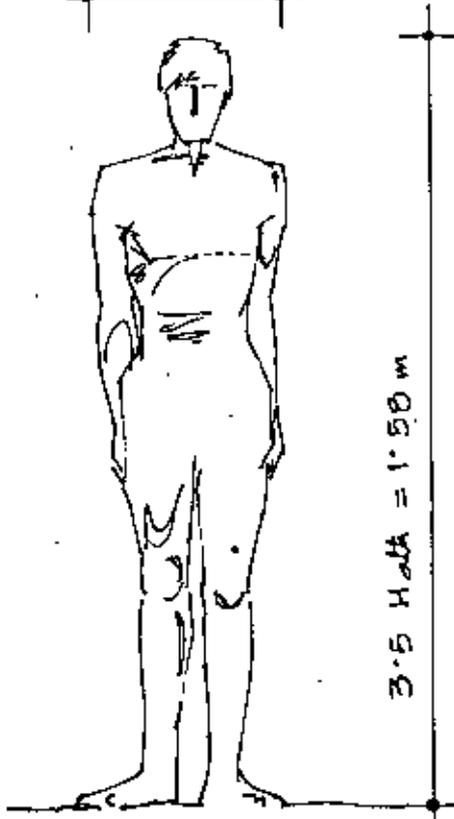
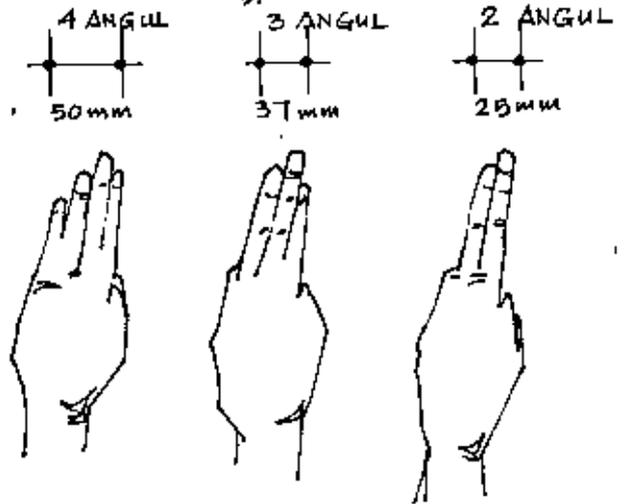
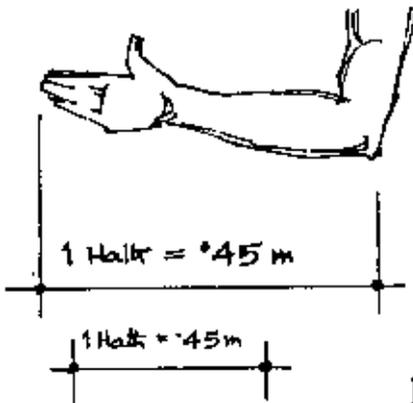
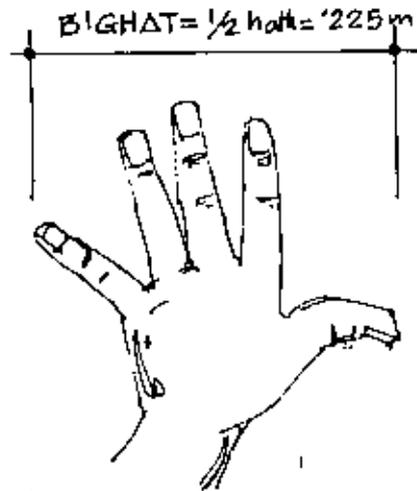
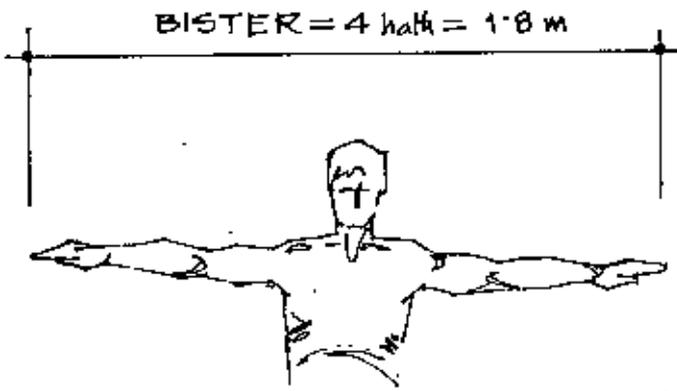
iv) Tile House -- Houses with tile as roof covering, irrespective of the wall is termed as tile house. House structures, walls and roof structure may be any one of the mud house, G.I. Sheet house or thatch house except the roof covering. There are two types of tiles in use - flattered and curved. Tiles are locally burnt and available in local markets. Tile house is durable so far the roof structure is all right and quite comfortable due to its good heat insulation quality. Once tile house were popular more or less all over Bangladesh, but now a days this types of houses are mostly seen in western region of Bangladesh. Its use is decreasing day by day with the scarcity of wood and craftsman.

v) Other types -- Many of the tribal houses are built on stilts ranging from .6m above the ground level to 6m high (Garo tribe) platform which are mainly thatch house. A few Bhuddist communities dotted along the coast also build their houses on 1.5-2.5m high stilts with the characteristics of G.I. sheet house. Another type of house is 'Boat House' which is built on boat and are inhabited by the nomadic people like 'Bede'(snake charmer).

If geometry is concerned; rural houses offer their varieties, mainly in roof shapes, and roof always is the dominant character of a house. The room shape determined by the

enclosing walls are almost universally rectangular. Rectangular shaped houses range in size from 10'X15' to 15'X25'. In some cases a varanda is added, width not more than 5 to 6 feet. The size of the house varies with the economic ability and social status of the occupants. Size and layout of a rural house is determined by 'bandh' (length + width = 'Bandh' in hand unit or 'hath'). There is a prejudice that the 'Bandh' must be an odd number -- which commonly varies from 13 'hath' to 27 'hath' (1 'hath' = .45 met). Besides 'hath' there are other traditional units of measurement like 'Bighat' (half of a 'hath) and 'angul' (width of a finger). These are used in more detailed measurements. Height of the plinth varies in different regions within .3m to 1.2m. Height of walls varies from 2.1m to 3.6m

Pitched roof is common in rural houses. A variety of pitched roof are there -- single pitched ('EK chala') of 5° - 10° slope, double pitched gabled ('do-chala'), hipped ('char chala') of 30° - 45° slope. Other than pitched roof, humped roof and barrel vault type roofs are also seen which are usually thatched roof. Humped roof is a pre-tensioned roof structure to counteract the load of the thatched roof when it is heavy under rain.



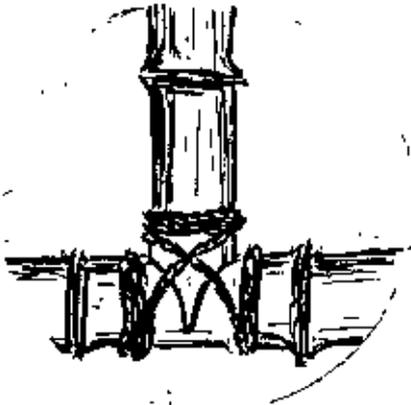
TRADITIONAL SYSTEM OF MEASUREMENT

4.2 ELEMENTS, MATERIALS, AND METHODS OF CONSTRUCTION

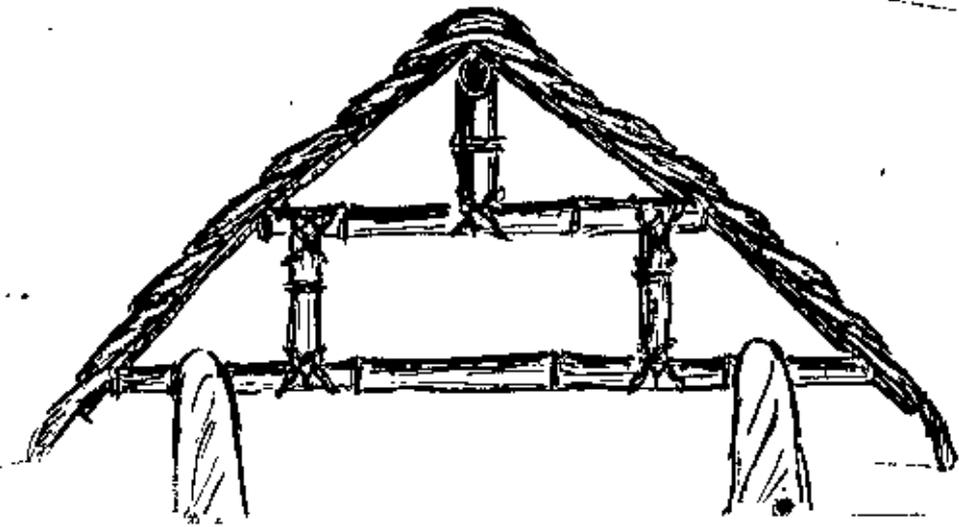
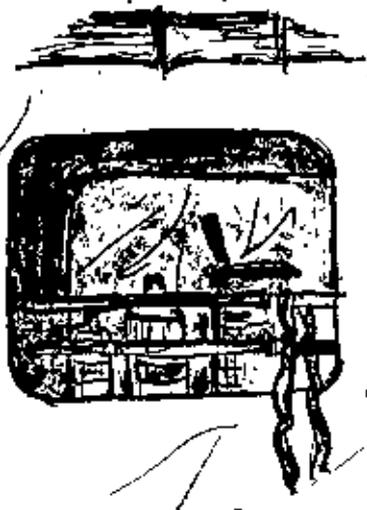
House building in rural Bangladesh is a seasonal event usually completed before the onset of the nor 'wester and the arrival of the monsoon and carried out in periods of low agricultural activity i.e. after harvest and rice planting. The first step in the process of building a new house is the construction of the plinth or 'Viti' -- a platform of rammed earth on which the shell of the house will stand and this is true in case of a site above the flood plain. If the site is below the flood plain, then an artificial 'mound' is first built using earth from a freshly dug pond on the site. The 'viti' or 'the rammed platform' is then built on the 'mound' to take the super structure of the house. Building of the 'viti' is preceded by selection of suitable quality of earth. Red soil or sandy clay is preferred which may be clayey silt or silty clay. The earth is usually collected from the undisturbed sub-soil strata and placed, rammed and stabilized in layers upto the desired level and in the desired form. Prior to placement of the soil and ramming, preparation of the soil is necessary which is done by kneading and mixing with water to make it softer and more workable. Sometimes rice-husk or wood dust is mixed with this soil mass and the soil mass is left idle for a few days to allow

the water to be absorbed uniformly. After formation and hardening of the plinth, thin soil plaster is applied on the surface of the plinth to make it neat and ready for use. Except in the case of mud houses and mud-brick houses where the walls are first built over the foundation trenches, the plinth is the first element of the house structure that is to be built.

The walls of the traditional house structures can be of two basic types, namely, the mud walls and the bamboo or reed walls as has already been mentioned. Apart from these two types walls are sometimes, made with C.I. sheets on timber frames. This technique is expensive and only the relatively rich families can use it. Construction of mud walls is preceded by digging of foundation trenches, about .5m-.6m wide and .6m-.9m deep all around the plan of the house. Foundation walls then come up filling the entire width of the trenches and getting gradually narrower upwards. Prepared well-mixed cohesive mud is placed in layers of about .3m-.5m depth and rammed well before and allowed to dry for one to two weeks and then next layer is constructed. The process is repeated until the full height is reached. The required opening for doors, windows, and recesses for shelves etc. are provided during the process of construction.



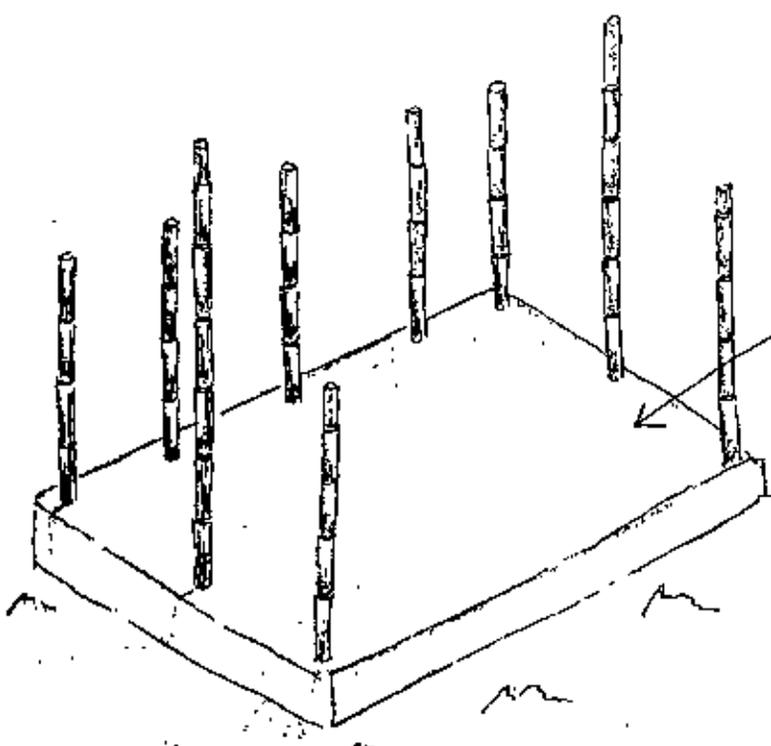
MUD HOUSE
(THATCH ROOFING)



To control irregular cracks, the outer surfaces of the mud walls are sometimes provided with thick horizontal and vertical grooves in a square or rectangular pattern. These grooves increase in size as the wall dries and the cracks due to shrinkage and joints between successive layers are filled with a mixture of mud and cow-dung and finished to a smooth surface in the final coating. The process of construction takes about 3-6 months. Another type of mud wall is also in practice with hand-made sundried mud bricks. In this type, foundation upto plinth level is done as usual like the formal mud walls and the mud brick is laid from the plinth level upward using clay mortar. Asphalt or lime is sometimes applied on the exterior surface of the walls to protect them from damage due to rain water. The resulting wall has good insulation, can support considerable load and is stable against stormy winds. The wall serves also the added function of providing sufficient storage space in the recesses which can be built in the walls.

For bamboo, reeds or wooden frame walls, no foundation is necessary. The plinth is first built and consolidated. Quality bamboo poles or timber logs are then erected vertically at the four corners of the plinth and also in between if necessary by introducing the lower ends of the posts or logs in to the holes dug through the depth of the plinth and upto

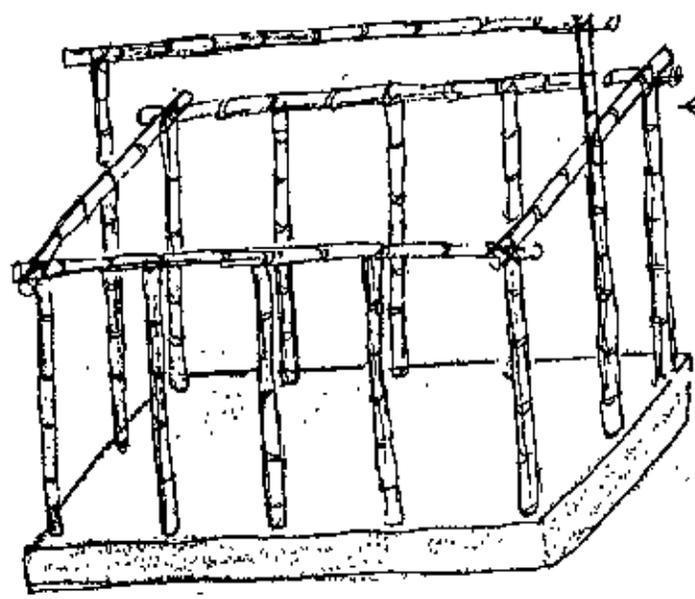
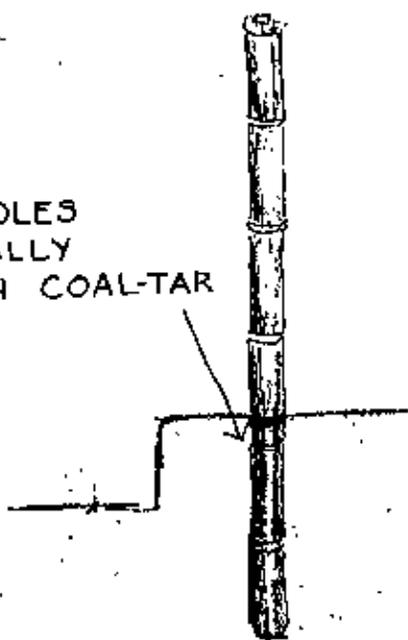
a depth of about .6m-.9m in the original ground. The posts are braced horizontally by bamboo or timber members tied together with ropes, G.I. wires and iron nails, to form a rigid frame for the walls. This frame receives the wall panels of bamboo, reeds or timber framed C.I. sheet, which are fastened or fixed to the frame by G.I. wires or iron nails. On the basis of roof structure and roof covering traditional roof can be classified into three types -- thatch roof, tin roof and clay tile roof. All these roofs, have rectangular base frames coinciding with the rectangular out-line of the of the house which is made by bamboo poles or timber logs of required length being tied together or nailed at the ends with each other. Thatch roof framing consist of bamboo members framed into a triangular truss supported on the frame of the wall and horizontally braced by ridge ties. Rectangular grid of split bamboo spaced .3m both ways is laid on the truss and is tied together. The ridge of the roof frame is occasionally raised in the middle forming a heaped roof of usually four slanting planes, one pair of which is larger and rectangular while the other pair is smaller and triangular and generating a ridge at the top. The cross members of the roof frame forming the ridge is sometimes bowed applying pre-tension which adds a stooping character to the usual sloping roof form.



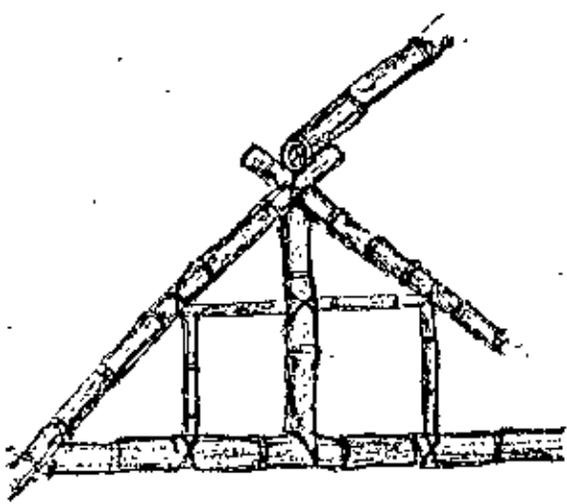
LOOSE SOIL IS BEATEN UP TO BUILD THE PLINTH.



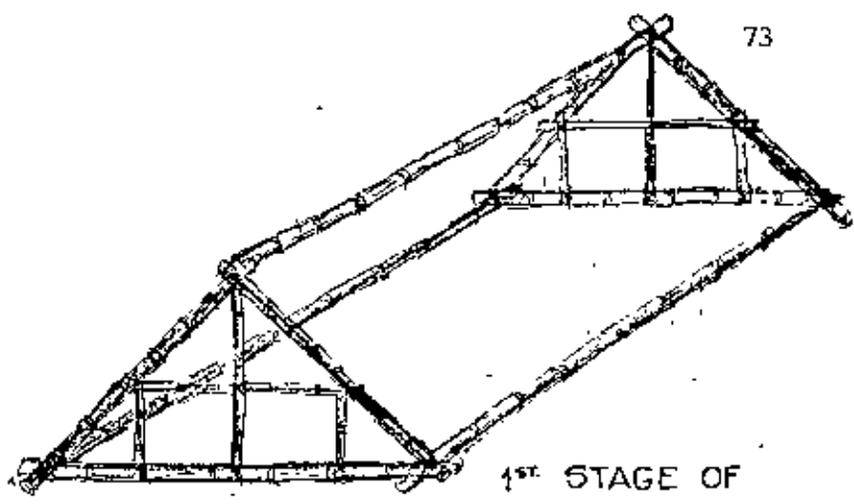
BAMBOO POLES ARE PARTIALLY COATED WITH COAL-TAR



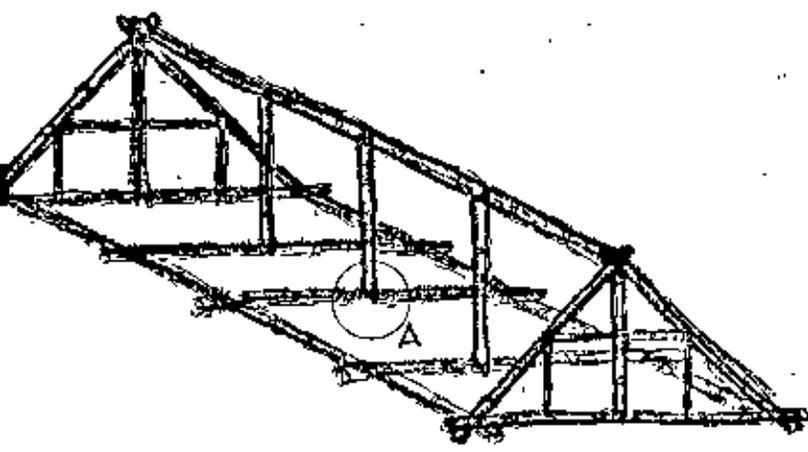
HORIZONTAL BAMBOO POLES ARE FIXED WITH THE VERTICAL POLES.



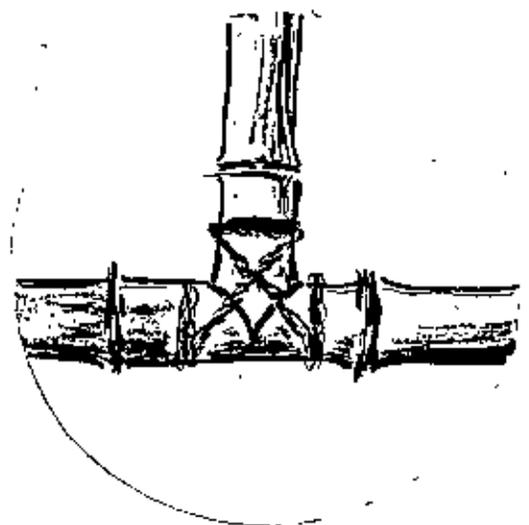
DETAIL OF END TRUSS.



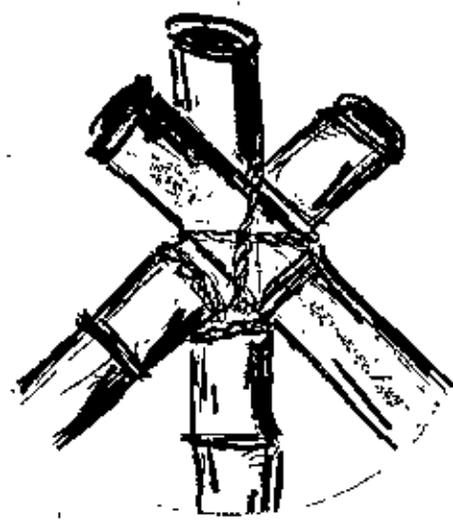
1ST STAGE OF ROOF FRAME



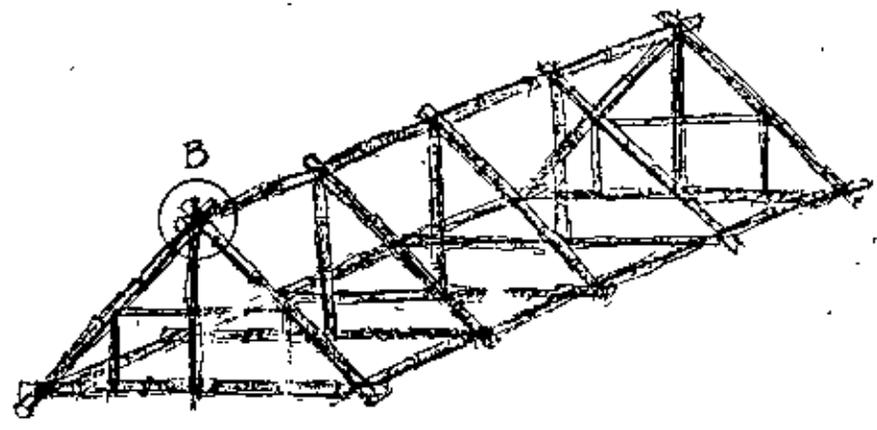
2ND STAGE OF ROOF FRAME



DETAIL AT A

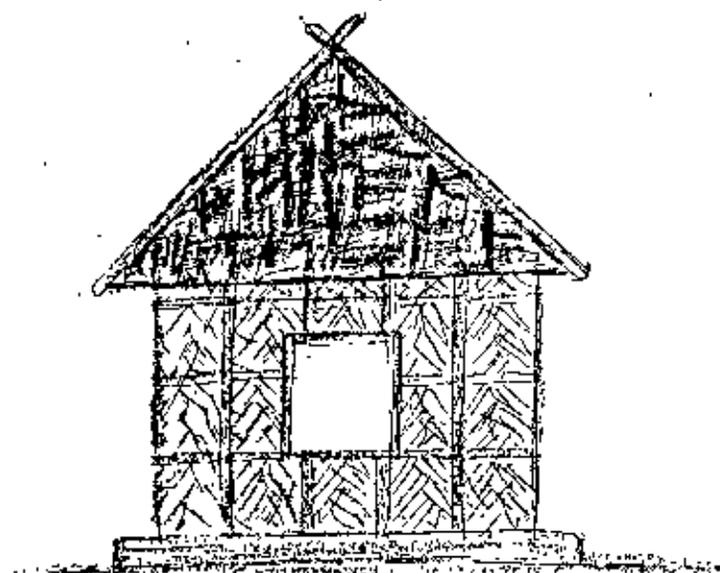


DETAIL AT B

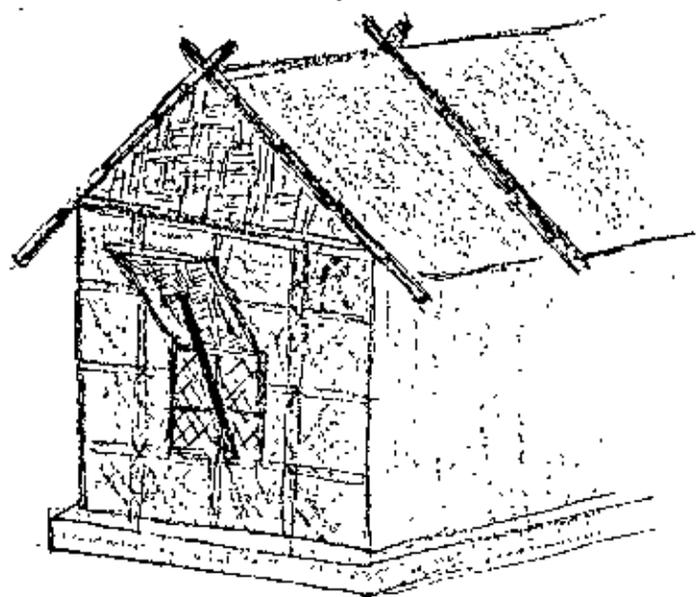


3RD STAGE OF ROOF FRAME

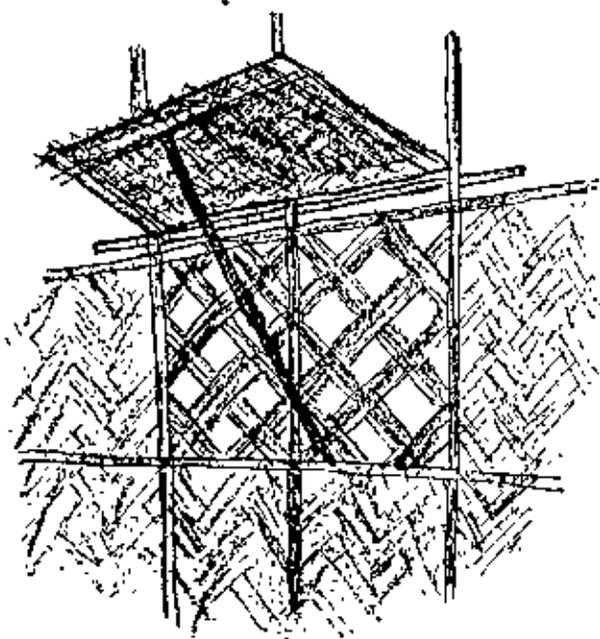
BAMBOO ROOF FRAMING



MAT IS CUT AWAY
SO AS TO FORM
THE WINDOW/ OPENING.

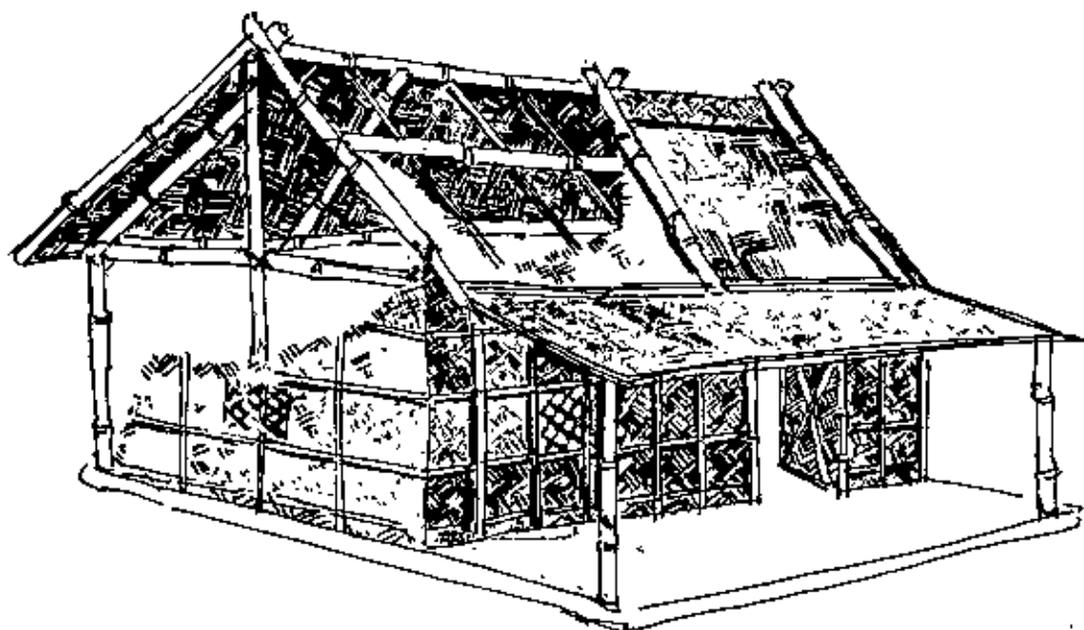


ANOTHER MAT IS
MOVEN AND FIXED.

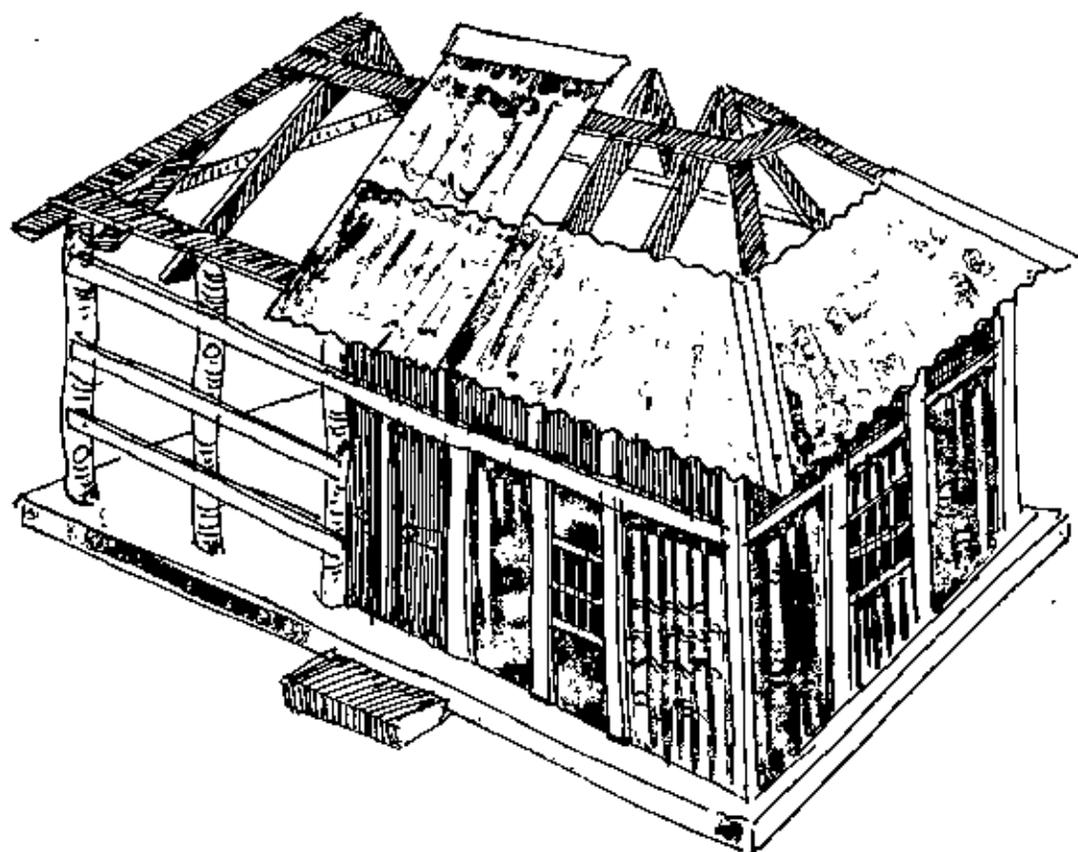


THE WINDOW/ SHUTTER IS
RAISED AND KEPT IN
PLACE BY A BAMBOO STICK.

This is done to counter-act the sagging tendency of the frame under self weight. The roof configuration may be double pitched (do-chala) gabled or hipped (char-chala) both in 30° - 45° degree slope. The roof frame is covered on the surface with a thick layer of thatch (sometimes rice straw, ulu, jute sticks, reeds, gol-pata, palm leaf, bamboo matting etc) woven carefully and skill fully along the surface of the roof structure. In case of bamboo or reed panels walls, the base frame of the roof structure is tied with the top ends of the vertical members of the walls framing by means of ropes, canes or G.I. wires. In case of mud walls, the base frame of the roof structure sits on the walls and is anchored with horizontal bamboo poles laid embedded in the two layers walls slightly above the door level during construction of that level. The embeded poles are kept approachable by means of narrow slits at regular intervals at the top portion of the walls. Anchoring of the base frame of the roof structure with the embedded poles is done by means of G.I. wires. In another system, the two longer parallel walls receive a series of cross poles near the top of the walls. These horizontal poles pierce the pair of walls and extend for some length on either end beyond the wall. Two longitudinal poles are then placed over the ends of these horizontal poles. The



BAMBOO HOUSE

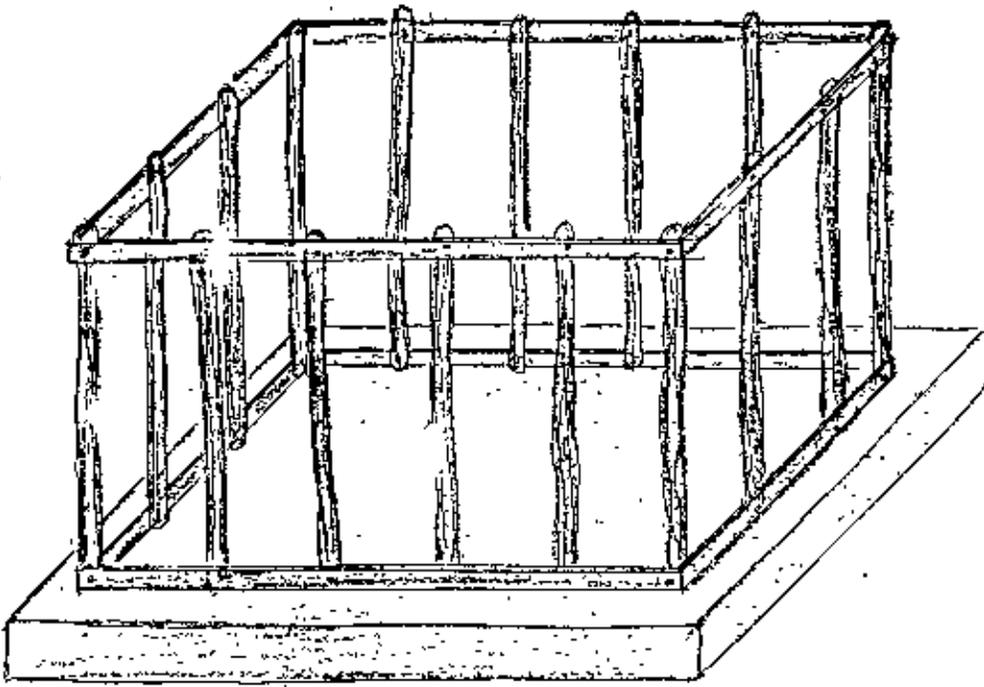


C.I. SHEET HOUSE

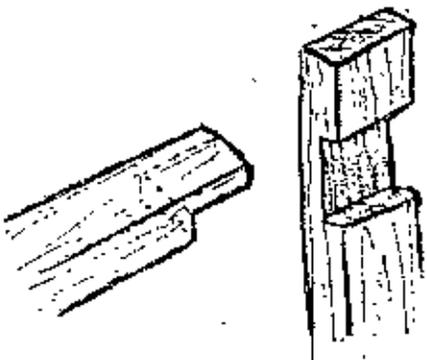
slanting members of the roof frame are then tied to these longitudinal poles which are in turn tied to the ends of the horizontal cross poles. Thus the load of the roof is transferred to the walls through the longitudinal and the cross poles.

In the tin roof type, timber or palm tree beams are supported on the vertical poles top and horizontal beams on the walls and are embedded into the same. Roof structure consists of timber frame, rafters, purlins and battens fixed by nails. The roof configuration may be single pitched (Ekk chala) 5° - 10° degrees slope, Double pitched (do-chala) gabled 30° - 45° degrees slope or hipped (char-chala) 30° - 45° degrees slope. Roof covering is galvanized corrugated iron sheets (C.I. sheet) nailed or screwed directly to the battens. Usually there is a false ceiling of wooden planks, palm tree planks, battle nut planks or bamboo matting spread on the horizontal beams under the roof. Space above the false ceiling is used as storage space and acts as a buffer zone for heat insulation. This type of roof is more or less popular all over Bangladesh due to its permanency, load bearing capacity and reusable quality.

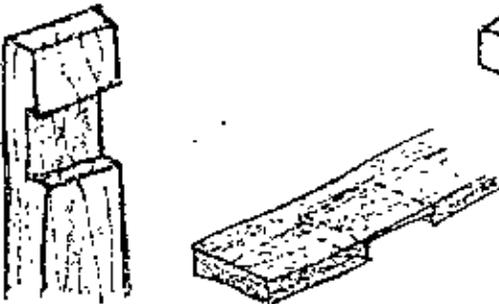
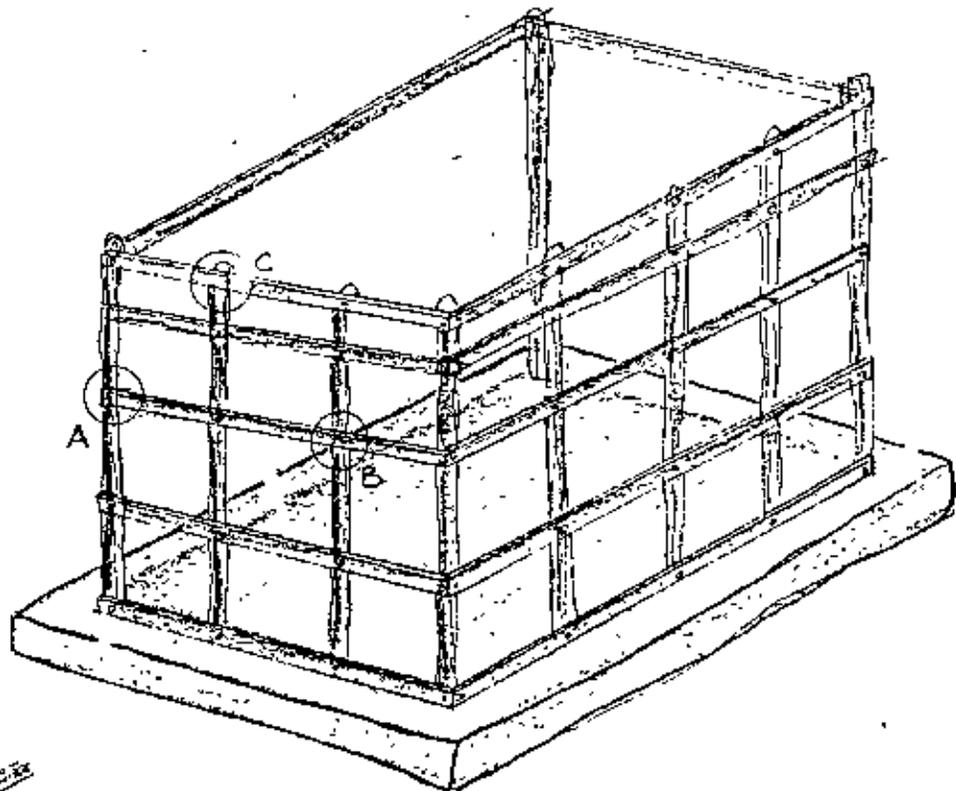
TIMBER LOG
FRAME
STRUCTURE



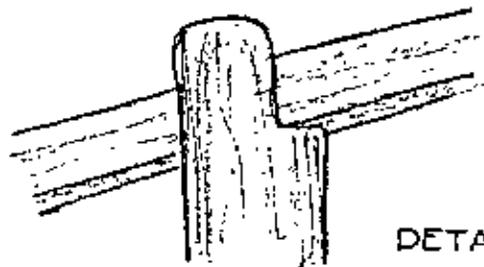
HORIZONTAL BARS
ARE FIXED TO THE
TIMBER POST.



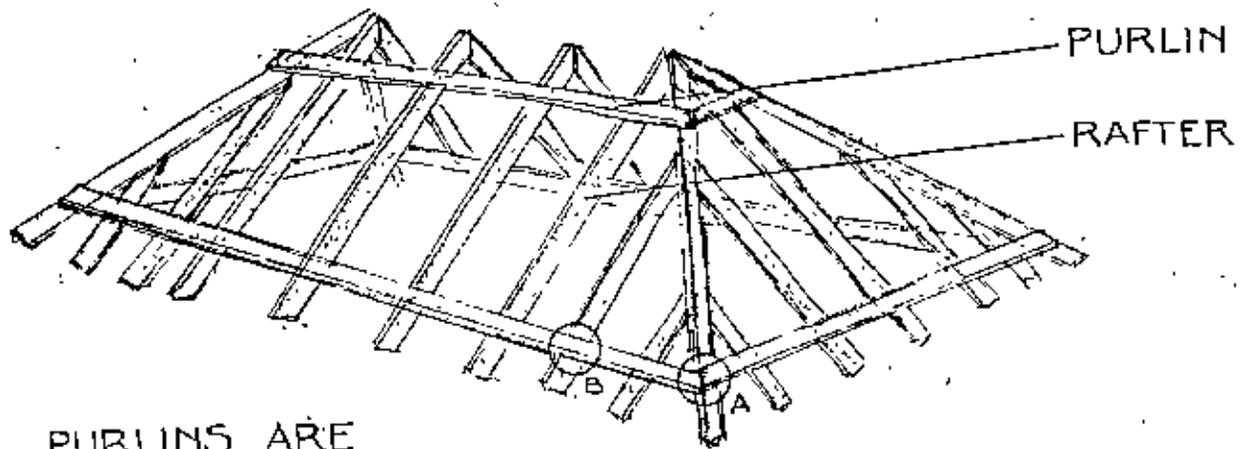
DETAIL AT 'A'



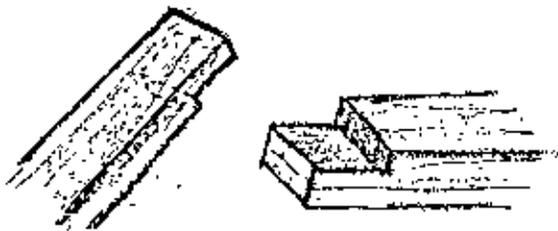
DETAIL AT 'B'



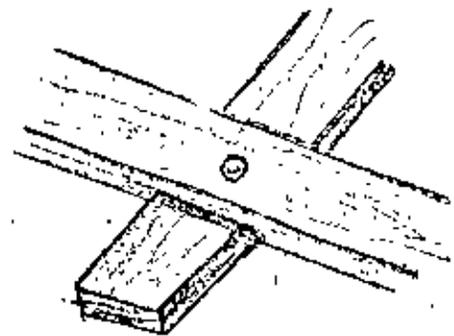
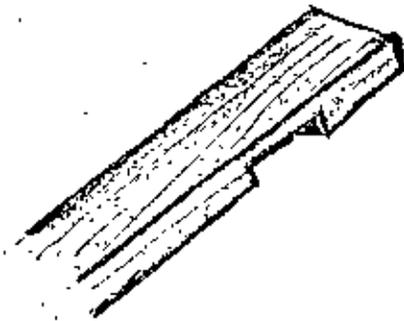
DETAIL AT 'C'



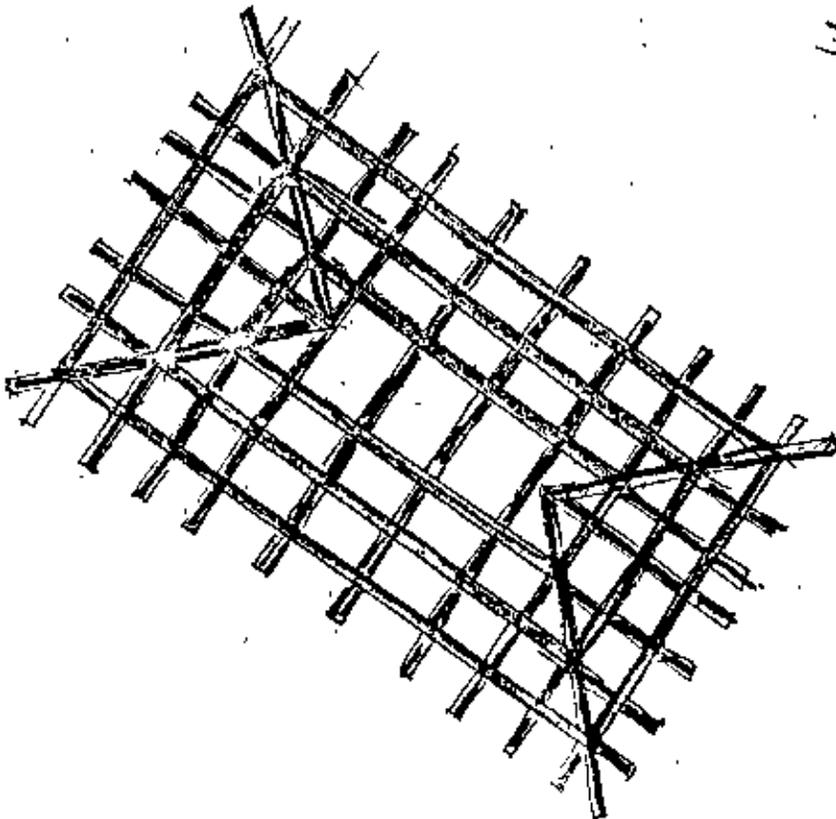
PURLINS ARE
JOINED TO THE
RAFTERS.



DETAIL AT 'A'

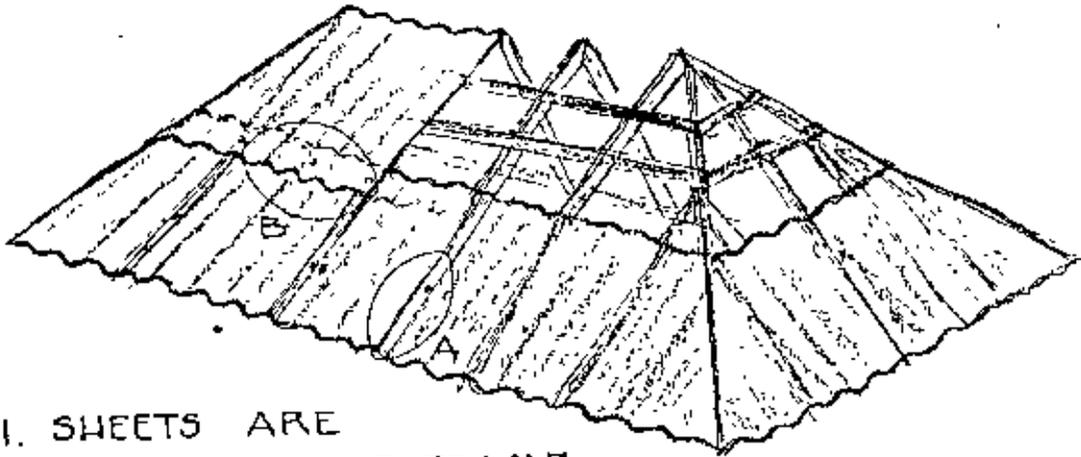


DETAIL AT 'B'



PLAN OF ROOF FRAME

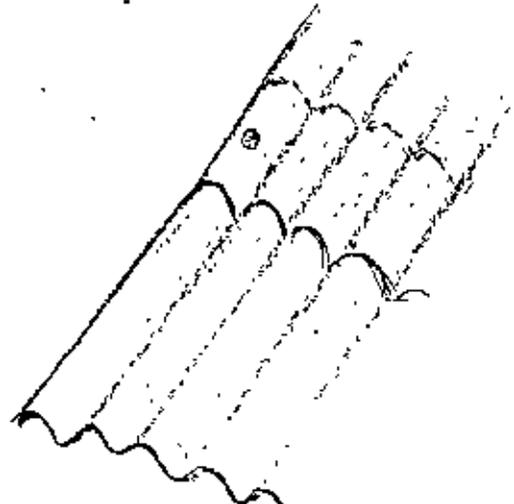
WOODEN FRAME
ROOF STRUCTURE



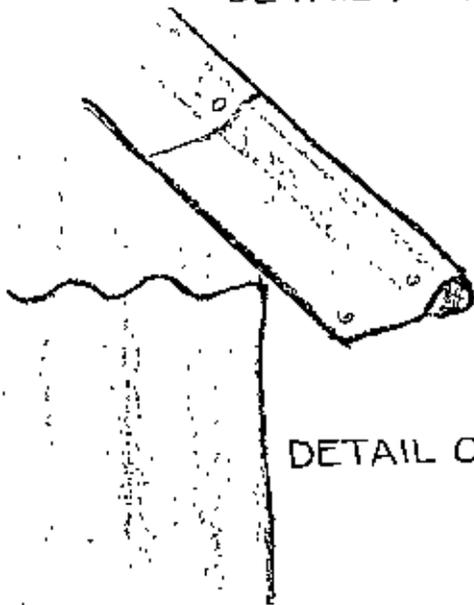
C.I. SHEETS ARE
FIXED TO THE ROOF FRAME



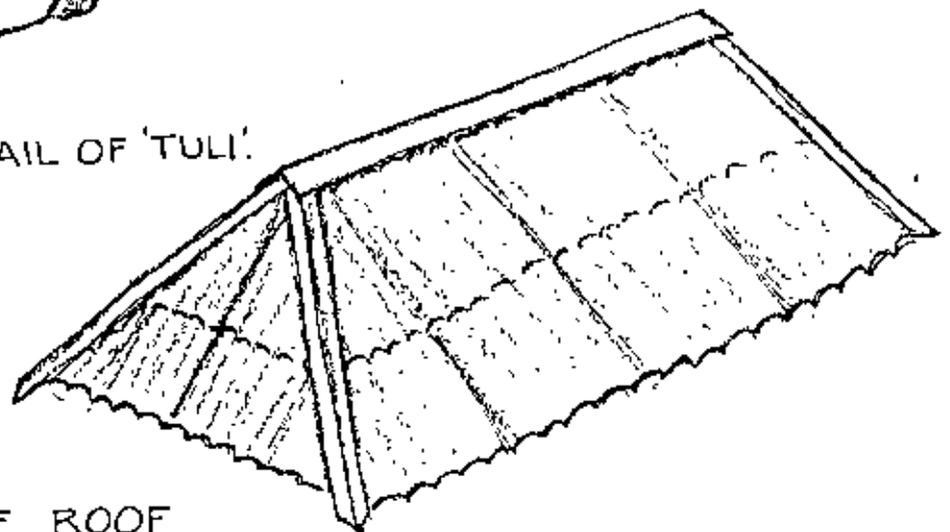
DETAIL AT 'A'



DETAIL AT 'B'



DETAIL OF 'TULI'



THE COMPLETE ROOF

Last of all Clay tile roof is also seen in some region specially in the western part of Bangladesh, although, once it had popular use all over the country. In this type of roof, the roof structure is similar to that of the tin roof structure and only the roof rafters and battens are closer and the clay tiles are fastened with G.I. wire. It is a long lasting roofing material.

CHAPTER - V

HOUSE CASE STUDIES

- 5.1 Objectives of the case studies.
- 5.2 Selection of case study houses.
- 5.3 Check-list of Questions for the case studies.
- 5.4 Presentation and arrangement.
- 5.5 Case studies.

5.1 OBJECTIVE OF THE CASE STUDIES

The case study was done with the intention to find the social explanation to different 'house' solutions present in the rural Bangladesh. Why for instance, some 'houses' are large, while others are broken into small ones? Why some are excessively built and the others are broken in to small ones? Why some 'houses' show total disregard to traditional values associated with 'houses'? Why the houses are built with particular layout and organization? Why particular materials are used for a particular house? Subsequently it was the target to find the roots of origin of the 'houseform' and to analyse the effects of land, culture, climate and available resources on houseform. Relative importance given to the various aspects of houseform was also under investigation. The variety was empirically observed in built expression - either in the houseform or in the way the land is used. It was also the objective of the case study to see the trend of transformation and change in traditional houseform, analysing which the potentials of indigenous materials, methods and techniques could be found out.

5.2 SELECTION OF CASE STUDY HOUSES

The houses for the purpose of the case study were selected as samples from different physiographic regions of Bangladesh to get a wide range of variety. It included more or less all the regions except the tribal areas. Tribals have their different cultures, life styles and their houses are quite different from that of the rest of Bangladesh, which itself can be a separate topic of study.

For the purpose of their research work, rural Bangladesh was extensively visited covering different characteristics regions. Sample houses were selected mainly from the flood plains which covers 2/3 area of Bangladesh.

In the different regions some typical villages were selected and the houses of the farmers were given priority for the case study.

For the purpose of the case study, as many as 30 houses were surveyed, but only 15 are presented here. Duplication of houses of similar character from the same region was avoided. Stress was given to represent wide variety of houses in a broad spectrum.

5.3 CHECK-LIST OF QUESTIONS FOR HOUSE CASE STUDIES

5.3.1 Identification

- 5.3.1.01 Particulars of the respondent
- 5.3.1.02 Particulars of the house and the Locality
- 5.3.1.03 Nature of surrounding countryside.

5.3.2 Family Profile

- 5.3.2.01 Family history
- 5.3.2.02 History family employment and specialization
- 5.3.2.03 Present employment/education of different family members, their economic condition
- 5.3.2.04 Family tree and land inheritance/
Subdivision etc.
- 5.3.2.05 Future plan on homestead land.

5.3.3 The house information

- 5.3.3.01 Physical description of the house/
property etc.
- 5.3.3.02 Evolution and fragmentation of the
homestead land.
- 5.3.3.03 Original house and development.
- 5.3.3.04 Layout and organization of spaces.
- 5.3.3.05 Description of various structures --
Dwelling unit proper, kitchen, Out-house,
Cowshed, Stove etc.

5.3.3.06 Batting and toiled facilities.

5.3.4 House Structure Information

5.3.4.01 Type of structure and geometrical properties

5.3.4.02 Use of materials and construction techniques.

5.3.4.03 Maintenance and Repair of the structure.

5.3.4.04 Probable life of materials used.

5.3.4.05 Role of local craftsman and the owner.

5.3.5 Total Cost/built area

5.3.5.01 How the building materials were acquired
and economised etc.

5.3.5.02 Labour - skill or semi skill, cost
or wage.

5.3.5.03 Time and duration of construction

5.3.5.04 Source and amount of finance for housing.

5.3.6 Users View

5.3.6.01 User's views on advantages/disadvantages
of the present type of housing elements.

5.3.6.02 User's view for the future housing.

5.4 PRESENTATION AND ARRANGEMENT

For the purpose of the presentation, each case study explanation is done in the light of the following aspects:

- i) Evolution of the house
- ii) Organization of the house
- iii) Preference of building materials.

Only those parts of the interview and observation directly related to such explanation is included.

In presentation, the sketches are made self-explanatory though a brief written material is included. It follows the following sequence:

- a. House and the locality
- b. House and land
- c. Family and the dwelling unit
- C.1 Description of the present house
- C.2 House growth-evolution
- C.3 Space allocation/functional use of spaces.
- d. House and the Building Materials.
- e. Conclusion.

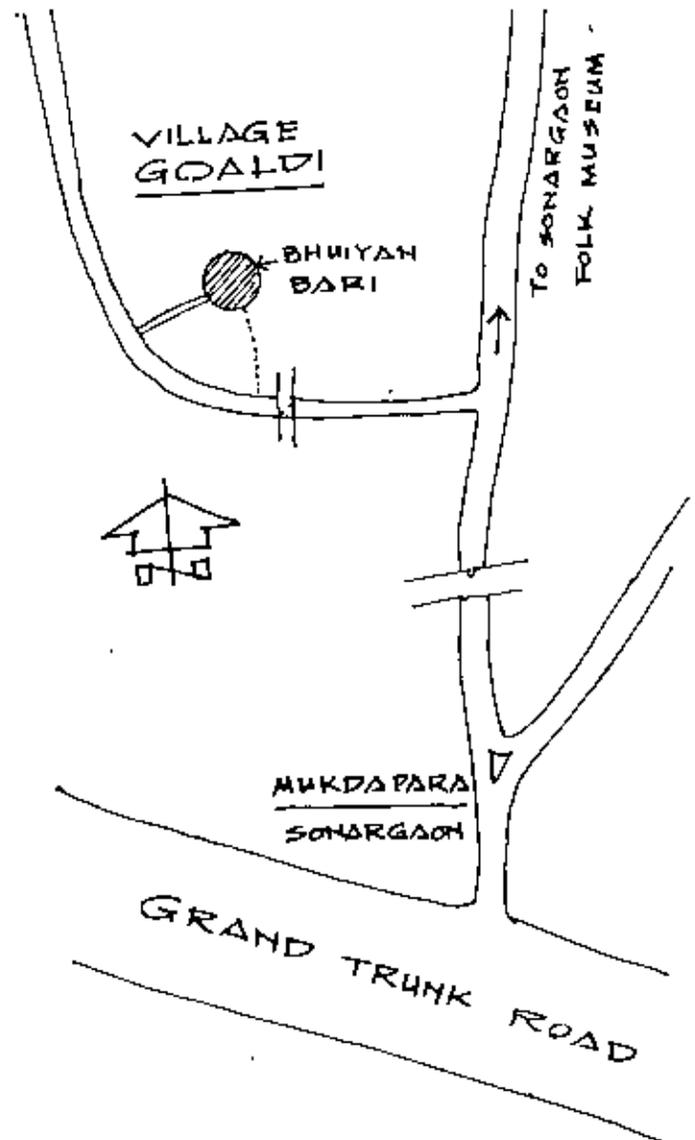
CASE STUDIES

CASE STUDY NO 01

HOUSE NO. 1/A

'Bhuiyan Bari',

Goaldi, Sonargaon, Dhaka



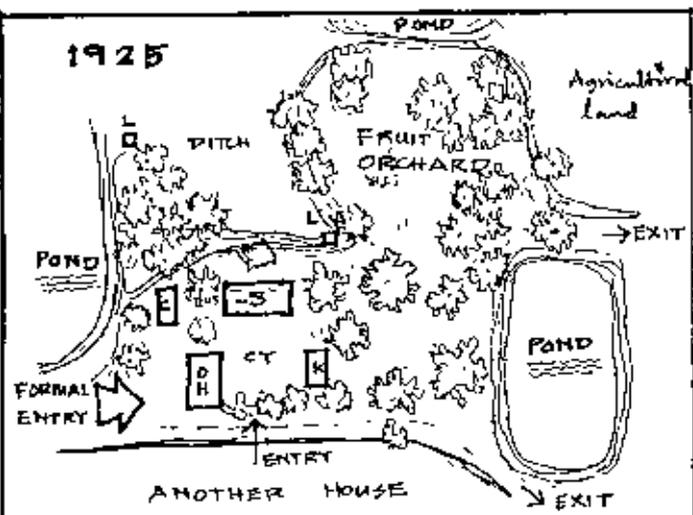
THE HOUSE AND
THE LOCALITY

The house under study is located in the Village Goaldi, under Sonargaon Upazilla of district Dhaka. The village is 18 miles off from Dhaka city and is approached by semi pucca road from the Grand Trunk road. It is a characteristic typical village of the flood plains of Bangladesh. It is an old tradi-

tional village, composed of four 'Paras' (neighbourhood), which are clustered in character. The 'Bhuiyan Bari' is located in centre of the villages and one of the oldest typical house of the village. The house is approached by a pedestrian village track which becomes submerged during the flood. Attached to this house is another house and they are separated from other clustered houses by low agricultural land. There is one main approach to the house and there are some other access too. The whole house is characteristically an extended house, socially identified as a single house, even though there are three separate houses clustered together.

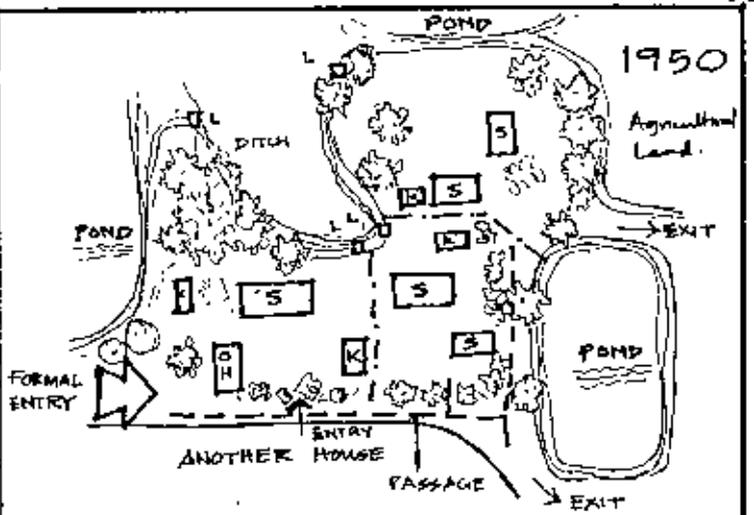
House and the land

The land that the whole home posses presently was originally an agricultural land. About sixty years back, the forefather came here and raised an artificial 'mound' (Raised plinth of the homestead) from the soil out of the ponds and ditches surrounding the house. A house was build around a courtyard at one side of the raised mound. The rest of the land was a fruit orchard. In course of time family members increased and consequently the family became divided in to three. The eldest brother got the paternal house within his one third share and the rest of the land was equally divided to the two younger brothers. They started building their own houses and now the greater house has become a cluster of three houses arranged around separate courtyards.



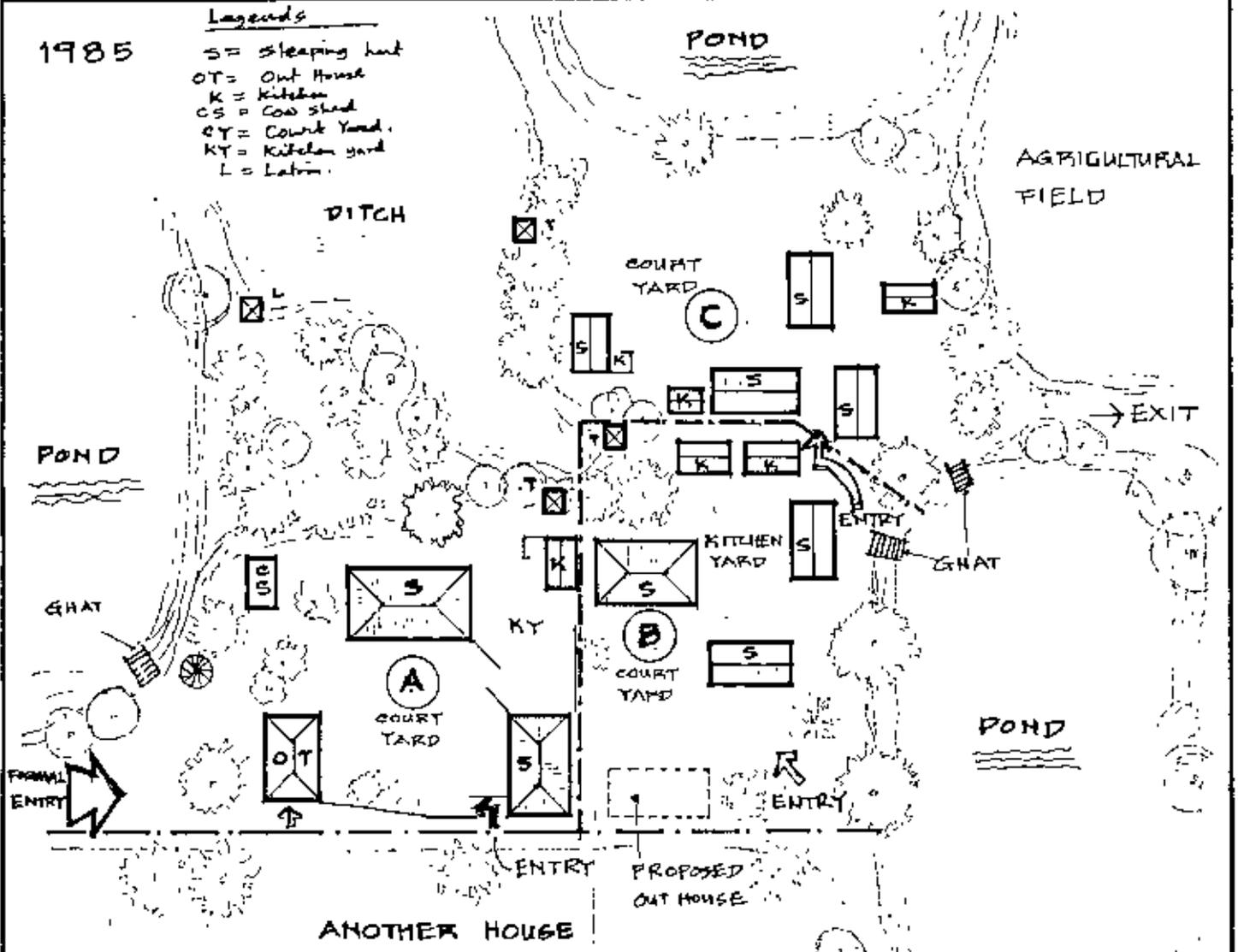
1925

THE HOUSE WAS BUILD, IN ONE SIDE OF THE NEWLY BUILD MOUND. HOUSE WAS ORGANISED AROUND A COURT-YARD. SURROUNDING OF THE HOUSE WAS FRUIT ORCHARD



1950

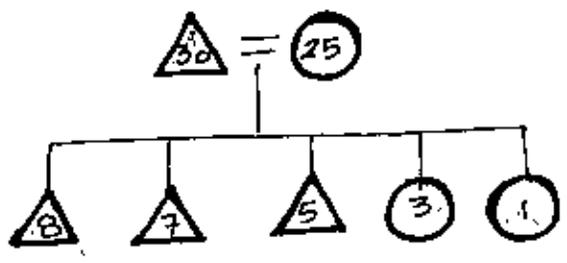
THE WHOLE HOME STEAD PROPERTY WAS DIVIDED IN TO THREE FOR THREE BROTHERS.



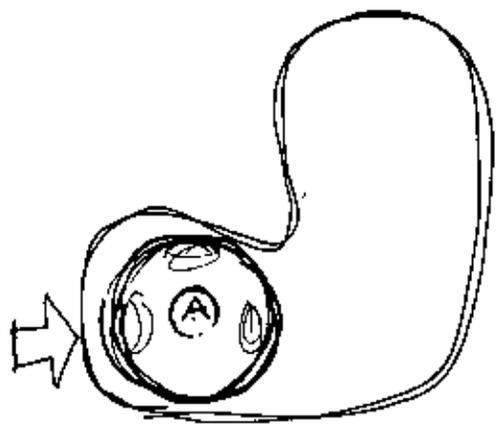
AT PRESENT THE WHOLE 'BHUIYAN BARI' IS INFACCT CLUSTER OF THREE INDIVIDUAL HOUSES. ALL THE HOUSES ARE ORGANISED AROUND SEPERATE COURT YARDS.

1925

1950

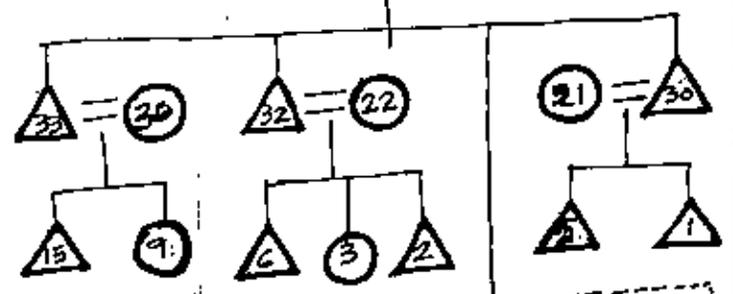


Family was a nuclear family with husband, wife, three sons and two daughters.

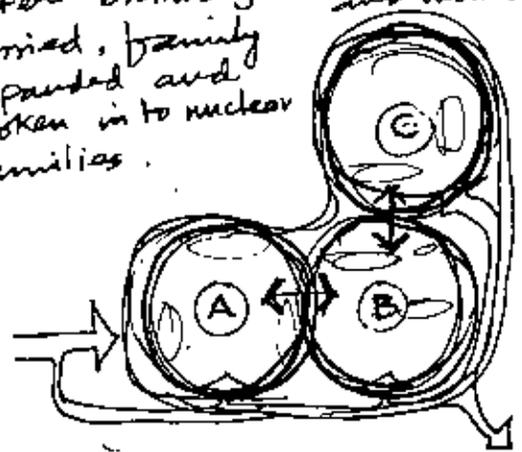
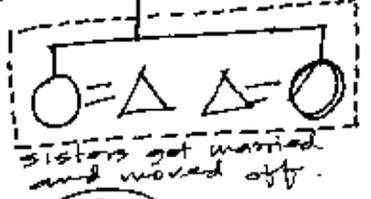


Single house within a corner and rest of the homestead was joint orchard.

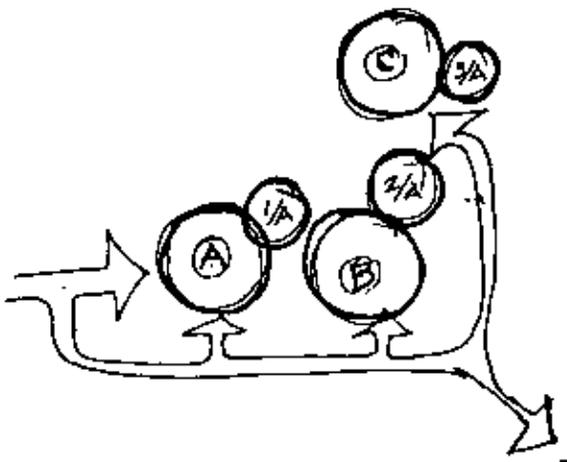
Diad → $\Delta = 50$



Initially it was a joint family. Later brothers got married, family expanded and broken into nuclear families.



The land of the whole homestead was divided into three parcels for three brothers after the death of their father. Each brother started building their own house on the separate land.



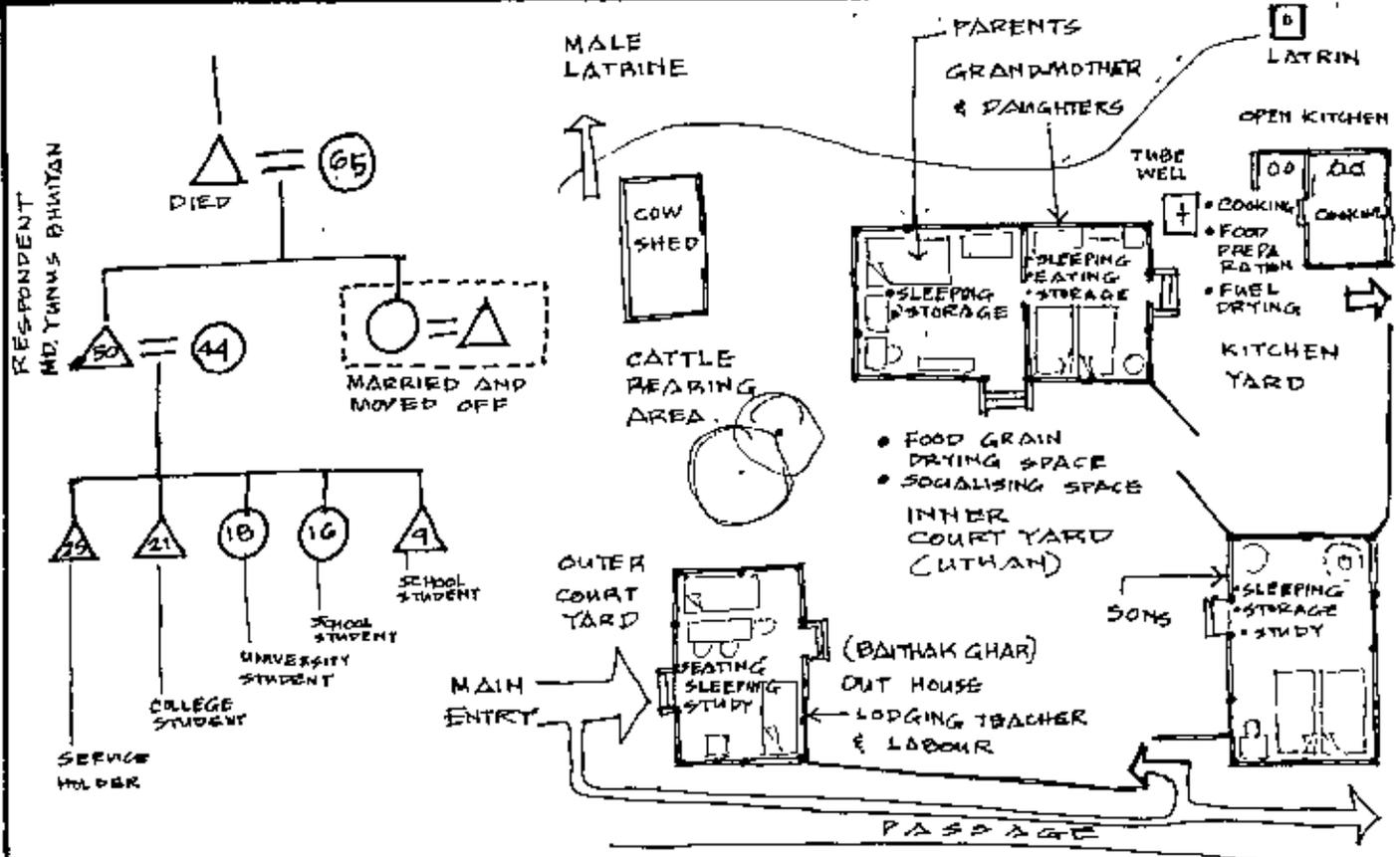
All the time new houses are grouped around an internal courtyard. Initial private walkway becomes public passage gradually. As the growth of houses goes on they become separate unit with separate identity.

Family and the Dwelling Unit

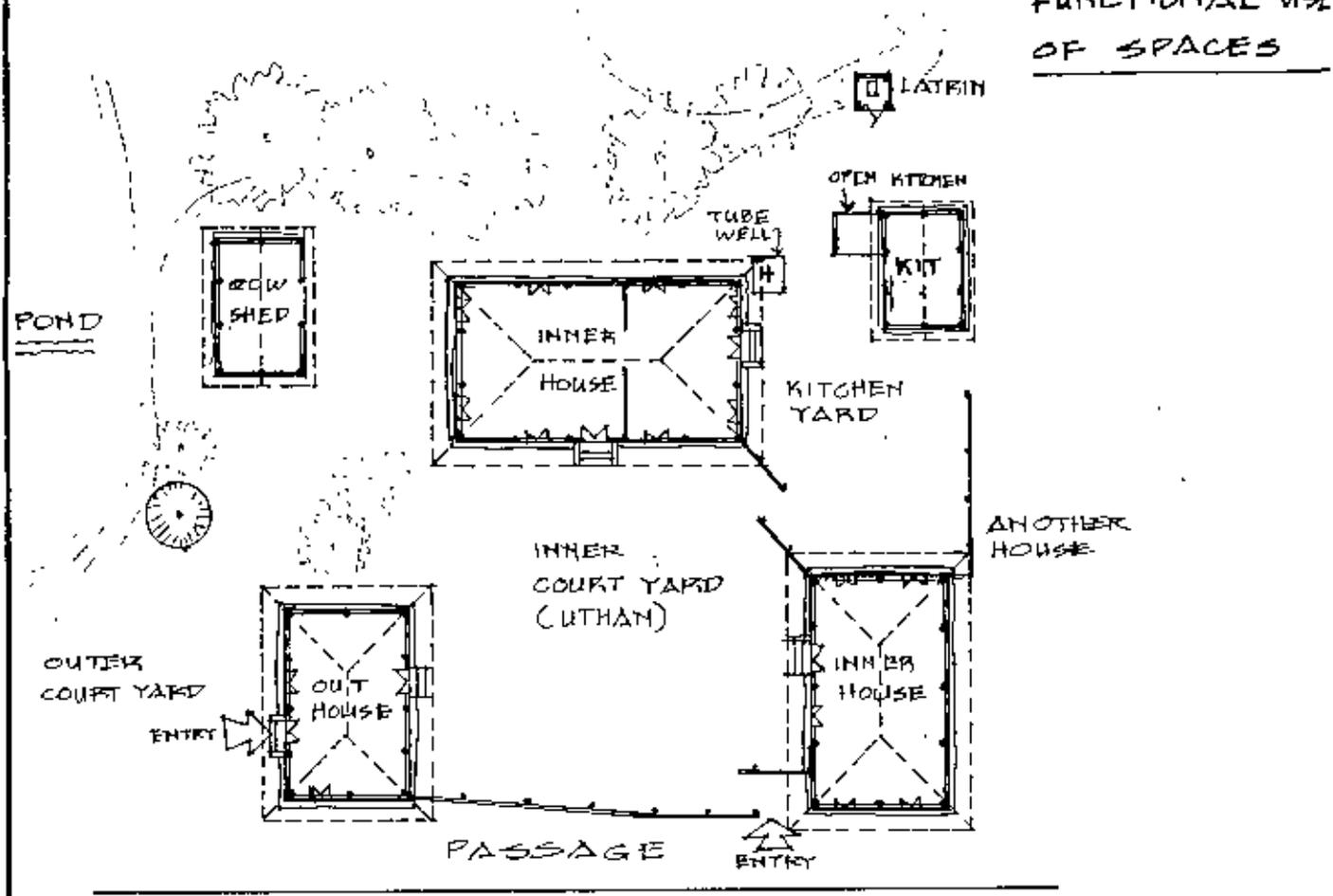
HOUSE NO. 01

Owner -- Md. Yunus Bhuiyan(50)

This house is owned by Md. Yunus Bhuiyan and other members of his family are his old mother, wife, three sons and two daughters, a lodging teacher and a seasonal labour. The owner of the house is basically an farmer by occupation. He has other sources of income from some business in the local market. He is an influential man of the village and he was once a member of the local Union Parisad. His family is well off. His children are all getting education. The elder children are student of college and university in Dhaka city. As Mr. Yunus is the only son of his parents, he got quite good amount of agricultural land. He cultivate some of his agricultural land on his own. The rest are leased to the share croppers. He has surplus crops, from his land. This is the original house resided by the forefathers. There were three units. Now only one of the original exists, rest two were removed by his uncles as they were equal share holders. The owner's father erected two temporary structure and he remodelled. The units are grouped around a 'Uthan' (courtyard). The kitchen and the cowshed are placed out of the main group.

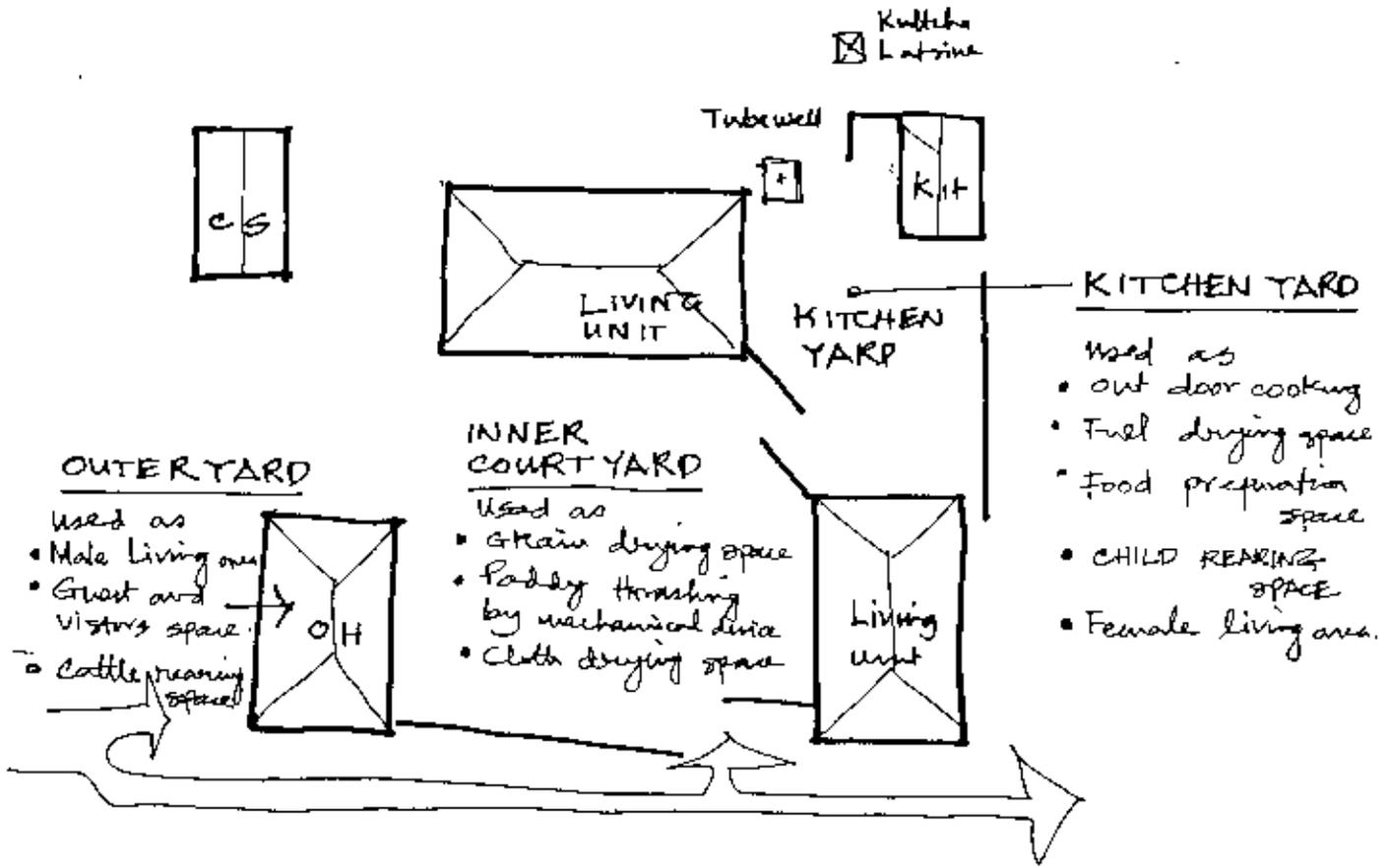
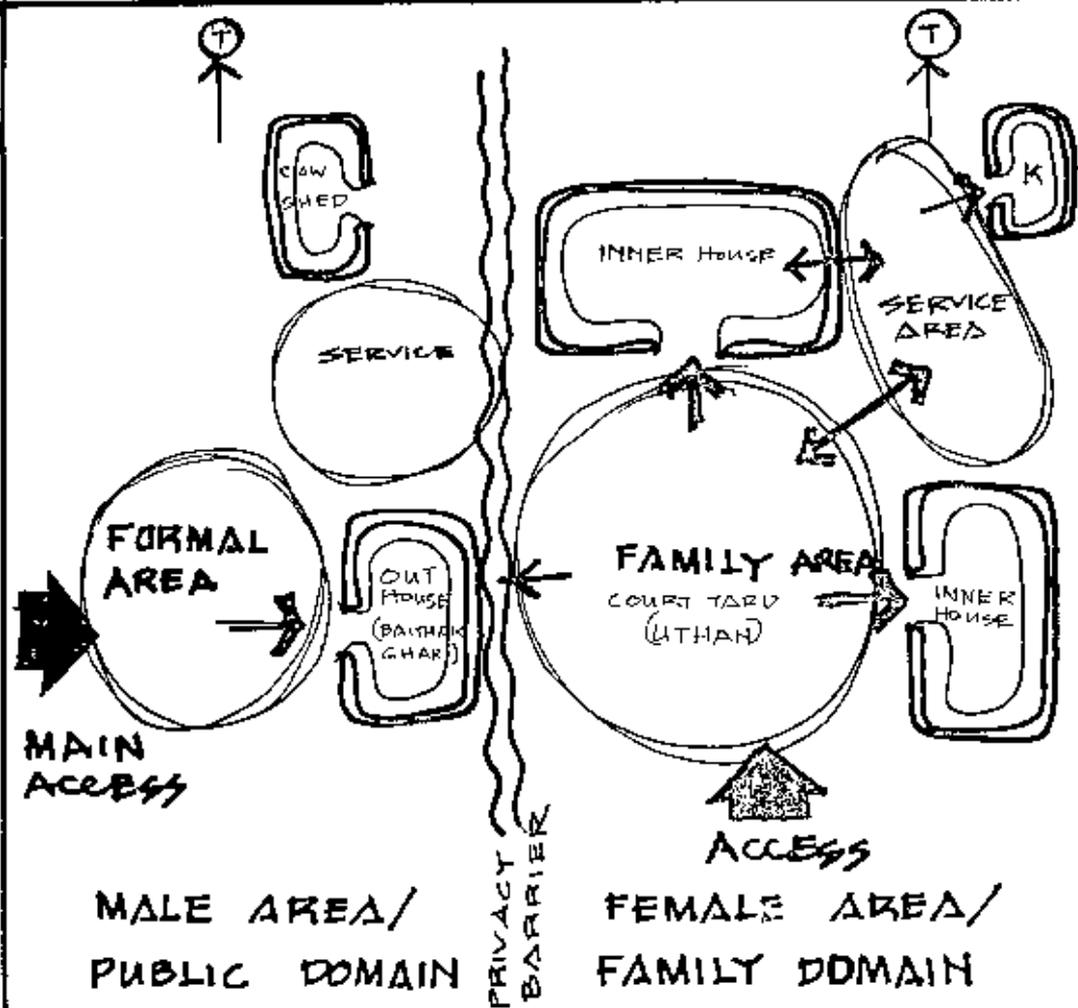


FUNCTIONAL USE OF SPACES



HOUSE OF MD YUNUS BHUIYAN

In the house, all the units are organised in such a way that family area and formal area are separated with privacy barrier. There are separate service areas for both inner and outer house. All the units are single space except the main dwelling unit. The main dwelling unit space is separated into two parts with a partition. One part is the parents' sleeping space, and the other half is used for sleeping space for grandmother and daughters. The second half is also used for dining. Second dwelling unit is for sons' sleeping space and food grain storage. Out house is for guest entertainment and children's study. A lodging teacher stays in the out house. The seasonal labour also stays in the out house at night. The kitchen and the kitchen yard is adjacent to the main dwelling unit. Kitchen yard is linked up with the main dwelling unit. Kitchen yard is linked up with the main courtyard with a privacy barrier to have more privacy to the female members. Kitchen is extended to the kitchen yard with open kitchen. Female members prefer to cook outside the kitchen in the fair days to avoid smoke and heat. Adjacent to the main dwelling unit is a tube well. There is internal link of this house with the adjacent clan group. Cow shed is on the outer house which is maintained by the seasonal labour. Courtyard is mainly used as out-door living space and Paddy thrashing (small mechanical device), paddy drying, cloth drying etc. Previously, courtyard was mainly used for paddy thrashing by cow.



HOUSE AND THE BUILDING MATERIALS

All the structures of the house are more or less of good quality with respect to material, construction technique, maintenance etc. As the owner is financially solvent and wants to keep his status in the society, he is always trying to improve the quality of his house. The floors are made of mud. The floor edge of the main dwelling unit is pucca to secure more safety, because the thieves enter the house, cutting hole at the edge of the plinth. The main dwelling unit is of wooden frame and walls and roofs of C.I. sheet. Second dwelling unit is of timber log frame, bamboo matting wall with C.I. sheet roofing. The out house is of timber log framing, wooden plank wall with C.I. sheet roofing. False ceiling in both the living units are used as seed and valuable storage. Both kitchen and cowsheds are of bamboo poles with jute stick and thatch roofing. Jute stick is widely used in various fences as easily available. The owner has bamboo bush at the backyard where from he procures bamboo to build his houses.

LOCALLY AVAILABLE BUILDING MATERIALS ARE PREFERRED IN THIS HOUSE. MOST OF THE MATERIALS LIKE BAMBOO, JUTE STICKS, CANE, TIMBE LOGS ARE PROCURED FROM THE HOUSE PREMISE. G.I. SHEET IS FROM LOCAL MARKET, THOUGH COSTLY, BUT AVAILABLE ALL THE TIME.

MAIN DWELLING UNIT

- EDGE PUGGA MUD FLOORING
- WOODEN FRAME STRUCTURE
- TIN WALL COVERING WITH WOODEN DOOR & WINDOWS
- WOODEN FRAME ROOF STRUCTURE
- HIPPED (CHAR CHALA) G.I. SHEET ROOF

KITCHEN

- HUMPED TYPE THATCH ROOF
- JUTE STICK WALL PANELS
- BAMBOO POLES STRUCTURE
- MUD FLOOR 1.5 M HEIGHT
- BAMBOO FRAME ROOF STRUCTURE

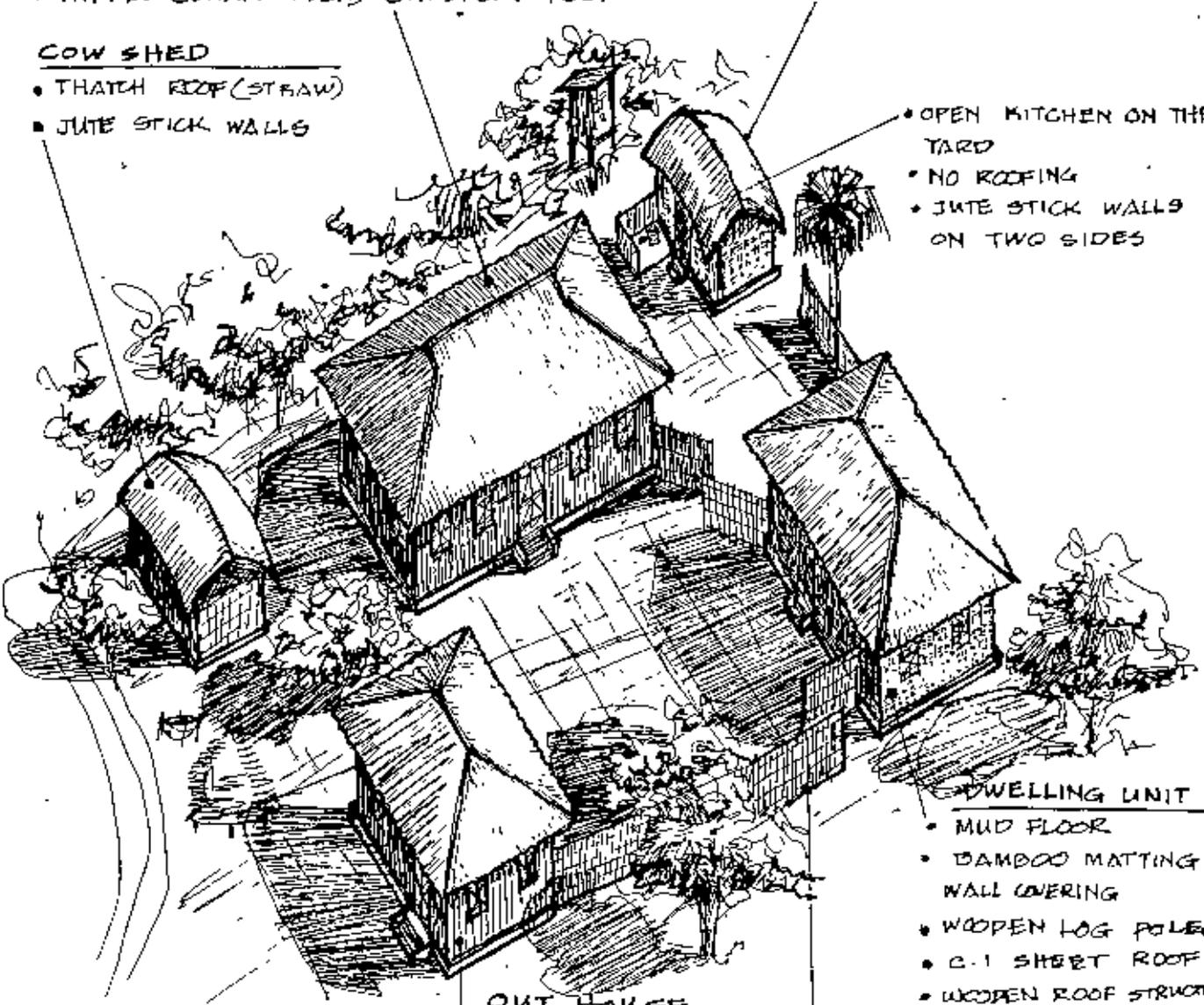
TOILET

- TIN COVER LATRIN

COW SHED

- THATCH ROOF (STRAW)
- JUTE STICK WALLS

- OPEN KITCHEN ON THE YARD
- NO ROOFING
- JUTE STICK WALLS ON TWO SIDES

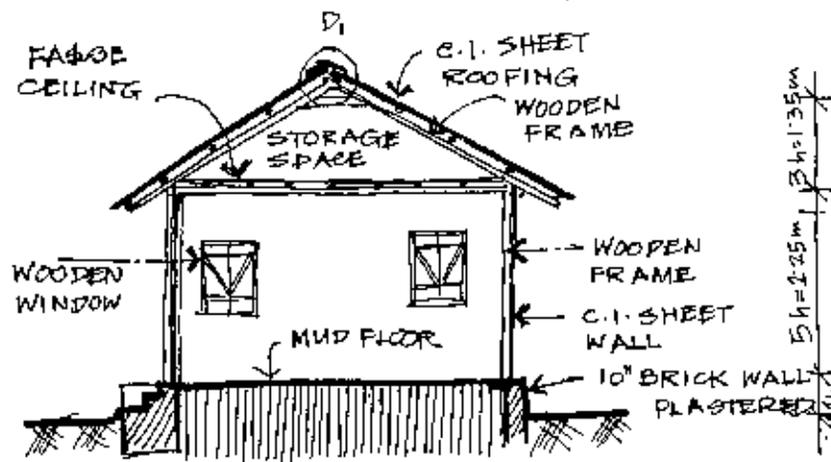


DWELLING UNIT

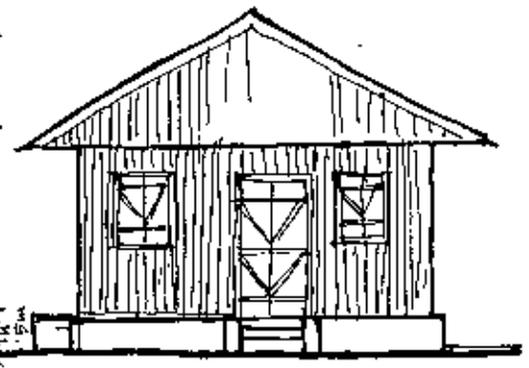
- MUD FLOOR
- BAMBOO MATTING WALL COVERING
- WOODEN LOG POLES
- G.I. SHEET ROOF
- WOODEN ROOF STRUCTURE

OUT HOUSE

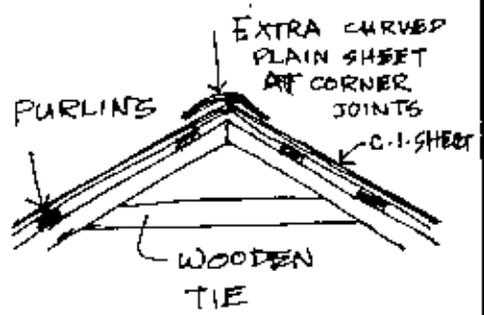
- MUD FLOOR
- JUTE STICK FENCE
- TIMBER LOG FRAMING
- WOODEN PLANK WALL COVERING
- WOODEN FRAME WITH G.I. SHEET ROOF



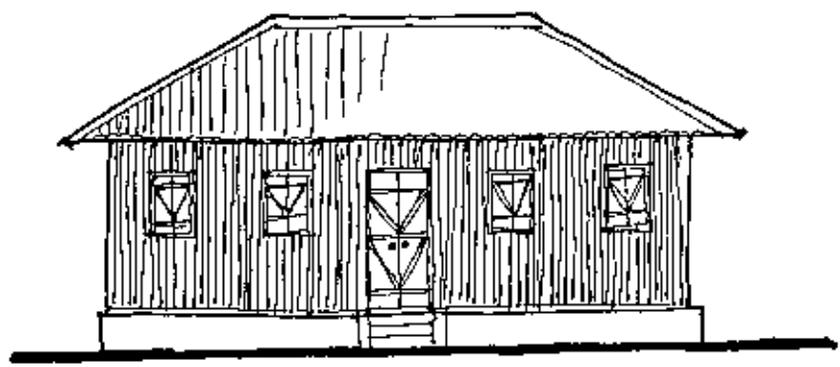
SECTION - AA'



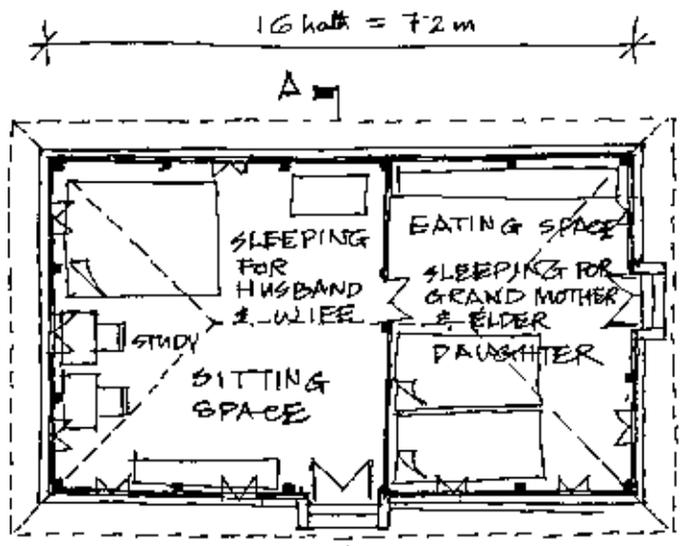
SIDE ELEVATION



DETAIL D1



FRONT ELEVATION



PLAN SCALE 1:100

MAIN DWELLING UNIT

HALF OF PERIMETER = BANDTH
 BANDTH = $16h + 9h = 25h$
 (An odd number)
 DOOR HEIGHT = $4h = 1.8m$
 WINDOW SIZE = $1.5h \times 2h$
 $= 2.8m \times 1.9m$
 PLINTH HEIGHT = $1h = .45m$
 WALL HEIGHT = $5h = 2.25m$
 ROOF HEIGHT = $3h = 1.35m$

CASE STUDY NO. 02

House No. 1/C

Respondent - Md. Ali Hossain Bhuiyan (40)

Bhuiyan Bari

Goaldi, Sonargaon, Dhaka.

HOUSE AND THE LOCALITY

Same as Case study No. 1

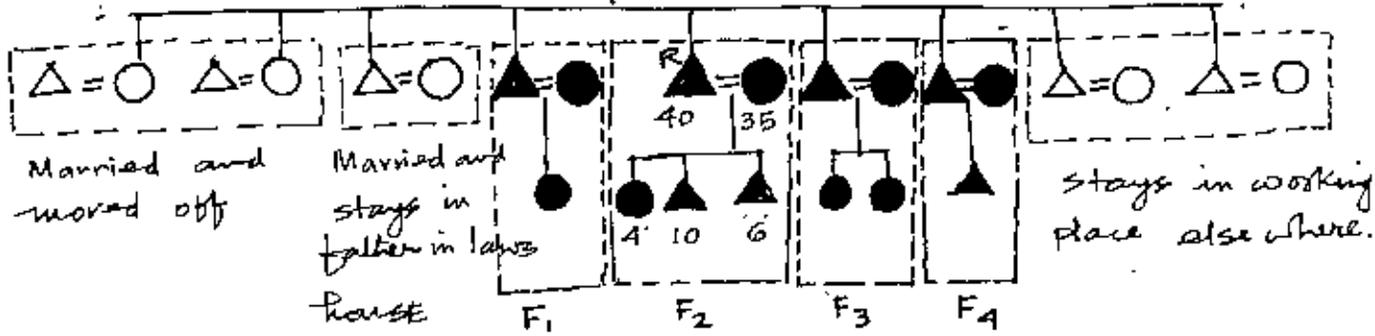
HOUSE AND THE LAND

Same as case study No. 1

FAMILY AND THE DWELLING UNIT

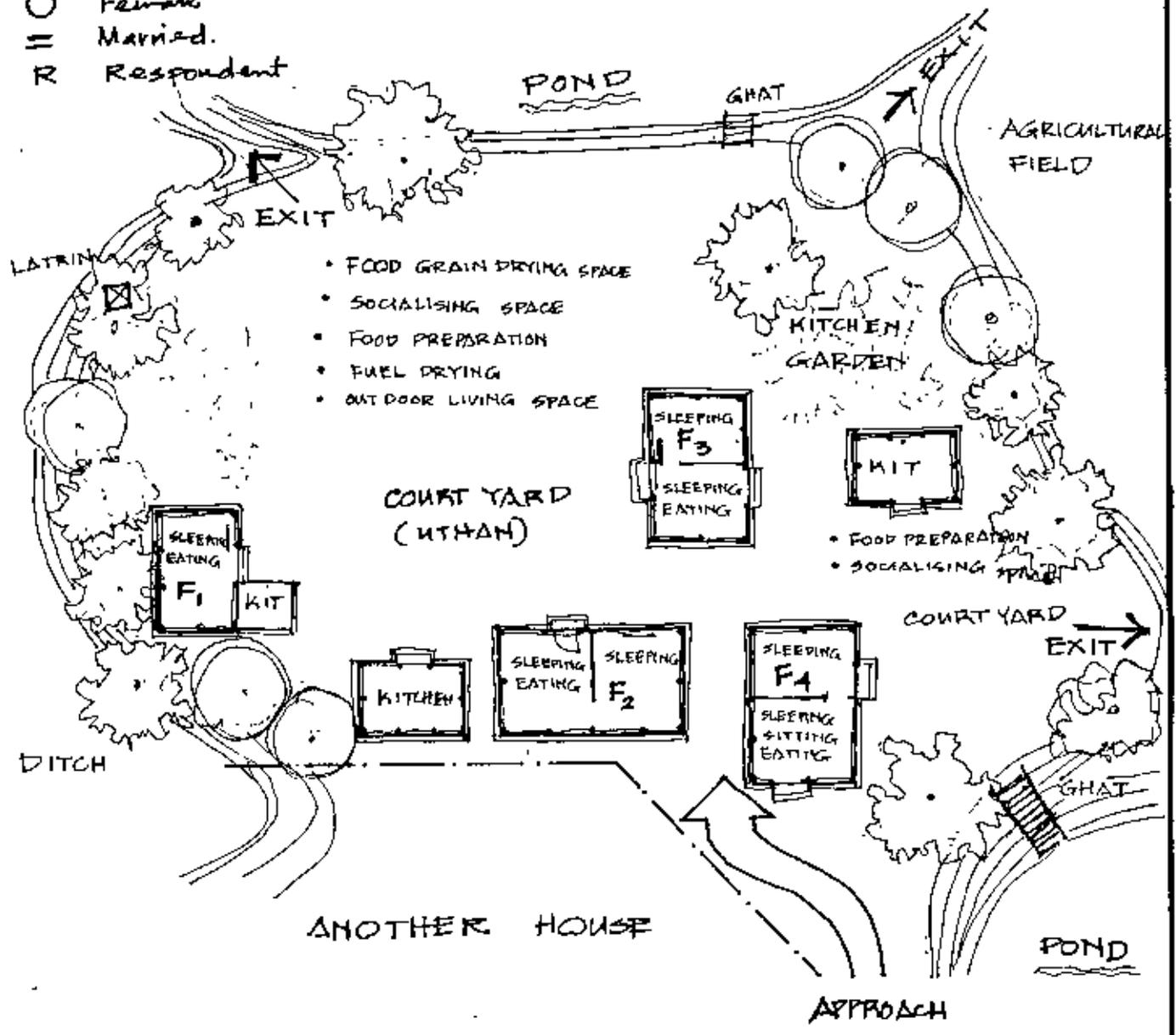
The house is owned by seven brothers of which respondent Md. Ali Hossain Bhuiyan is the eldest. At present four brothers are residing in the house and out of the rest three, two brothers stay at their working place in industrial area elsewhere and the last brother has become permanent resident at his father-in-law's house. All the brothers have their ownership on the land but only four brothers have their dwelling huts in the house. When the other brothers come to visit the house occasionally, they stay in their brothers shelters. The land of the whole house is mutually sub-divided among the seven brothers, but now the four brothers residing in the house are enjoying the shares of three other brothers. None of the brothers are educated. Two of them are farm labour, three of them are industry worker and two are sharecropper. Respondent

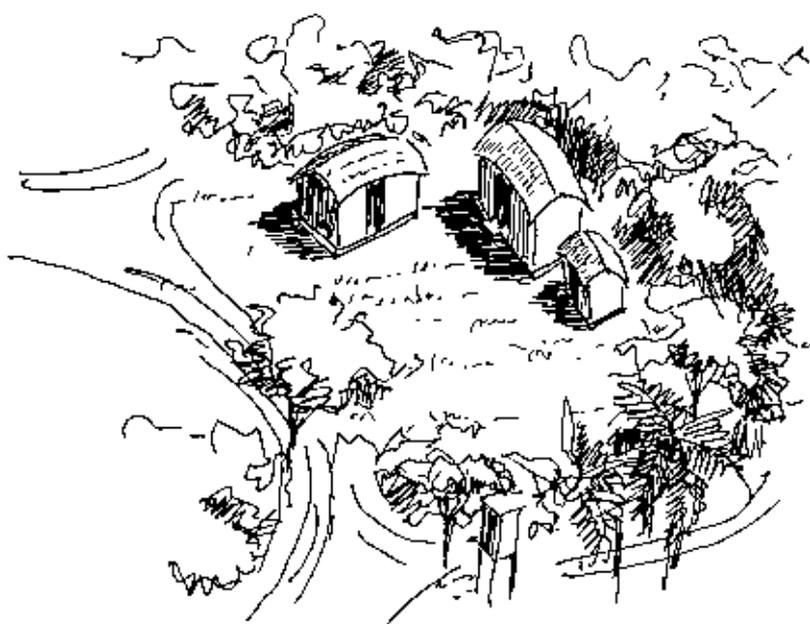
$\Delta = \bigcirc$



Legends

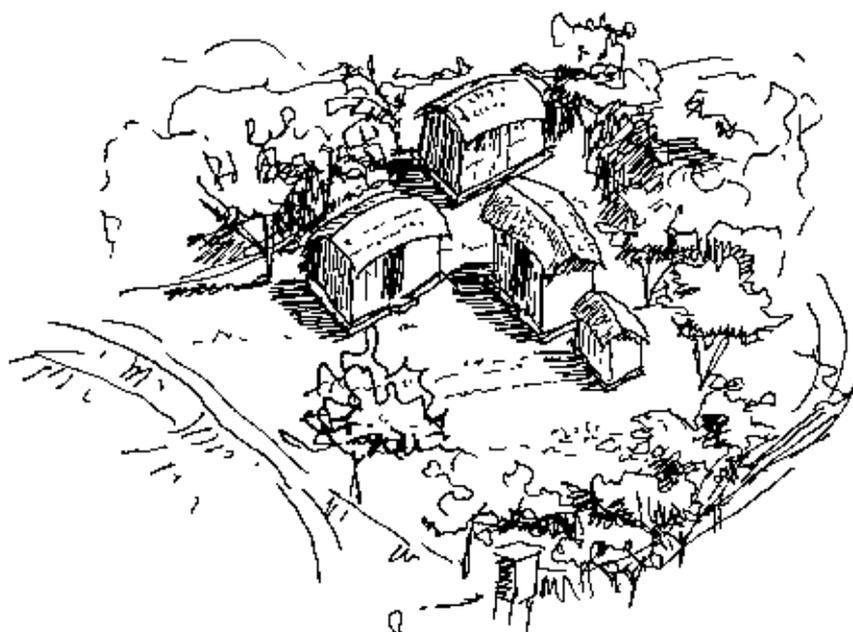
- \blacktriangle Male
- \bigcirc Female
- = Married.
- R Respondent





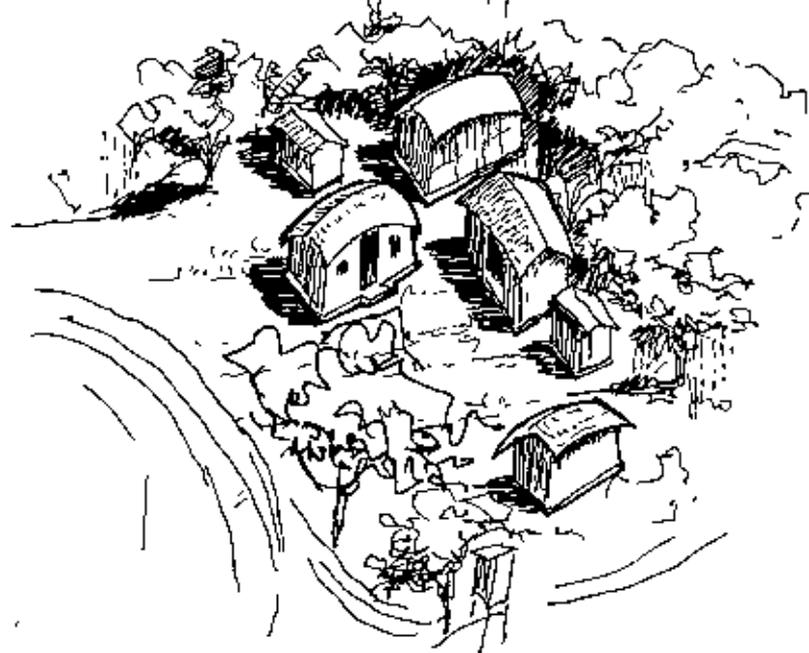
1950

AFTER THE SEPERATION OF THE GREATER HOUSE THE THIRD BROTHER BUILD THIS HOUSE. HOUSE COMPOSED OF TWO HUTS AND A KITCHEN. FAMILY WAS NUCLEAR. STRUCTURES WERE THATCH TYPE. FRUIT ORCHARD WAS THERE SURROUNDING THE HOUSE.



1970

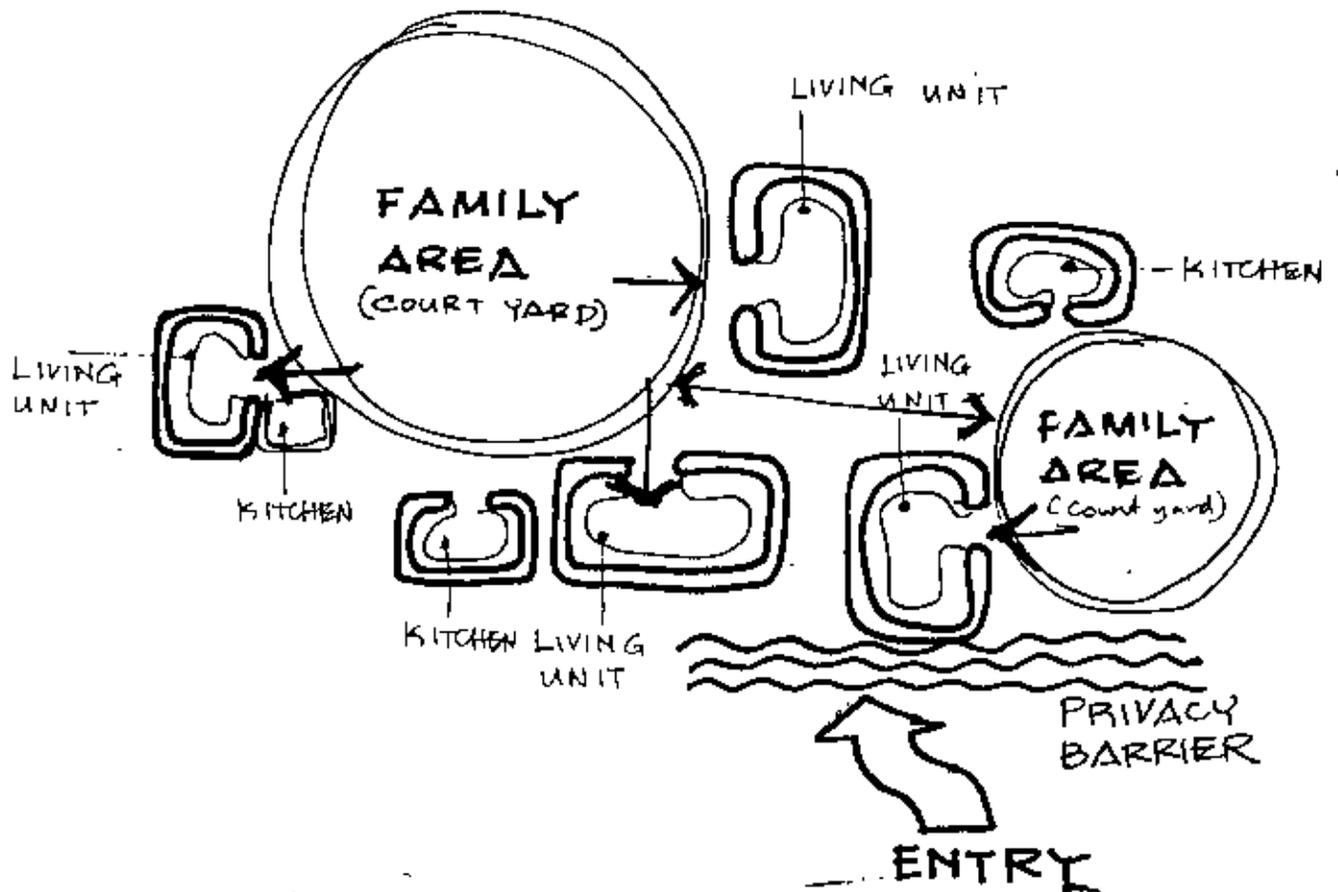
NUMBER OF HOUSE STRUCTURES INCREASED WITH THE FAMILY GROWTH. FAMILY BECAME A JOINT FAMILY OF BROTHERS WITH THEIR FATHER. THERE WAS A SINGLE KITCHEN.



1985

AFTER THE DEATH OF THEIR FATHER 1972, BROTHERS FAMILY BECOME SEPERATED. MORE DWELLING HUTS AND KITCHEN WERE INCLUDED. A SECONDARY COURT YARD IS CREATED AND AT PRESENT

THE BASIC HOUSE WAS AROUND A CENTRAL COURT-YARD. WHICH IS THE MAIN FAMILY AREA. BY THE SEPERATION AND CREATION OF NEW HUTS, A SECONDARY COURT YARD IS CREATED WHICH HAS LINK WITH THE PREVIOUS ONE. FAMILY AREAS ARE MOSTLY USED AS THE HUTS ARE VERY TIGHT IN SPACE.



THERE IS NO SUCH DISTINCT INNER HOUSE AND OUTER HOUSE CONCEPT IN THIS HOUSE. THE WHOLE HOUSE IS OF FAMILY AREA, MAINLY FEMALE DOMAIN. MALE MEMBERS ARE TO ENTERTAIN THEIR VISITOR EITHER ON THE ROAD SIDE AT THE ENTRY POINT OR IN THEIR INDIVIDUAL HUTS. PRIVACY IS LESS CONCERNED IN THIS HOUSE AS THREE SIDES ARE OPEN TO THE PUBLIC VIEW. ENTRY TO THE HOUSE IS NOT DEFINED, RATHER THROUGH THE BACK SIDE OF A DWELLING UNIT.

Md. Ali Hossain is a share-cropper. He cultivate the land of others are share cropper beside cultivation of his own small amount of land.

The organization of the house is not done in a systematic way. Structures are built, time to time with the family need. Entry to the house is not defined, rather from the back of one brother's hut. There is a defined courtyard but there is also another undefined courtyard. The courtyards are mainly used for family outdoor living. All the members specially the female members spent most of their time at the courtyard and there is no such space for the male or visitors. They chat and gossip at the entry side. There is no outer house. Privacy of the inner court is secured by the staggered placement of the huts. Each of the four families stay in different single separate huts. Out of the four living units, three have partitions in between and the rest one is a single space hut. Within the hut, there is also privacy demarcation for the female members. Both male and female members take their bath in the pond. There are three kitchen of which two brothers share a kitchen.. Food preparation and cooking is mostly done in the courtyard adjacent kitchen under the open sky.

F₃

- MUD FLOOR
- BAMBOO MAT WITH BAMBOO POLES WALL
- THATCH ROOF OF CHON.

KITCHEN (F₃ & F₄)

- MUD FLOOR
- JUTE STICK WITH BAMBOO MATTING WALL.
- THATCH ROOF

F₄

- MUD FLOOR
- BAMBOO MATTING WITH BAMBOO POLES.
- THATCH ROOF OF CHON.

F₂

- MUD FLOOR
- BAMBOO FRAME
- BAMBOO MATTING WALL.
- THATCH ROOF OF JUTE STICKS.
- PRE-TENSIONED HUMBED TYPE ROOF.

KITCHEN (F₂)

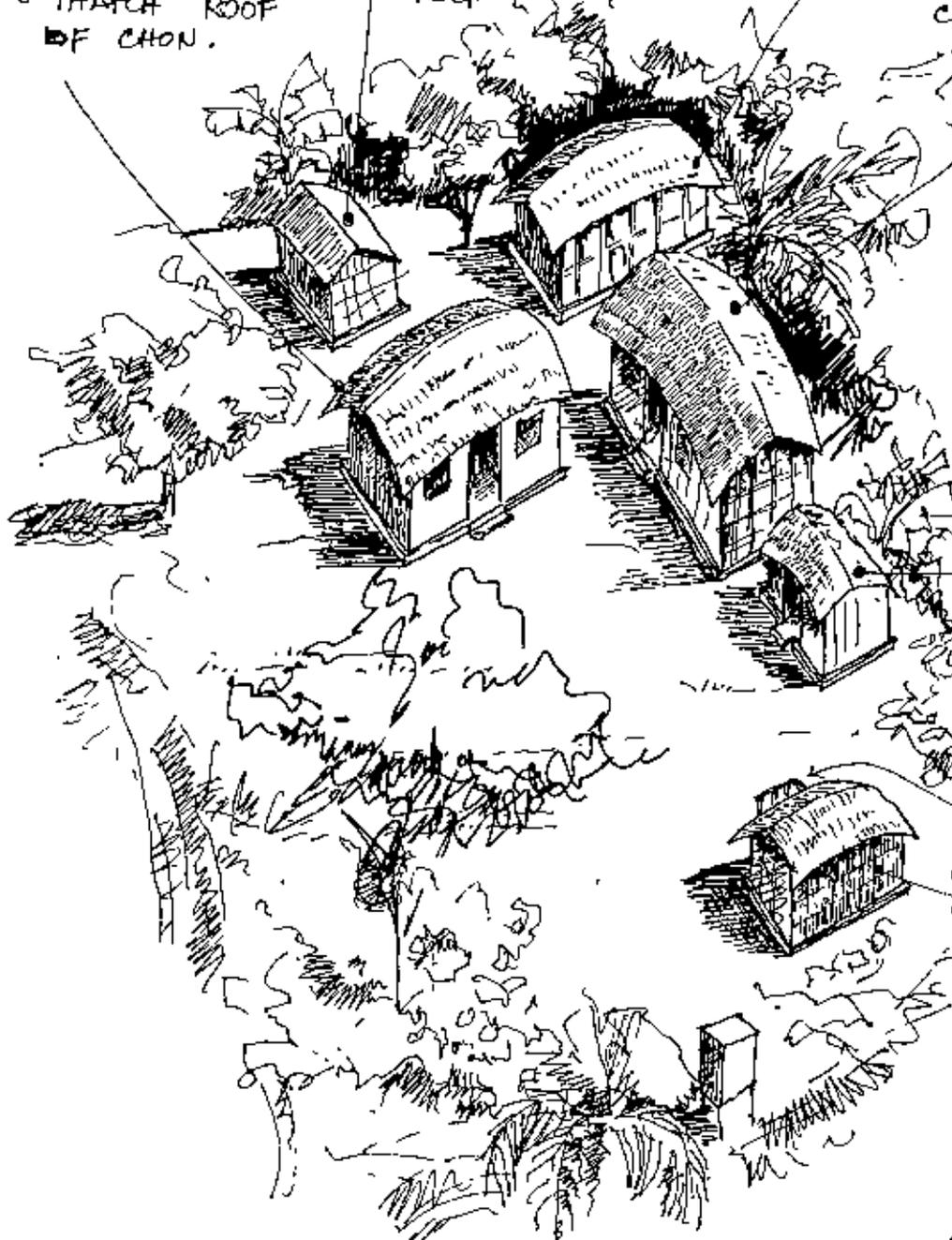
- MUD FLOOR
- BAMBOO FRAMES WITH JUTE STICK WALLS.
- PADDY STRAW ROOFING.

KITCHEN F₁

- JUST FENCE ON TWO SIDES. NO ROOF.

F₁

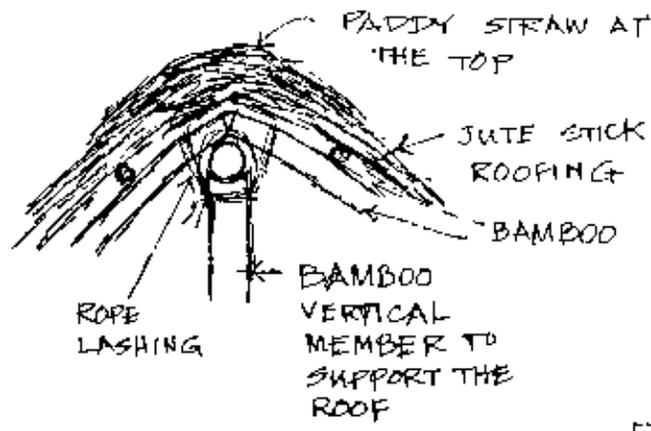
- MUD FLOOR
- JUTE STICK AND PADDY STRAW WITH BAMBOO WALLS
- PADDY STRAW ROOFING REQUIRES FREQUENT MAINTENANCE.



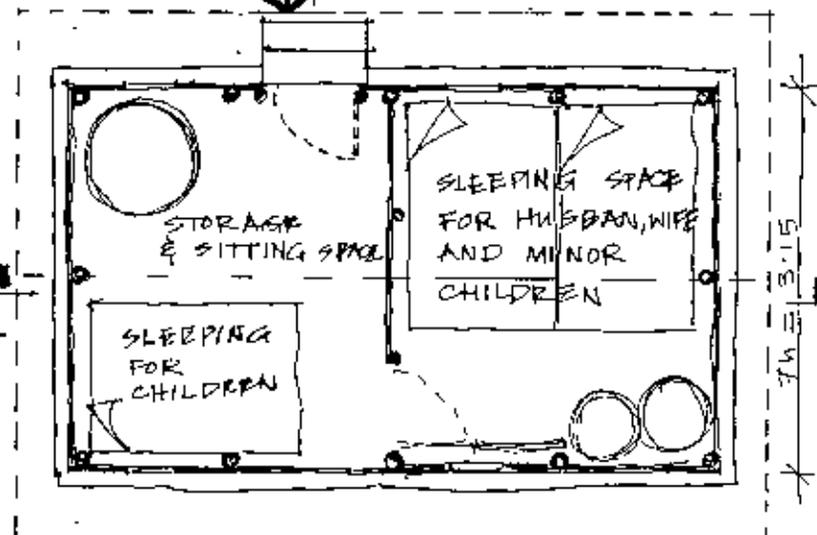
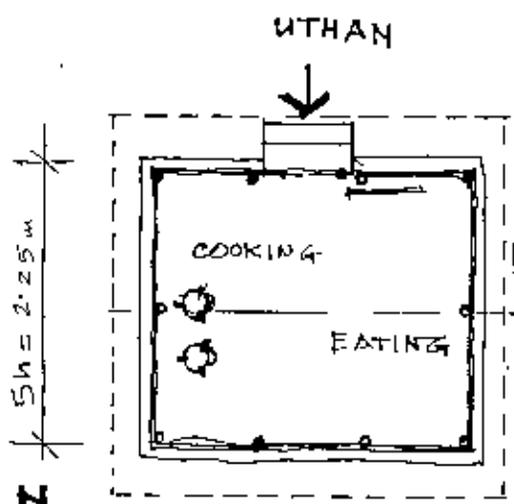
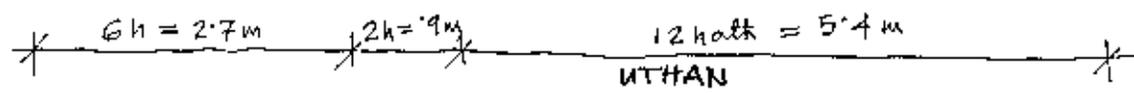
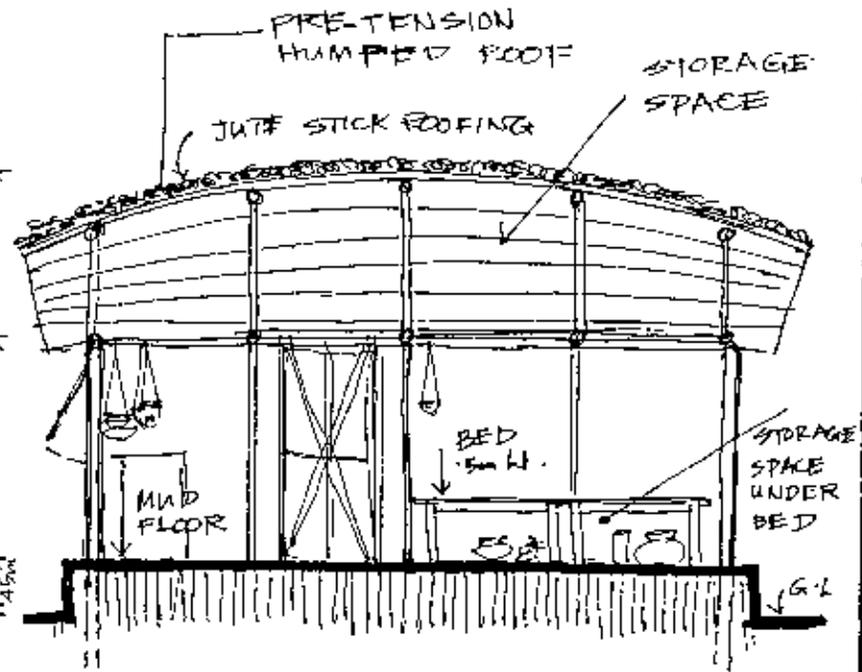
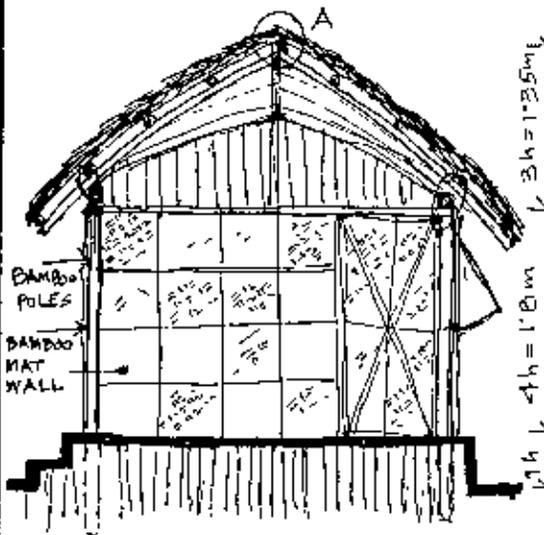
MATERIALS USED IN BUILDING THE HUTS ARE MOSTLY BAMBOO, TIMBER LOGS, JUTE STICKS, PADDY STRAWS WHICH ARE OF THEIR OWN RESOURCES, COST NO MONEY AT ALL. HUTS ARE BUILT ON THEIR OWN LABOUR TAKING NO CRAFTSMAN FROM OUTSIDE. THEY MAINTAIN THE HOUSE ON THEIR OWN.

RESPONDENTS HUTS

FAMILY NO - F₂



DETAIL - A



KITCHEN

LIVING UNIT

PLAN

HOUSE AND THE BUILDING MATERIALS:

All the structures of the house are of thatch. The respondent got the original shelter, which his father built after the family separation. All the shelters are of mud flooring of .5 m height. The walls are bamboo frame with bamboo matting or of jute stick. The roofing area of chhon and jute stick.

ABANDONED RIVER CHANNEL

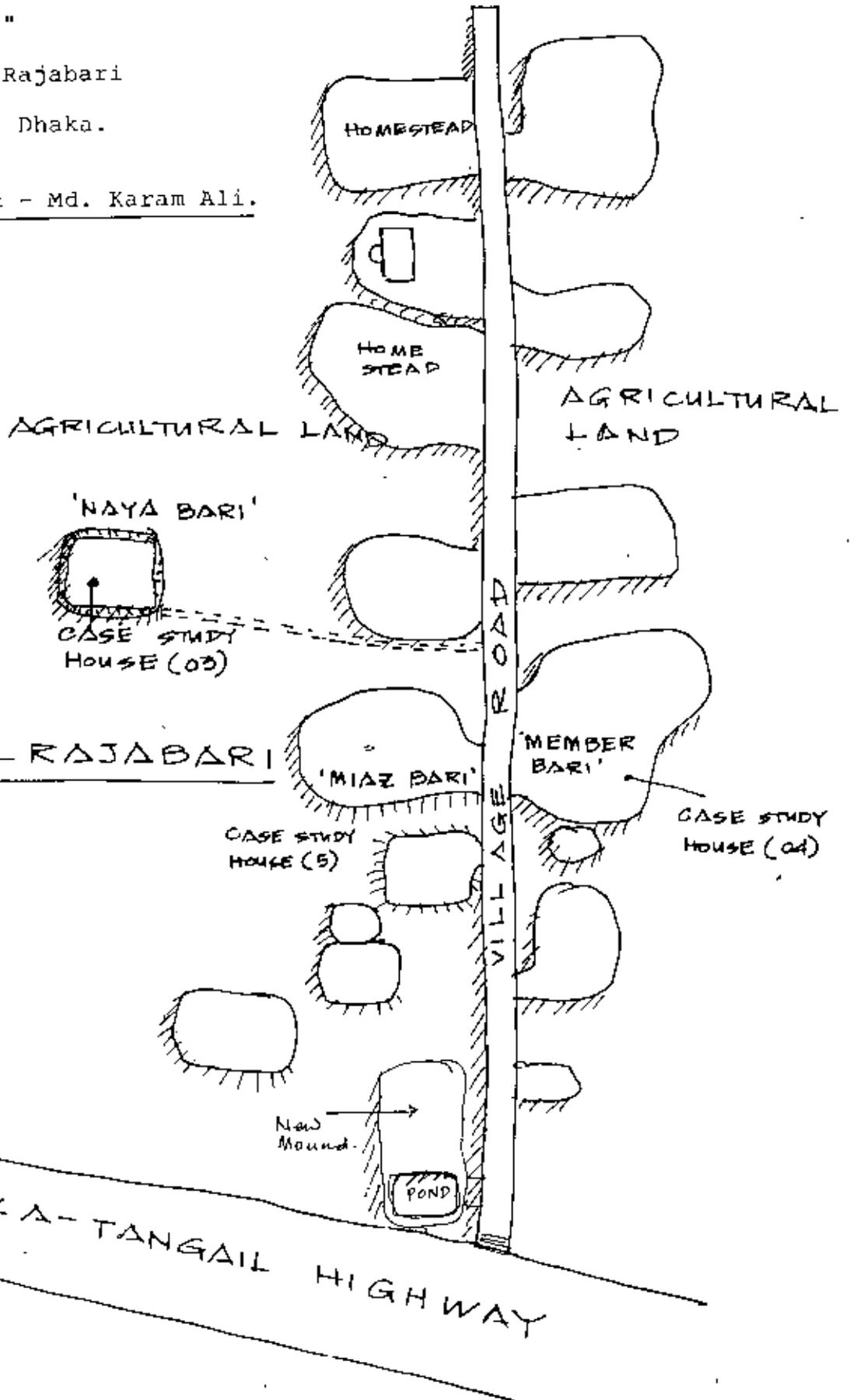
CASE STUDY NO. 03

"NAYA BARI"

Village - Rajabari

Joydevpur, Dhaka.

Respondent - Md. Karam Ali.



HOUSE AND THE LOCALITY

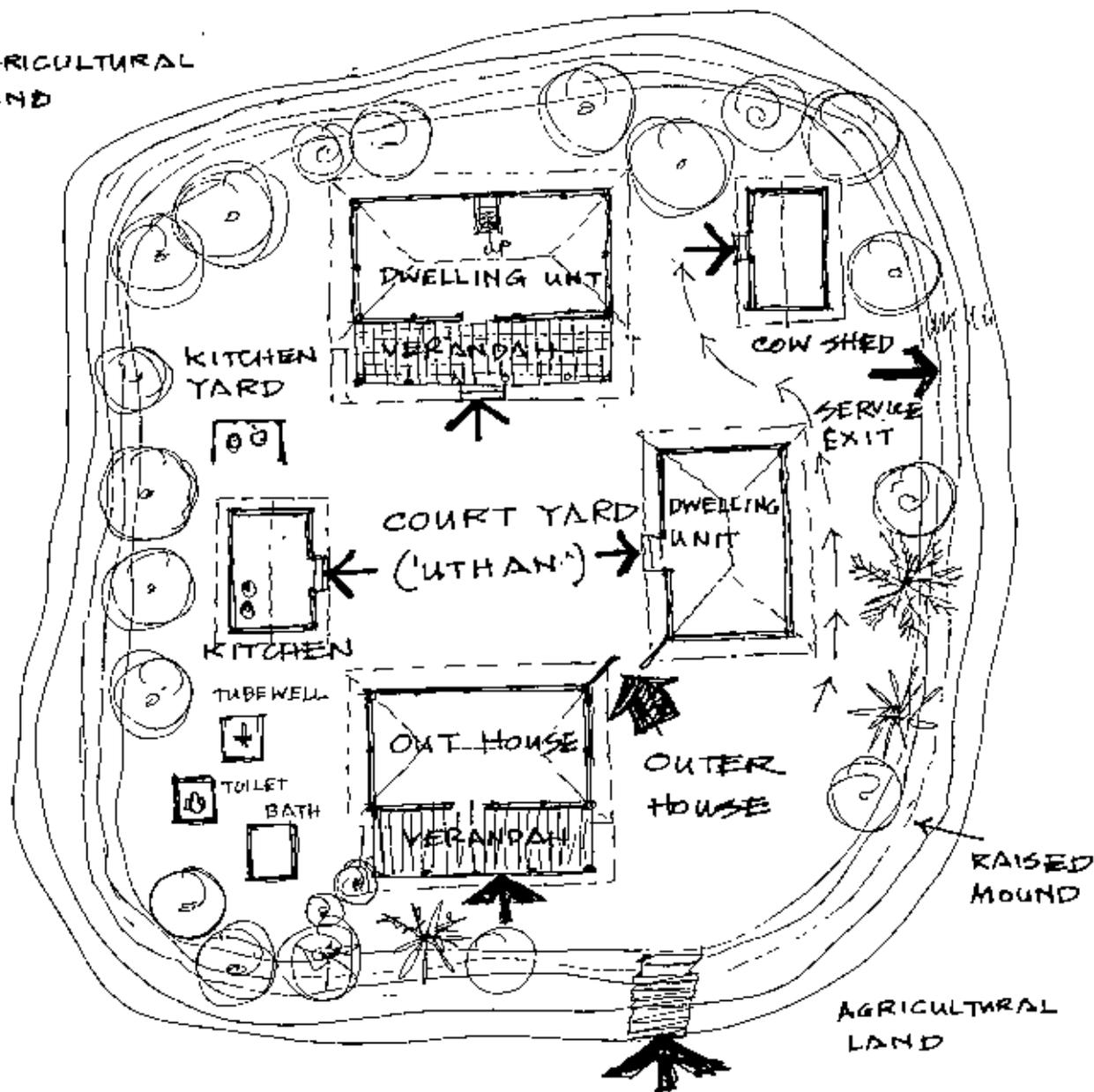
The house is located in the Village - Rajabari of Joydevpur, Dhaka. Rajabari is located on the Dhaka-Tangail Highway, about 4 miles west of Tongi - Joydevpur Cross road and about 25 miles north of Dhaka City. The meandering Turag River flows about 2 furlongs east of the Village. There is an abandoned river channel to the north of the village. The village is a linear development along a 12 feet earth road coming out from the highway. The road is motorable in the dry season and generally goes under water during high flood. Almost all the houses of this locality are built on artificially raised mounds, from 6 to 10 feet high.



HOUSE AND THE LAND

The land on which the house is built was an agricultural land some fifteen years back. The house is built on a artificially raised mound of about 8 feet high. The house is detached from other houses and is not approached by any distinct road. Only a single family is residing in this house. This house has not yet been subdivided.

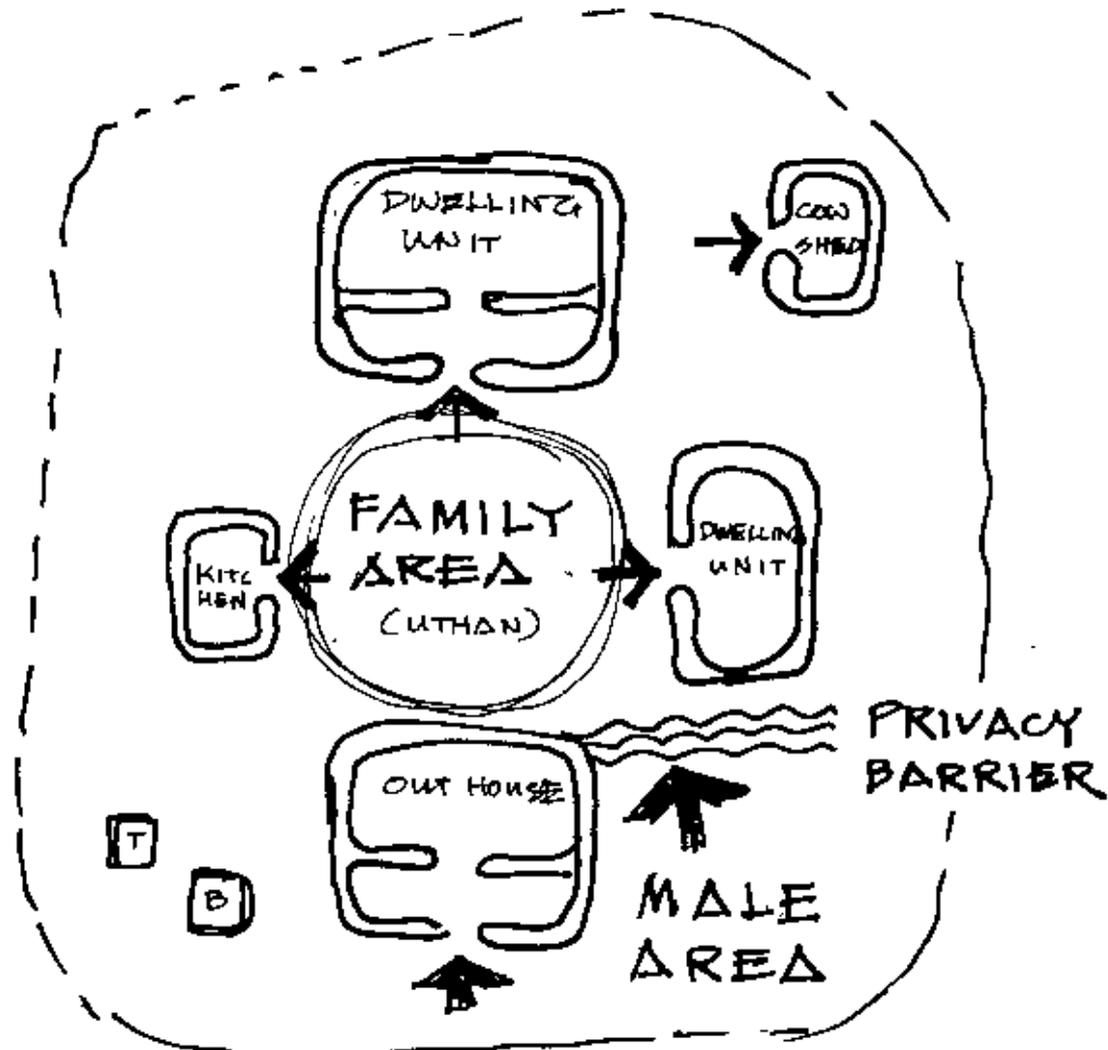
AGRICULTURAL
LAND



FAMILY AND THE DWELLING UNIT

The house is owned by MR. MD. KARAM ALI, and other members of the family are his wife, two daughters, two sons, and two seasonal labours and lodging teacher. The owner of the house is basically a farmer. He separated from a larger joint family of the Village, and eventually settled here. The house is arranged around a courtyard. There is also a outer courtyard at the approach. The main dwelling unit is two-storied. Here the owner himself and the daughters reside. This is also used as the grain

storage. The sons reside in the other dwelling unit. The lodging teacher and the seasonal labour stay in the out-house. There is distinct privacy barrier between the outer house and the inner house. At the entry, indirect entry protect the privacy. All the activities of the house are around the courtyard. Cooking, specially the boiling of paddy done in one side of the courtyard and paddy is dried in the courtyard. All the service facilities are grouped in a corner to use from both inner house and outer house. The toilet is a pucca pit type which has not such hazard. There is a varandah in front of the main dwelling unit, mostly used as sitting and storage space.

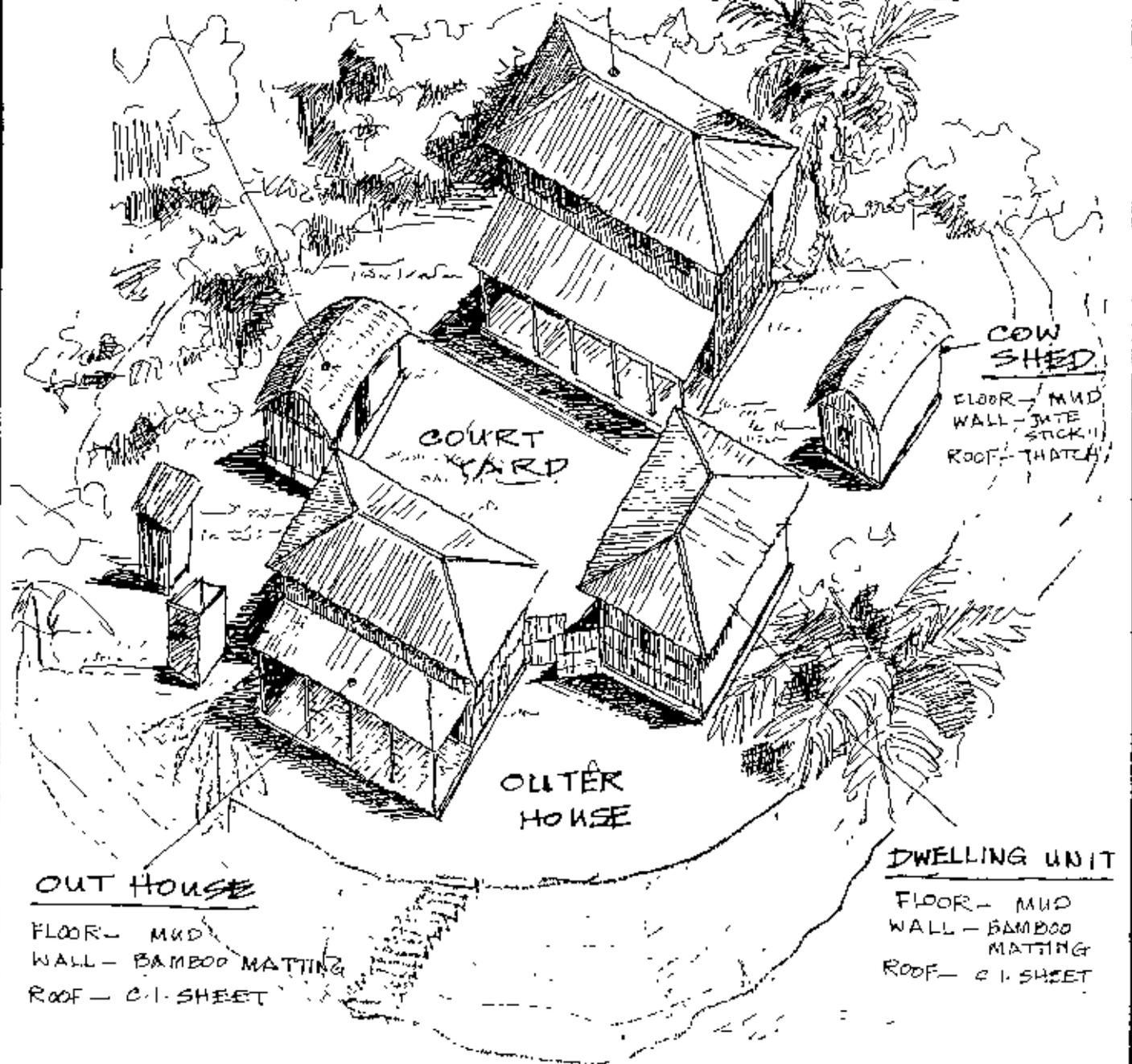


KITCHEN

FLOOR - MUD
WALL - BAMBOO & JUTE STICKS
ROOF - PADDY STRAW

MAIN DWELLING UNIT
(DOUBLE STORED STRUCTURE)

FLOOR - MUD
WALL - C.I. SHEET
& BAMBOO MAT
ROOF - C.I. SHEET



COW SHED

FLOOR - MUD
WALL - JUTE STICKS
ROOF - THATCH

COURT YARD

OUTER HOUSE

OUT HOUSE

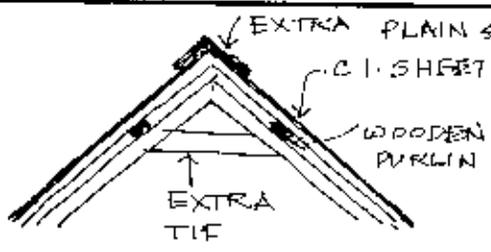
FLOOR - MUD
WALL - BAMBOO MATTING
ROOF - C.I. SHEET

DWELLING UNIT

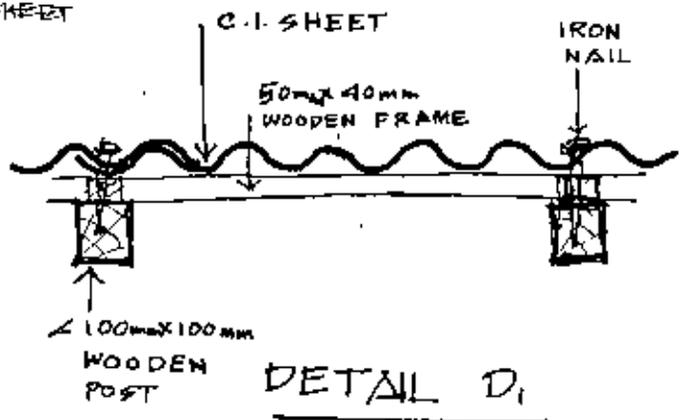
FLOOR - MUD
WALL - BAMBOO MATTING
ROOF - C.I. SHEET

HOUSE AND THE BUILDING MATERIALS

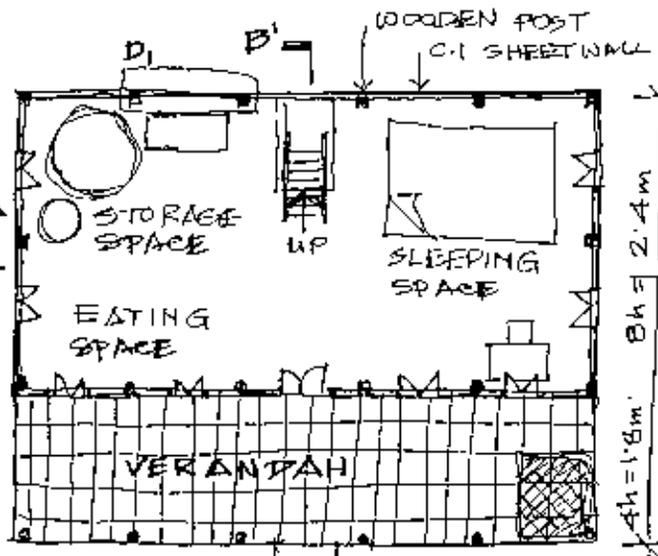
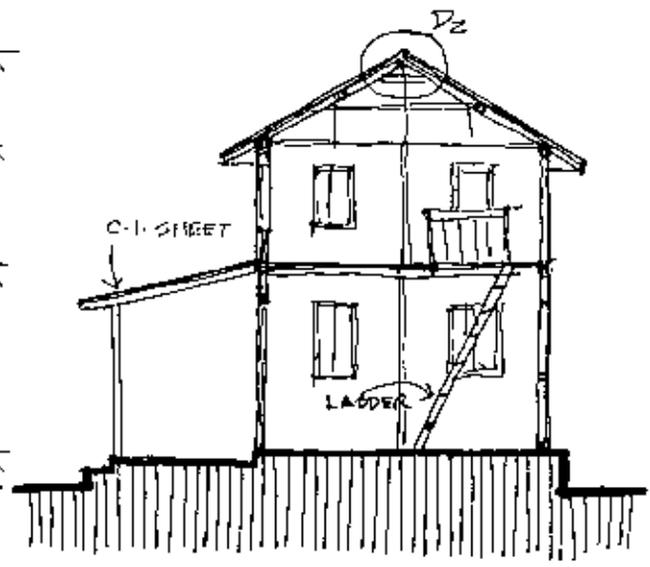
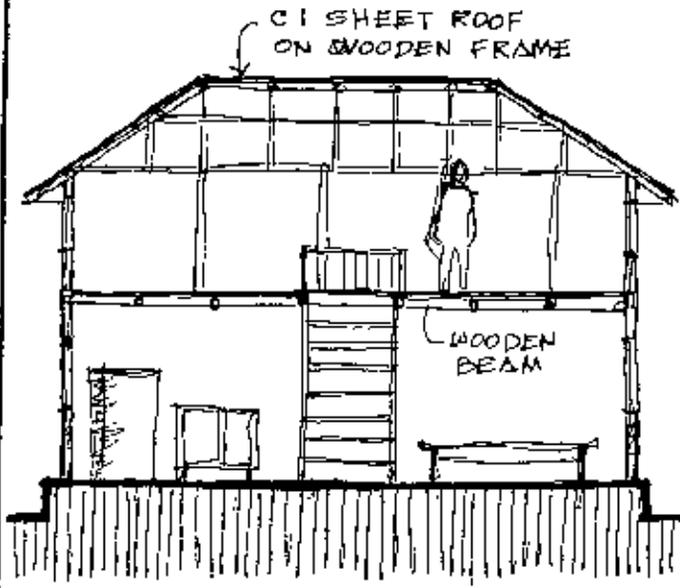
Of the shelters of the house, the main dwelling unit is a two storied structure. The plinth of all the structures are of mud (Kutchra) of 0.5 m.ht. Main dwelling unit is of wooden frame structure with C.I. sheet roofing. Walls of lower side is of bamboo matting and the upper



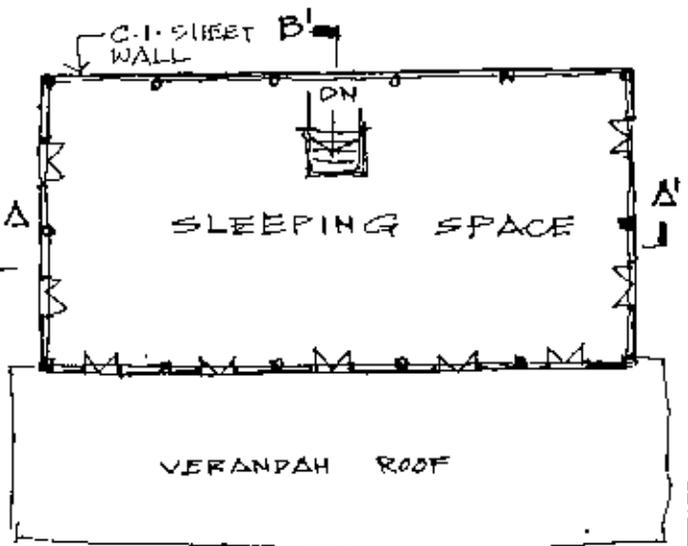
DETAIL - D₂



DETAIL D₁



17 halls = 7.65m
B = |
GROUND FLOOR PLAN
SCALE 1:100



B = |
BANDTH = HALF OF PERIMETER
= 17 halls + 12 halls = 29 halls
FIRST FLOOR PLAN
SCALE 1:100

part is of C.I. sheet. The upper floor is of wooden plank, which requires no furniture to sleep. Users just sleep on the wooden floor using some mat. Both upper and lower spaces are single space with no partition within the space. There is no false ceiling under the C.I. sheet which makes the upper floor quite uncomfortable in the summer days. There is a small verandah in front of the main unit covered with C.I. sheet roofing. The second dwelling unit and the out house are made of timber log frame with bamboo matting wall. Both the roofs are C.I. sheet type on timber frame roof structure. The Out House has also a verandah of C.I. sheet roofing in front, to have sitting space mainly for outsiders. The kitchen and cowsheds are of thatch type and the latrine and bathing spaces are pucca type with bamboo matting walls.

CASE STUDY NO. 04

'MEMBER BARI'

Rajabari

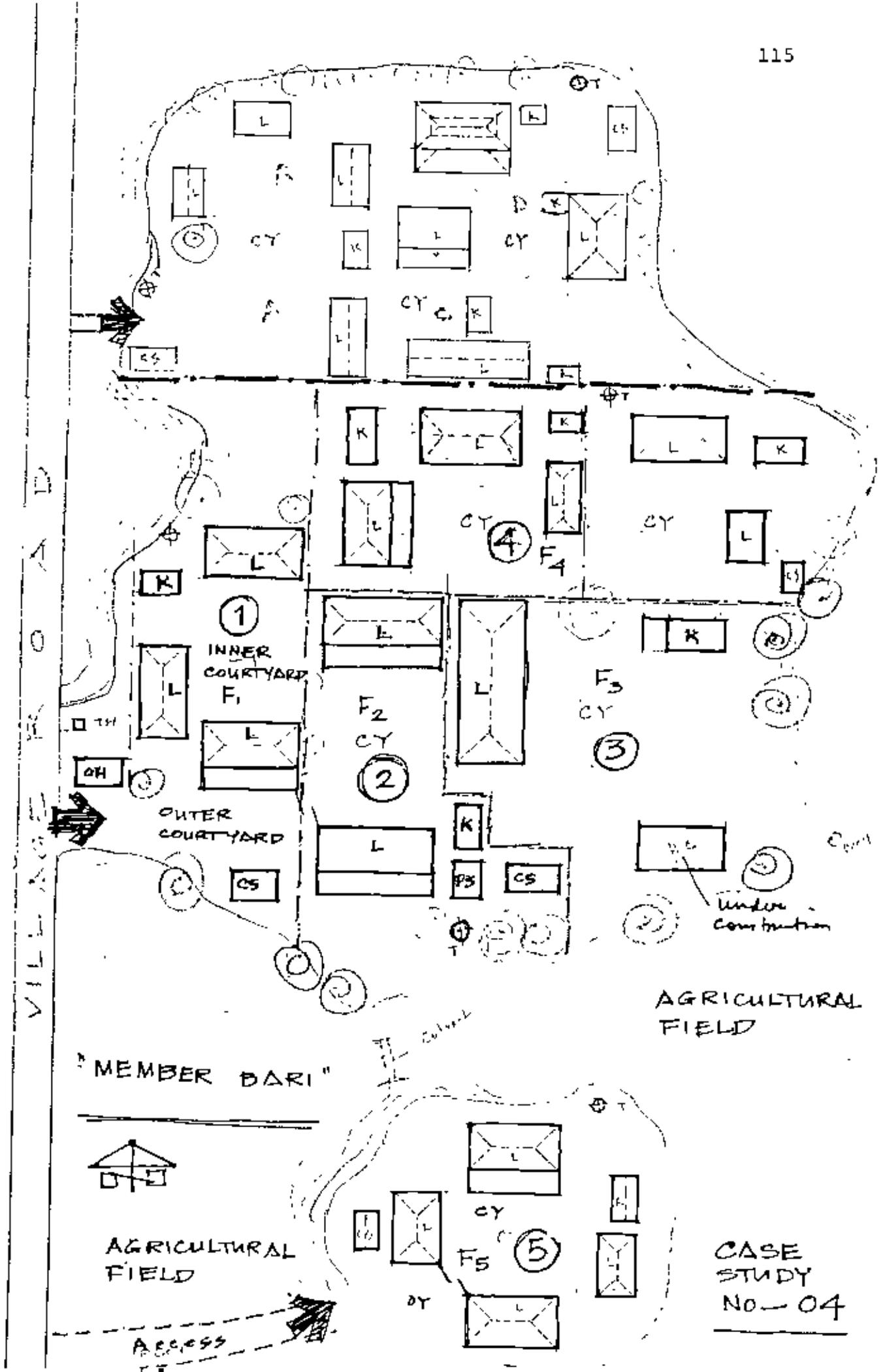
Joydevpur, Dhaka

HOUSE AND THE LOCALITY

Same as Case study No. 03.

HOUSE AND THE LAND

The house is built on a raised land linked up with the village road in one point. Initially the land was possessed by two owners of distant relation, one in the north and the other in the south. Respondents forefather settled in the area, building the house. Gradually the house expanded as the family grew. The respondent are five brothers. Four of them are now residing in the original land and the other brother shifted to a new land adjacent to this land. That new land was raised and eventually the house is built independently. The original land is divided into four equal shares and the fifth brother got the raised land of the new house. Land division is done considering the equal amount of land and as a result there is no such road linkage to the house of two brothers. To go the next two houses, one is to cross through the courtyards of other brothers.

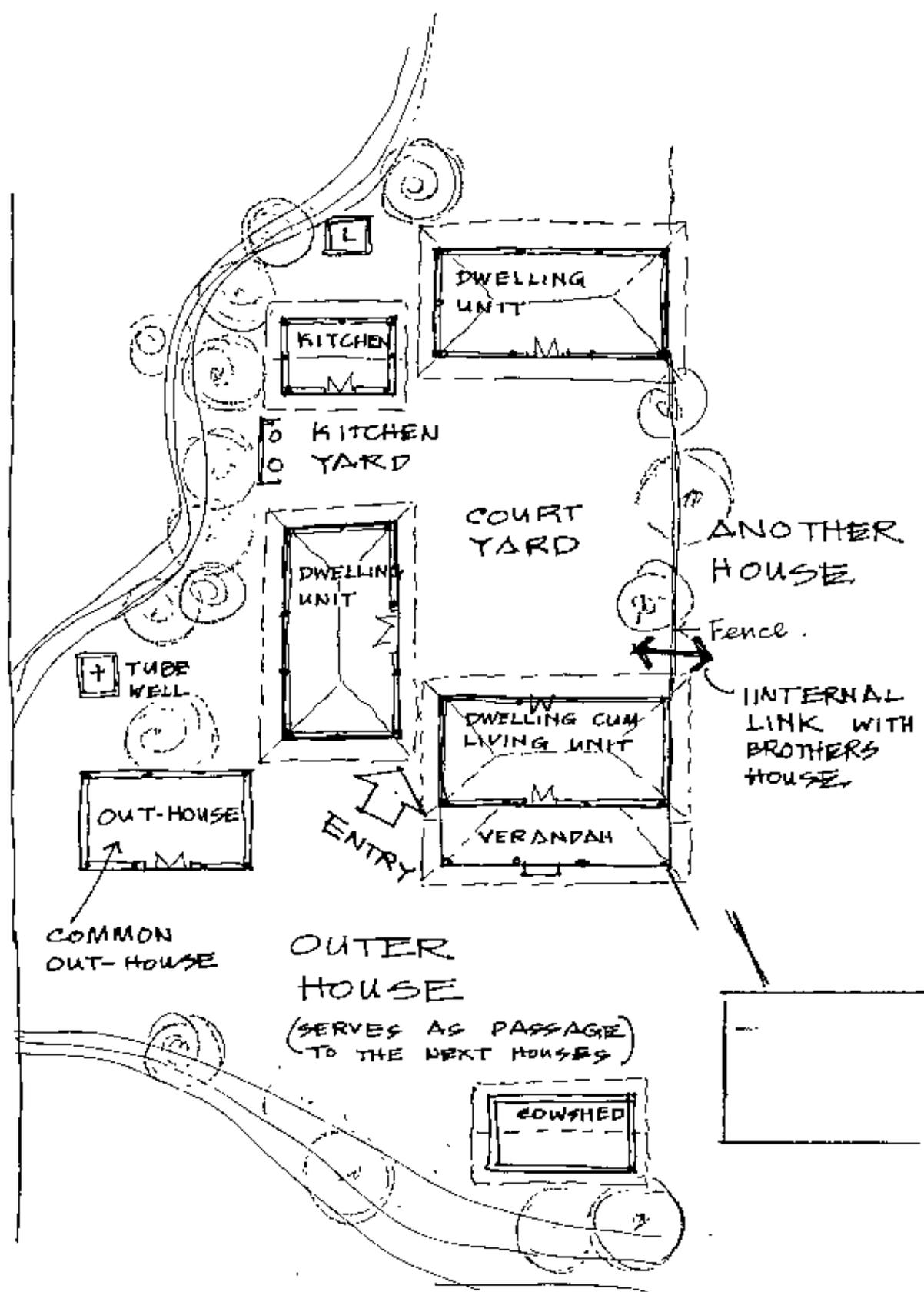


CASE
STUDY
No. 04

FAMILY (F₁) AND THE DWELLING UNIT

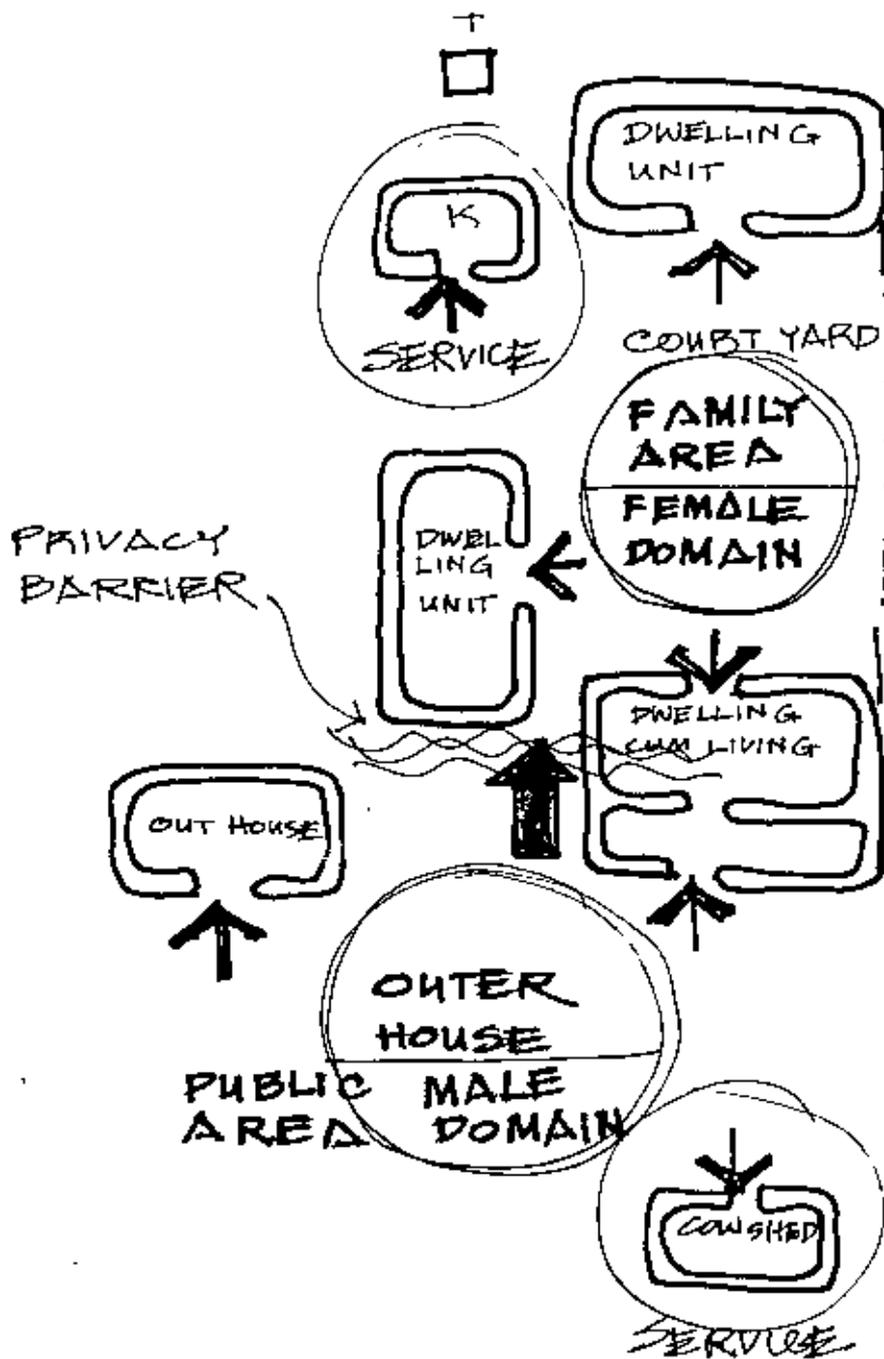
Respondent Md. Abdul Latif (50) is a farmer by occupation. He has three sons and two daughters. Of them, elder son is married and resides with them with his wife and daughter. Elder daughter got married and moved off to her father in-law's house elsewhere. Of the two other sons, both are students in school, Youngest daughter is also a school student. The structure of the house is organised around a courtyard and the courtyard is interlinked with the adjacent houses of the brothers. The main dwelling unit is south facing at the northern side of the courtyard. The front unit is used as a living unit for the family. Sons stay in the front unit. There is a verandah in front of this unit which is used mainly as sitting space. The third unit is at the western side of the courtyard which is used by the elder son and his family. Kitchen is in between two structures. Courtyard is used as outdoor living and extension of cooking space. The inner court is approached through a passage by the side of the front unit. The inner house has the privacy from outside. There is a sort of open space in front used by the male members and a cow shed is also there. The owner and his elder son take care of their agriculture and cattle. Paddy thrashing is performed in the agriculture field.

VILLAGE ROAD



RESPONDENT'S HOUSE

CASE STUDY NO. — 04



CASE STUDY
 NO — 04

DWELLING UNIT

FLOOR — MUD
 WALL — BAMBOO
 ROOF — THATCH (CHHON)

KITCHEN

FLOOR — MUD
 WALL — JUTE STICK
 WITH MUD
 ROOF — C.I. SHEET

MAIN DWELLING UNIT

FLOOR — MUD
 WALL — BAMBOO MATTING
 ROOF — C.I. SHEET

OUT HOUSE

FLOOR — PUGGA
 WALL — MUD WALL
 ROOF — C.I. SHEET

COURT
 YARD

LIVING CUM
 DWELLING UNIT

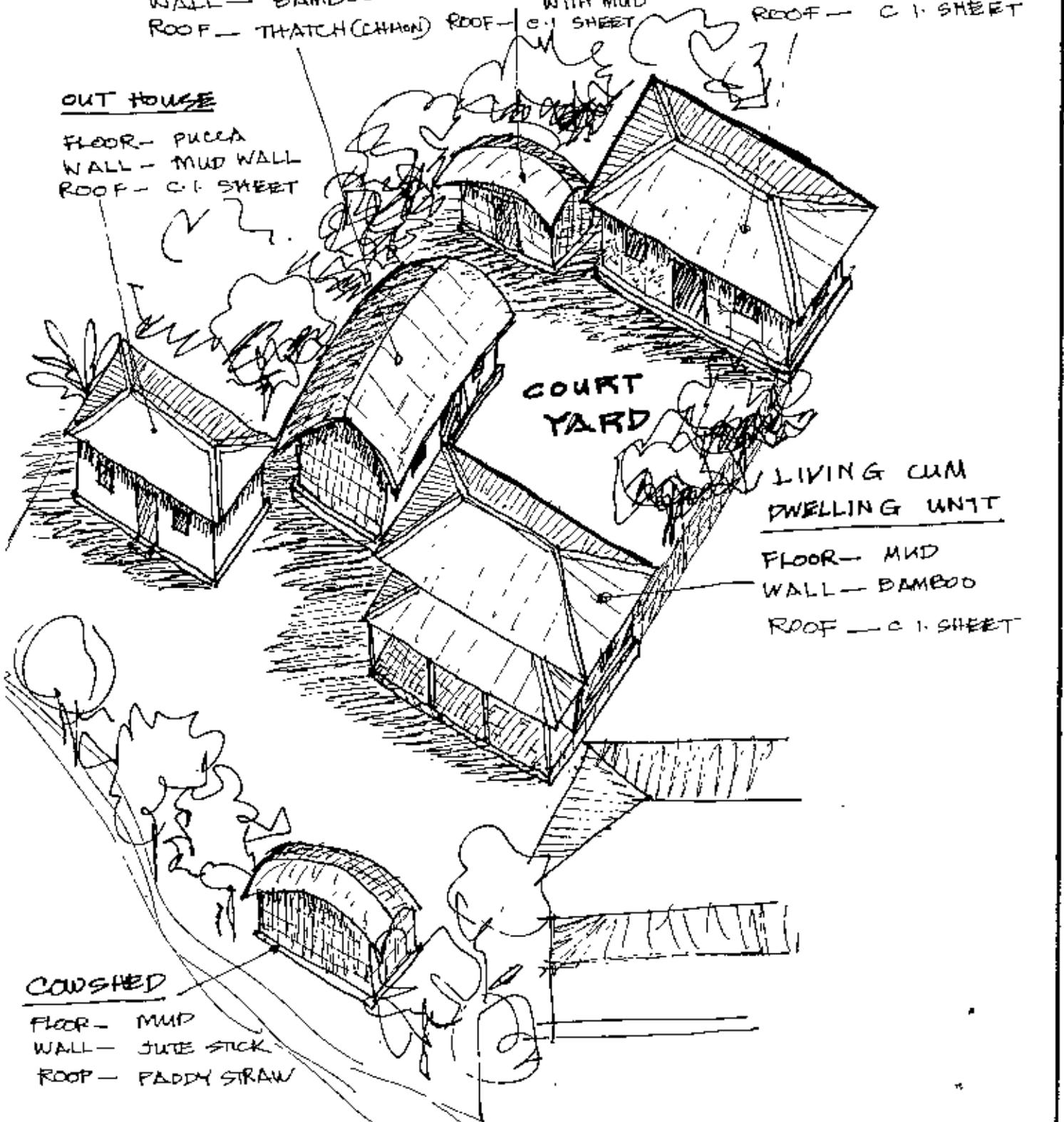
FLOOR — MUD
 WALL — BAMBOO
 ROOF — C.I. SHEET

COWSHED

FLOOR — MUD
 WALL — JUTE STICK
 ROOF — PADDY STRAW

RESPONDENTS HOUSE

CASE STUDY
 No — 04



HOUSE AND THE BUILDING MATERIALS

There are three dwelling units and a kitchen in the house. Floors of all the structure are of mud (kuttcha). The main unit, where the owner resides is of wooden frame bamboo mat wall and roof of C.I. sheet. The front unit is of wooden frame C.I. sheet wall and roof. The third unit where the married son resides is of bamboo poles with bamboo matting wall and the roof is of C.I. sheet. Kitchen is thatch type structure, of paddy straw roofing and jute stick wall with bamboo poles.

CASE STUDY NO. 05

'MIAZ BARI'

Rajabari, Joydevpur, Dhaka

Respondent - Md. Abdul Jalil Mia (35)

HOUSE AND THE LOCALITY

Same as case study No.03



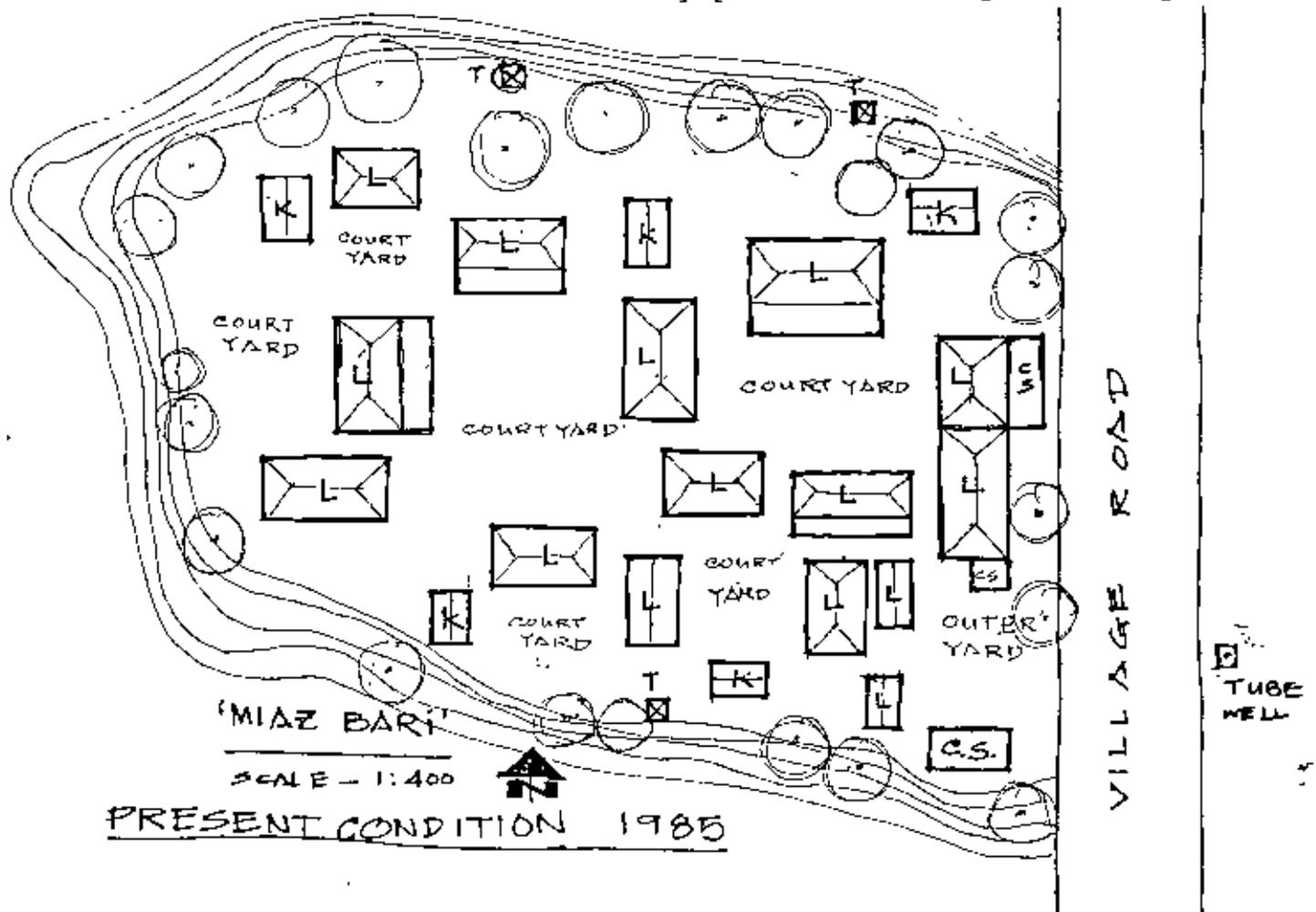
VIEW FROM THE ENTRY

HOUSE AND THE LAND

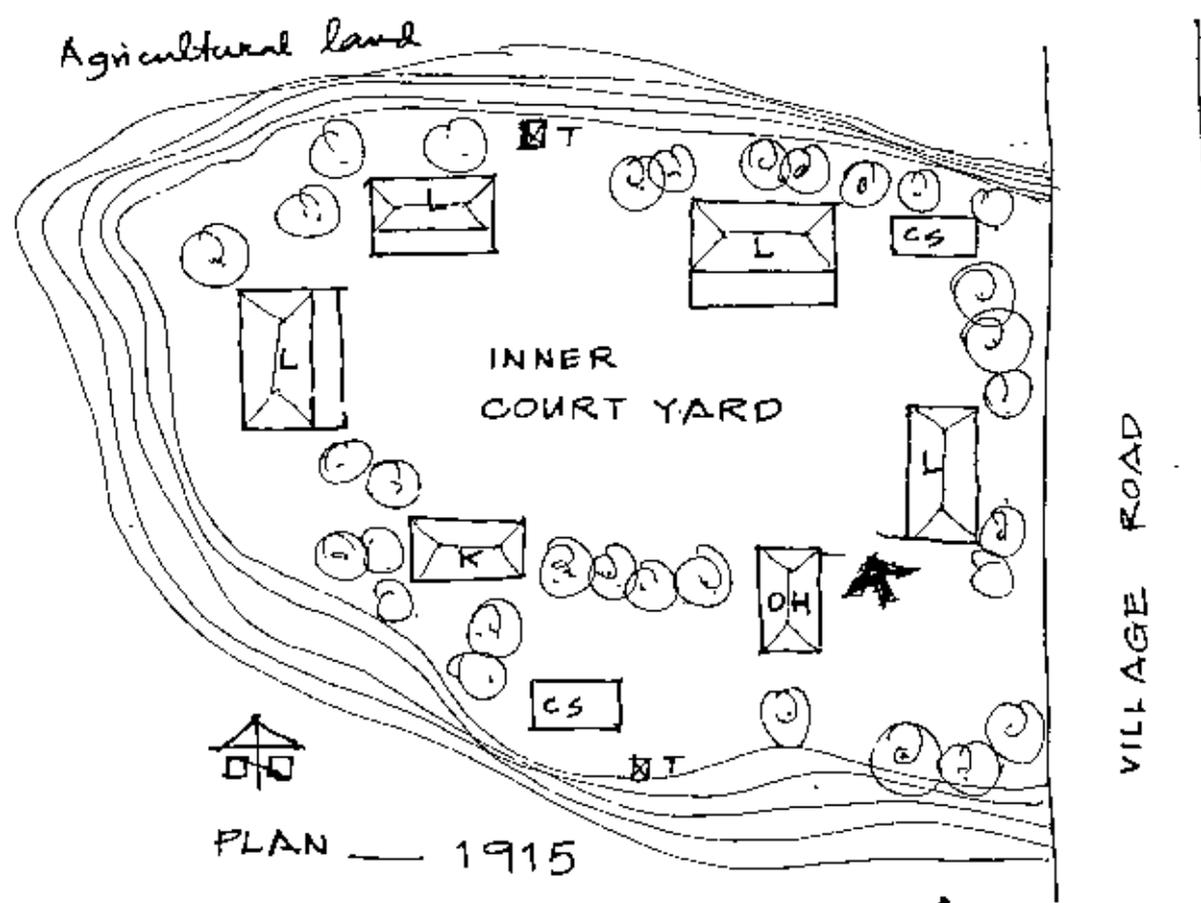
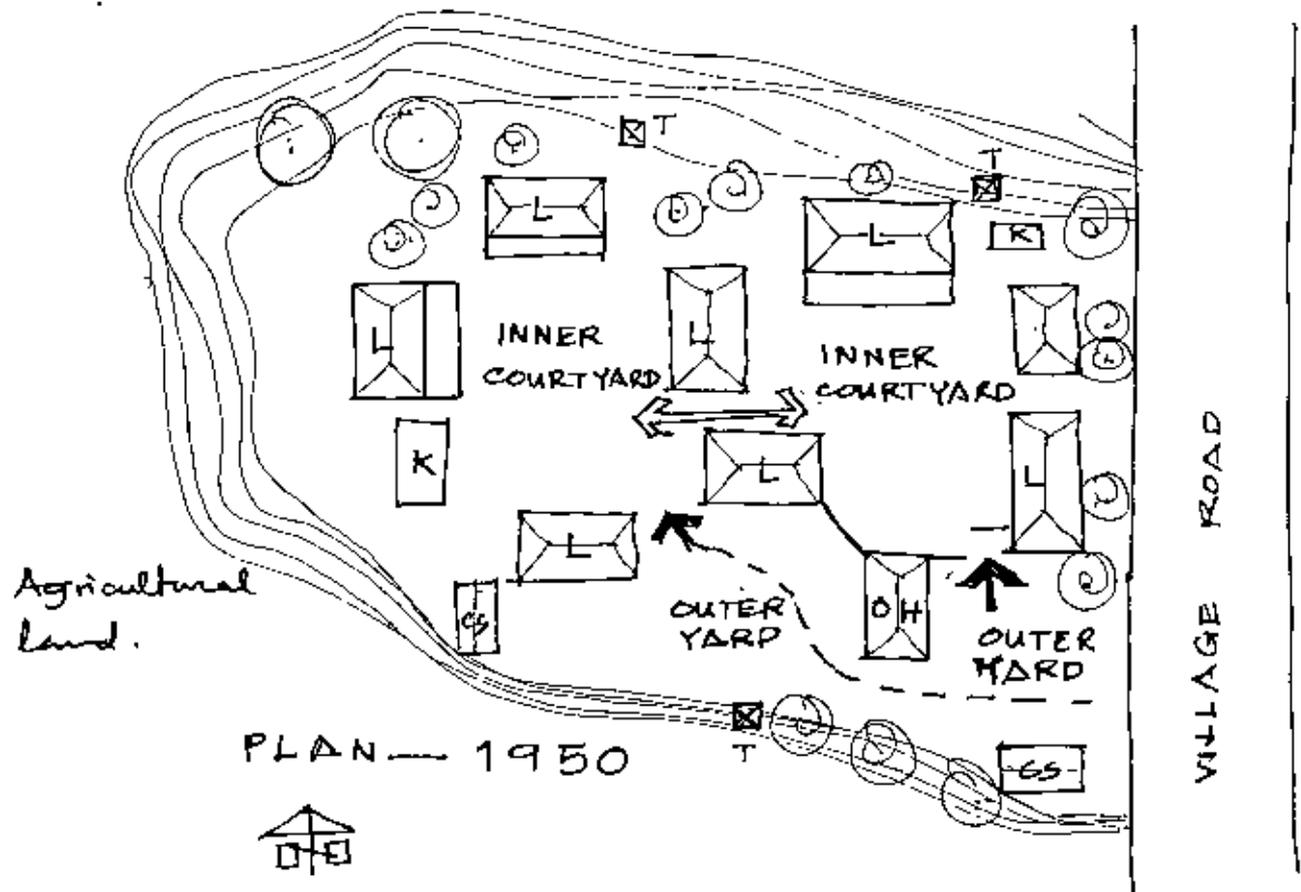
The house is built on a raised land linked up with the village road in one point. Initially the land was possessed by two brothers, who are grandfather of the respondent. Later, each part was divided into more parcels. In each parcel, house structures are built at different times according to their immediate need. The land surrounding homestead are owned by other people and as a result there is no scope to expand the house horizontally, and the result is over crowded of dwelling units in the house.

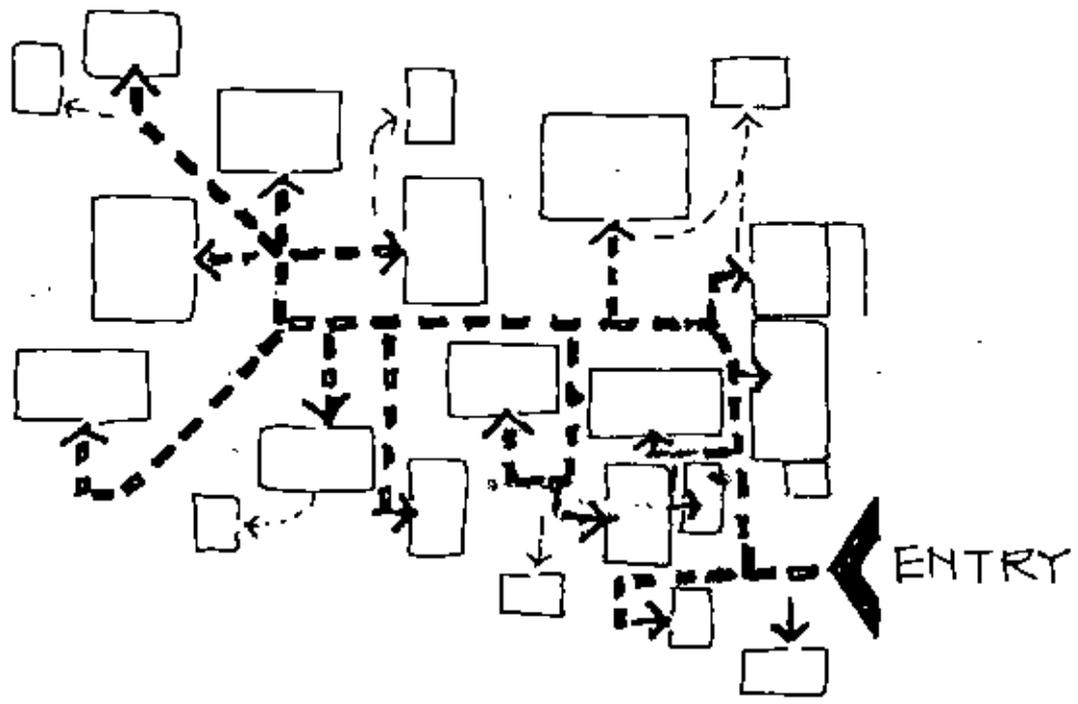
FAMILY AND THE DWELLING UNITS

Basically there are two extended families in the whole house, surrounding the two main inner courtyards. New dwelling structures are built as the families extended and divided into smaller nuclear families. The old dwelling structures are subdivided by partitions and possessed by

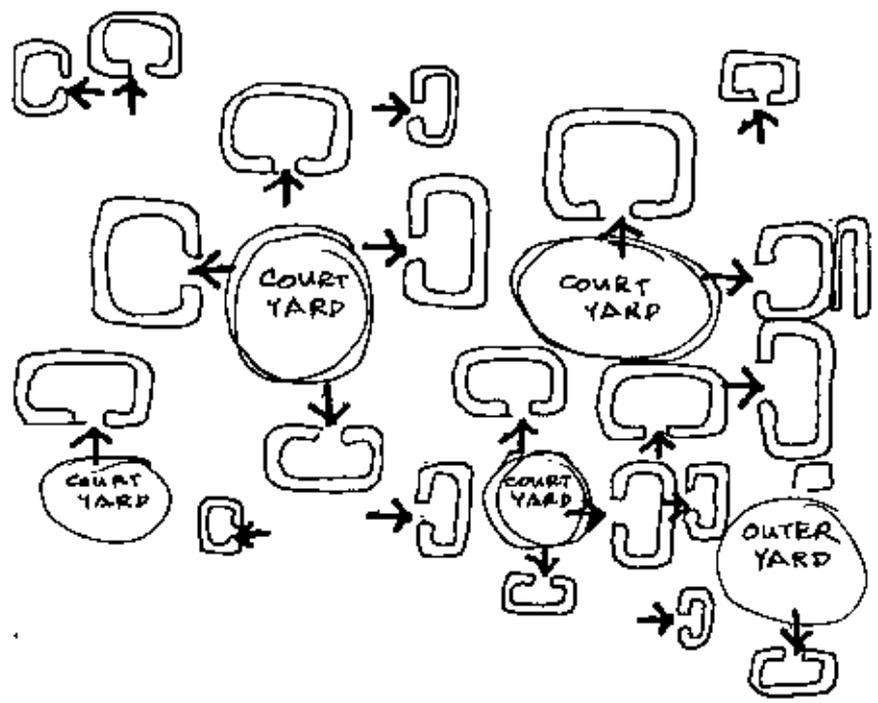


two or more families. Each family has individual or group kitchens. At present there is no 'Out-House' (Baithak Ghar), even though there was a 'Out-House' in the past. There are many smaller courtyards, which are linked up with the main inner courtyards. Circulation pattern in the house has become chaotic. Layout of electric line is solved in a complicated way. Most of the previous latrines are changed into pit Latrines.





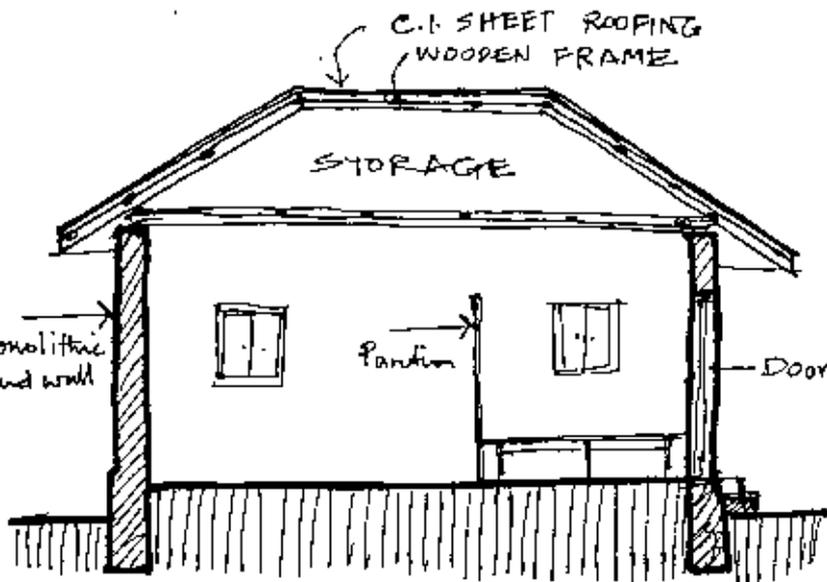
CIRCULATION PATTERN



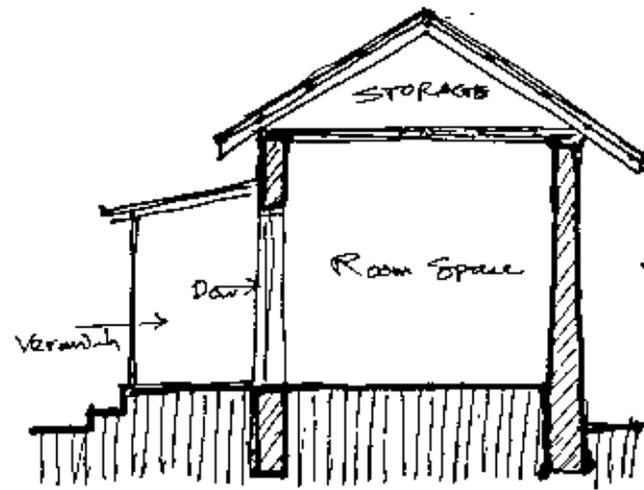
ORGANIZATION OF STRUCTURES ARE CHAOTIC.
NO DEFINITE SYSTEM IS THERE. COURT YARDS ARE
INTER-LINKED WITH NARROW PASSAGE.

HOUSE AND THE BUILDING MATERIALS

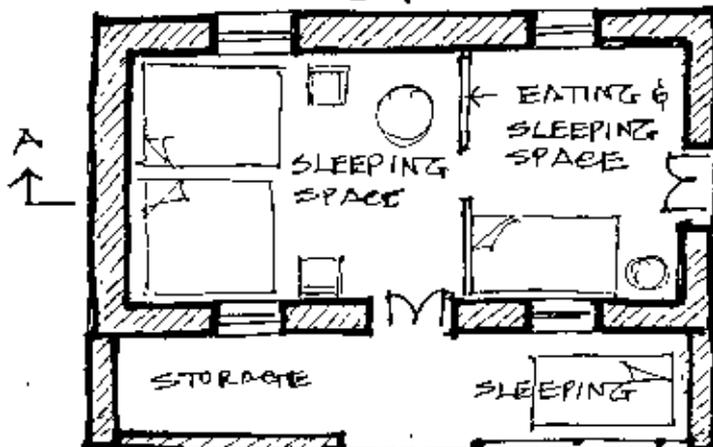
There are two types of house structures in the house, some of which are old and bigger in size. Old structures are of monolithic mud wall and the new ones are of mixed wall type of mud in combination of bamboo matting. Roof of all the main dwelling units are of C.I. sheet. Less important huts (kitchen, cow sheds etc) are of thatch roofing with reed or jute stick walls.



SECTION - A A
B9



SECTION - B B



PLAN



RESPONDENTS DWELLING UNIT

• PREVIOUSLY THE VERANDAH WAS OPEN TYPE. NOW IT HAS BEEN COVERED FROM ALL SIDES AND USED AS STORAGE AND SLEEPING SPACE DUE TO SHORTAGE OF COVERED SPACE.

• CASE STUDY NO 05

CASE STUDY NO. 06

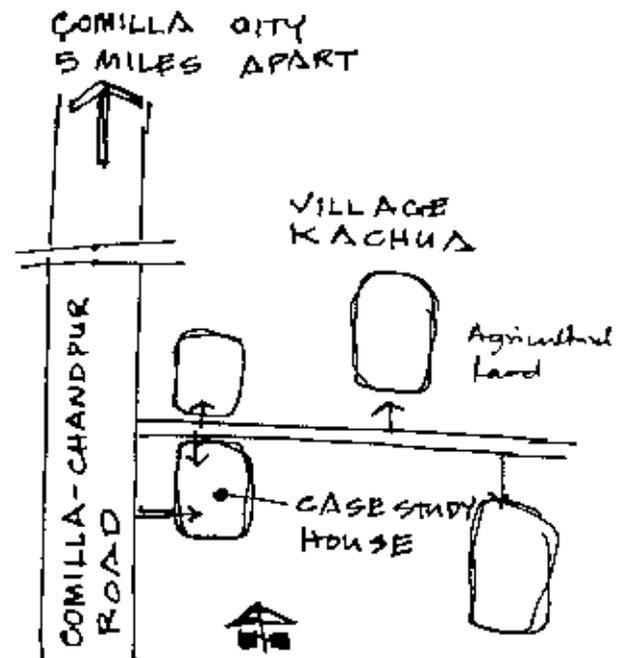
'MOZUMDER BARI'

Parchim Para

Vill - Kachua of Ahmed Nagar

Dist - Comilla

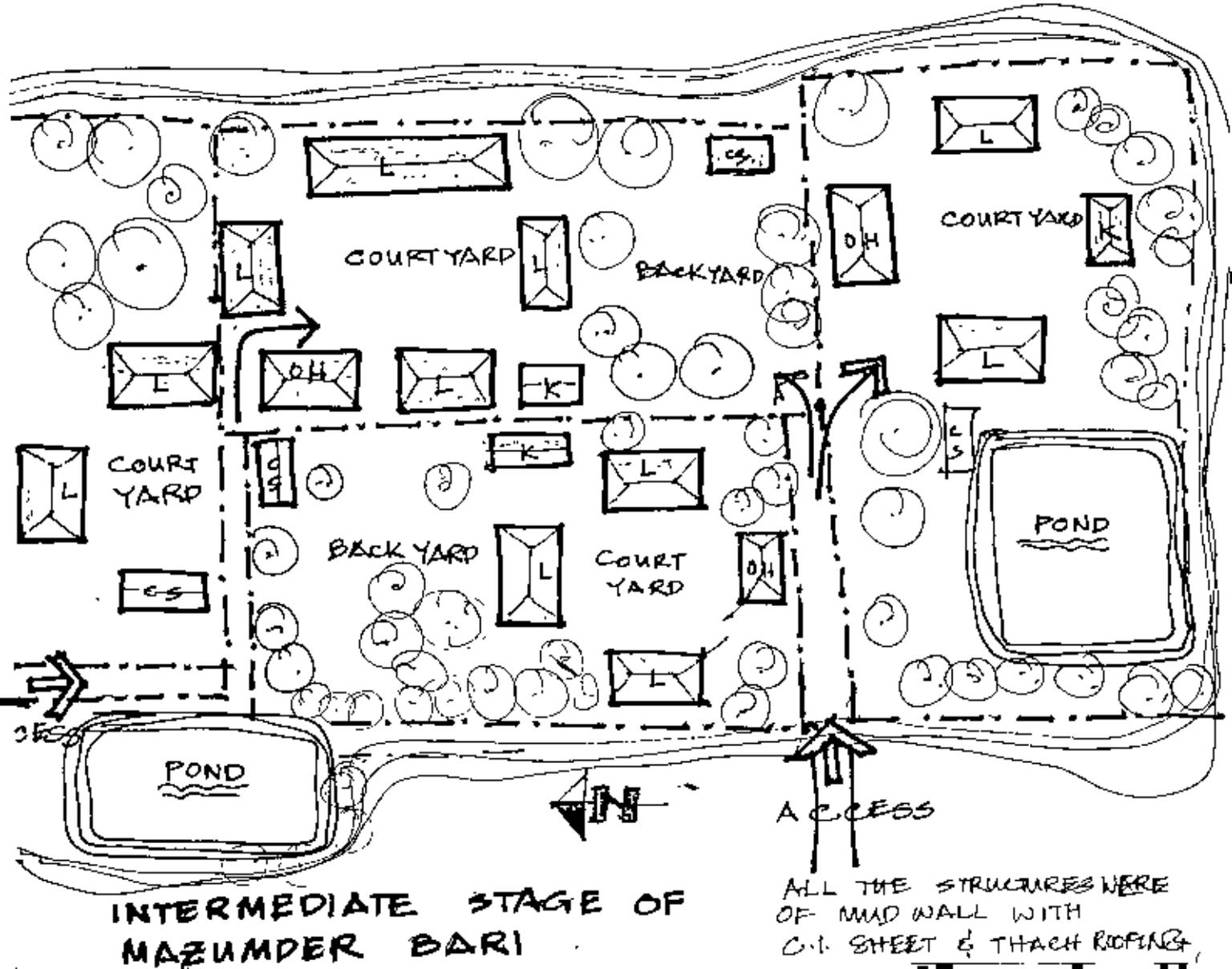
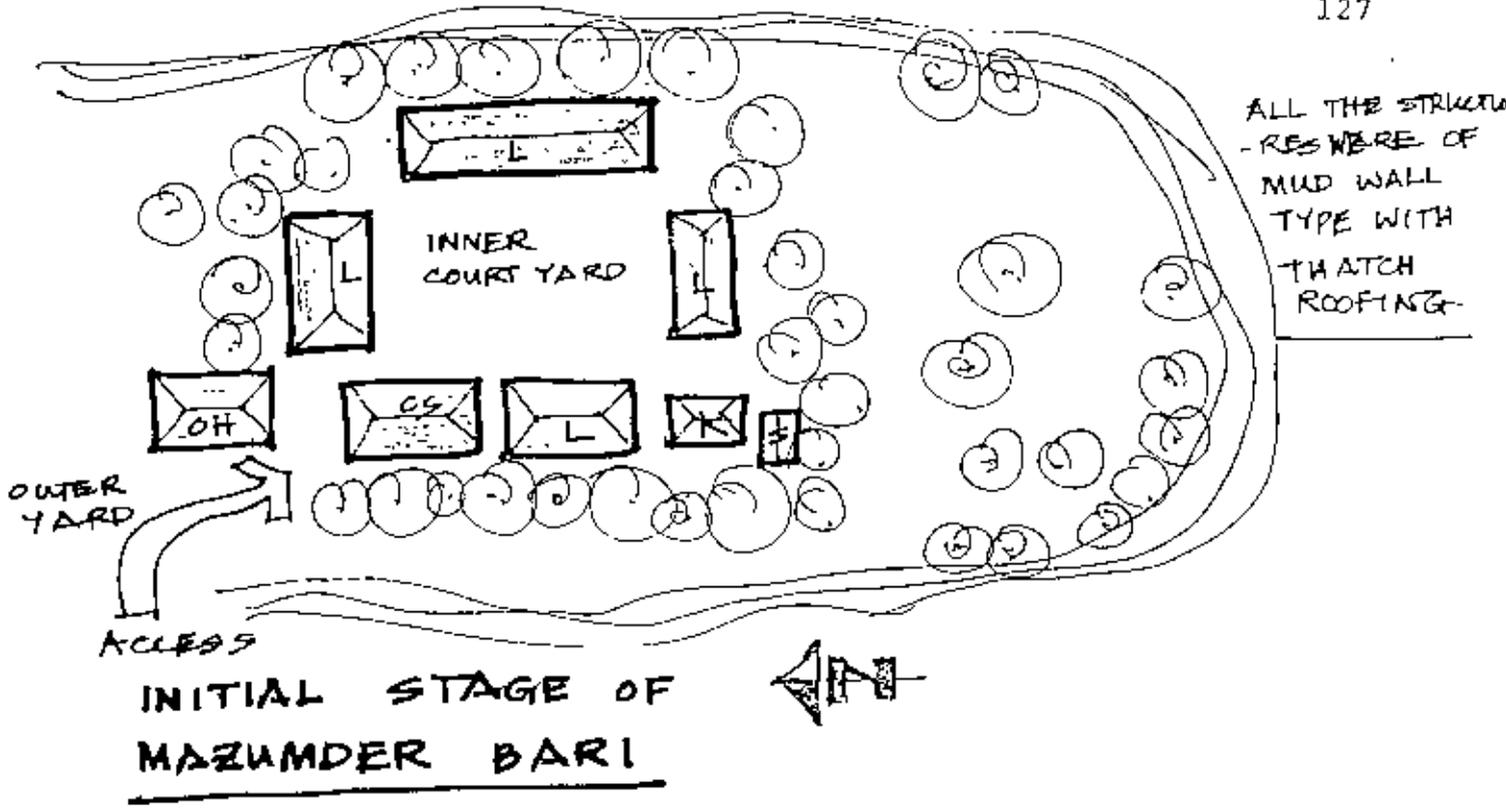
Respondent - Abu Naser' Mazumder.

HOUSE AND THE LOCALITY

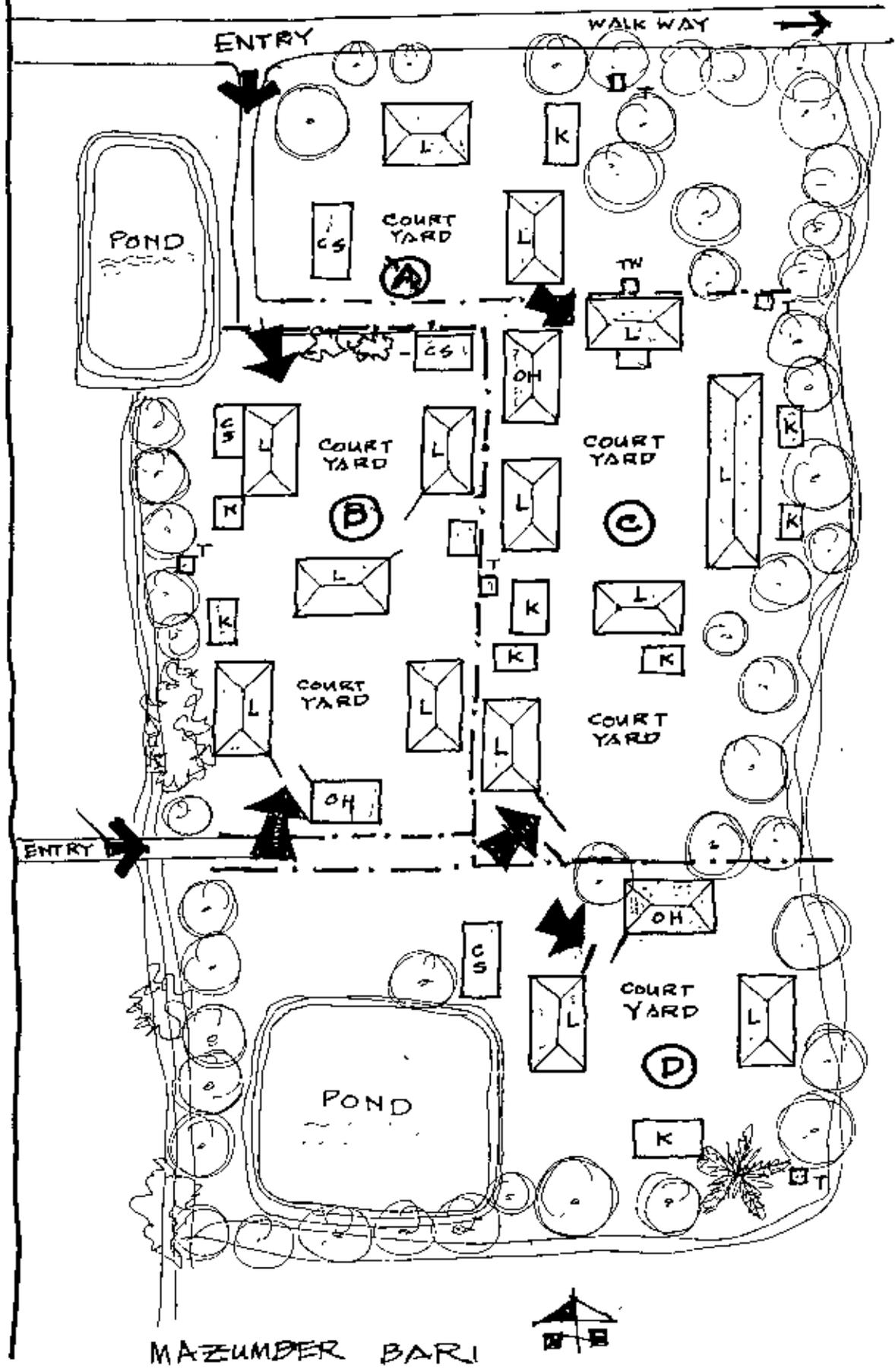
The house 'Mazumder Bari' is in the village of Kachua under Kotwali Upozilla of Comilla district. It is 5 miles apart from the district town and adjacent to the Comilla - Chandpur Highway. The house is in the western neighbourhood of the village. The area is a high land free from flood. The soil of the locality is sandy clay - which is very much appropriate for mud houses. Houses in the locality are mostly of mud. Both monolithic mud wall structure and hand made sundried bricks structures are in practice there. There are many closely spaced clusters of houses in this neighbourhood.

HOUSE AND THE LAND

Respondents grandfather, late Hossain Ali Mazumder was the single owner of the whole homestead land. Later the land was equally divided to the four sons of Mr. Hossain Ali. At present all the four parcels have become four



COMILLA - CHANDPUR ROAD



MAZUMBER BARI

CASE STUDY NO. 06

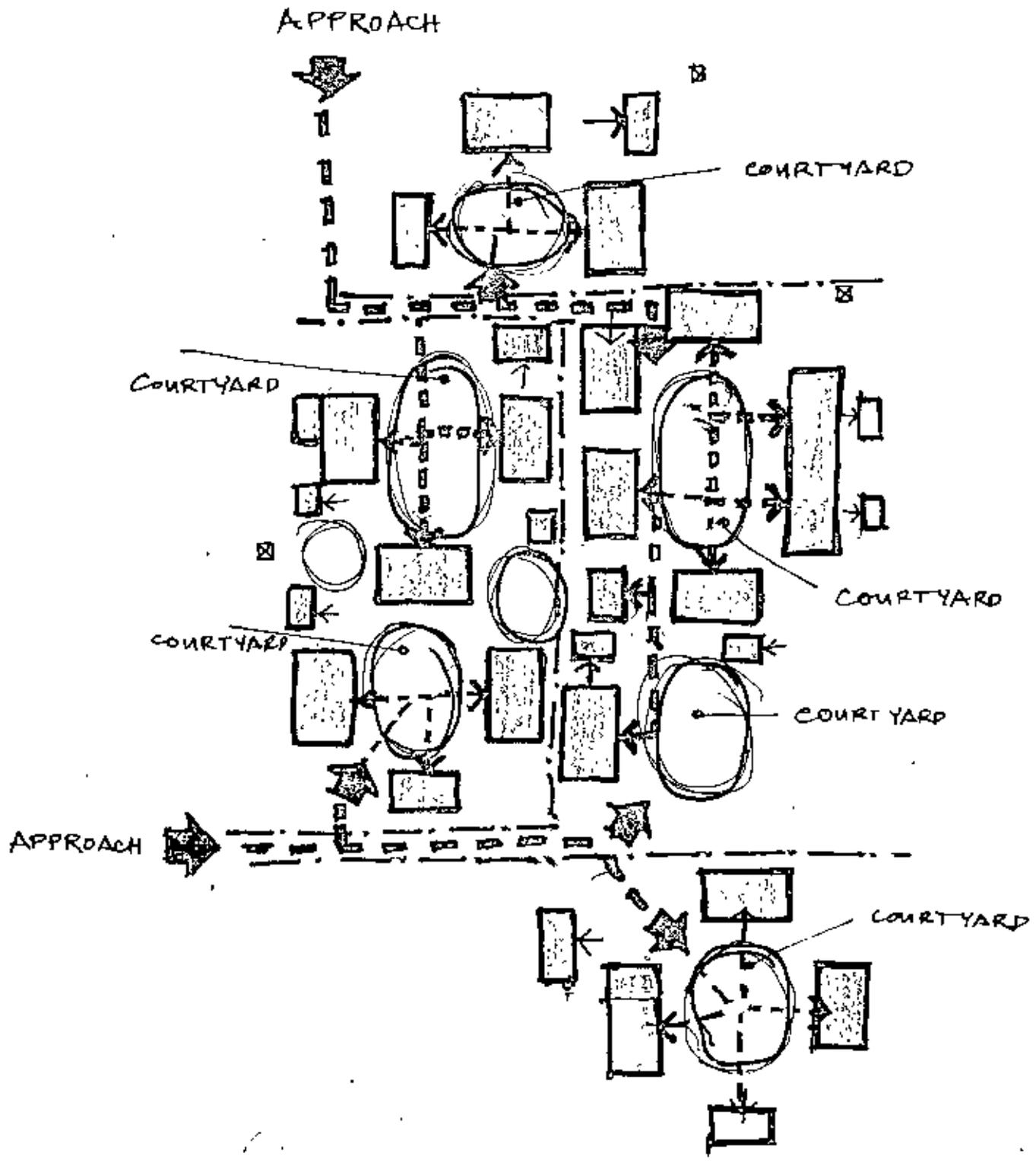
independent houses. Again there are divisions within the families in the independent houses. Respondents father got the land at the back and the approach to the house is through some passage inbetween other two houses.

FAMILY AND THE DWELLING UNITS

Respondents father is alive and the homestead land is not officially divided yet, but each brother has given separate parcels of land. Respondent has six other brothers and all of them have separate families. All the six brothers have separate house units (Ghar). Previously there was a single inner courtyard, but with the introduction of a hut at the centre it became separated into two. Respondent has built his house recently about three years back. The 'Out-house' at the entry is a common property. Outsides and visitors are entertained at the 'Out House'. The Inner courtyards are family space. Courtyard is mainly used as drying space. Paddy thrashing is done by small mechanical device. Electricity is there in the house. Previous Kuttcha latrines has become either pit type or pucca sanitary type.

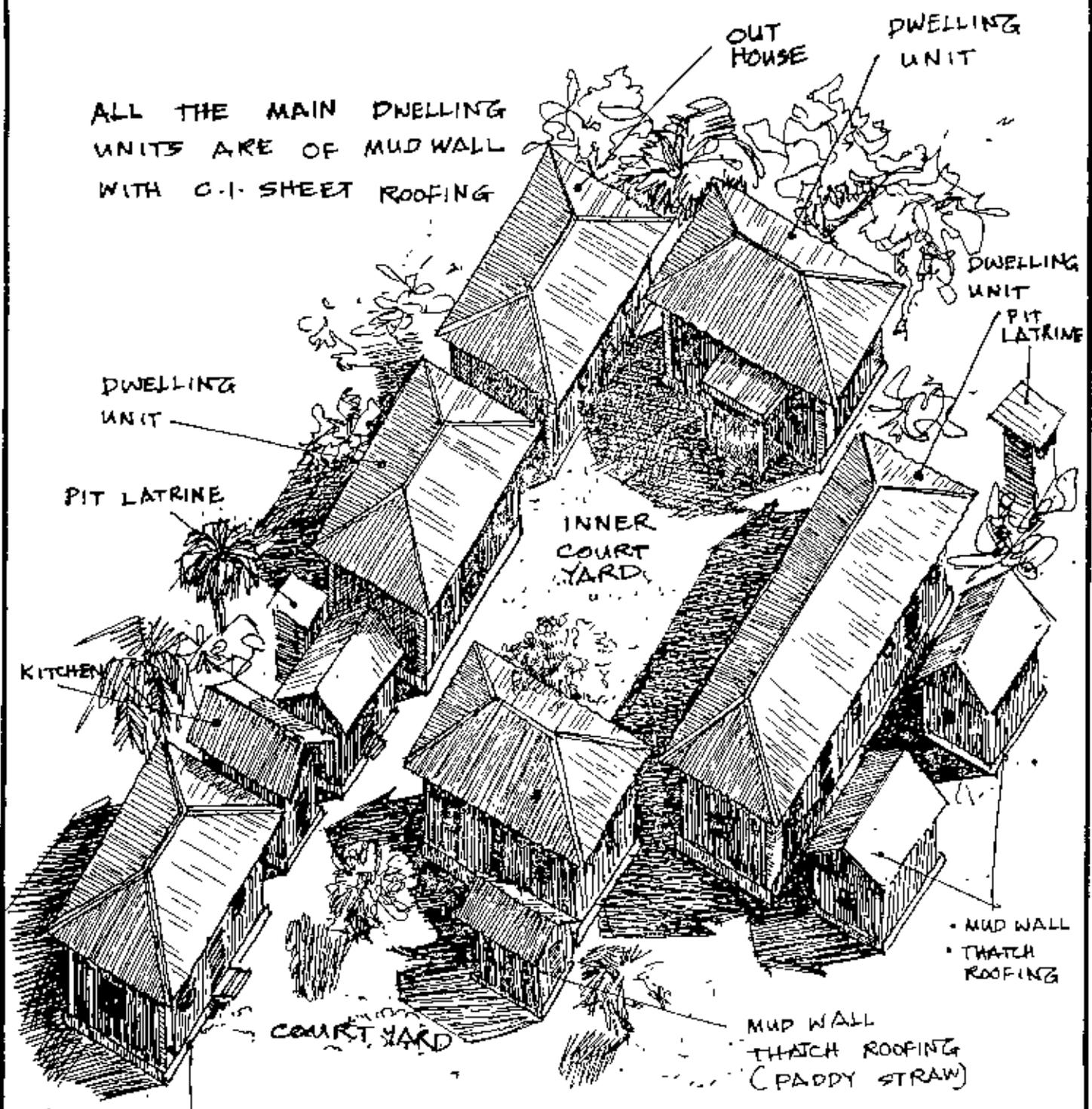
HOUSE AND THE BUILDING MATERIALS

All the house structures (Ghar) in the house are of mud type. Roofing of the main dwelling units are with either



CIRCULATION PATTERN

ALL THE MAIN DWELLING UNITS ARE OF MUD WALL WITH C.I. SHEET ROOFING



- MUD WALL
- THATCH ROOFING

MUD WALL THATCH ROOFING (PADDY STRAW)

RESPONDENTS DWELLING UNIT

- MUD WALL OF HAND MADE SUNDRIED BRICKS
- C.I. SHEET ROOFING
- TIMBE ROOF FRAMING

CASE STUDY NO. — 06

C.I. sheets or Asbestos sheet. Less important units are of thatch roofing type. Floors are of mud and walls are either of monolithic mud walls or handmade sundried bricks. Mortar used for mud bricks are also of mud. Some types of mud plaster is used on the mud wall. Preference is given for mud type structure because the available soil is sandy clay and lasts for long period as wall. Mud walls cost less with compare to other types of structures. Occupants are very happy with mud houses for its thermal comfortability.

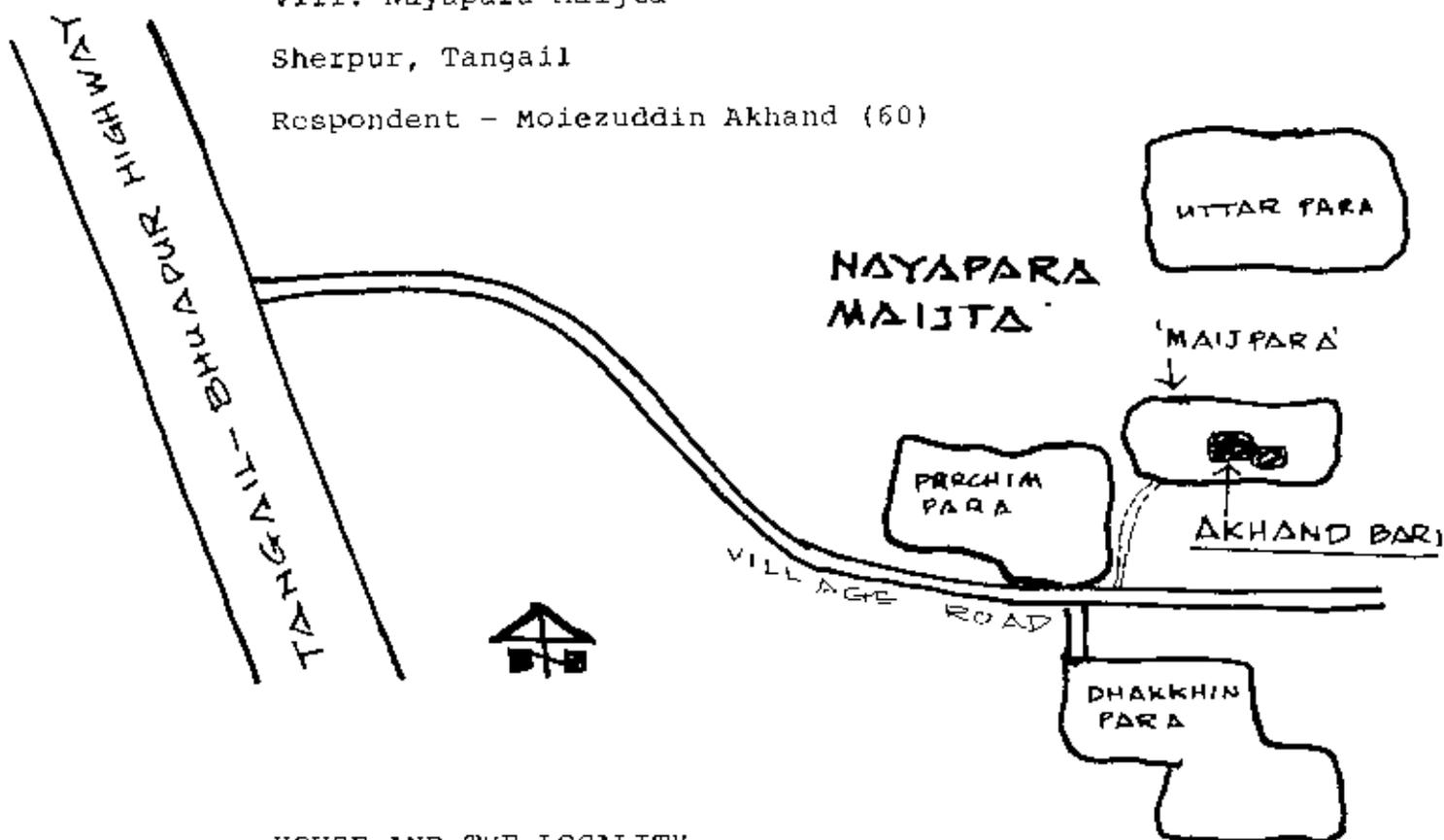
CASE STUDY NO. 07

'AKHAND BARI' - (A)

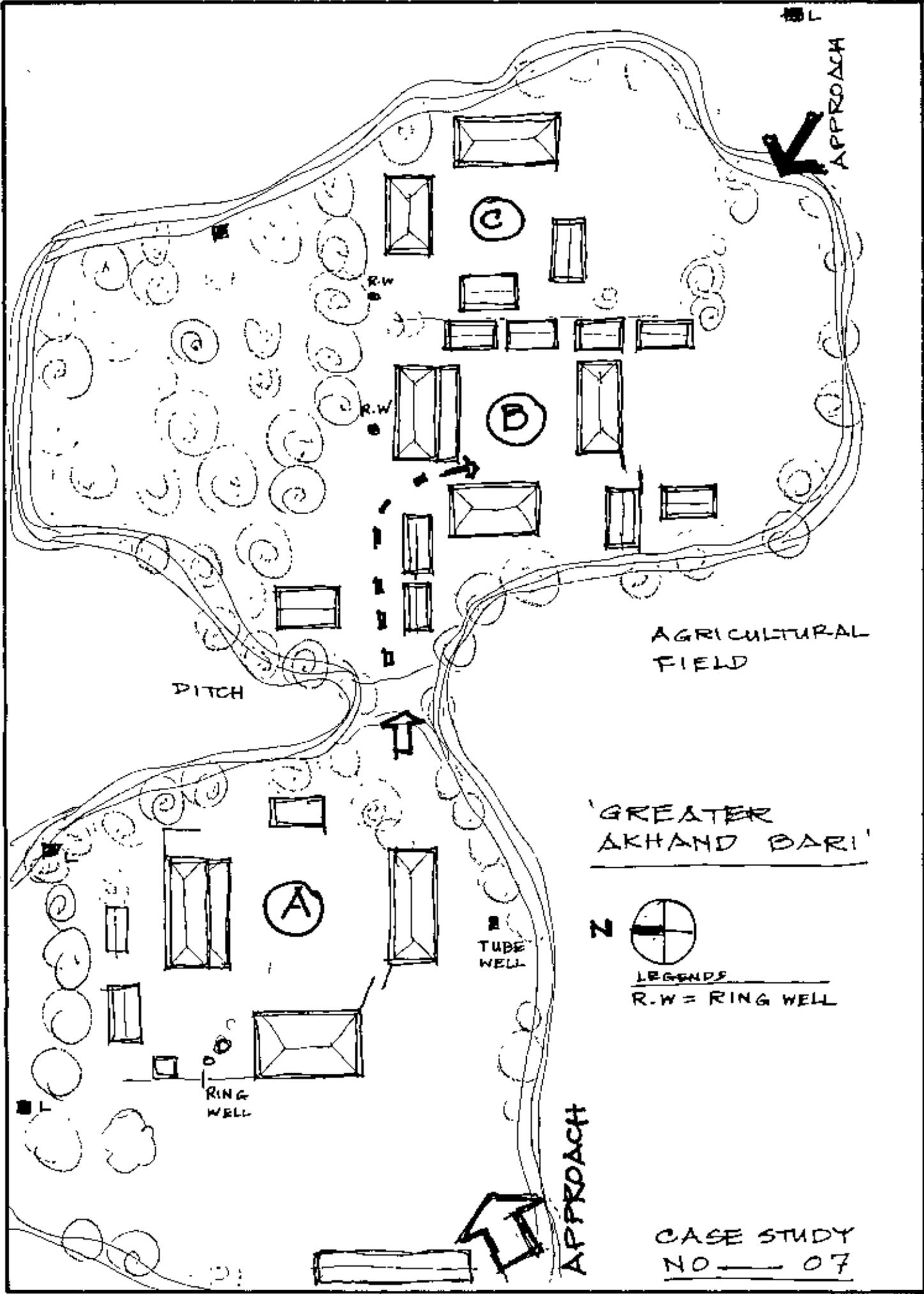
Vill. Nayapara Maijta

Sherpur, Tangail

Respondent - Moiezuddin Akhand (60)

HOUSE AND THE LOCALITY

The village Nayapara Maijta is 15 miles apart from the District of Tangail. The village is approached by a mud road stemming from the Tangail-Bhuapur high way. The village is in the river flood plains. The land surrounding the village site is principally found from the deposits of River Jamuna.



AGRICULTURAL FIELD

'GREATER AKHAND BARI'



LEGENDS
R.W = RING WELL

APPROACH

CASE STUDY
NO. 07

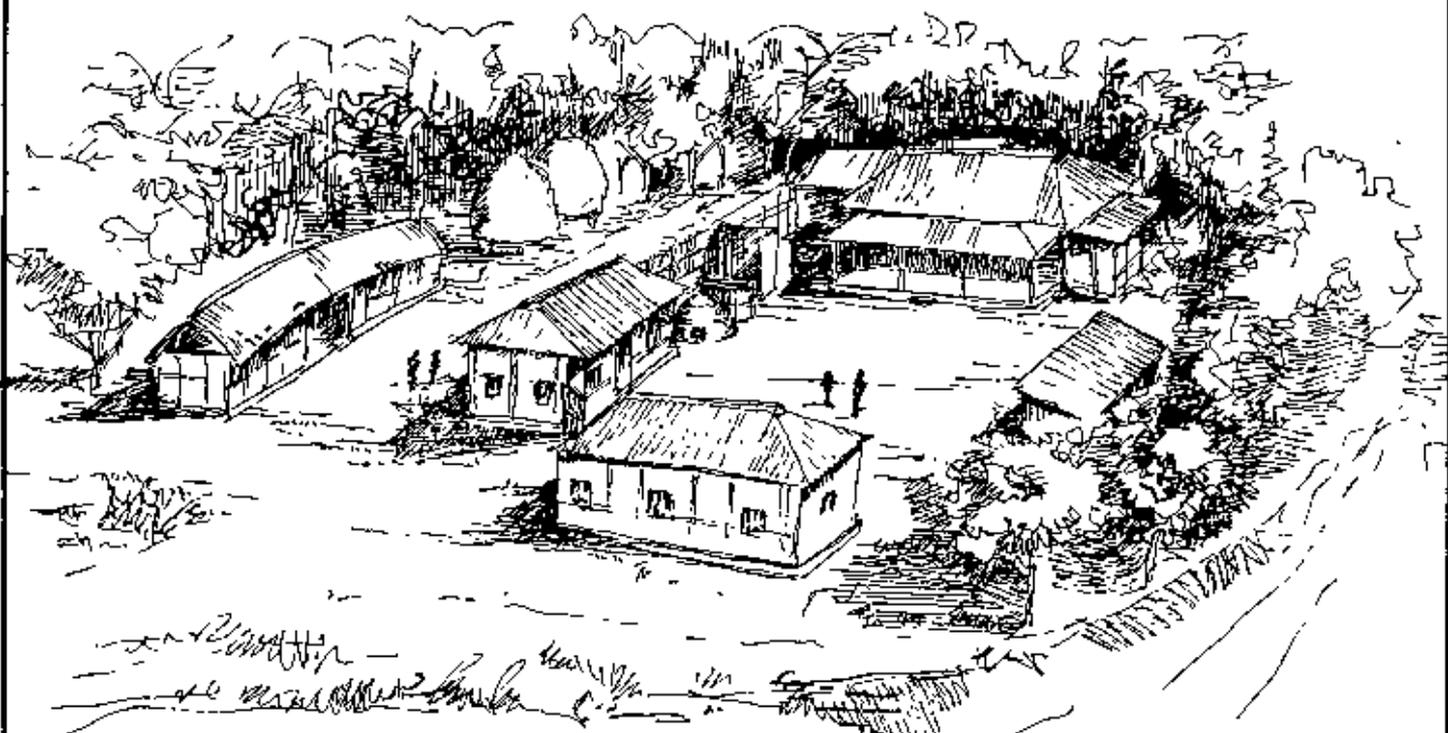
The village is comprised of four 'para' (neighbourhoods) each of them being a cluster of several houses. The village road passes through the three of the four 'paras'. The fourth one is rather detached. Greater 'Akhand Bari' (of which the case study house in a part) is located in the Maijpara (Central neighbourhood). There is no distinct path from the village road leading towards this house. In the flood season, they have to pass through other houses, as the usual track goes under water. The Greater house is surrounded by agricultural land on the two sides.

LAND AND THE HOUSE

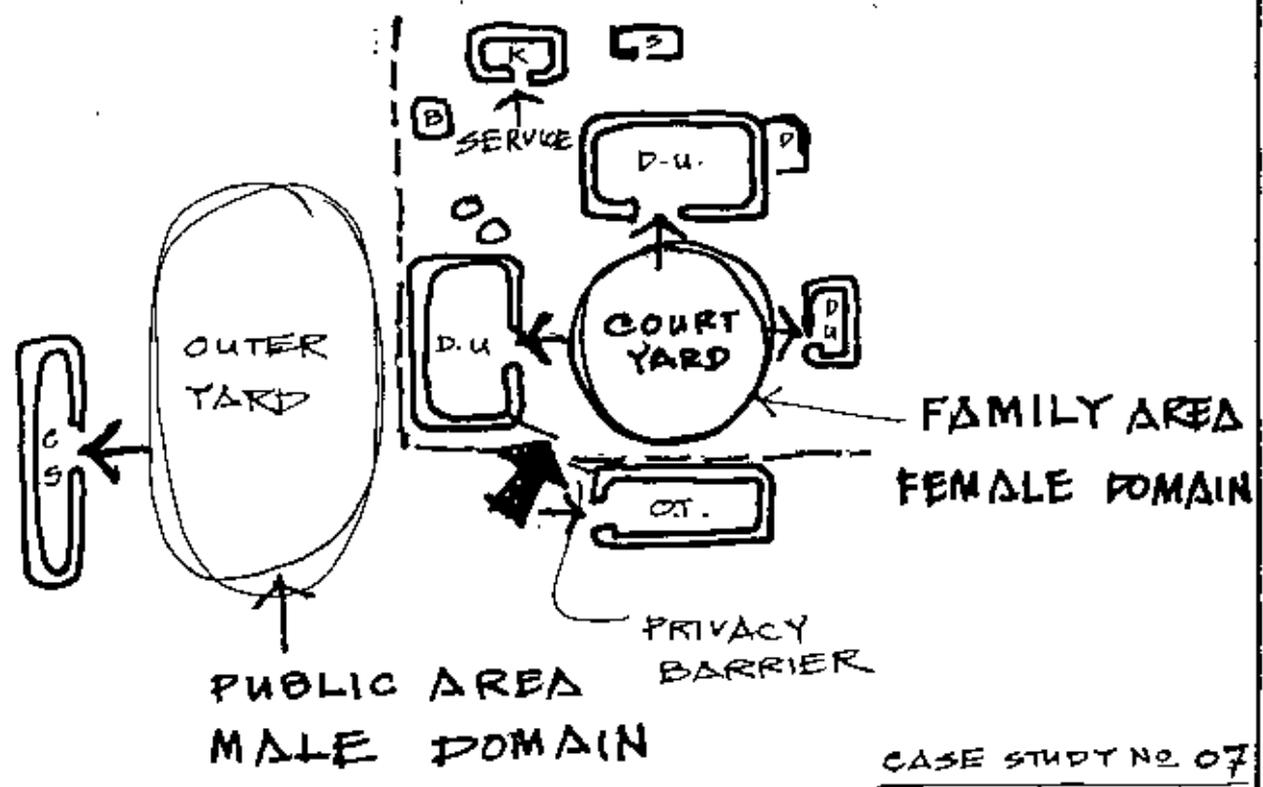
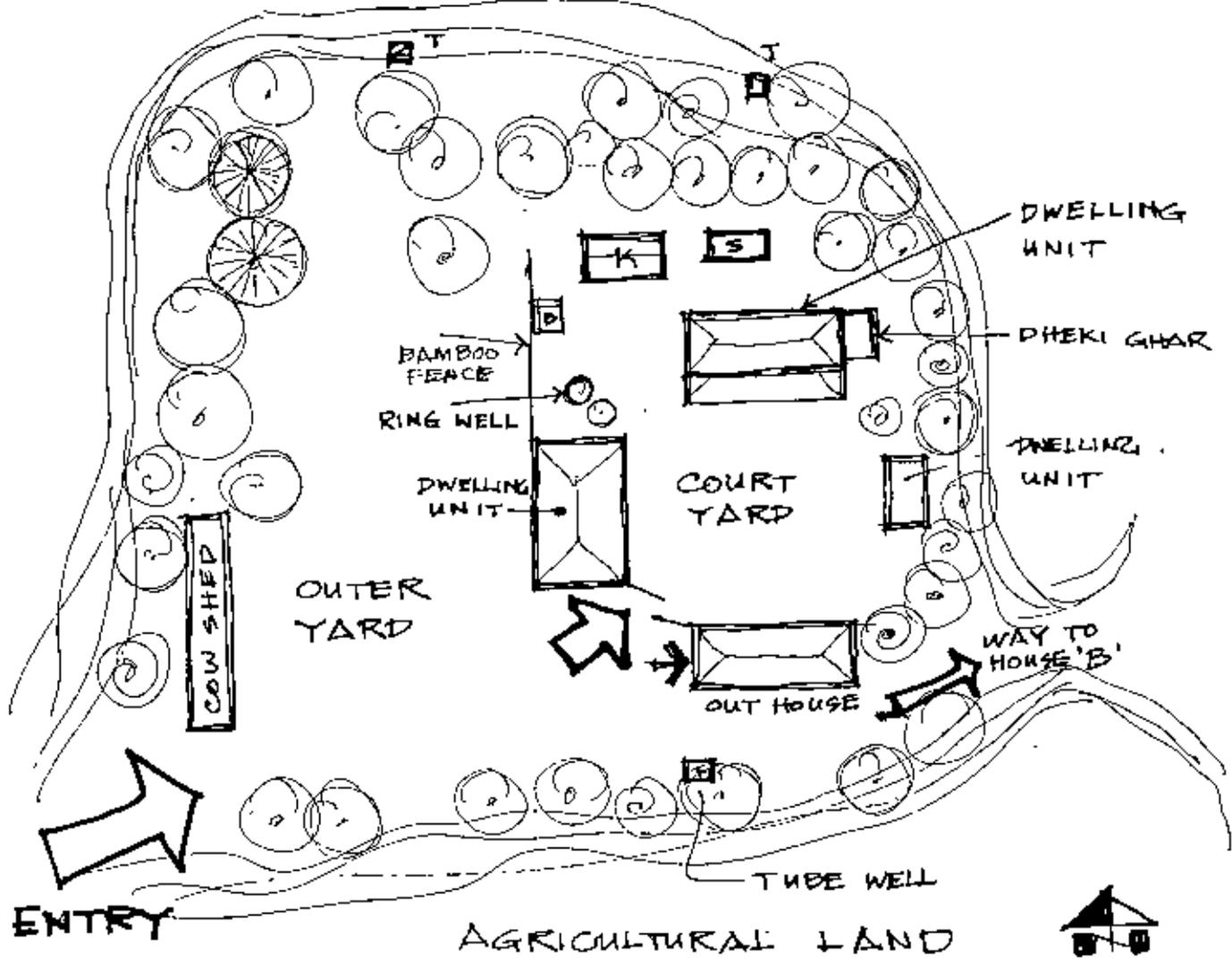
House No. A which is under this case study, is the original house built by the grandfather of the respondent. The adjacent land on which the other two houses "B" and "C" were built later on, was a high domestic agricultural land. The original house was owned by the respondents father. Uncle of the respondent moved to the adjacent high land where he built his house.

FAMILY AND THE DWELLING UNIT

The head of the family is Md. Moiezuddin Akhand, who is very old now. His family is a joint family in character. He has four sons and two daughters. Elder two sons are married and have their children. Other two are school going students. Elder daughter is married and moved off to husband's place and the younger one is a school going student. The house is separated into inner house and the outer house. The structures are arranged around the inner courtyard. There are four living units out of which the northern one was originally built by the grandfather of the owner. This is now shared by the married brothers.



<u>COWSHED</u>	<u>OUT HOUSE</u>	<u>DWELLING UNITS</u>	<u>KITCHEN/STORE</u>
FLOOR — MUD	FLOOR — MUD	FLOOR — MUD	FLOOR — MUD
WALL — BAMBOO & JUTE STICKS	WALL — WOODEN POSTS & WOODEN PLANK	WALL — WOODEN POSTS & C.I. SHEET	WALL — BAMBOO POSTS & JUTE STICK
ROOF — THATCH (PADDY STRAW)	ROOF — C.I. SHEET ON WOODEN FRAME.	ROOF — C.I. SHEET ON WOODEN FRAME.	ROOF — THATCH (PADDY STRAW)



The western unit is used by the owner, his wife and their daughter. The small unit in the east is for the two school going sons. The out house is for guests entertainment. Seasonal labours stay here at night. There is a kitchen, kitchen yard, fuel storage and rice husking space (Dheki Ghar), a ring well, a bathroom for the female, a poultry shed etc. all around the kitchen yard. The inner courtyard is used as space for drying grains and family living space. The verandah of the original house is used for sitting. Outer yard is mainly used for paddy thrashing and drying.

HOUSE AND THE BUILDING MATERIALS

The structure of the houses are of timber frame having C.I. sheet roof and wall, and mud floor. The service structures are thatched type. The doors and windows are either wooden or bamboo matting respectively.

CASE STUDY NO. 08

AKHAND BARI (B)

Vill. - Nayapara Maijta

Sherpur, Tangail.

Respondent - Majid Akhand (45).

HOUSE AND THE LOCALITY

Same as that of case study No. 5

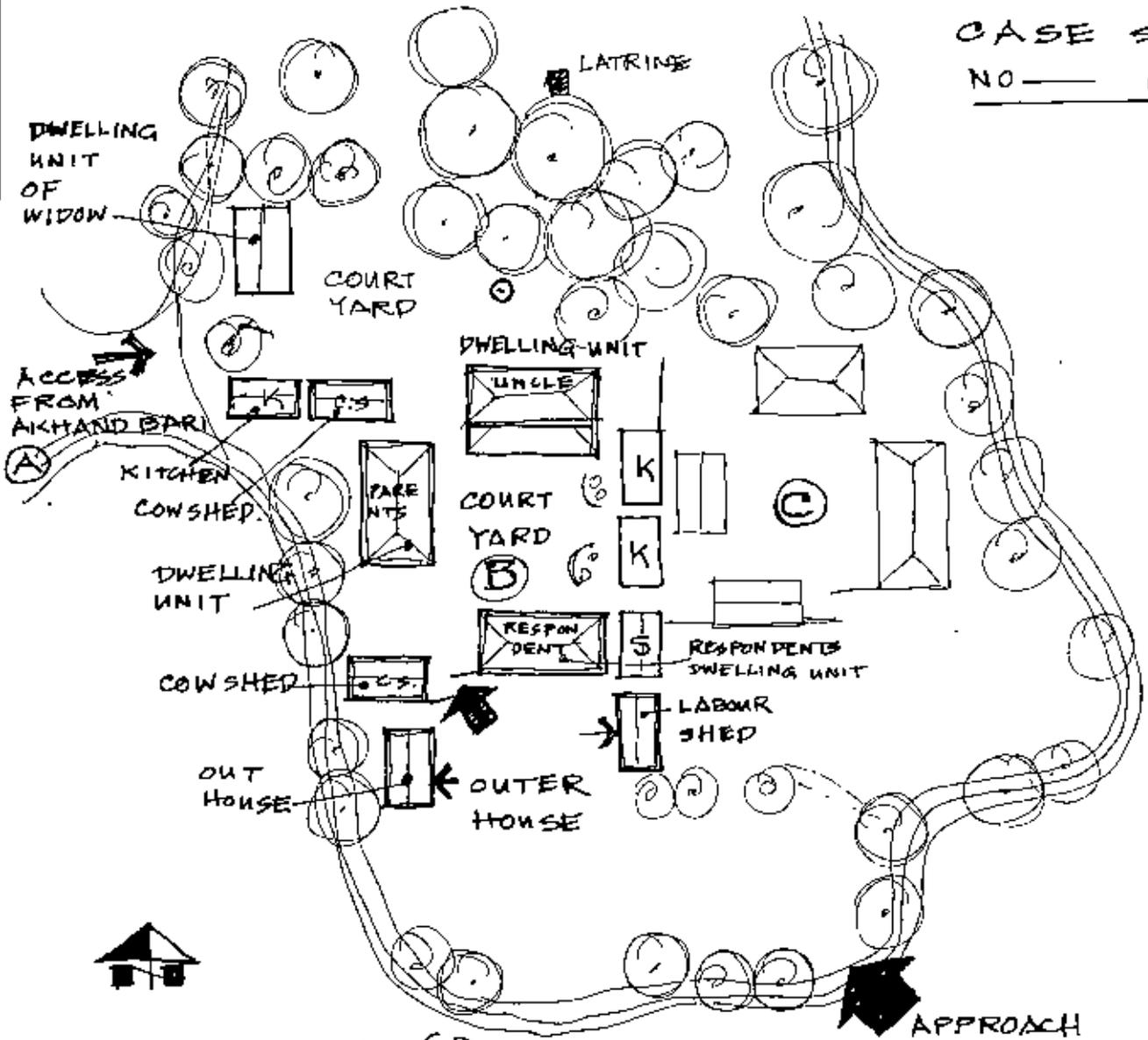
HOUSE AND THE LAND

Same as that of case study No. 5

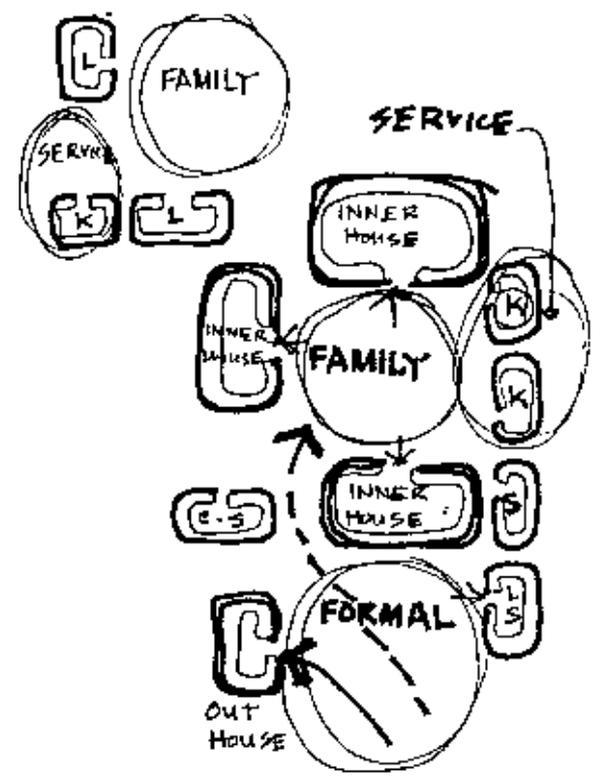
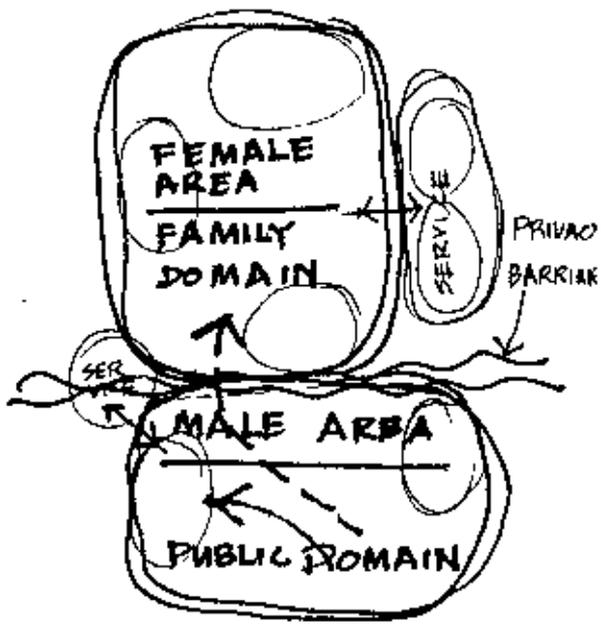
FAMILY AND THE DWELLING UNITS

Originally the house was owned by the respondent's father and an uncle. Now the house is resided by the respondent's family and his cousin's family. Recently another cousing (sister) now a widow, has been given accomodation at the back yard. Out of the three main dwelling units, around the central courtyard, respondents cousin and his family stays in the northern unit, his father with his second wife (respondents mother expired) reside in the Western unit and the respondent himself in the southern unit. The respondent's only brother, a Police officer stays outside and seldom visits the house. There are two common small out houses - one of which is for guests,

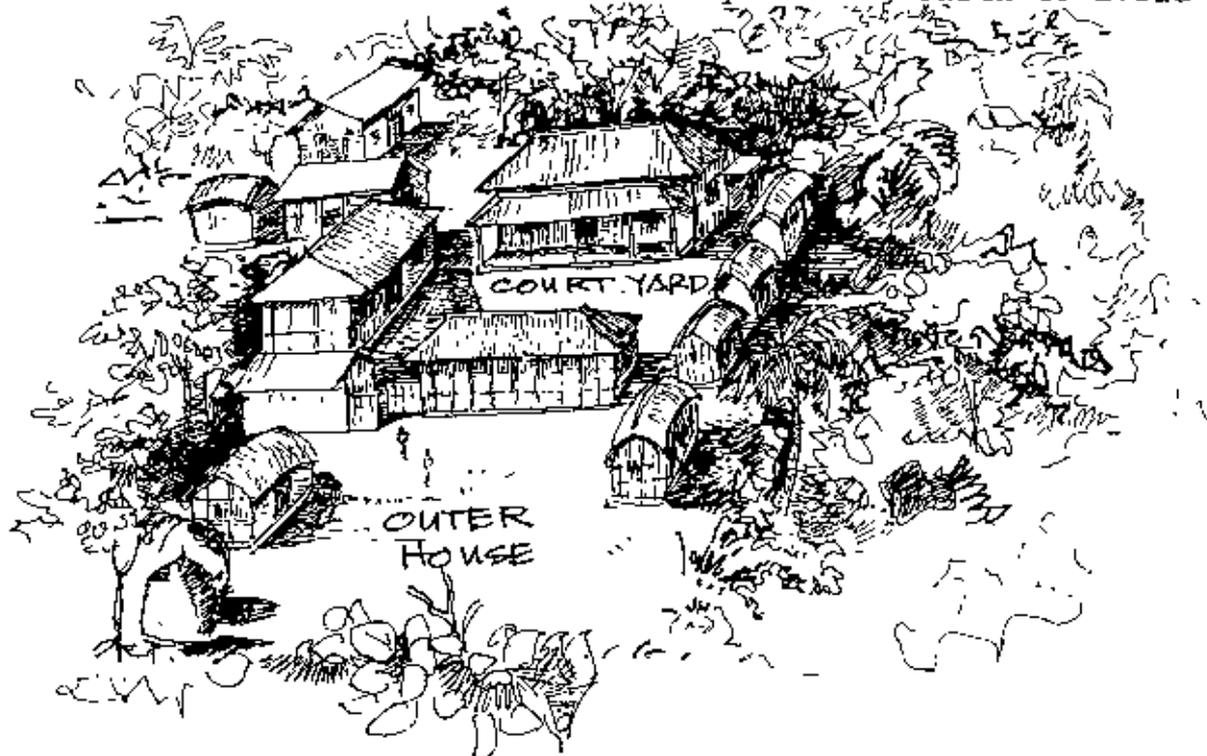
CASE STUDY
NO — 08



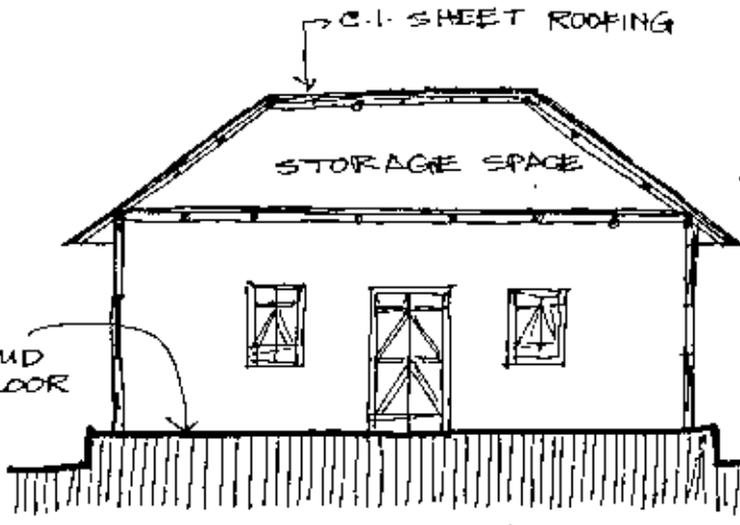
AKHAND BARI (B)



children study and staying of a lodging teacher. The other is resided by the seasonal labours. All the main dwelling units are grouped around the inner courtyard. The kitchen is at one side of the courtyard. Cooking and the family activities are extended in the courtyard. The courtyard is used for paddy drying. The outer yaard is mainly used for paddy thrashing by cattle and paddy drying. The cowshed is at one side of the entry. The cows are taken care of at the outer yard. As the house is jointly shared by two owners of second generation, the respondent is interested to move to the front to a newer site by filling earth to avoid



congestion and complicity of land ownership. The respondent is an employee of a consulting firm and he comes to his house once a week to see his family and take care of agriculture. His children are getting education at schools. They also look after their farm lands. The family with their agricultural product and other income is more or less solvent.

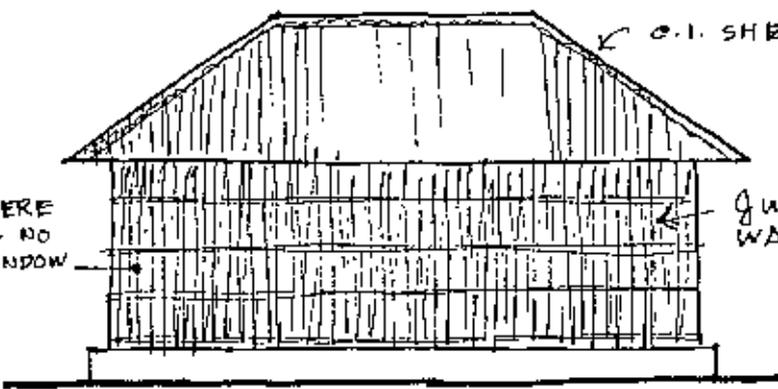


SECTION - A A'

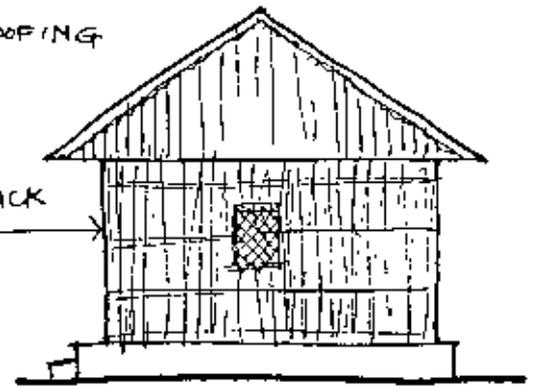
$1.5m$
 $2.7m$
 $1.5m$



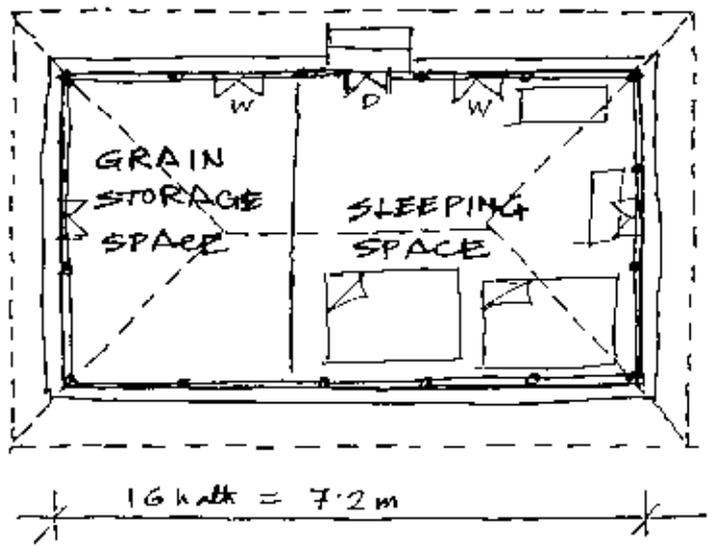
SECTION - B B'



SOUTH ELEVATION



WEST ELEVATION



PLAN SCALE 1:100

$9\text{ kakh} = 4.05\text{ m}$

$16\text{ kakh} = 7.2\text{ m}$

RESPONDENTS DWELLING UNIT

CASE STUDY
NO. — 08

HOUSE AND BUILDING MATERIALS

The roofs of the main dwelling units are C.I. sheet and the walls are of bamboo matting and jute sticks. But for the 'Out Houses', shelter of the widow cousin and the service structures, the wall and roofs are of bamboo frame with jute sticks. Jute sticks are extensively used in this locality because this is an high jute producing area.

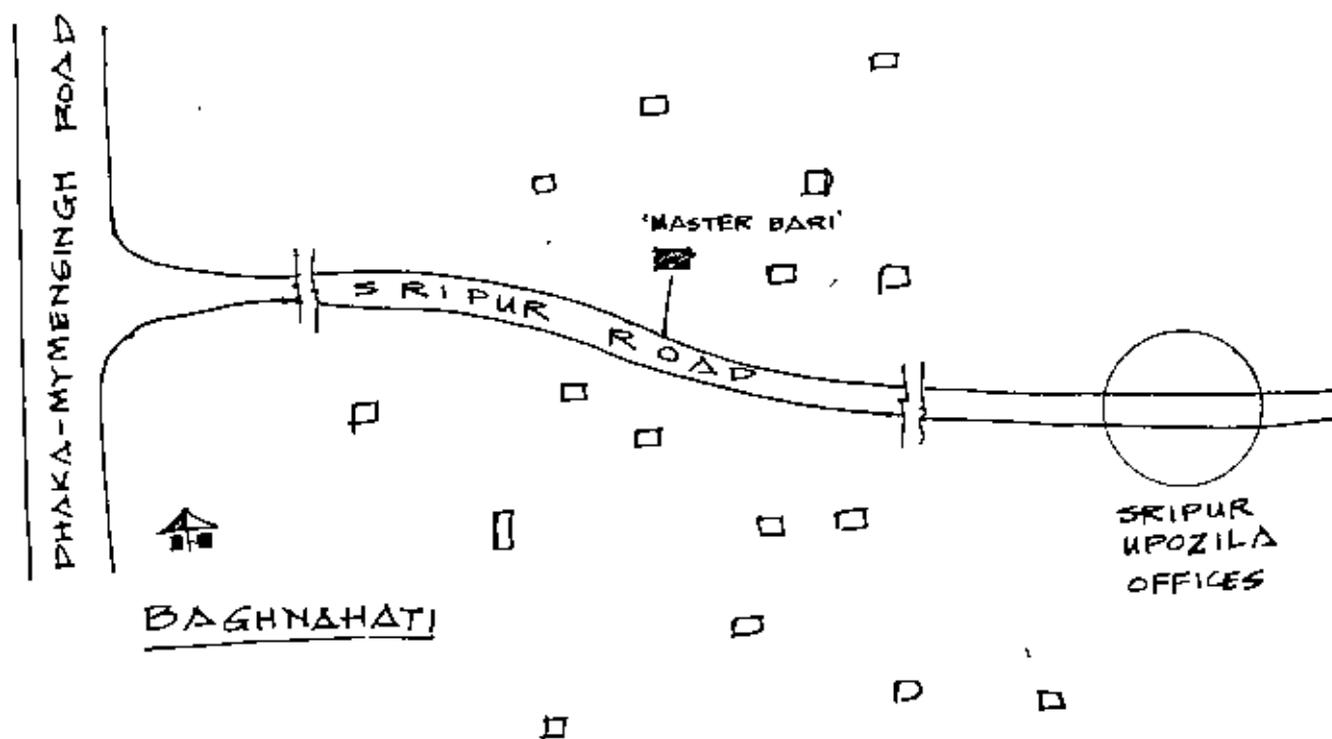
CASE STUDY NO. 09

'Master Bari'

Respondent - Abdur Rahim (40)

Vill - Bhangnahati

Upozilla - Sripur, Dist - Mymensingh.

HOUSE AND THE LOCALITY

The house "Master Bari" is located in the village 'Bhangnahati' of Upozilla - Sripur, District - Mymensingh. Bhangnahati is on the midway to the Sripur bound diversion from the Dhaka Mymensingh road. The village is in the Pleistocene upland of Modhupur Tract. The land is quite high from the floor level. Soil is red. Jack fruit orchard is all around. There are two 'para'

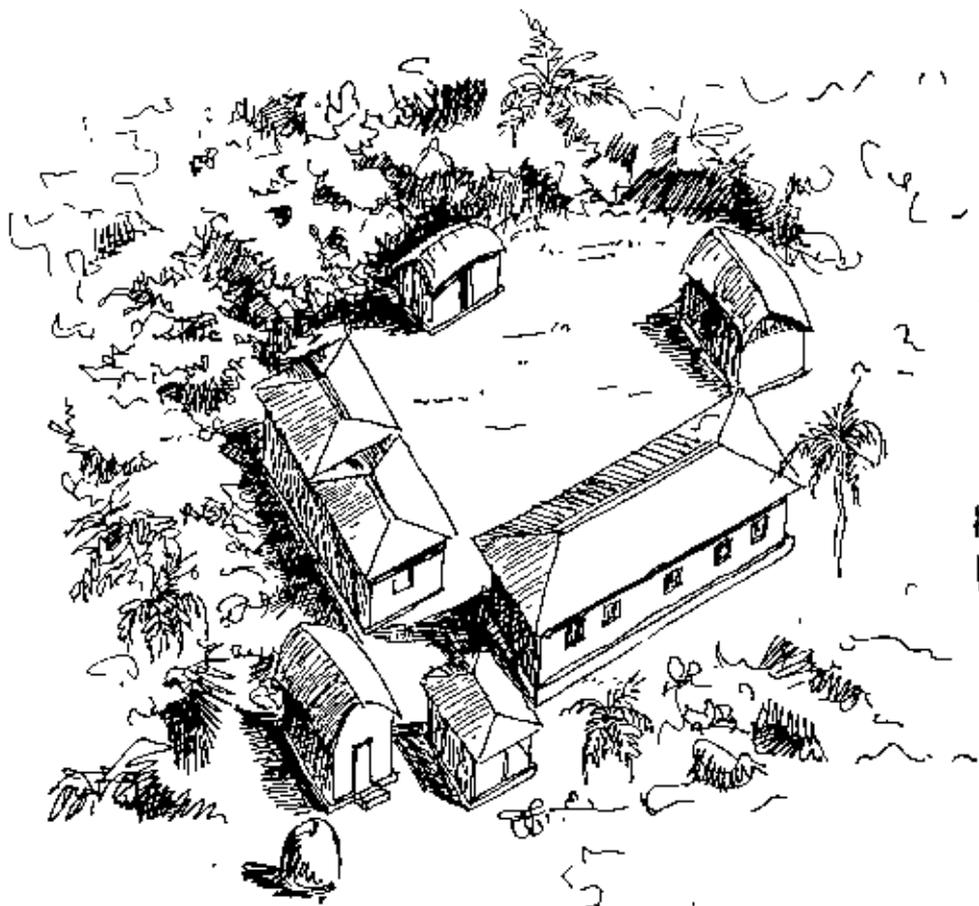
(neighbourhood) in the village which are composed of many scattered nuclear and small cluster of houses. Almost all the houses of the locality are made of mud. Double storied mud structures are also seen side by side with single storied structure.

HOUSE AND THE LAND

The land where the house is built was a jack fruit orchard. About 50 years back respondents father built this house coming from a nearby house. First two main dwelling units and other services such as kitchen, fuel store, rice husking shelter were built around the courtyard. Gradually other structures were built. It was a joint family and ten years back from now the family was divided into four individual families. Land of the homestead was divided into four equal divisions with the courtyard in common. Now the outer house land and the facilities are common property.

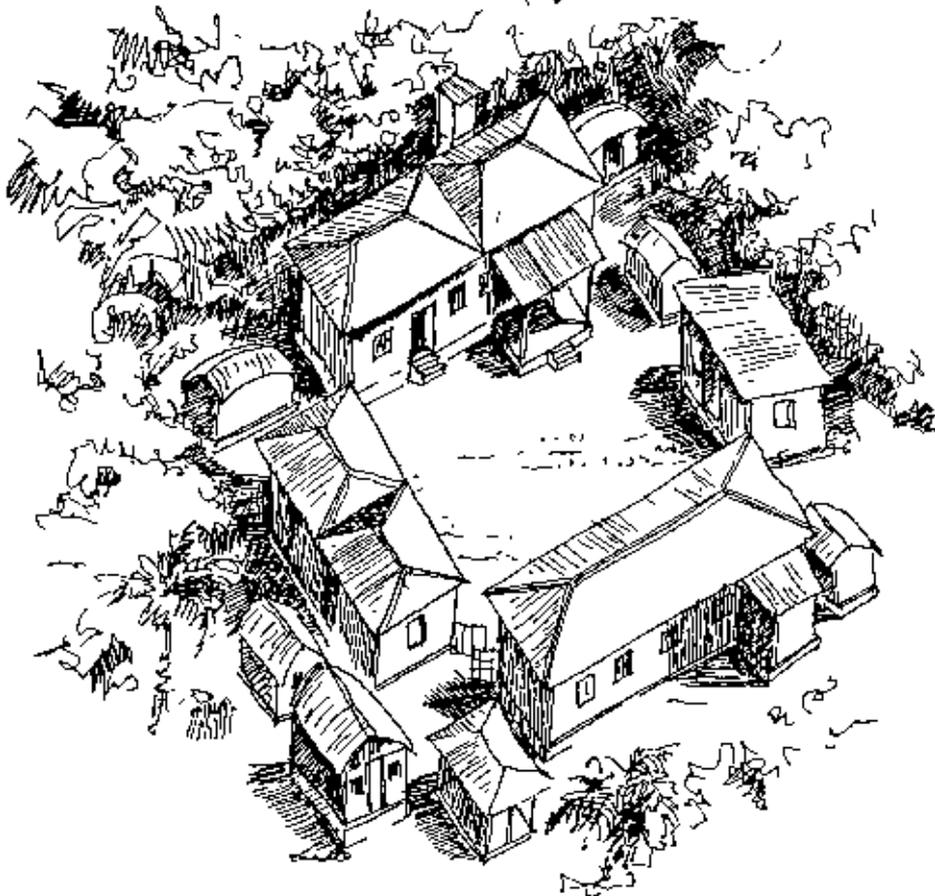
FAMILY AND THE DWELLING UNIT

At present, there are four families of four brothers in the house. The respondent's father stays in the original shelter. They are taken care by all his sons. Four brothers got the four sides of the courtyard. The structures of the house are longitudinal in character, divided into two parts with a



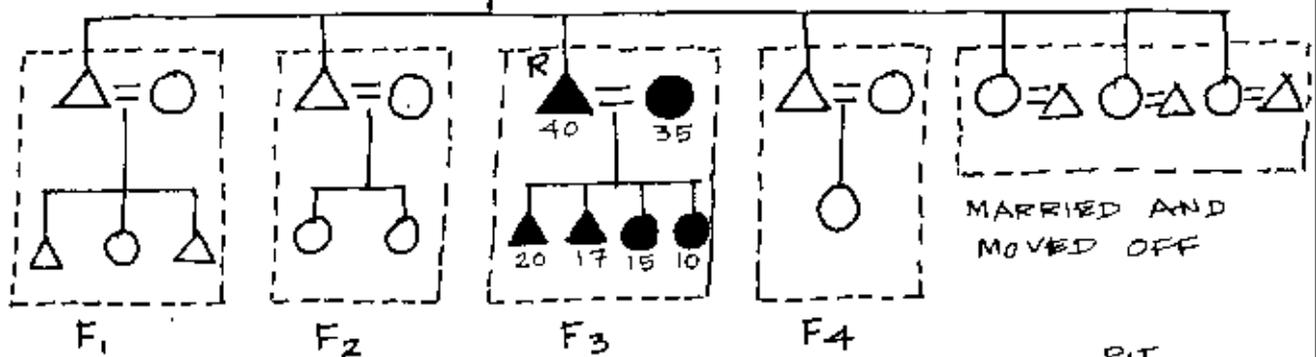
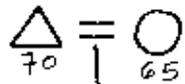
1960

HOUSE DURING
THE FAMILY WAS
JOINT. COURT YARD
WAS MAINLY USED
FOR PAPPY THRASHING
BY CATTLE.



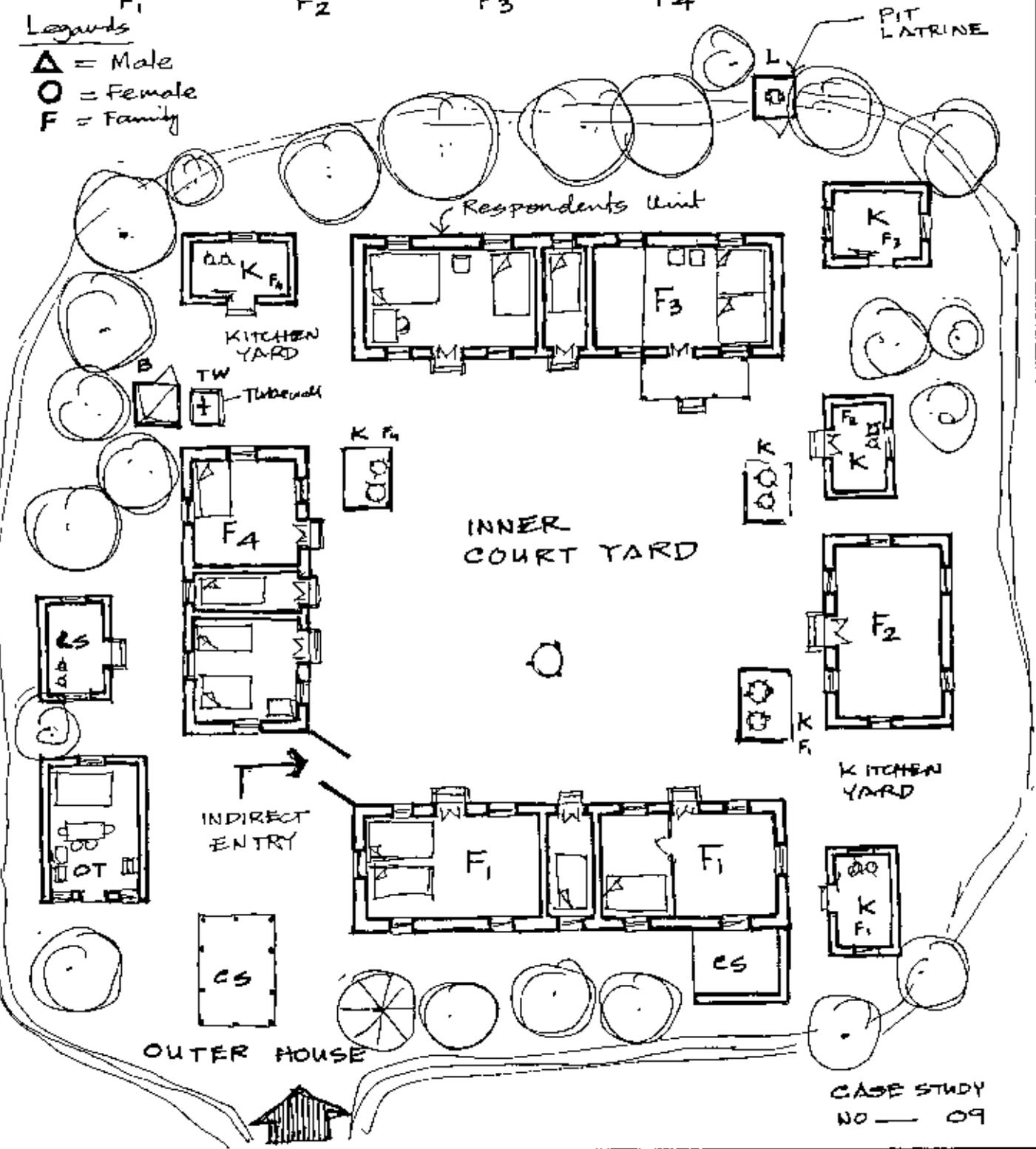
1985

HOUSE IS AN
EXTENDED FAMILY
HOUSE. THERE ARE
FOUR FAMILIES OF
FOUR BROTHERS.
THEY HAVE INDIVIDUAL
DWELLING UNITS, BUT
THE COURT YARD AND
THE OUTER HOUSE
IN COMMON. COURT YARD
IS USED FOR GRAIN
DRYING & EXTENSION
OF KITCHENS.

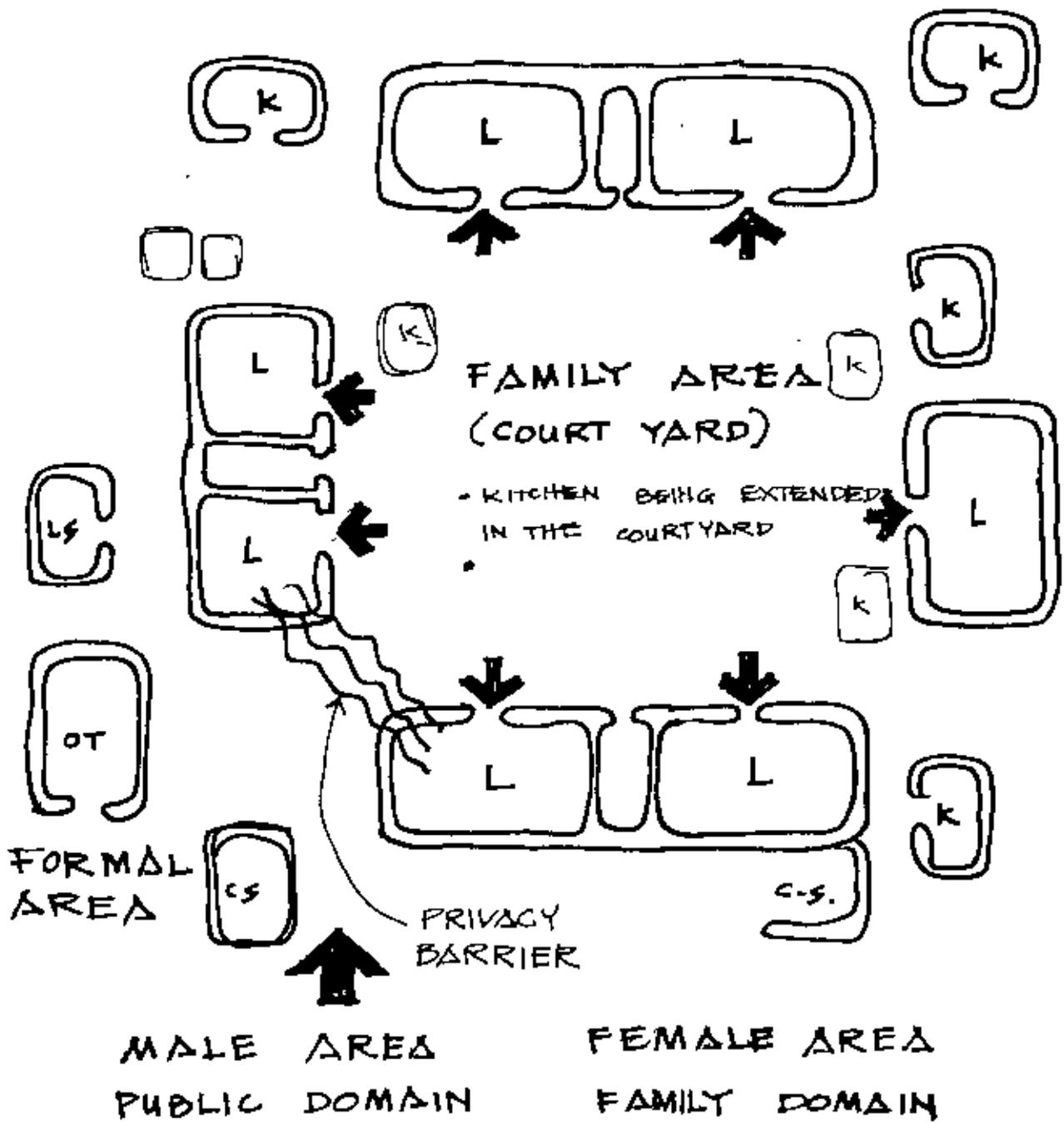


Legends

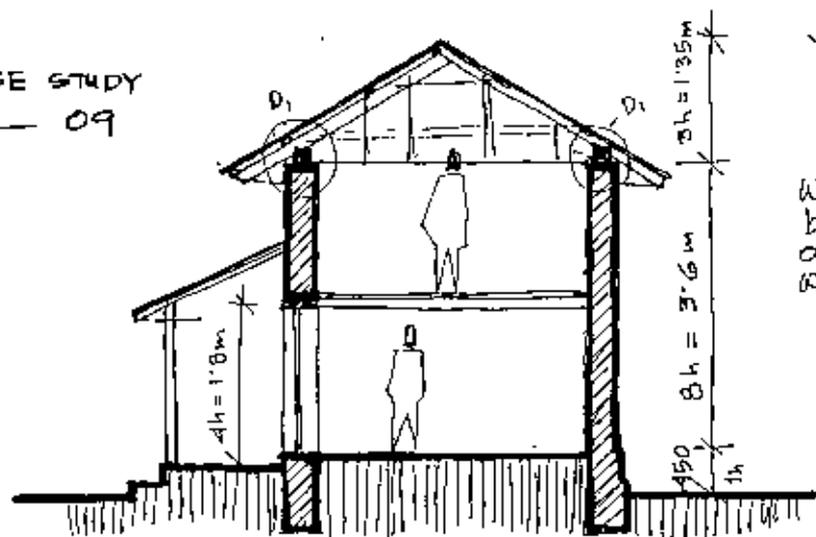
- △ = Male
- = Female
- F = Family



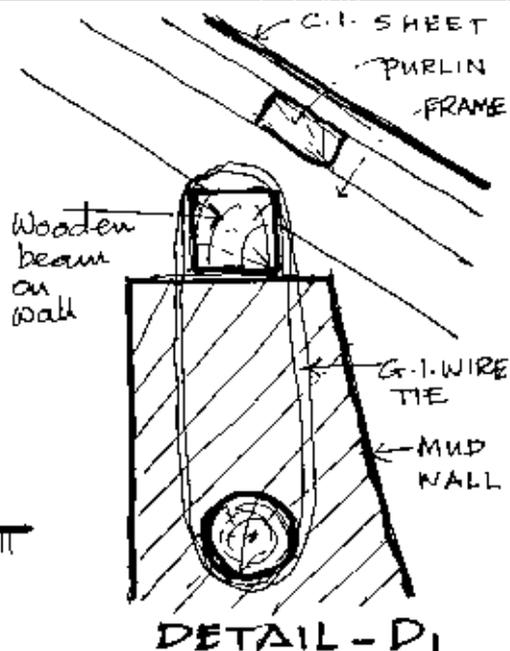
CASE STUDY NO — 09



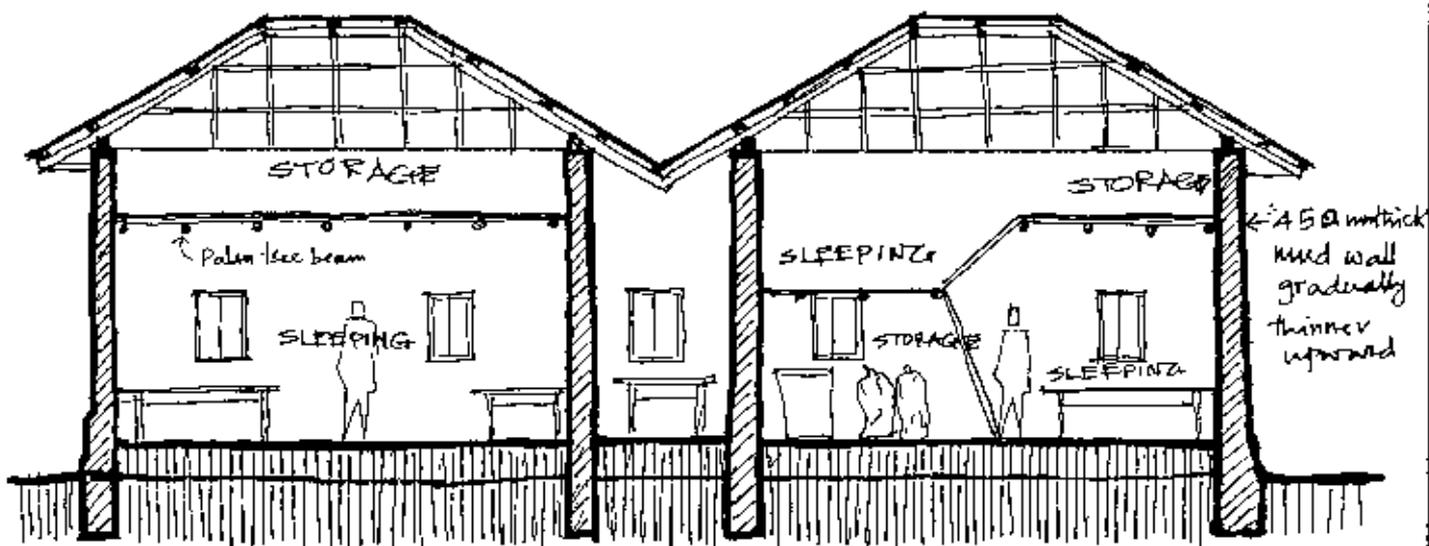
CASE STUDY
NO - 09



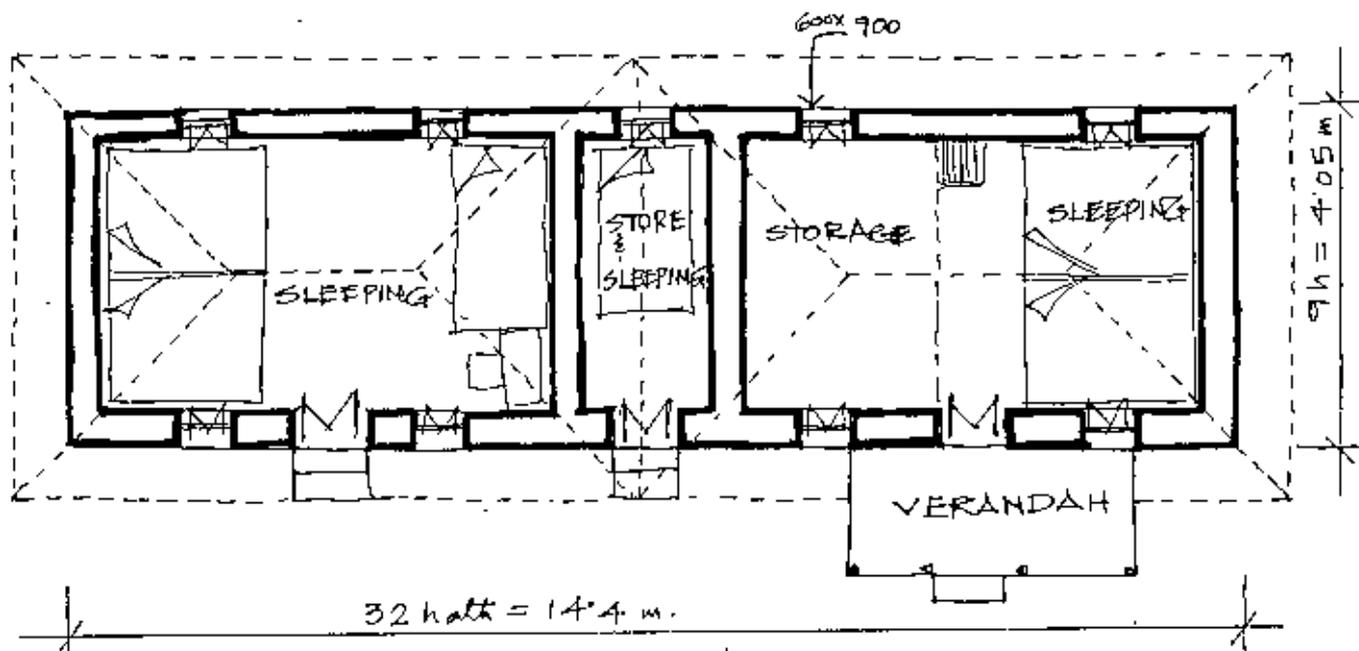
SECTION AA'



DETAIL - D1



SECTION - BB'



PLAN SCALE 1:100



RESPONDENTS DWELLING UNIT

partition by a small room in between two rooms. Younger brothers house is still in construction. Respondent Abdur Rahim (40) is a farmer. He has wife, two sons and two daughters. Children are school going. Both sons help their father in agricultural works time to time.



HOUSE AND BUILDING MATERIALS

Mud is extensively used in all the house structures for both floor and wall. Mud wall is of monolithic structure, built of layers of mud. At present roofs of all the main structures are of C.I. sheet on wooden frame. False ceiling and normal beams are from palm tree. Wood of jack fruit tree is extensively used for false ceiling, doors and windows. Service structure and out house roofs are of thatch (chhon). Roofing of almost all the structures were of thatch before and have been changed to C.I. sheet gradually.

CASE STUDY NO. 10

'CHOUDHURY BARI'

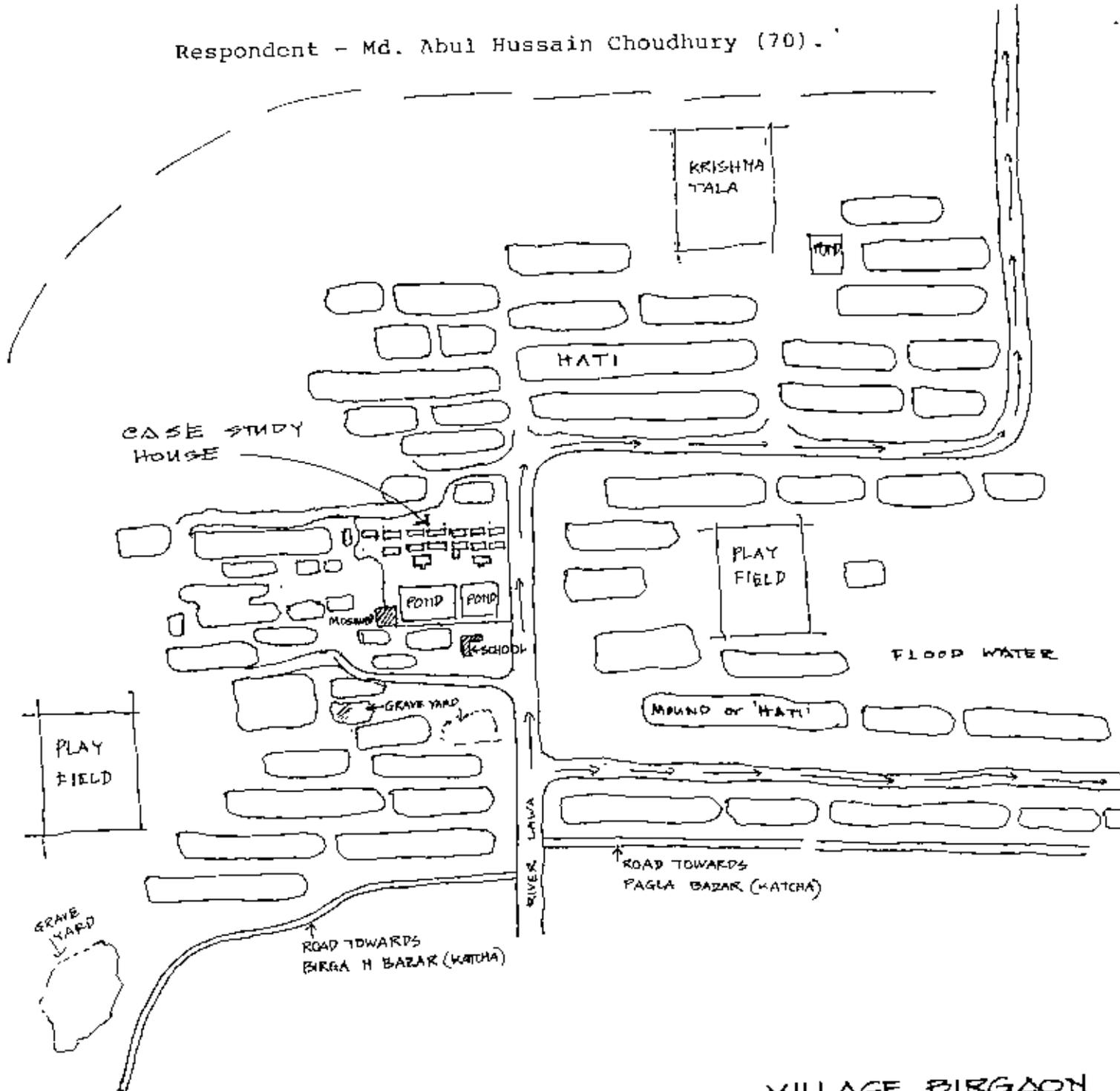
Vill. Birgaon

Dist. Sunamgonj



VIEW OF THE OUT HOUSE

Respondent - Md. Abul Hussain Choudhury (70).



VILLAGE BIRGAON
SUNAMGONJ

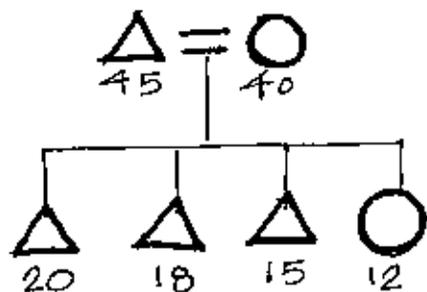


SCALE 500'

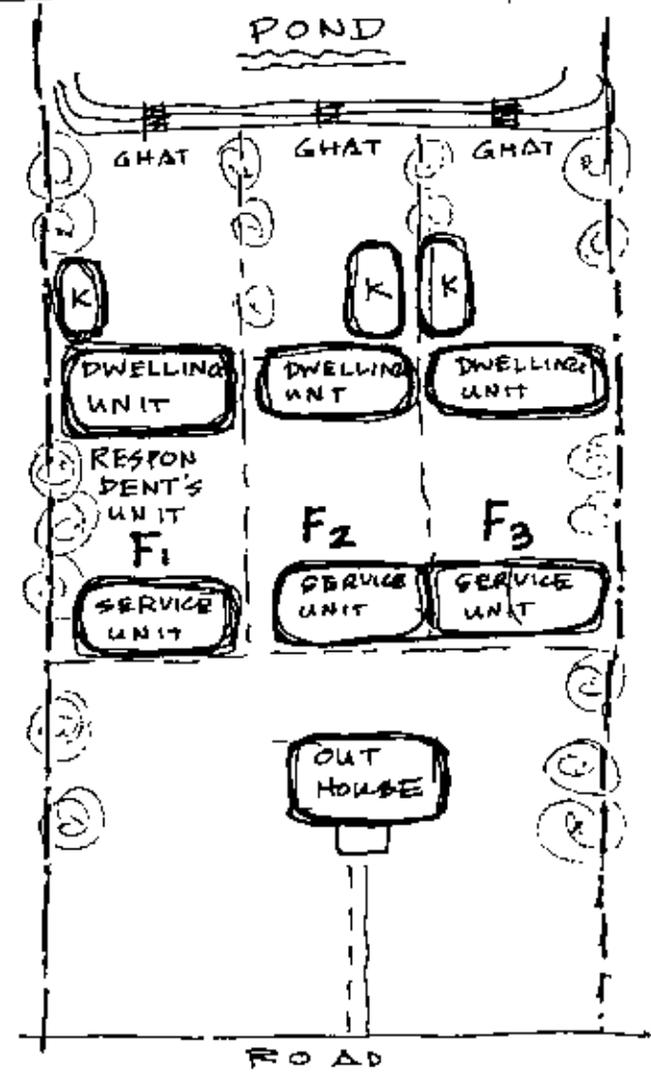
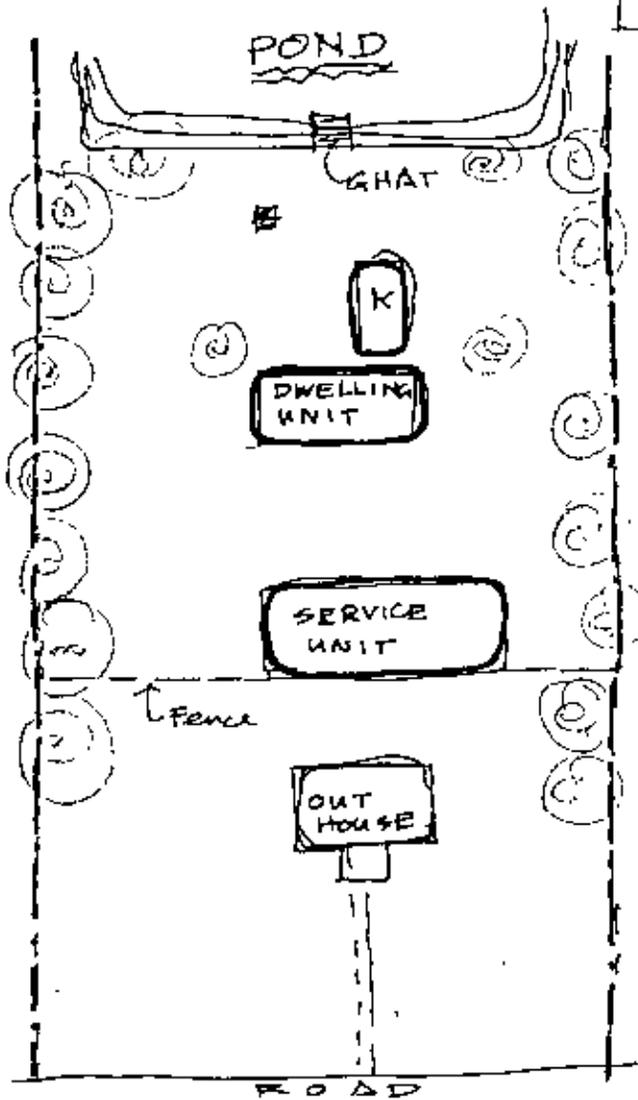
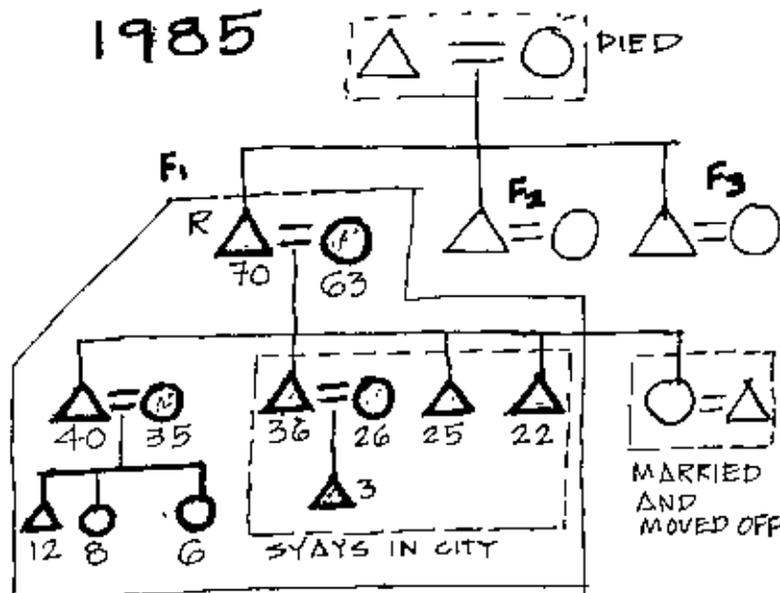
HOUSE AND THE LOCALITY

The house is located in the village - Birgaon which is in the newly formed district - Sunamganj and about 10 miles away from the district town. There is a kuttcha road linkage to the village from the Sylhet - Sunamganj road. This road goes under flood water. The village is in the haor region of Sunamganj. There are three 'paras' (neighbourhoods) in the village, each composed of many 'Hatis' (Mounds). Each 'Hati' is again composed of many houses. Homesteads are built on artificial mounds about 3m to 5m in height. All the mounds are of linear in pattern which are called 'Hati' in local term. Houses are also built on mounds in a linear pattern. The size and shape of the mounds varies from family to family. Generally a family clan resides in a particular mound, which gradually grows. In the flood season all the 'mounds' become independent units seem to be island in the water. That time boat is the only communication media. In the haor region farmers get only one crop per year. Paddy is thrashed in the field.

1935



1985

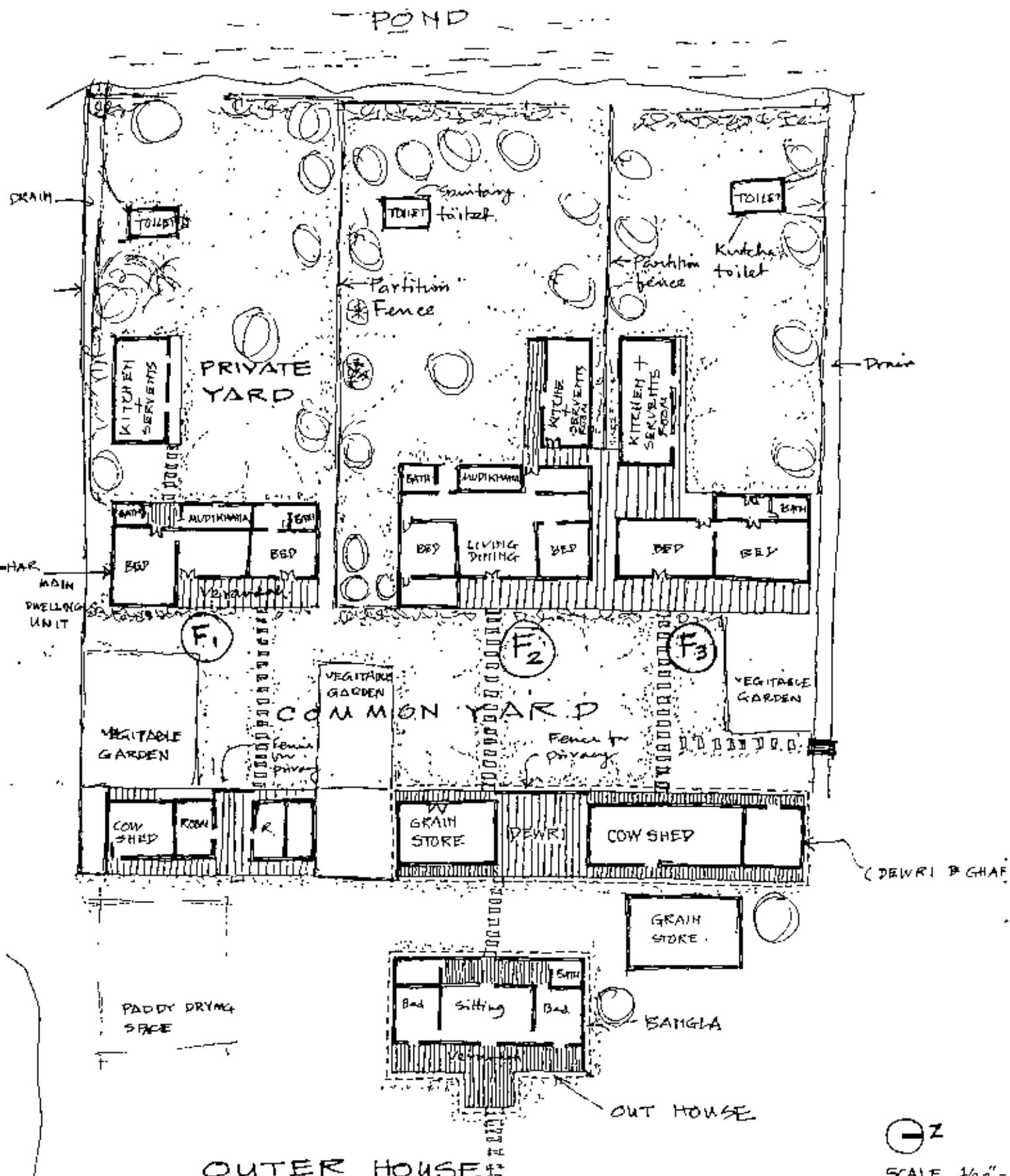


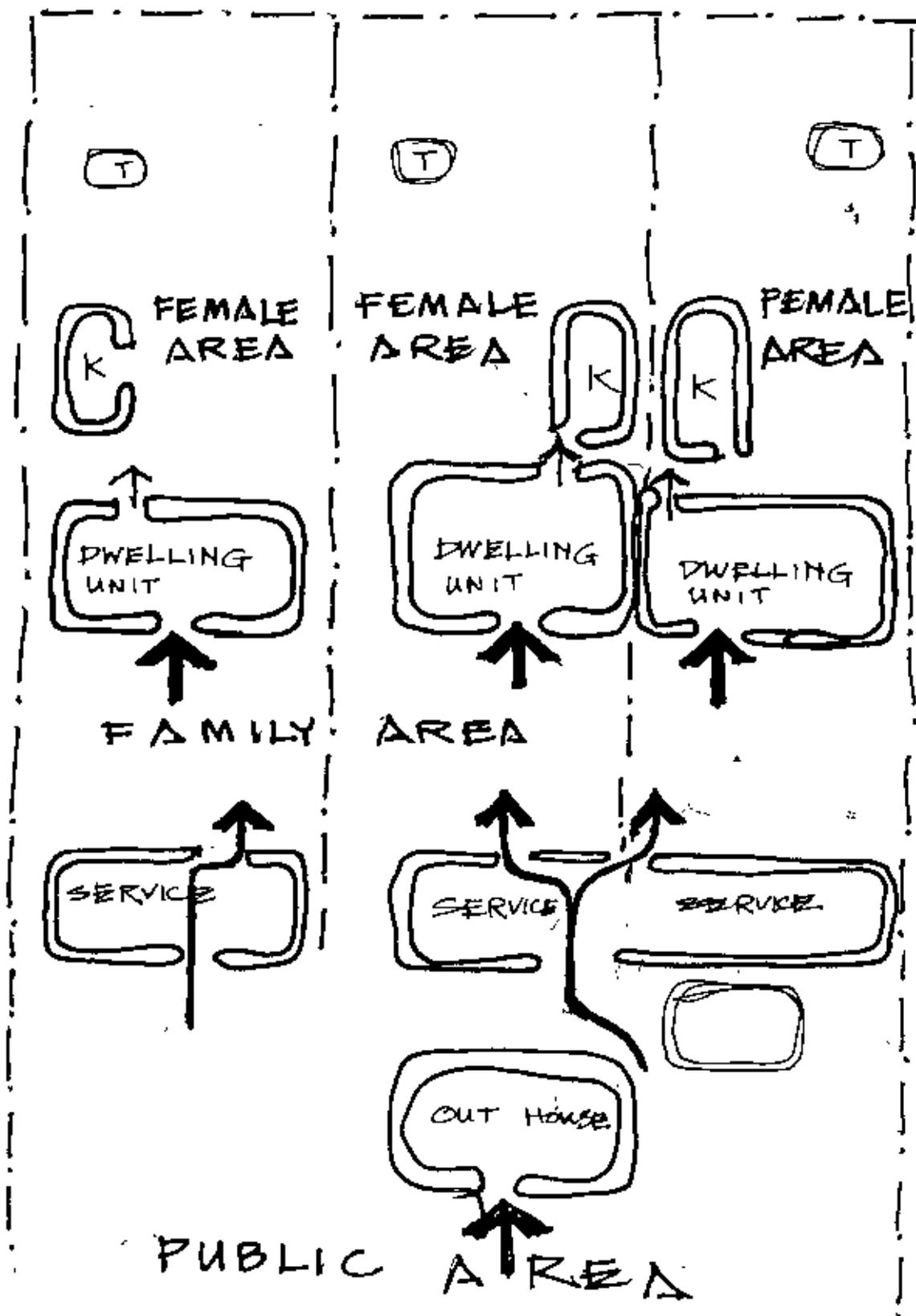
HOUSE AND THE LAND

Respondent's grand-father first built this house about 100 years back. The whole homestead was in a single ownership. After 30 years, the homestead was divided into two parts to respondents father and uncle. Then in 1950, the house was again subdivided into three in each group, of which respondent got his part. Respondent and his two brothers have their common out house. The land division of the house is in a linear pattern side by side.

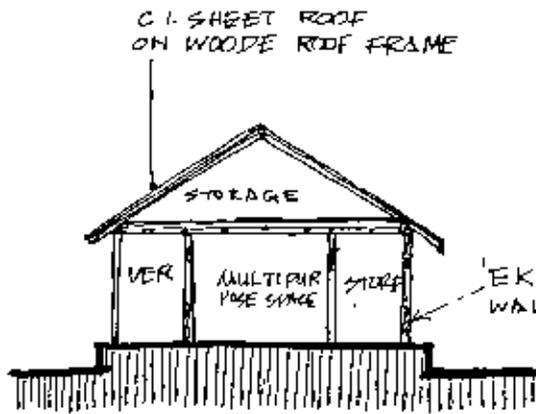
FAMILY AND THE DWELLING UNITS

"Choudhury Bari" is one of the oldest house in the locality. Once 'choudhury's were effluent land lord. At present most of the family members became educated and serving in urban areas except few, who are taking care of their agriculture. The organization of the house is in a linear pattern. First the Outer House and then the Inner House one after another and other brothers houses are side by side in a similar pattern. In the face of the house there is the common 'Out - House', then the service unit of cowshed, granary, labour shed etc. which serves as a privacy barrier & then the main living units. Again service facilities of the living units are at the back yard. Respondent has

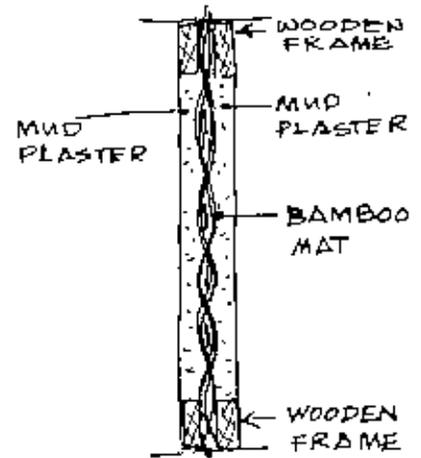




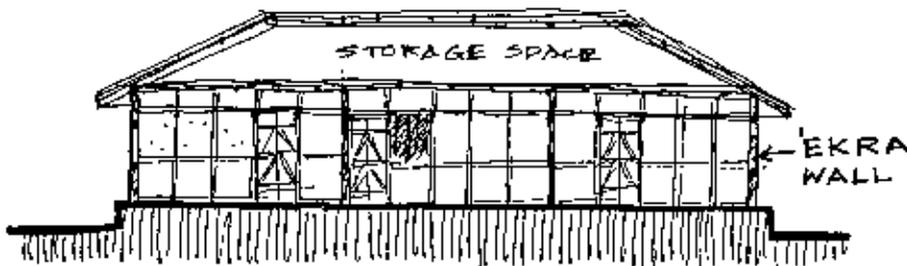
- SERVICE UNIT IN BETWEEN PUBLIC AND FAMILY AREA SERVES AS A PRIVACY BARRIER, THOUGH IT IS LINEAR IN CONCEPT, BUT HIERARCHY OF SPACE, LIKE TRADITIONAL SYSTEM IS THERE.



SECTION - BB



'EKRA' WALL
DETAIL



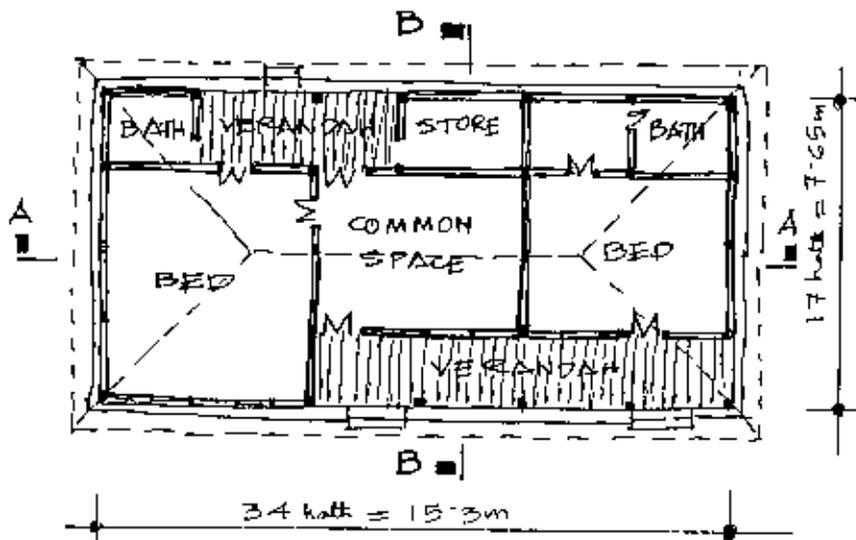
SECTION AA'



FRONT ELEVATION



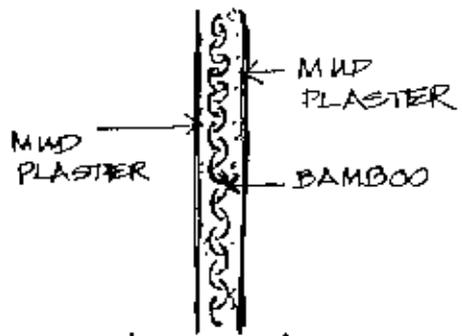
SIDE ELEVATION



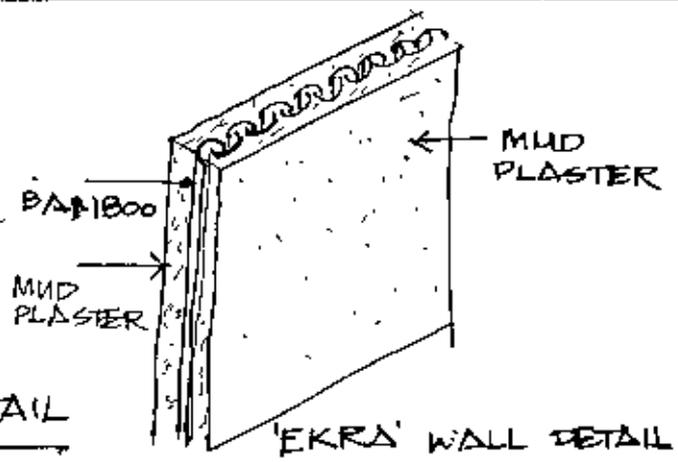
PLAN SCALE 1:200

$$\begin{aligned} \text{BANDTH} &= 34h + 17h \\ &= 51 \text{ hakt} \\ &\dots (\text{odd number}) \end{aligned}$$

$$\text{DOOR HT.} = 4h = 1.8 \text{ m}$$



'EKRA' WALL DETAIL



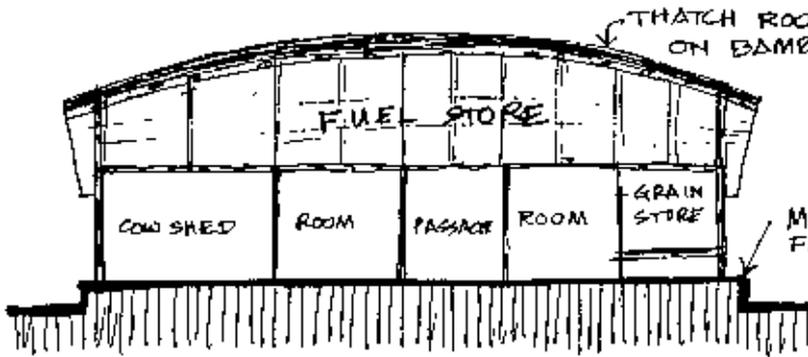
'EKRA' WALL DETAIL



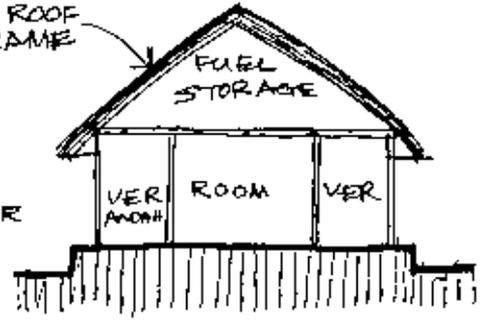
FRONT ELEVATION



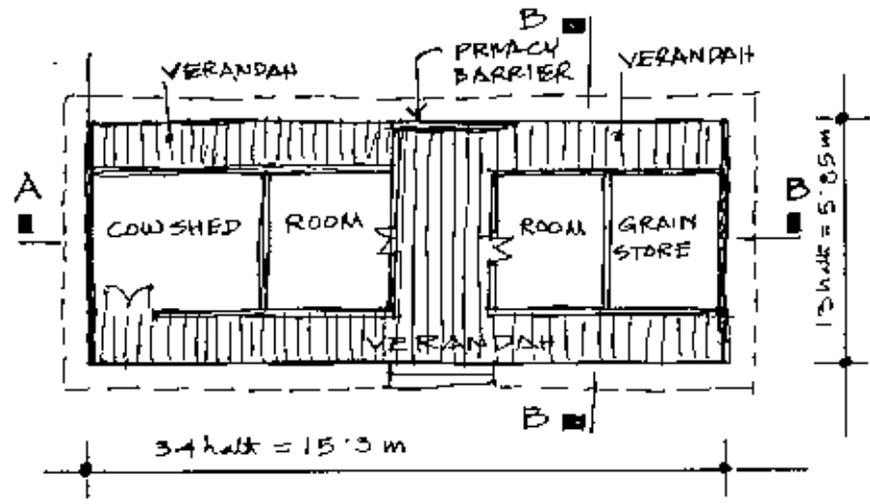
SIDE ELEVATION



SECTION - BB



SECTION AA'



PLAN SCALE 1:200

$$\begin{aligned} \text{BANDTH} &= 34h + 13h \\ &= 47 \text{ half} \\ \text{BANDTH} &= \text{Half of Perimeter} \end{aligned}$$

'SERVICE UNIT'

CASE STUDY NO-10

four sons and a daughter. One of the sons, look after their agriculture and other brothers are serving in the city. Brothers residing in the city are occasional visitors to the house.

HOUSE AND THE BUILDING MATERIALS

The region is a heavy rain fall area. So the houses are built with a view to have sufficient protection against rain. Verandah on both side of the structure is common to protect the wall. In the case study house, the main dwelling unit and the Out - House are of 'ckra' on timber frame wall and C.I. sheet roofing. All the floors are of mud about 1 meter high.

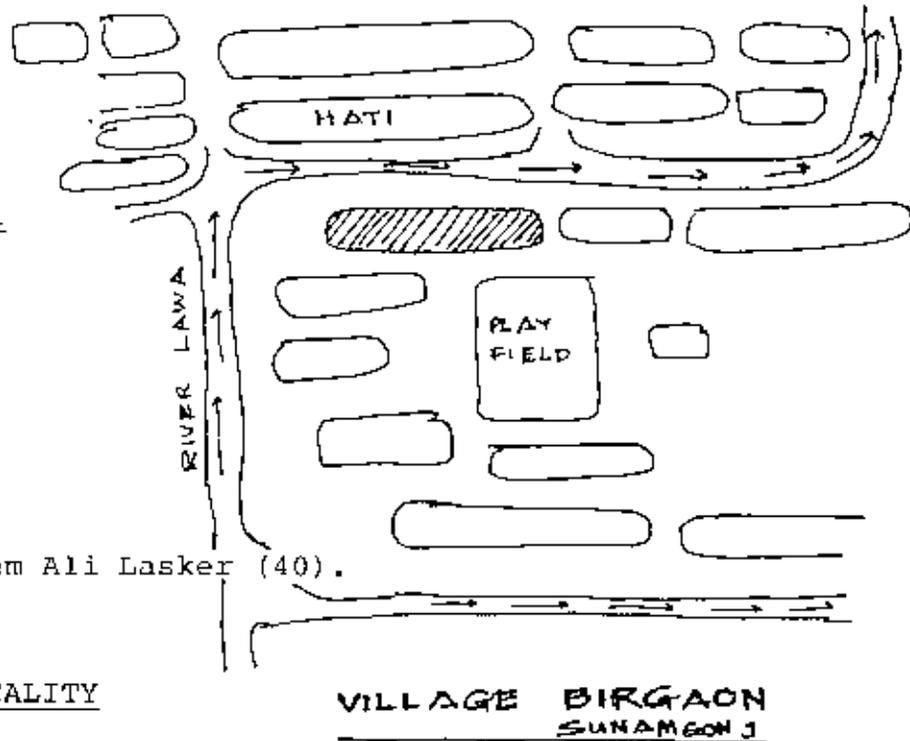
CASE STUDY NO. 11

'LASKER BARI'

Vill - Birgaon

Dist - Sunamgonj

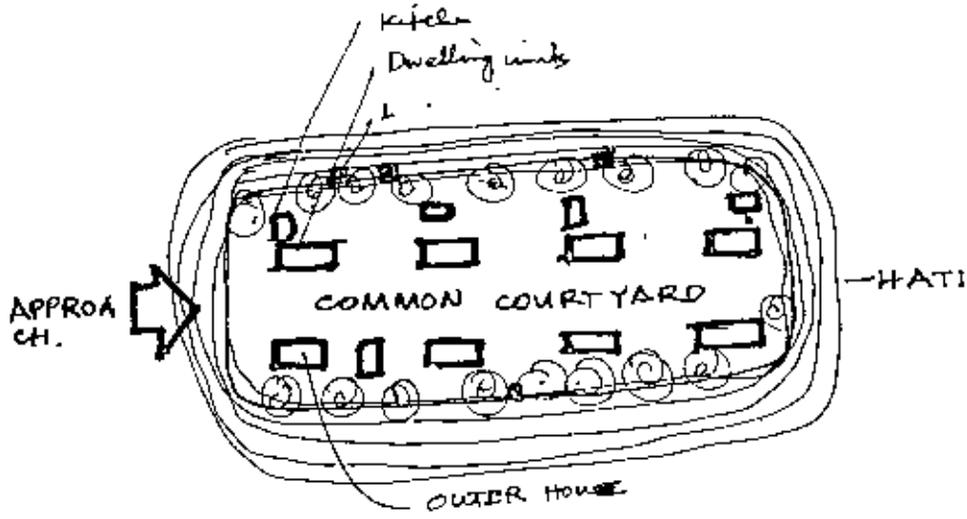
Respondent - Kazem Ali Lasker (40).

HOUSE AND THE LOCALITY

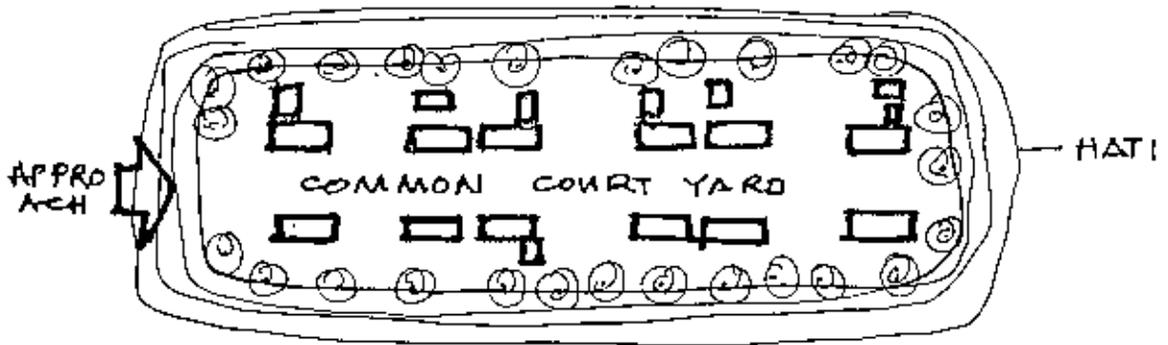
Same as case study No. 10.

HOUSE AND THE LAND

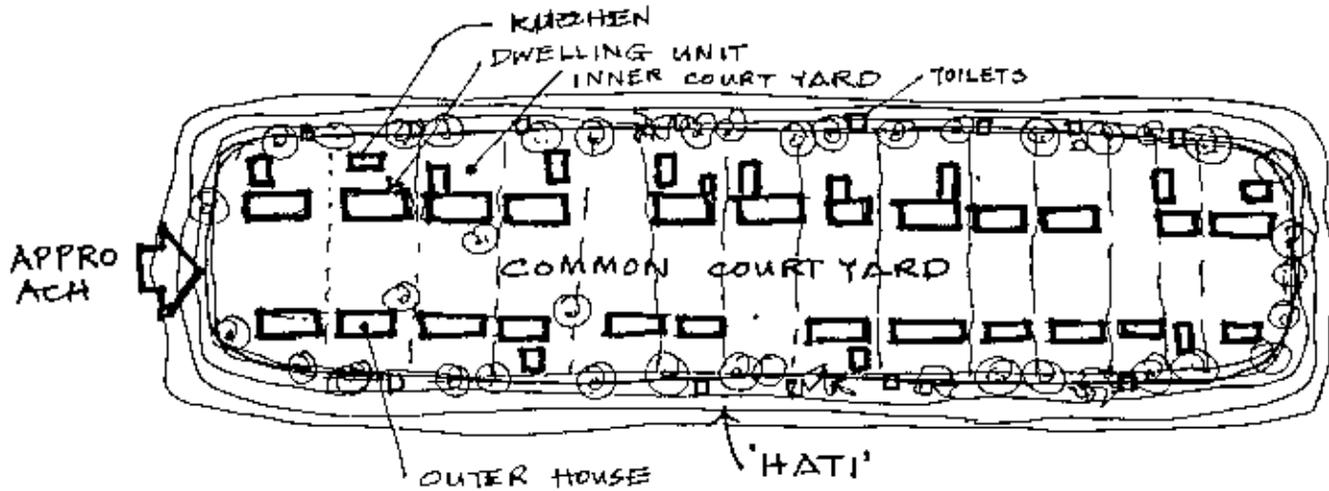
The homestead land is a high raised mound of linear shape which is locally termed as 'Hati'. This 'Hati' is about 150 meter in length and 25 m in width. There are about 10 families in this 'Hati'. The house structures of the individual families are arranged in a row, side by side. There is a long common yard which serves the purpose of both courtyard and circulation space. The initial smaller 'Hati' being expanded in a linear direction. The occupants of this 'Hati' are of a single 'clan'.



INITIAL STAGE 1915



SECONDARY STAGE 1950



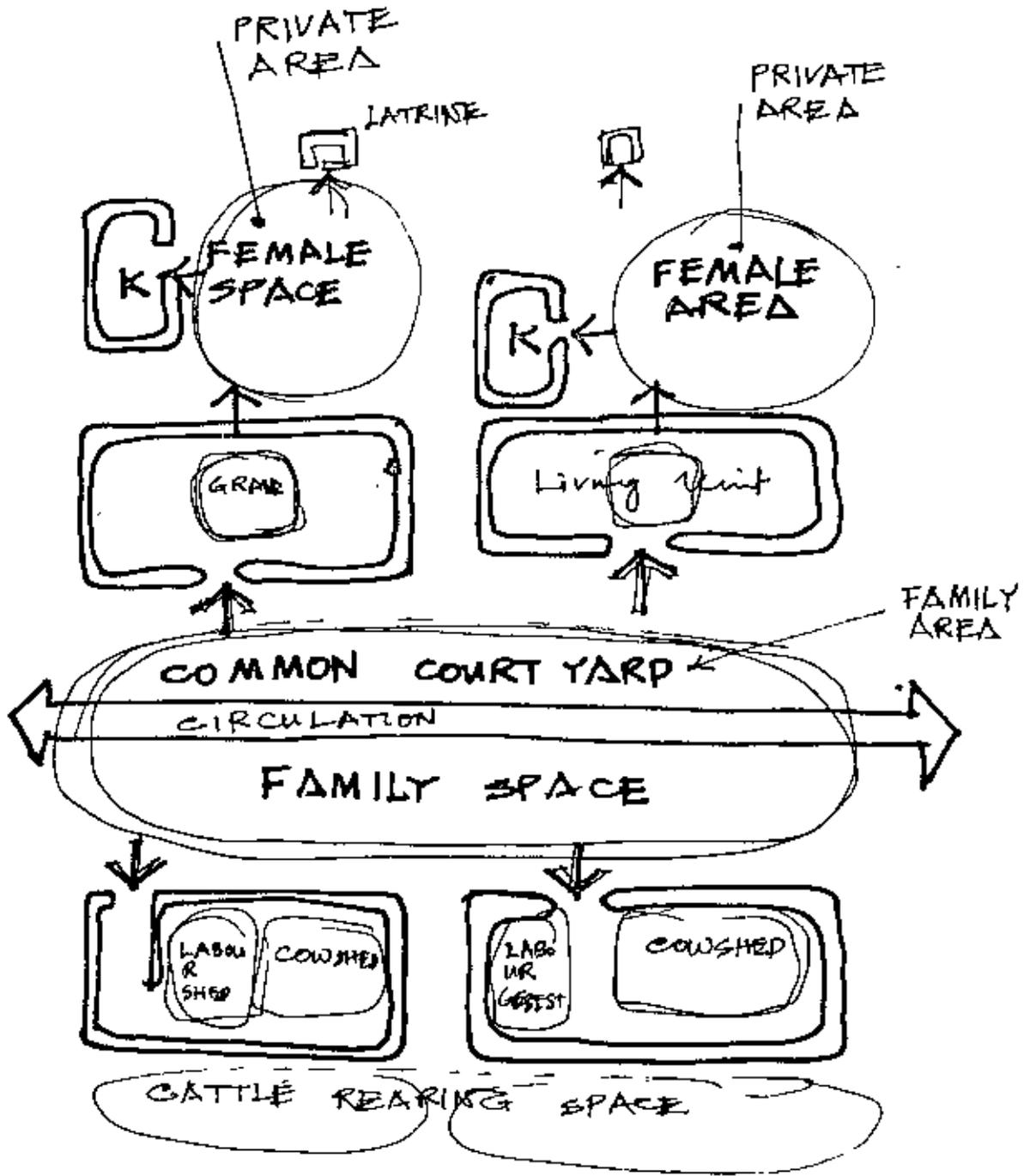
PRESENT STAGE 1985

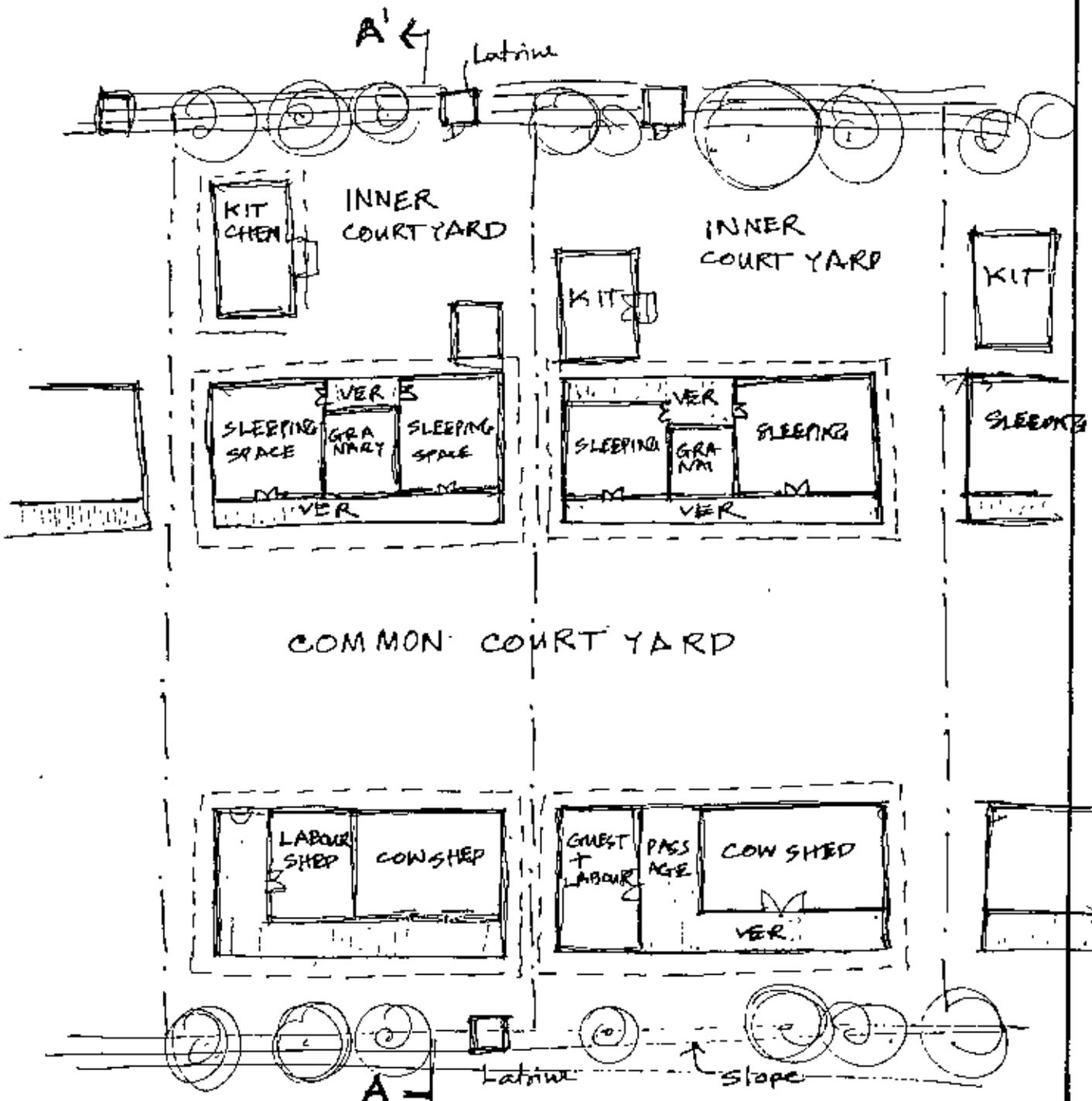
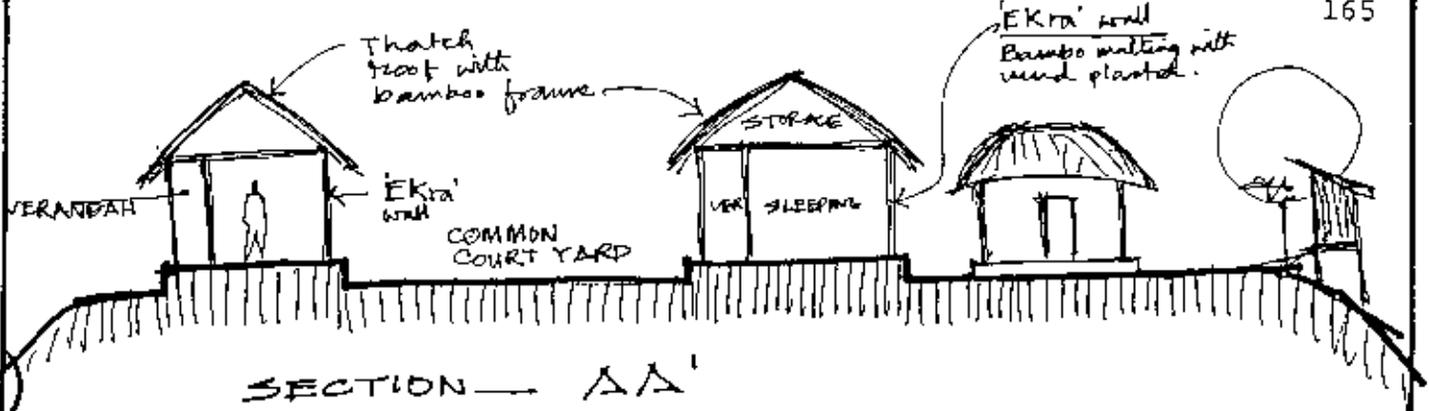
FAMILY AND THE DWELLING UNITS

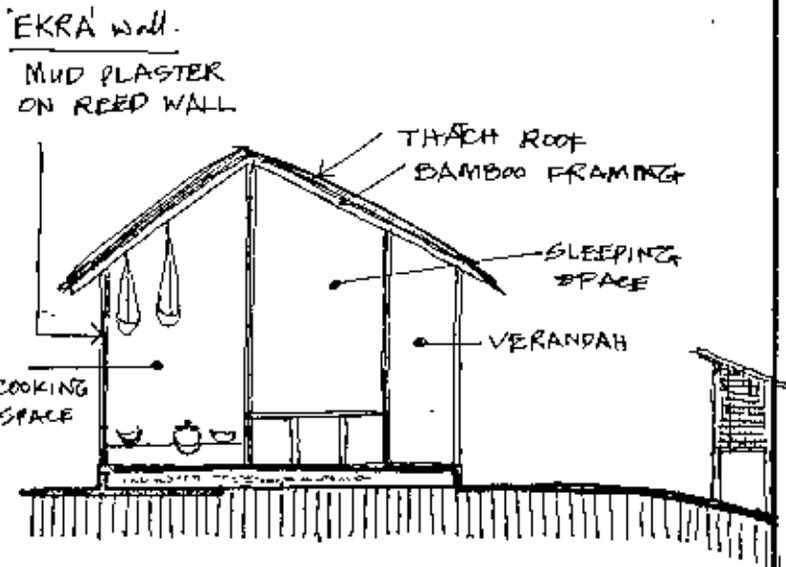
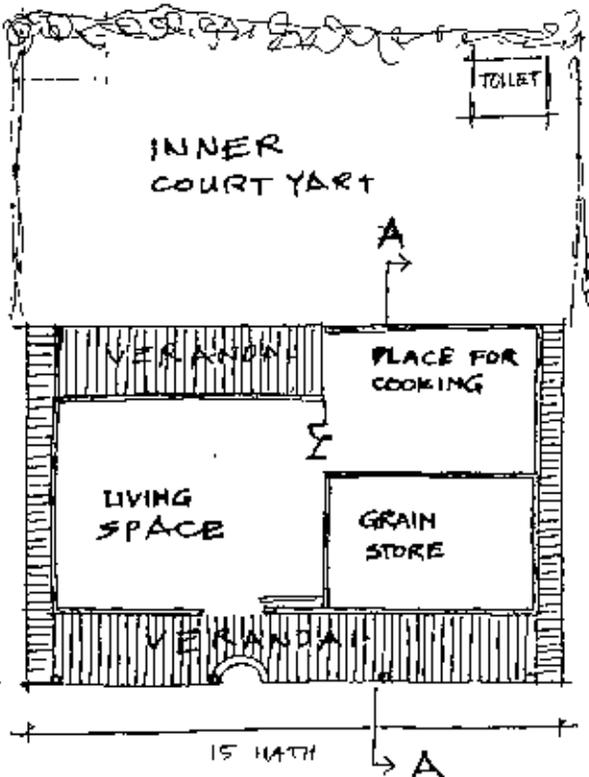
The occupants of this 'Hati' are farmers. Each family has sufficient agricultural land and the land is high yielding. As the area is low (Haor), people get single crop per year. Paddy thrashing is not done in the house, but in the agricultural land during the dry winter season. Paddy is dried in the common yard by the female members. The houses are organized in such a way that the main dwelling units are placed in one side and the other structure (which accomodates cattles and labours) in other side of the common yard. Kitchen is placed in the inner side at the back of the main dwelling unit. Kuttcha Latrines are located at the back yard edge. No house structure is placed in the common yard, but at the side of other structures. The house structures have a big over hanging of roof which serves the purpose of verandah and protects the walls from heavy rain. There are two tube wells in this - 'Hati' which serves the drinking water.

HOUSE AND THE BUILDING MATERIALS

Most of the house structures in the 'Hati' are of thatch type. Floor is of mud and the walls are of 'Ekra' (mud plaster on reed or bamboo matting). Roofing of the main dwelling units are of 'chhon' and the less important structures are of paddy straw. Use of C.I. sheet as roofing not that popular to the usual farmer families. Indigenous materials are mostly popular and used.



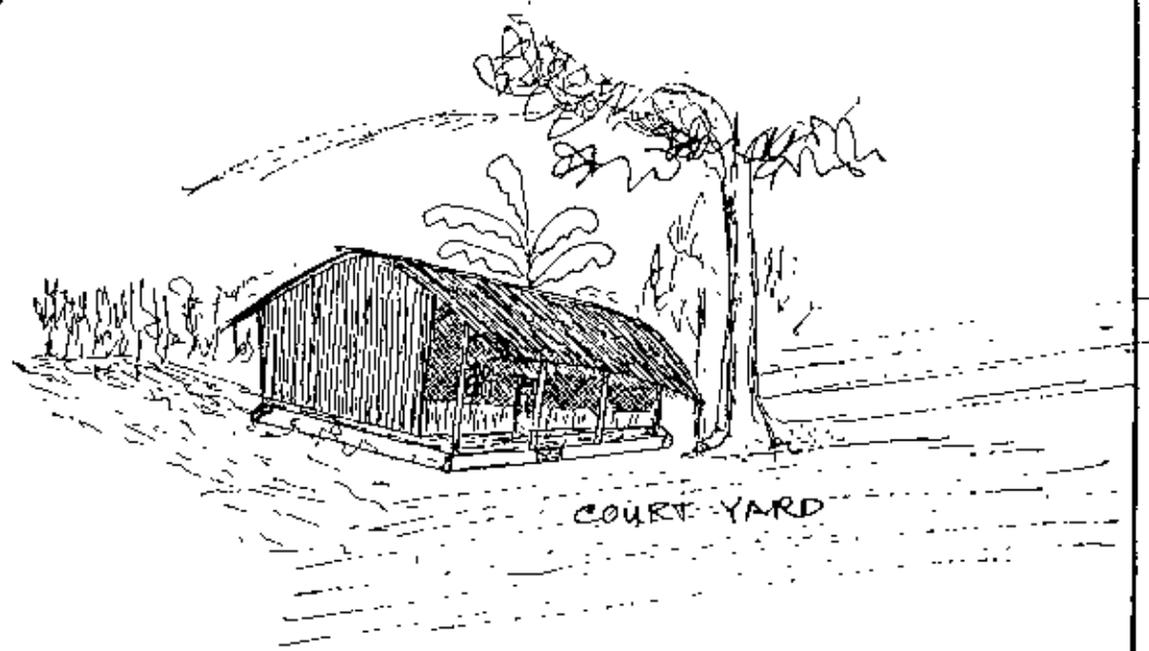




PLAN COMMON COURT YARD



SECTION AA



HOUSE (DWELLING UNIT) OF A POOR FARMER OF THIS 'HATI'

CASE STUDY NO. 12

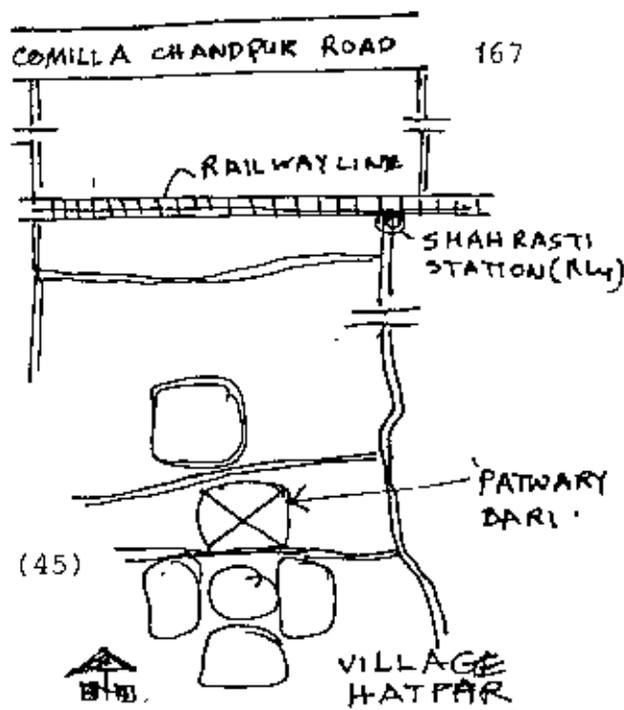
'PATWARY BARI'

Vill - Hatpar

Upozilla - Shahrasti

Dist - Chandpur (Comilla)

Respondent - Tajul Islam Patwary (45)



HOUSE AND THE LOCALITY

The house 'Patwari Bari' is located in the village Hatpar of newly formed district Chandpur of former Comilla district. The village is 20 miles from the district town and 3 miles from the Upozilla headquarter. The village is approached by a wide mud road. The area is in the high flood plain region. Occassionally high floods touches the edge of the homestead land. Houses are built on low mound. There are five 'Para' (neighbourhood) in the village, each of which is composed of many cluster of houses. The village is one of the oldest village in the locality. The case study house is located at the north of a big pond and there are other house on the other sides of the pond. A cross walk way passes through the front yard of the house.

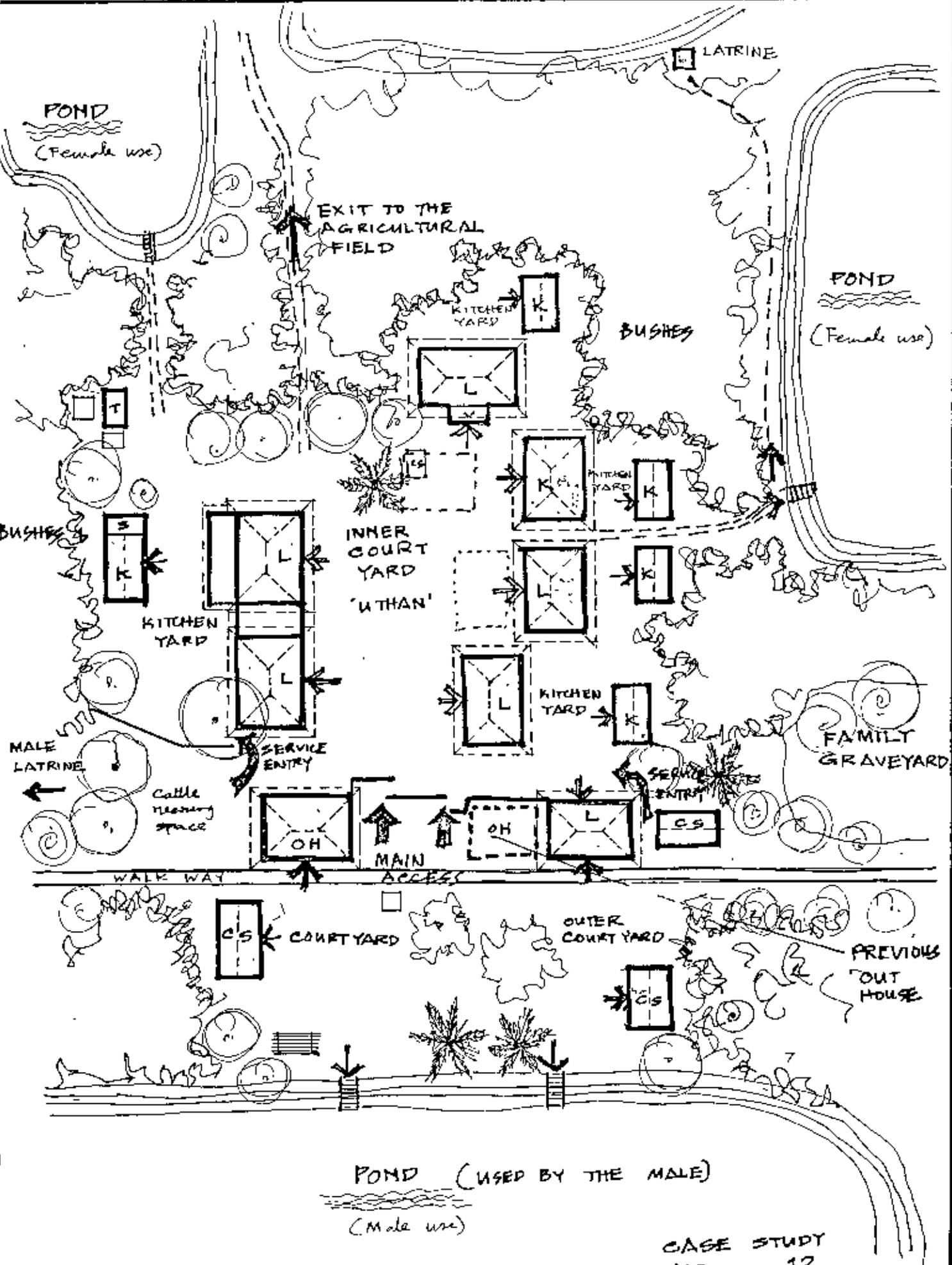
HOUSE AND THE LAND

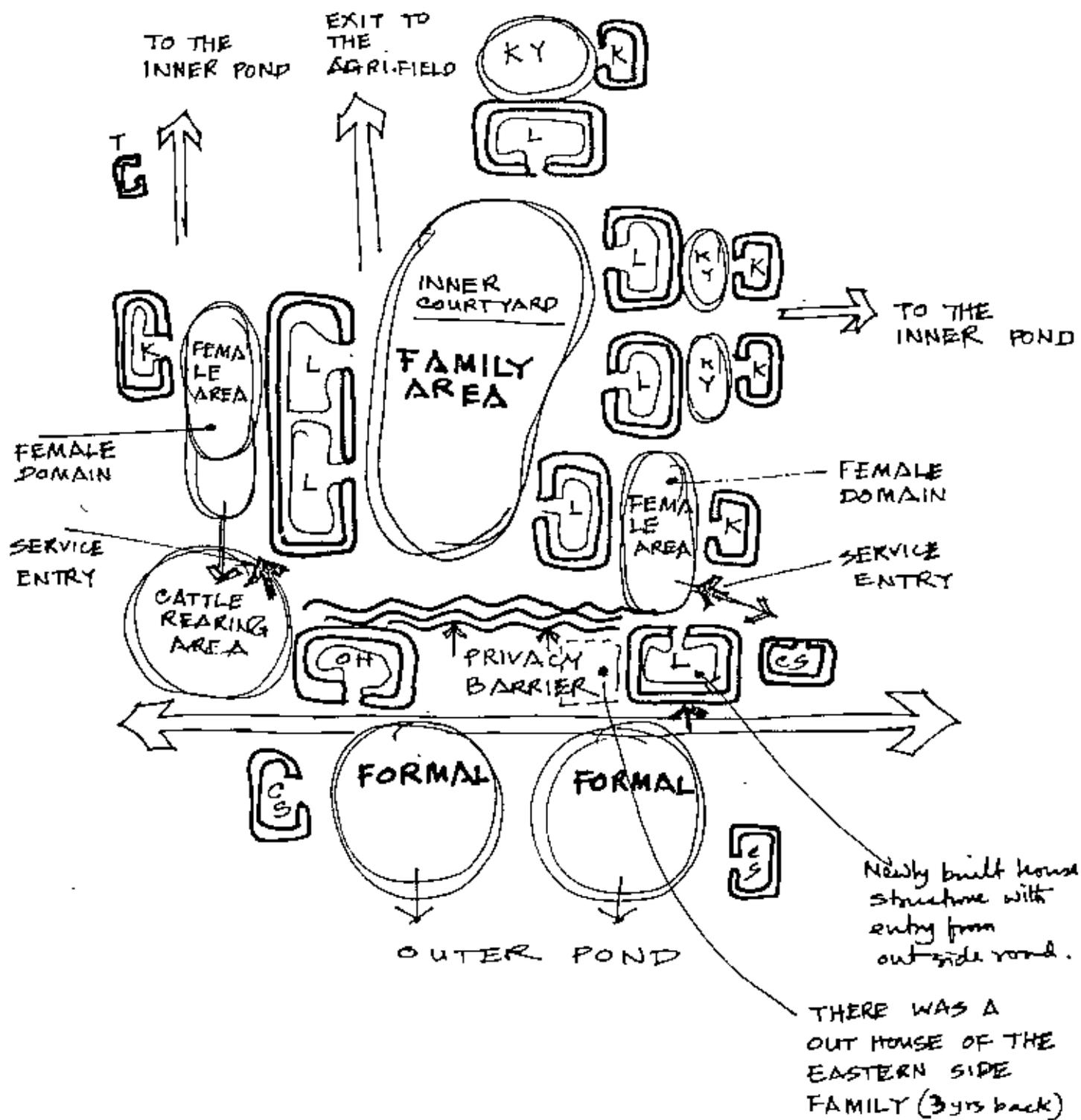
The homestead land is a low raised 'mound' seperated from the rest of the agricultural land. The land was raised

with the earth from the ponds, surrounding the house. There are four ponds in the house. The bigger front pond is shared by the families at the other sides of the pond. The house is possessed by two groups who are distant relation. The main house is equally shared by both the groups and they have their house structures at their side but the inner courtyard is common. There are bushes and fruit orchards at the back of the house structures.

FAMILY AND THE DWELLING UNITS

The house is more than hundred years old. There is a distinct group separation in the house with a common courtyard at the centre. Each group has separate entry to the same inner courtyard. There was separate 'Outer House' (Baithak Ghar) of each group. There is also separation in the outer courtyard. In the eastern side, the joint family has broken into nuclear families and each family has separate dwelling units with separate kitchen at the back of the dwelling units. The western one is a joint family. Respondent's father and uncle were in the joint family, which still continues even though most of the brothers of the respondent are residing in the cities. Once the respondents forefathers were of affluent class. but the respondent has become a farmer at present. Respondents father and uncle had separate dwelling units with common kitchen. But now after their death, both the

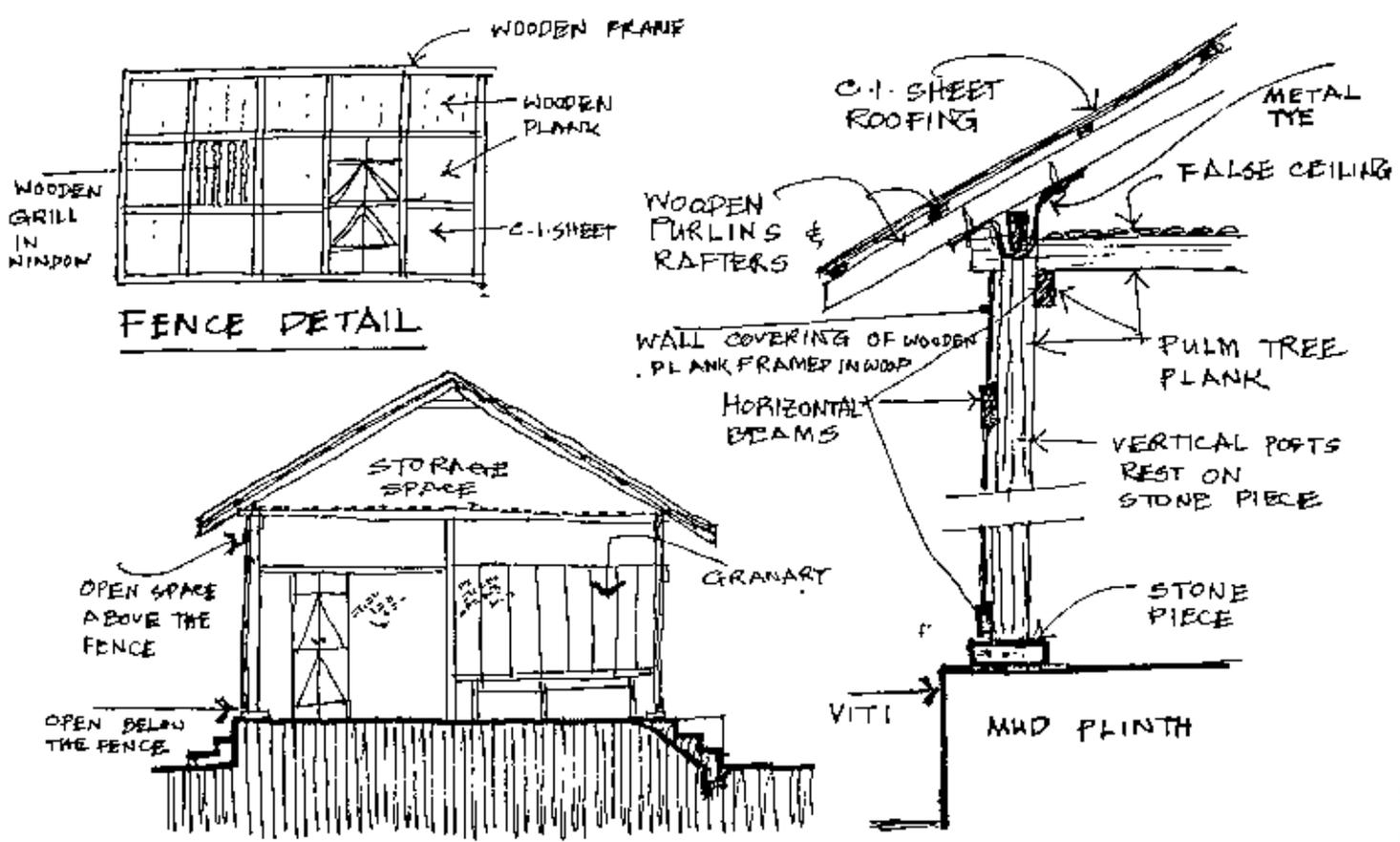




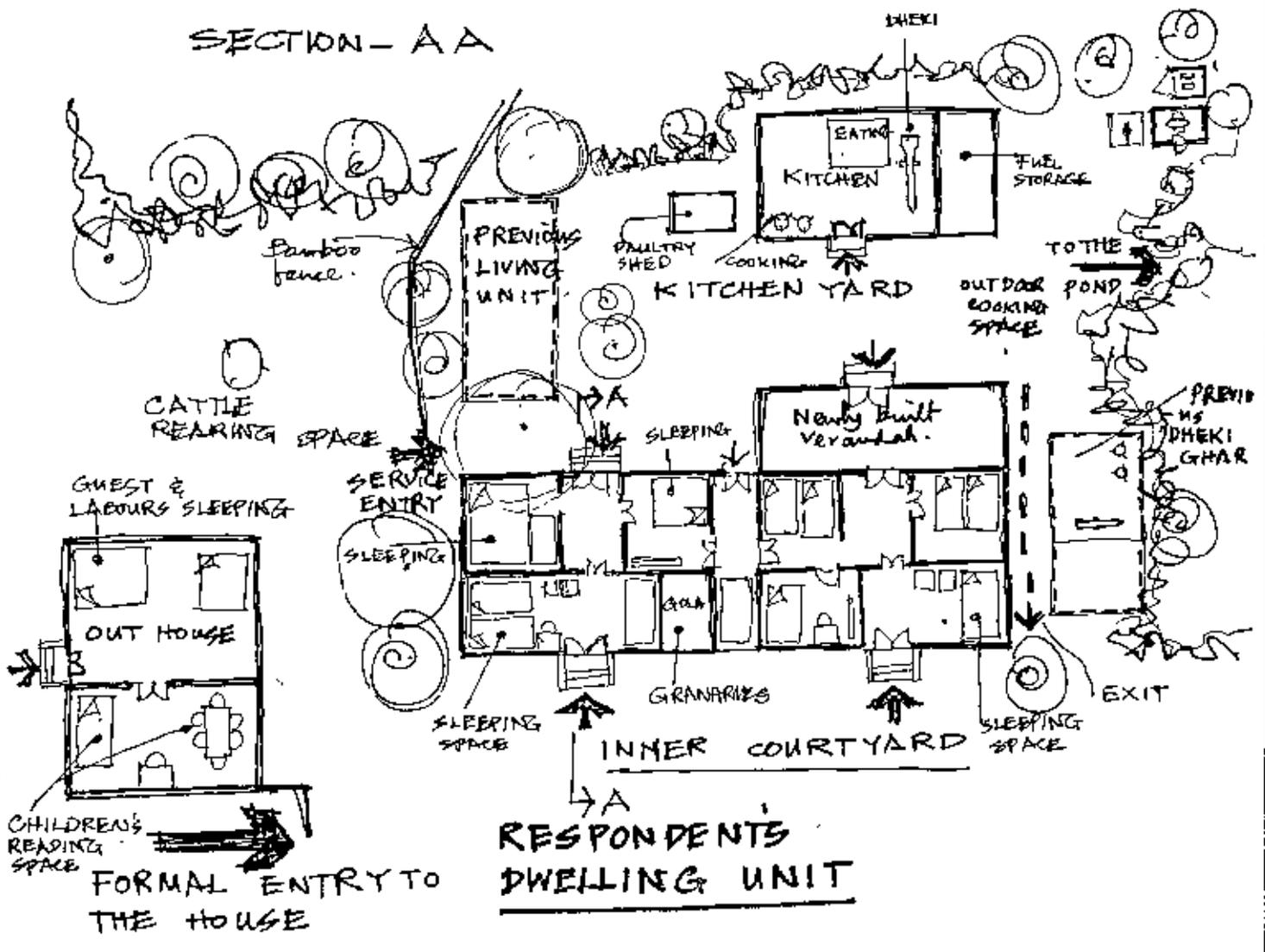
dwelling units have been joint together with a passage inbetween. Simple spaces been changed to more subdivided spaces. Previously latrine was at a distant place, Now pit latrines been introduced adjacent to the kitchen yard. There is also a tube well in the inner house in addition to other at the front yard.

HOUSE AND THE BUILDING MATERIALS

Building materials used in the house is mostly C.I. sheet with wooden frame. The mud plinth is quite high of about one meter. House structures are built on frame structures of palm tree plank. The vertical posts are rested on stone pieces. Post are not put into the plinth mud and seperated from the plinth. This is a common feature of house structures of this region. The structures can be shifted from one plinth to the other without much trouble. Less important structures are mostly of thatch type.



SECTION - AA



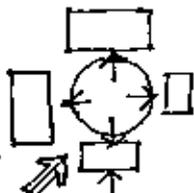
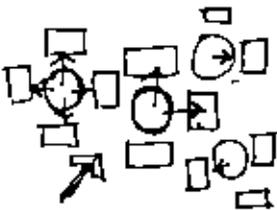
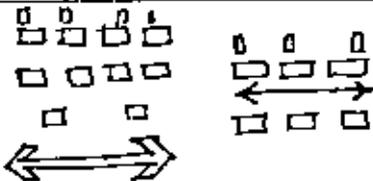
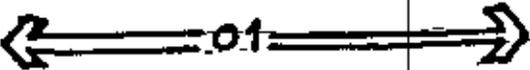
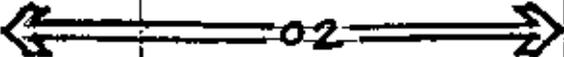
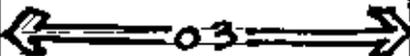
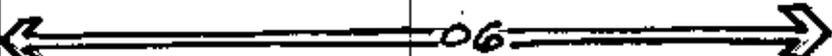
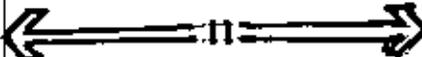
RESPONDENT'S DWELLING UNIT

HOUSE CASE STUDIES -- CONCLUSION

From the 'House Case Studies', Field Investigations, Observations and Interviews, it can be concluded as follows --

- i) Built space in the house is not increasing with respect to population increase and as a result most of the rural houses ('Ghar') are over crowded.
- ii) With the increase of population, families are extended and more new smaller independent families are created, which demands new houses or accommodations. But new houses are not built, keeping pace with this and the result is sub-division of homestead land, sub-division and partitions in the dwelling units.
- iii) Day by day, people are becoming educated and coming in touch to urban influences specially through mass media and more interactions with the urban areas, which inturn influencng the life style of the rural populace. Hence new expectations are demanded from the houses.
- iv) With the increase of poverty in the rural areas, burgling and dacoity is increasing and as a result security is very much concerned in the houses

- v) Court yards of traditional houses of rural Bangladesh are hardening, loose layout is changing towards compact layouts which is evident from almost all the case studies.
- vi) Simpler form of courtyards are changing towards more irregular and complex form (see case studies (1, 4, 5, 6, 12, 13)).
- vii) Courtyard of the houses are becoming compressed and smaller in size (see case studies 4, 5, 6, 10, 11). There is a tendency of the house layouts towards linear pattern due to pressure on the courtyard (See case studies 10, 11, 12).
- viii) Functional use of courtyard is changing as it is not widely used for paddy thrashing as before.
- ix) Service facilities like Kitchen and Latrine are coming closer to the main dwelling units (see case studies 4, 5, 6, 7, 10, 12).
- x) Improved sanitary system, specially the pit latrines are introduced, where-ever possible.
- xi) Introduction of tube well is increasing for pure drinking water.

TRADITIONAL FORM / ARCHI TYPE. I	SUB-DIVISIONS / RE-ORGANIZATION AND ADDITION OF FORMS II	LINEAR HOUSE FORM - EXISTING AND PROB- BLE FORMS. III
		
		
		
		
		
		
		
		
		
		
		
		
		

GROUP I — REPRESENTS THE TRADITIONAL FORM. LAYOUTS NOT CHANGED MUCH.

GROUP II — REPRESENTS HOUSES THAT BEEN REORGANISED, SUB-DIVIDED
NEW COURT YARDS CREATED ETC

GROUP III — REPRESENTS HOUSES ALREADY EXISTS AS LINEAR IN FORM AND
ALSO THE HOUSE THAT HAVE TENDENCY TOWARDS LINEAR FORMS.

- xii) Service facilities like electricity are introduced in some places which need proper and simpler layout of houses for efficient functions (see case studies 1, 2, 4, 6).
- xiii) Circulation system in the extended houses and surrounding settlement is becoming complexer (see case studies 1, 4, 6, 13).
- xiv) From almost all the case-studies it is clear that the house structures (dwelling units/'Ghar') of rural Bangladesh were of simple rectangular form of single space within the unit. The single space was used as multipurpose space. But now a days the single spaces are becoming divided by partitions towards complexer room layouts (see case studies - 3, 8, 9, 10, 12, 13).
- xv) Size of the 'House Structures' are becoming smaller and compact. People can't afford a bigger house structure due to their financial hardship and high price of various building materials.
- xvi) The rural people have the desire to have spacious and durable dwelling units (Ghars) which requires less maintainance. People try to build more durable house structures within their means .

- sectors.
- xxi) Construction of new house structures and maintenance of the old structures are self financed by the rural people, where they need some support from the formal sectors.
- xx) Traditional construction techniques are used in using indigenous materials (see all the case studies).
- xix) Beside indigenous materials some imported materials like C.I. sheet is highly popular in rural Bangladesh specially for roofing purpose of the main dwelling units (see most of the case studies) because of its durability, reusable quality, less maintenance and not comfortable from the climatic view point.
- xviii) Available resources like mud, bamboo, various thatches etc. are preferred first for house building purpose. In houses where the main dwelling units are built of pucca, semipucca or C.I. sheet type, but the lesser important huts (like kitchen, store, granaries, cow sheds etc) are built with indigenous materials.

CHAPTER - VI

DISCUSSION AND CONCLUSION

There are two views regarding socio-economic changes and their impact on traditional houseform in rural Bangladesh. One view is that transformations are taking place in the social and economic fields; and the other is that there have been no transformations but only some changes, and they have not made any welcome positive impact. It is evident from the case-studies that changes in social and economic affairs are taking place as modifications of old; as drifts from older forms. It has also been clear that many of the changes that are seen are minor changes or modifications rather than major change or transformation. For example, the form of the traditional rural joint and extended families is in a process of change towards smaller nuclear families. But the social interaction and strong feeling of ties for clans is always there, which implies significant role in the traditional rural houseform. It is important to note that in the rural areas, whether the family is joint or not, closely related households live contiguously, intimately grouped into clusters or enclaves. Often in such clusters two or more households have their house arranged so as to have one courtyard in common, and one sitting place for grown male members in common.

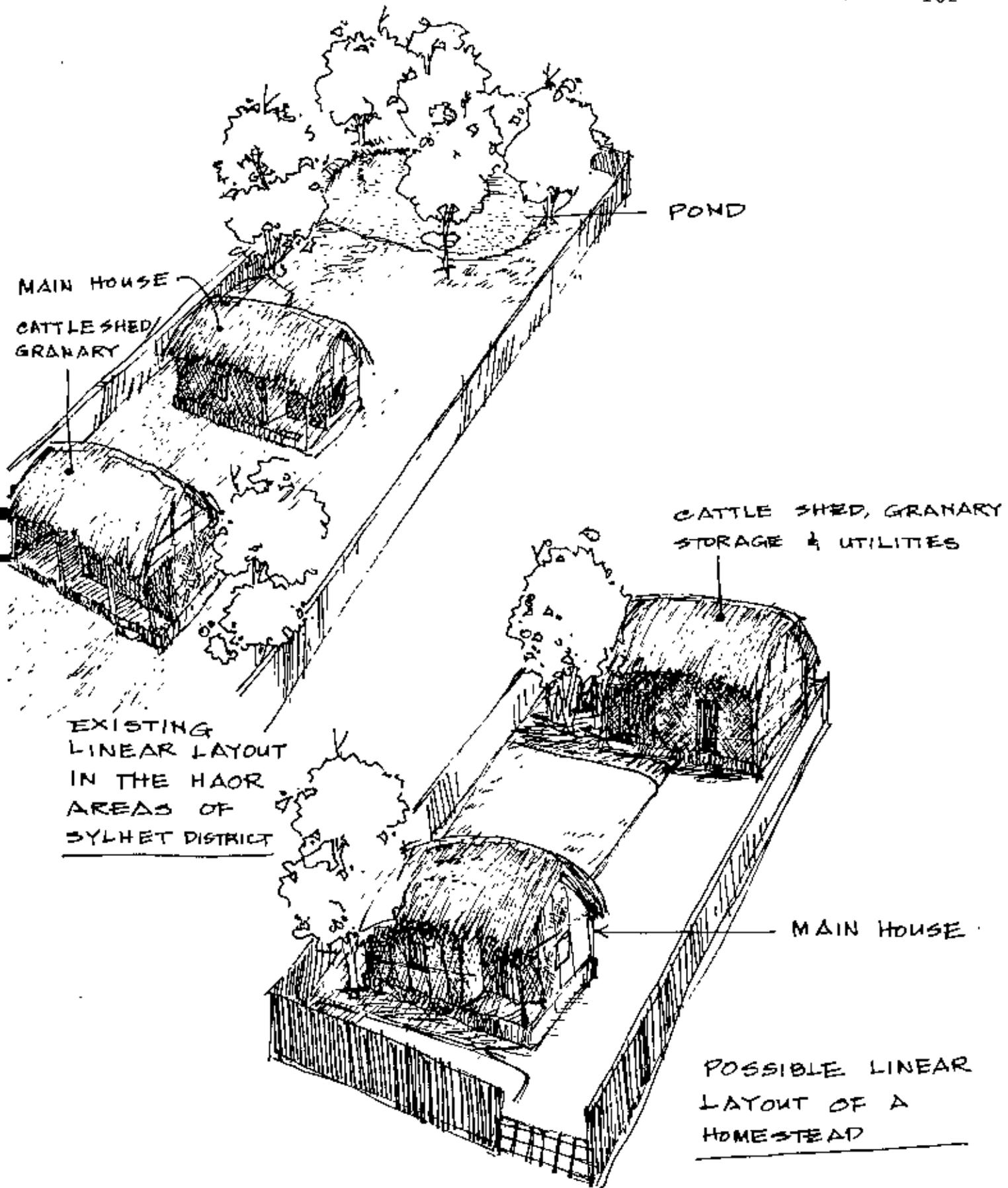
6.1 DISCUSSION AND CONCLUSION

The concept of rural houseform is culture specific and it has to be understood in its own socio-cultural context. Whatever be the houseform, there are some fundamental characteristics that apply to all the 'Bengali House', which makes them unique from the houses of other culture. The characteristics can be understood from the use and purpose of different domestic space and their associated values and meaning. The traditional attitudes towards different domestic activities still dictates the space organization of a rural house, which has already been discussed. It has been seen that the geometric 'form' or 'design' of the traditional rural 'Bengali House' is introvert in layout and consists of small detached 'huts' around a courtyard. It has also been seen that the court yard exists as an extension of the indoor living areas of the dwelling units which are characteristically inadequate. The courtyard not only maintains a direct and convenient functional relationship with the huts around but it also provides for seclusion of the women folk from the passersby and male visitors. Further, it responds well to a number of activities such as paddy thrashing, grain drying etc. which are characteristically common in the life of an agricultural community in rural Bangladesh. These functions can be performed conveniently and with a sense of security in a protective courtyard layout. These advantages are considered more important than the disadvantages of poor orientations and the irregular,

inefficient and rather chaotic growth of rural settlement pattern, which induced largely by the courtyard layouts posses considerable difficulties and problem in laying out of utility services as well in the rural habitats of Bangladesh. However, it can possibly be argued that some of the conditions dictating a court-yard form for the traditional rural house in Bangladesh is in the process of change. For example the rural women folk are gradually coming out of their seclusion through such programmes as mass literacy, family planning women's co-operative etc. Also agriculture is being organized on a co-operative basis elminating the need of a court yard for every house for paddy thrashing, grain drying etc. Moreover, paddy thrashing is now done either manually on hard surface or using locally made small mechanical devices which do not require large spaces. Moreover the population of Bangladesh is increasing in an alarming rate creating pressure on the rural homesteads. The possibility of increasing the area of rural homesteads land is meagre due to immense scarcity of land and any increase will reduce the agricultural land which is already in a shortage. With the increase of population and family growth, subdivision of homesteads is an inevitable product. The result is a greater built up and more crowded houses. Obviously, the growth of the house is going in a chaotic

pattern. The rate of population growth is quite high and the problem is at the threshold of a great crisis. The living pattern of rural people is being changed slowly and increased modernization are also influencing the rural life. A desire for improved living standard is increasingly felt. New service facilities like electricity are also coming to the village. All these are perhaps indicative of the possibility that the traditional court yard layout may eventually be changed in favour of linear layout which will not only conform better to the socio-climatic requirements but which will also ensure convenient and efficient layout of utility services and better utilization of land. In fact such linear layouts do exist in the haor areas of Sylhet district in the north-eastern part of Bangladesh. The geometry of the house structure may remain basically unchanged, although the size may be increased and the interior may be sub-divided into more than one space and utilities added.

The rampant poverty that exists in rural Bangladesh rules out the possibility of anything but the bare minimum investment in the housing sector. Research should be encouraged to find imaginative use of local resources through design and planning of houses. A new sense of dignity must be created in the use of traditional, indigenous materials to over



MAIN HOUSE

CATTLE SHED/
GRANARY

POND

CATTLE SHED, GRANARY
STORAGE & UTILITIES

EXISTING
LINEAR LAYOUT
IN THE HAOR
AREAS OF
SYLHET DISTRICT

MAIN HOUSE

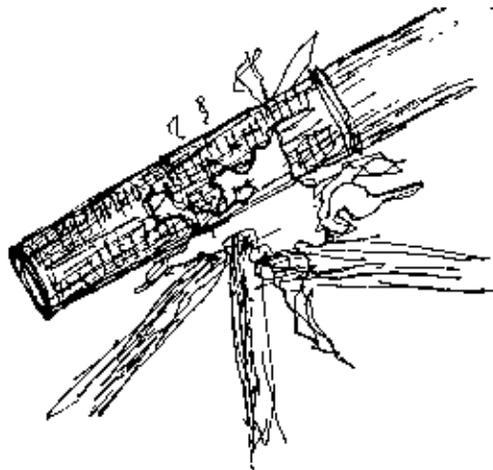
POSSIBLE LINEAR
LAYOUT OF A
HOMESTEAD

come the prevailing attitudes towards their application. Here designers and the media could play a significant role.

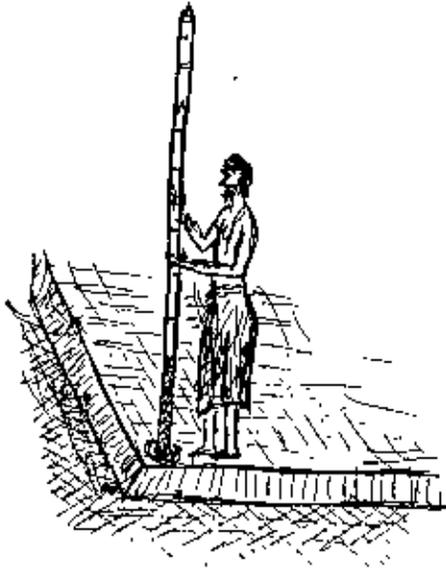
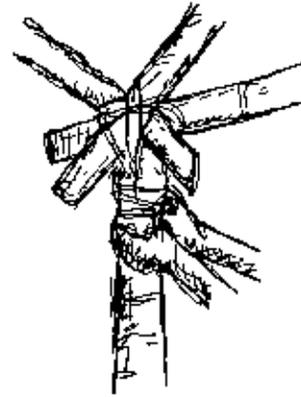
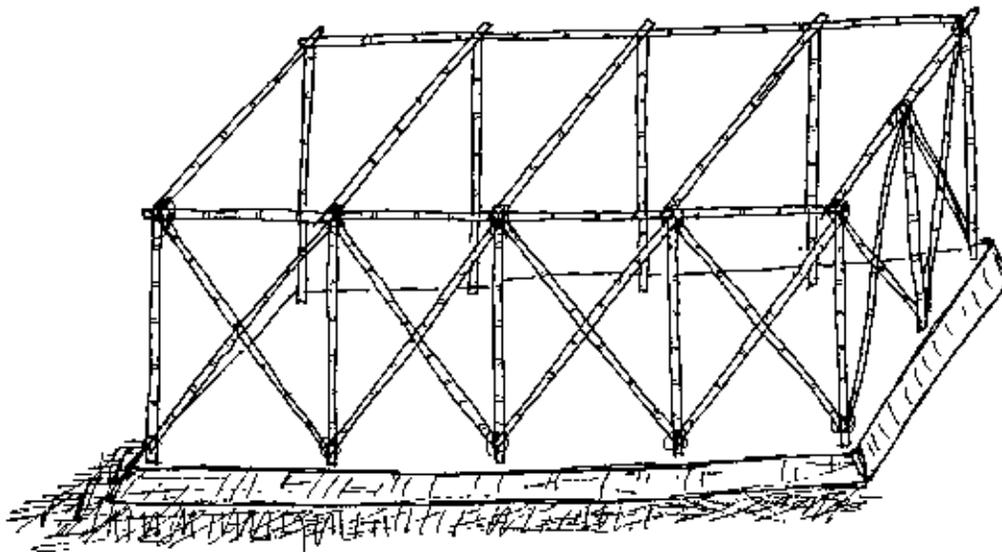
Indigenous and local materials should be given priority in rural housing sector. Even though, the structures made from industrialised and imported materials are much more durable and quite secured from natural hazards and other problems. But the rural poor populace has to make their houses with local indigenous materials because of their easy availability, less cost and known construction methods and techniques. The use of industrialized material is not feasible for problem of transportation, cost and involved construction methods unknown to the rural people. All these could possibly be overcome - but the immense poverty restricts any possible change of using materials other than of indigenous in character. The indigenous and traditional building materials widely used are rammed earth or mud for the plinth or floor; bamboo, jute sticks, various local reeds or mud for walls and bamboo and thatch for roof. Soil or mud has an advantage as a building material ;in that it is available in almost unlimited quantities at almost no cost. Further it can be provided with preservative treatment and stabilized adding asphalt or cement to it. Well built and properly maintained mud houses were seen in different parts of Bangladesh during field trips in connection with the case

studies. Even in areas of heavy rain fall such as the central and the southern part of the country, there are very old mud houses in quite good conditions.

The bamboo or reed panels are usually quite vulnerable to attack by insects and water. Also the bamboo framing for the super structure often fails to adopt proper structural principles for strength and stability. It appears that there exists ample scope for improving the durability of the materials by proper treatment and also improving the strength and stability of the completed structure by adopting proper techniques of construction. Thus the bamboo posts to be used for superstructure framing may be treated by burning their lower ends for a length of about 3' until they are black and then covering them with old sump/motor oil or by soaking them in alkatra (bitumen) for 24 hours before inserting them into the holes in the ground. This will prevent the posts from the attack of insects or water. To increase the structural stability of the wall frames, split bamboo cross members may be inserted in between the vertical posts which will prevent lateral sway of the house frame under wind load. The rectangular base frame of the roof structure may be provided with bamboo cross pieces at each corner to further stabilize the wall framing. For fastening the posts and lintels of the wall frames several lengths of



CHARRING THE POLE BY FIRE

APPLICATION OF COAL TAR
ON POST'S END.PLACING THE TREATED
POLE IN POSITIONTYING OF THE
ROOF FRAME WITH POSTS
USING G.I. WIRES.

CROSS BRACING INBETWEEN VERTICAL POSTS

thin G.I. wires twisted together may be used instead of ropes which are liable to rot quickly.

For bamboo roof framing, particular care should be taken in tying the different members together and several lengths of G.I. wire twisted together should be used for this purpose. The sloping roof frame should not be made too steep or too flat for in both of these cases, wind blowing over the roof will create greater suction and will try to lift up the roof. A flatter roof also increases the rain water leakage possibility. A slope of around 30° with the horizontal plane is considered to be more or less ideal both from the rain and the wind view points.

The traditional rural house structure seems to offer the best possible choice for development of housing and community facilities in rural Bangladesh, both from the viewpoints of the cost and the performance criteria. Two examples from the study of Rural Housing in Bangladesh by M.P. Chisholm of Newcastle University who spent about two years in Bangladesh in 1976-77-78 may provide further insight into the appropriateness and potentials of the traditional house structure of rural Bangladesh. On the cost aspect of the traditional house structure, Chisholm writes that the cost of an American camping tent (16'x16', £160/ 1978, used in the cyclone effected southern Bangladesh in 1970) was the

equivalent in cash terms of a bamboo thatched house together with two cows and a plough in Bangladesh (Chisholm, M.P. 1979). On the performance aspect, Chisholm writes that in Kamalganj in the district of Sylhet two Dutch volunteers, Dirk and Nel Frans and their newly arrived baby preferred to live in a traditional thatch house after a few modifications such as a concrete plinth and security mesh on windows and they had much better night's sleep and consequently they were in a much better physical condition than the rest of the team living in the nearby masonry (pucca) houses. The actual cost of their traditional house even with modifications approximately equalled the cost of the constructional improvements to one pucca house. Thus the traditional rural architecture of Bangladesh with its very low cost and comparatively high performance standard along with its potential for further improvement without excessive extra cost seems to offer perhaps the only viable approach for developing the rural habitats of Bangladesh.

APPENDIX

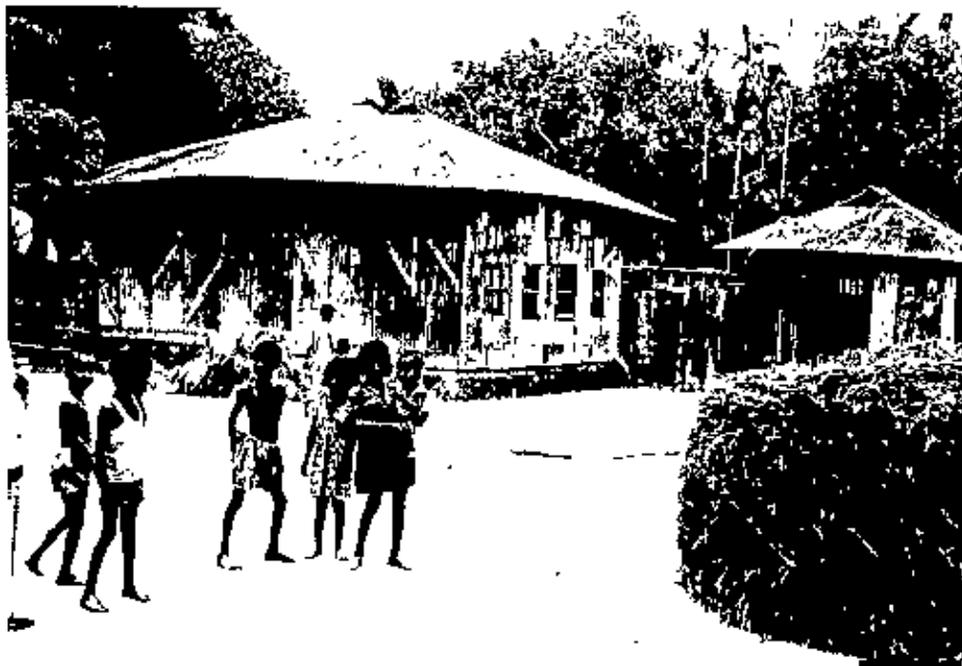
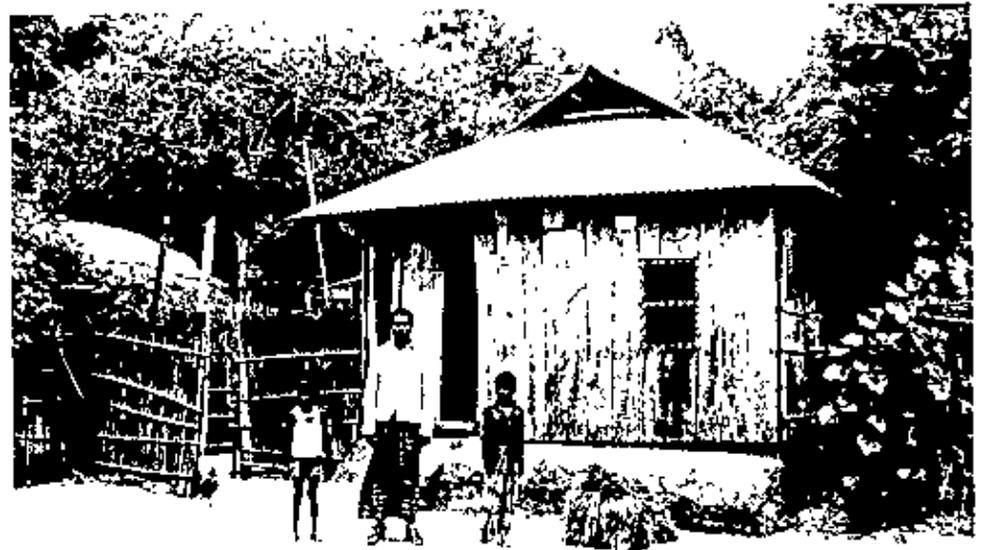


THATCH HOUSE

HUMPED TYPE GABLED
ROOF. WALL AND ROOF
OF JUTE STICK.

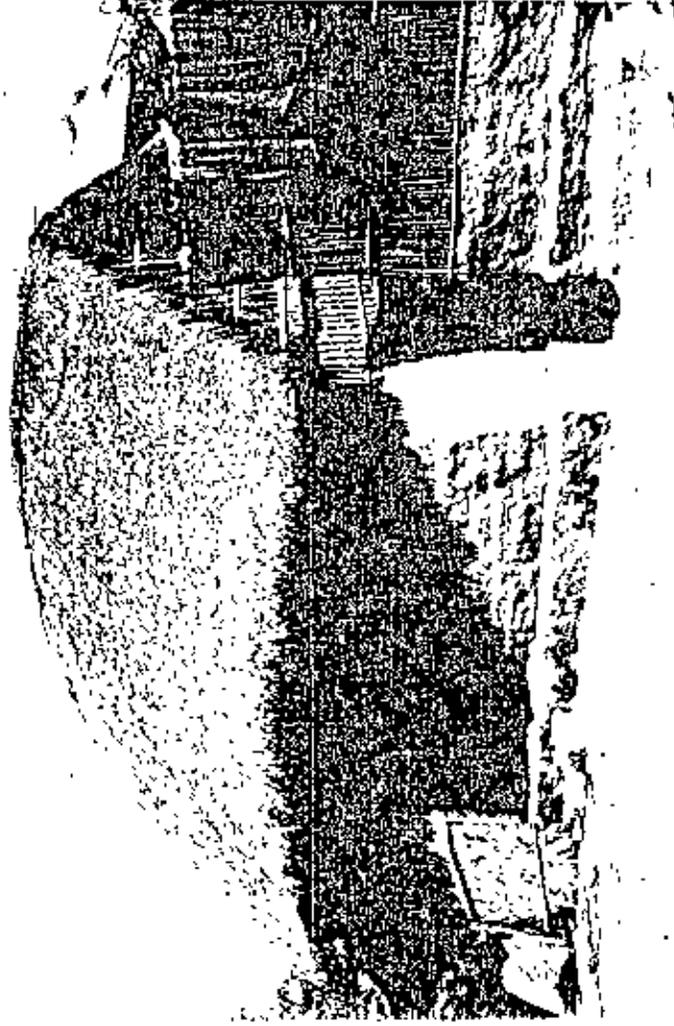
C.I SHEET HOUSE

WALL WITH WOODEN
PLANK. FENCE OF
JUTE STICK.

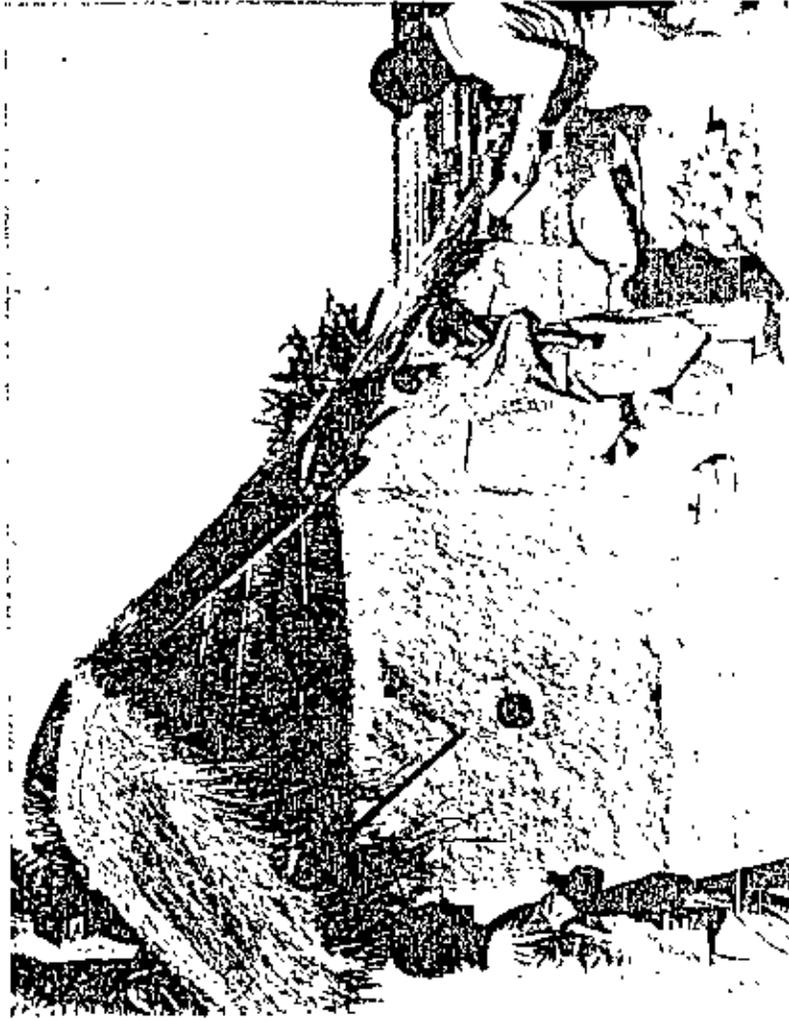


C.I. SHEET HOUSE

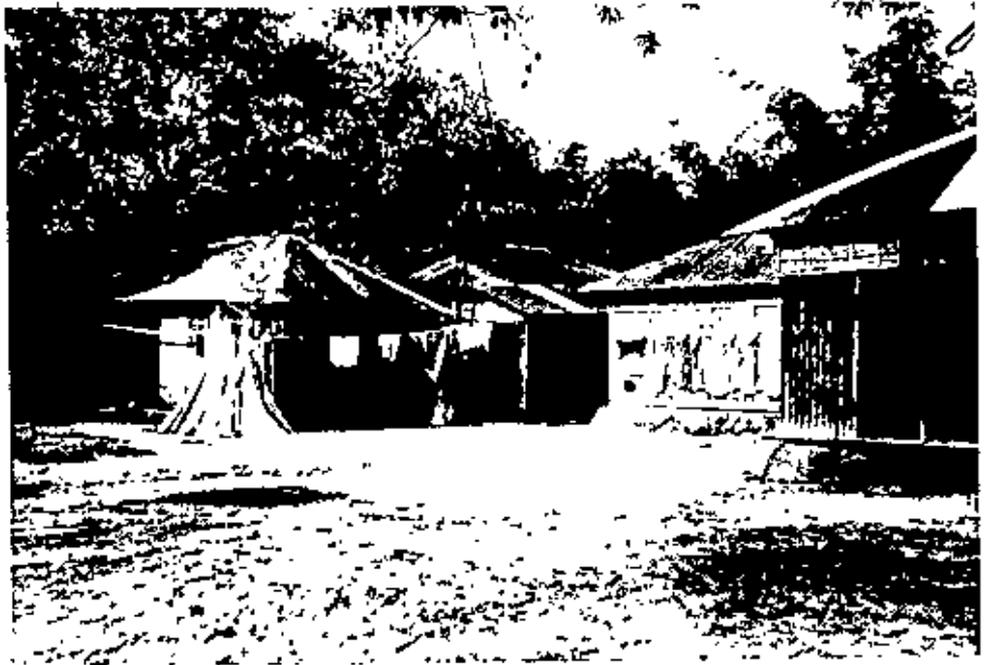
WALL WITH C.I. SHEET.



TYPICAL THATCH HOUSES WITH HUMPED TYPE ROOF.
PART OF THE WALL IS BUILT OF WATTLE & DAUB WITH
MUD PLASTER



C.I. SHEET HOUSE
(SINGLE HIPPED ROOF)



KITCHEN STRUCTURE

BAMBOO POLES, PADDY
STRAW ROOFING AND
JUTE STICK FENCE

C.I. SHEET HOUSE
WITH VERANDAH



MUD HOUSE
(MONOLITHIC)
C.I. SHEET ROOFING



MUD HOUSE
(SUNDRIED HAND MADE
MUD BRICK WITH
MUD PLASTER)
C.I. SHEET ROOFING

MUD HOUSE
THATCH AND
ASBESTOS ROOFING



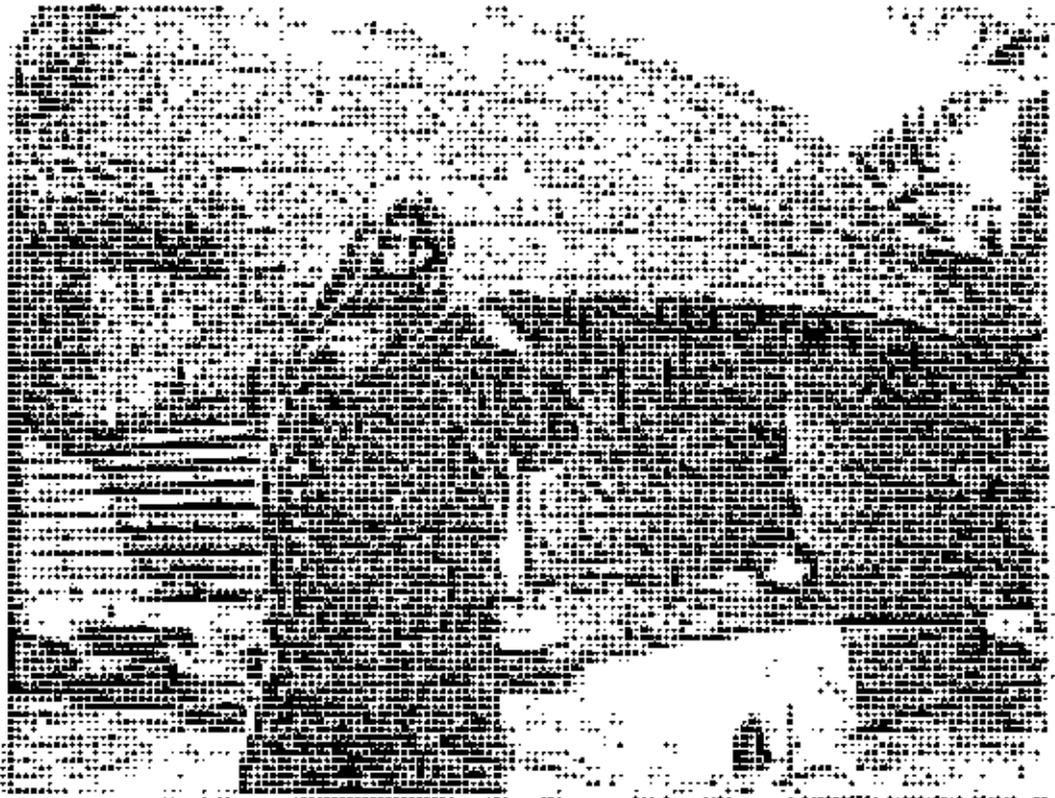


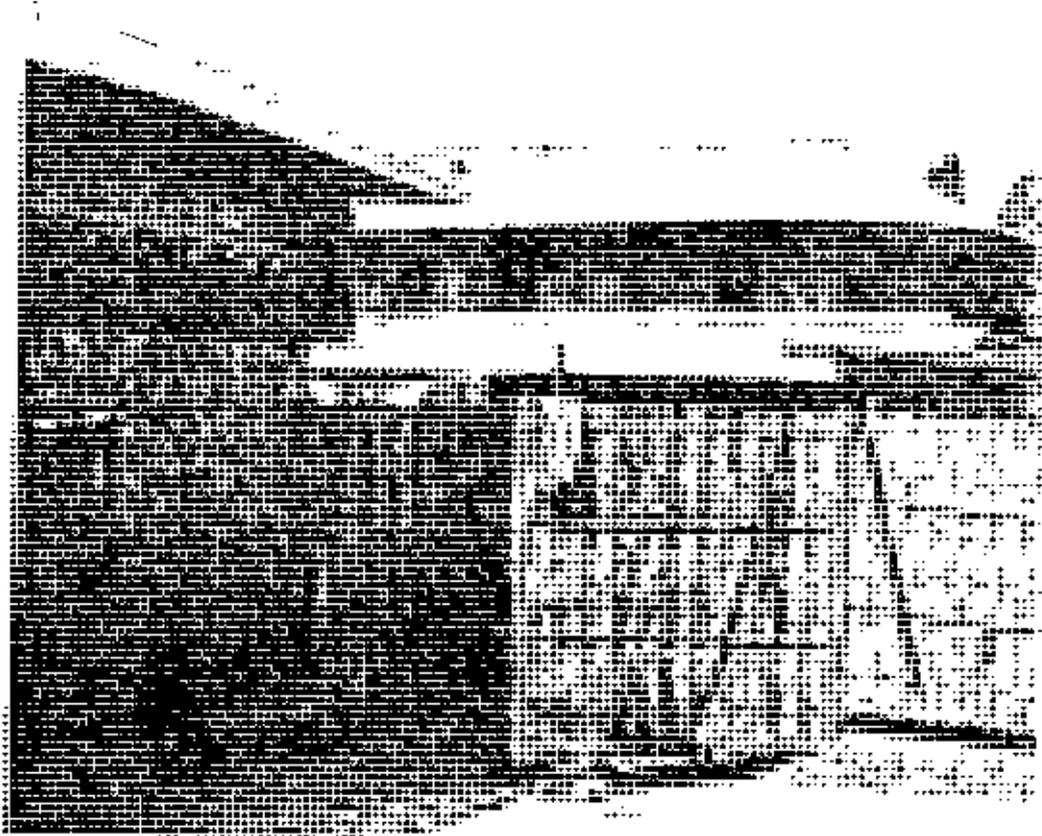
VARIOUS TYPES OF MUD HOUSES





TYPICAL STRAW HOUSES.
COMBINATION OF MATERIALS SEEN IN WALLS

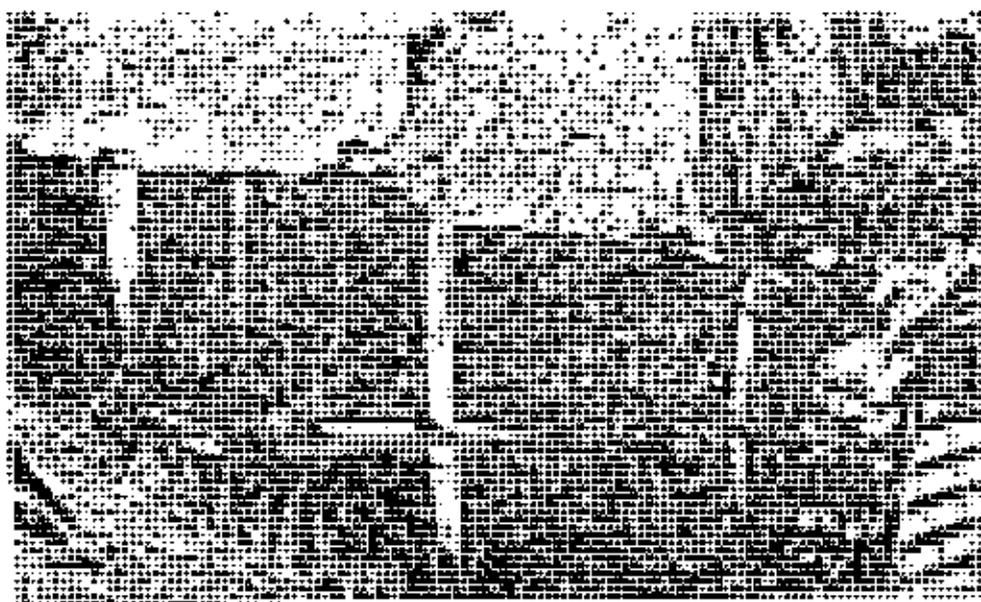




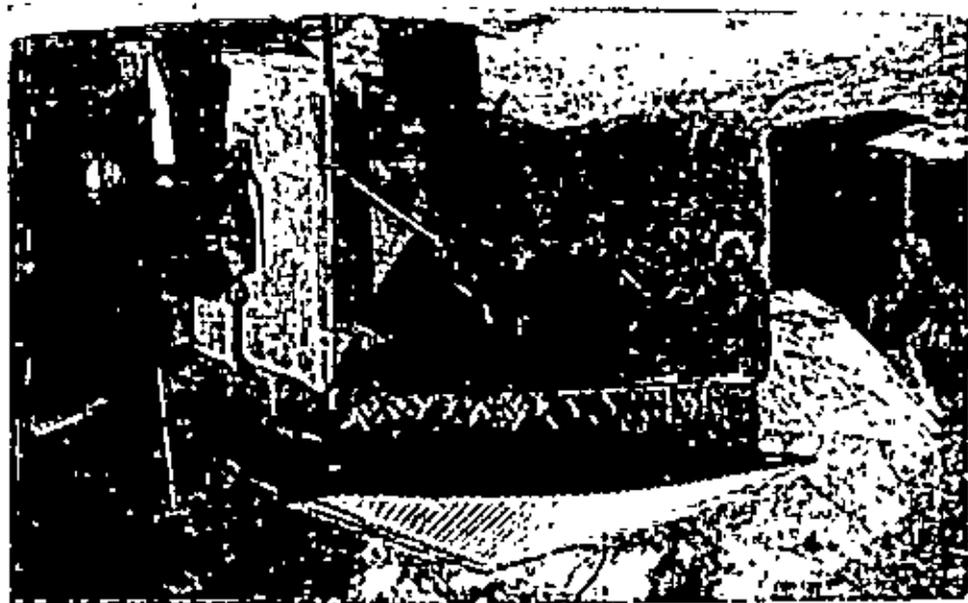
SINGLE AND DOUBLE STOREYED C.I. SHEET HOUSE (GHAR)



C.I. SHEET HOUSE WITH VERANDAH IN FRONT.



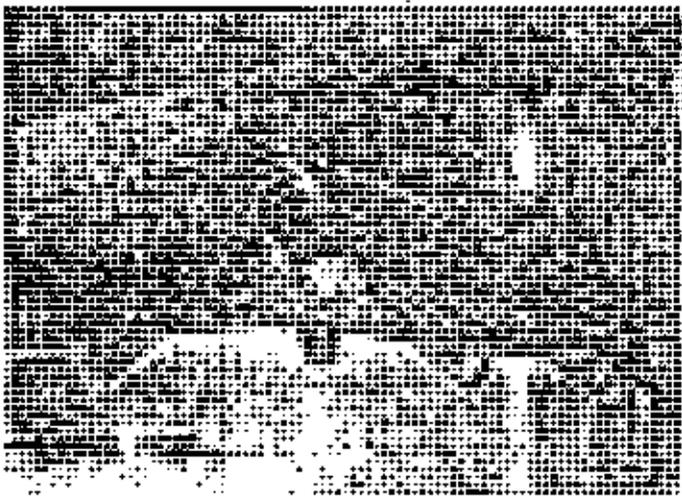
MUD WALL WITH
BAMBOO POSTS
INSIDE



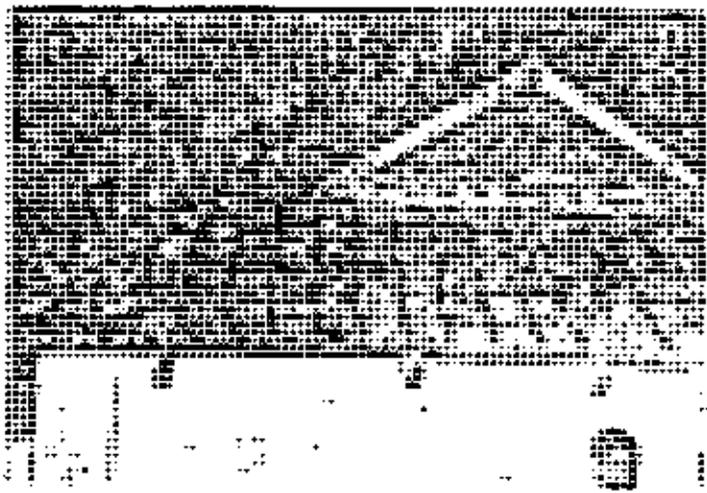
PARTLY MUD WALL
HOUSE STRUCTURE
WALL - MUD +
BAMBOO MAT
ROOF - C.I. SHEET



THATCH HOUSE
WALL - MUD +
ROOF - PADDY



VARIOUS TYPES OF
TILE HOUSES

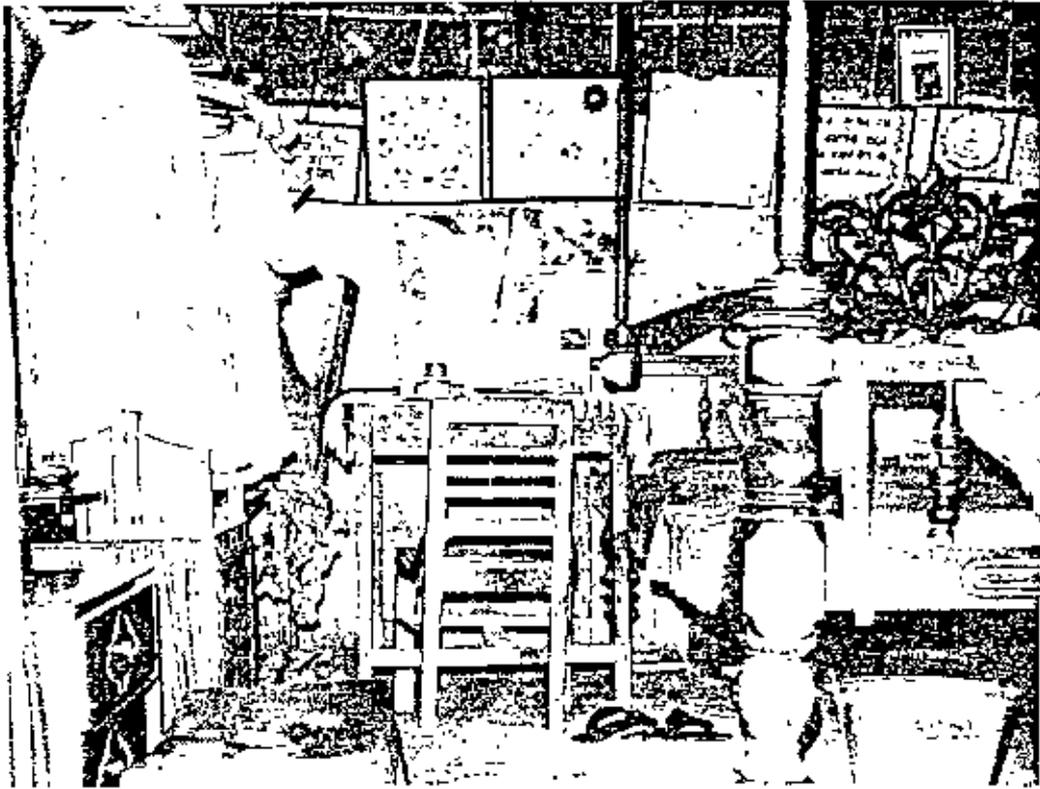




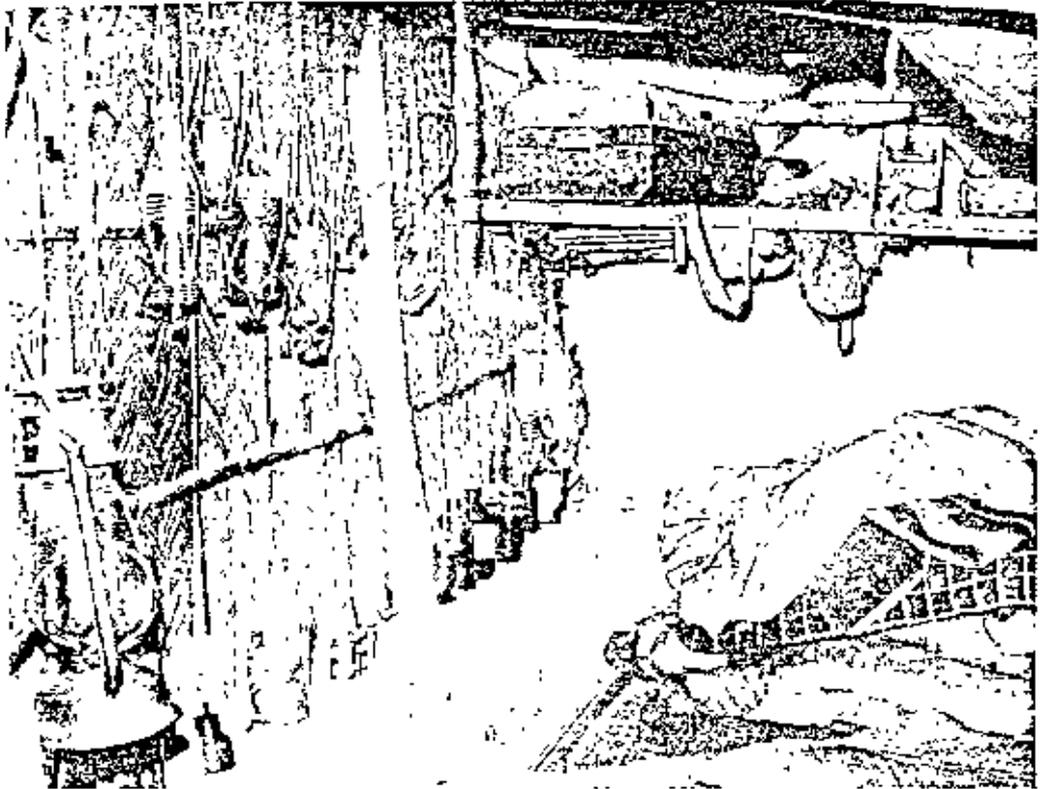
INNER COURTYARD USED AS COOKING AND CHILDRENS' PLAY AREA.



MUD WALL STRUCTURE (UNDER CONSTRUCTION AND NOT FINISHED).



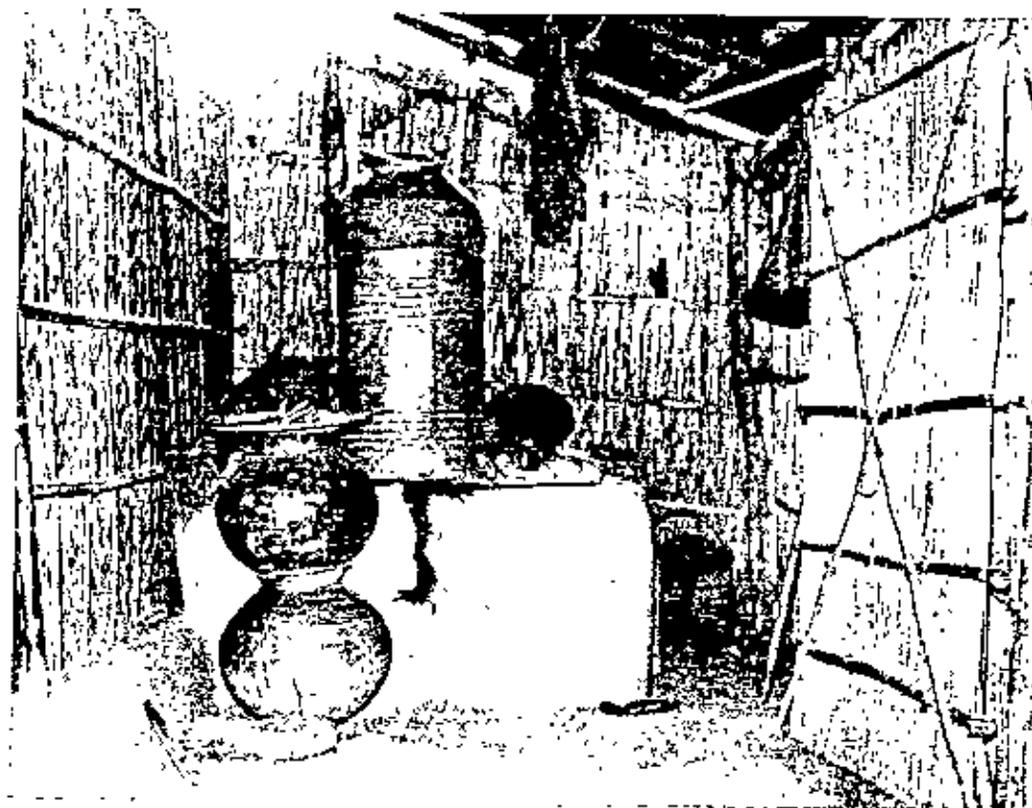
INTERIOR OF A WEALTHY HOME OF RURAL AREA.
USE OF MODERN FURNITURE IS COMMON THERE.



AN ORDINARY FARMERS HOME HAS LITTLE FURNITURE.
THE USE OF OVERHEAD SHELVES (MANCHA) AND ROPE
HANGINGS (SHIKA) ARE COMMON.



STORAGE ARRANGEMENTS IN FARMERS HOUSES





Nucleated settlements on artificially raised mounds in south Dacca District.



Scattered linear settlements S. Sylhet District.

Structure		Number of Houses					
Type	Roof	Walls	All Areas	Rural No.	Urban No.	Rural %	Urban %
1.	Concrete/cement baked Bricks/stone and Baked tiles	Concrete/baked bricks/Stone & Cement, Wood C.I. Asbestos Sheets Bamboo & Thatched	144,997	64,418	80,579	0.7	17.5
2.	C.I. Asbestos Sheets and wood	Concrete/baked bricks/Stone and cement	64,036	28,074	35,962	0.3	7.8
3.	Baked Tiles/C.I. Asbestos Sheets and Wood	Stone & Mud. Concrete Cement/Baked Bricks	18,432	10,610	7,822	0.12	1.7
4.	Baked Tiles, C.I. Asbestos Sheets, Wood	Earth Kutcha Bricks, C.I. Asbestos Sheets wood, Bamboo and Thatched	2,955,505	2,771,453	184,037	30.4	40.1
5.	Wood, Bamboo Thatched and Mud thatched	Wood, Bamboo and thatched	3,500,760	3,401,923	98,837	37.3	21.5%
6.	Bamboo Thatched and Mud Thatched	Earth Kutcha Bricks, Stone and mud	901,350	889,900	11,450	9.7	2.5
7.	Bamboo Thatched and Mud Thatched	C.I. Asbestos Sheets Concrete/Baked Bricks/Stones	50,921	40,863	4,058	0.45	0.9
8.	Mobiles and Others		722	290	432	0.003	0.09
9.	Unclassified		1,957,322	1,918,501	38821	21.027	7.91
			9,594,045	9,126,032	458,745	95.12%	4.88%

HOUSE BUILDING MATERIALS USED IN BANGLADESH

Source:

Planning Commission Housing Census of East Pakistan 1960. DACCA. Gov. of East Pakistan 1961

Note:

Percentages shown are of the total Rural or Urban Housing Stock respectively and not of the total accumulated figures for the country.

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