THE MALAY HOUSE: RATIONALE AND CHANGE

by

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ABSTRACT

The Malay house is defined and described in the Malaysian context. Underlying principles or rules that make up the house are derived from the analysis of its physical, spatial and functional elements and the variations that these elements exhibit.

The rules are tested in the reconstruction of the Malay house. Changes based on hypothetical cases are then introduced to find out how the house would transform under these new sets of requirements.

It is found that it is possible for a person, having not seen a Malay house prior to this, to reconstruct one based on the rules ststed in this work. It is also found that new systems have to be added to the existing systems in the Malay house to meet the requirements for change. The addition of new systems however, do not mean the destruction of the tradition.

It is hoped that this prototype would be the basis for further research in the Malay house.

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Introduction

Aim

It is the main objective of this study to understand what the Malay house is through the analysis of its elements, to discover the rules that generate them, and to outline the possible transformations that the house may undergo, given expected changes over time.

Until presently, little research has been done on the Malay house. Even so, most of the existing documentation is merely descriptive. Hilton in a paper entitled "The Basic Malay House"[1] traced its evolution and described the Malay house in Malacca. Noone, in another paper entitled "The Patani Village of Banggul Ara,"[2] did a similar study of a number of houses. So did Sheppard, who described the historical evolution of the Malay house in yet another paper entitled "The Traditional House Forms in Trengganu and Kelantan."[3] In his study of the Malay house published in Journal of the Institute of Architects of Malaya,[4] Morley described the many forms of the Malay house found in Malaysia.

1. R.N.Hilton, The Basic Malay House, Journal of the Malayan Branch of the Royal Asiatic Society (JMBRAS), vol. XXIX, pt.3, 1956, pp.134-159.
2. R.O.Noone, The Patani Village of Banggul Ara, JMBRAS, vol. XXI, pt.1, 1948.
3. Tan Sri Haji Mubin Sheppard, Traditional Malay House Forms in Trengganu and Kelantan, JMBRAS, vol.42, pt.2, 1969, pp.2-16.
4. P.G.Morley, Malay Timber Buildings, pt. 2 of a three part series entitled Towards a Malayan Architecture, Journal of the Institute of Architects of Malaya, (undated) pp. 2-16.

The descriptive nature of these studies contributes mainly to the understanding of the house forms as such, and thus becomes an end in itself. Nevertheless, these descriptive essays are slowly changing direction as evidenced in a paper by Emrick, "The Traditional Houses of Malacca and Negeri Sembilan: The Derivation from Mingangkabau Protype,"[5] which analytically shows how the houses in Malacca and Negeri Sembilan might have originated from Sumatra. However, his paper represents only the beginning of such an analytical study. It is also partly due to the concern for the small amount of work done in such a vast field that this study is initiated and hopes to add. Being largely analytical, it is hoped that this study will also contribute to the objective understanding of the Malay house.

5. Michael Emrick's paper submitted to Professor Fraser, course G4060, Columbia University, NY, (unpublished) 1977.

In contrast to the amount of work done on the Malay house, many works have been produced by researchers who have identified the fundamental rules that govern the conception of houses in other parts of the world. One is Glassie's Folk Housing in Middle Virginia, which expounds, in the chapter "Architectural Competence," the rules on "how the house is thought."[6] In Variations - The Systematic Design of Supports, Habraken outlines principles and methods by which mass housing has been and should be generated. He has also identified rules that govern the built environment in Holland. There are various other works by single or groups of people, general and specialized, hypothetical and completely practical and from behavioral to technological, done here and for other countries, that expound on how the house

6. Henry Glassie, chapter IV in Folk Housing in Middle Virginia, University of Tennessee, TN, 1975, pp.19-40.

works. Similarly, it is the aim of this work to come up with sets of rules, principles and/or an objectified rationale upon which the Malay house is based.

Changes in house forms created by changes in time are inevitable. The availability of resources, materials, technology or lifestyle changes contribute to the changing vocabulary and thus any house, not excluding the Malay house. From the description of houses in Perak, McNair observed how the "Dutch wife" is adapted into sleeping areas in the Malay house, showing the subtle change affecting the way in which the house is used. Radical changes could also happen. "One instance of this is found in Rajah Bot, ruler of Lookoot in the Soonghy Ujong territory near Malacca, who has supplied himself with a house precisely similar to that which would be built by a European. . . ."[7]

Part of the intention of this thesis is to provide a model for anticipated changes, by the introduction of rules into the design process.

Framework

Assumption:
"Just as rules to generate language relate sound and meaning, so the rules to generate artefacts relate form and use."[8] Rules sought in this study are those that relate to form, which is derived from physical elements, and use, derived from functional elements. Aesthetic or mystical elements[9] are explicitly not included, but are implicitly

7. J.F.A.McNair, Perak and the Malays,(written in 1878) Oxford University Press, Kuala Lumpur, 1972, p.170.
8. Glassie, ibid. p.21.
9. The mystical elements are exemplified in an article entitled No Hosting the Ghosts to be published in Colloquy, vol.1 no.1, Cambridge, 1981.

recognized by accepting the validity and the popularity of the "traditional" house forms and plans.

Although physical, spatial and functional elements cannot be detached from one another in order to understand the entirety of the house, it is done here only for the purpose of analysis.

Some Definitions:

1. A physical element is defined as the smallest whole component that is recognized as an integral part of the house.
2. A spatial element is defined as a whole space recognized as being part of the house and designated by a name.
3. A functional element is defined as a group of related activities taking place in or within the vicinity of the house.

Method

The house type chosen for this study is the Johore-Selangor-Perak type, drawn as a result of my familiarity with this house type.

Several houses are studied. The consistencies found in the relationship between the elements as exhibited by the houses are then generalized as rules or underlying principles which make up the Malay house.

The breakdown of physical elements is based on available documents, experience and observations on how the Malay house is constructed in Mukim Serkat, Malaysia. Spatial elements are drawn from the houses used in this study, except for bilik or "room," which is added to other elements based on the above experience. Functional elements are explicated on the same basis. At this

point, many of the functional elements are based on conjecture rather than rigorous evidence, since such evidence is scarce and its compilation is beyond the scope and limitations of this thesis.

Scenarios are then created to test the integrity of the rules in the process of design, to predict the transformation of the house and to see how building systems can be incorporated in the evolution of the Malay house.

1. BACKGROUND

1.1 Malaysia in Brief

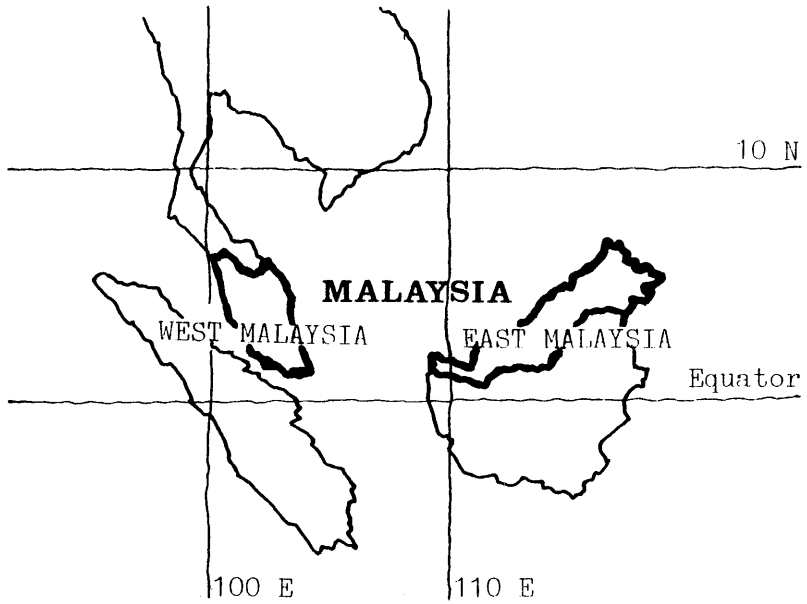
1.2 Architecture in Malaysia

1.3 Housing in Malaysia

1.1 Malaysia in Brief

Physical Features

West Malaysia is located in the center of the trade route between India and China. It stretches from 1°20' to 6°40' N and 99°35' to 104°20' E. It is bordered by Thailand on the north and Singapore on the south, a distance of about 500 miles. It has an area of 50,886 square miles.



Half of the total land area in Malaysia is more than 500 feet high, with 8 mountain ranges running north-south. The highest mountain, Gunung Tahan, located on the Tahan Range, is 7186 feet above sea level.

Climate

Malaysia has an equatorial climate with constant high temperatures and heavy rains. Unlike equatorial desert or inland climate, Malaysia is hot and humid with a climate that promotes the growth of lush tropical forests.

There are 8 or 9 major winds that blow over Peninsular Malaysia. Two major ones, the Northern Equatorial Air Stream and the Southern Equatorial Air Stream, are predominant for most of the year.

Coupled with rain, winds bring the seasons to the country. There are four not very distinct seasons:
1. South West Monsoon Season (June to September)
2. North East Monsoon Season (November to March)
3 and 4. the period between these two seasons which is usually characterized by weak winds of varying velocities and directions.

Rains are heavy. Being of the convectional or squall types, they fall about 46% of the days of the year, contributing to the annual total of about 160 to 170 inches. Although there are times when rain falls at the rate of 9 inches per hour, 2 or 3 inches per hour are most common.

There is a lot of sunshine. It averages between 2000 to 2600 hours a year. Daylight is about 12 hours a day and 50% of it is bright sunshine. Variation in the length of the day is between 9 and 37 minutes in the south and north of Malaysia respectively. The average temperature is 80°F all the year round, although it is lower in the higher altitudes. The average daily maximum temperature is 90°F and the minimum is a little above 70°F.

Population

West Malaysia has a population of 8.8 million growing at the rate of 3% annually. 47% of the people are Malays, 34% Chinese, 9% Indians and 10% others, including Kadazans, Dayaks and Eurasians. This multi-racial population composition was only stabilized after 1947 when immigration laws controlled the influx of Chinese and Indians into Malaysia. Although Malaysia had trade relations with India and China in the early 15th century, Indians and Chinese

at that time did not reside permanently in Malaysia. It was only after 1800 that the Chinese came to exploit Malaysia's tin resources and became engaged in other economic activities. The Indians, during this period, first came to work on rubber plantations and railways as well as road-building.

As a result of these reasons for immigration, the Chinese mostly settled near the tin mines which later developed into regular urban centers. The Indians settled both in rural rubber estates and in the existing urban areas. Malays dominated the rural areas.

Presently, there are 49 urban centers in Malaysia which hold about 29% of the total population. The majority is Chinese, forming 58% of the total urban population. Malays and Indians make up 28% and 13% respectively. Growth rates may vary from 0% to 50% and density can reach levels as high as 2000 persons per square mile in some cities.

Rural areas are dominated by 85% of the Malays. About 65% of Indians and 50% of Chinese are rural.

Manufacture

Malaysia is the world's largest producer of rubber and tin. These industries were developed during the colonial period. Later, secondary industries such as repair shops and light engineering developed. Rural industries were, however, neglected in favor of imported articles.

After WW2, Malaysia concentrated on local manufacture so as to be less dependent on imported goods. Domestic production of tobacco, wood and footwear met almost all local needs by the 1970s.

Small-scale industries are very important to Malaysia, providing 39% of full time employment in wood, rattan, attap, cork and chemical industries. Tax exempt status is given to these industries to encourage their development and growth.

Large capital-intensive industries such as petroleum, coal, chemical and electrical products contribute to a high gross output, but employ fewer people. In 1970 these large industries provided only 19% of the total full time employment, despite tax shelters and other incentives to those employing more labor.

At this point, small- and large-scale industries are concentrated along the west coast of West Malaysia. This is slowly changing due to locational incentives that encourage a more balanced development.

Trade

Trade in Malaysia has been going on for many centuries. The colonial period only reinforced Malaysia's position as a trade center in a modernizing era.

Local trade consists of foodstuffs, handicrafts and timber, the surplus of which is exported. However, it is difficult to determine how much this form of trade contributes to the total economy of Malaysia, due to lack of data.

External trade, involving export and import, is vital for the economy of Malaysia. Malaysia's primary exports are raw agricultural and mineral materials. Rubber and tin exports, which represent 55% of the total export, are slowly declining due to the exhaustion of local resources and global technological advances which have found sub-

stitutes for these natural materials.

Oil palm is the third most important export, followed by timber, which is slowly beginning to be locally processed into finished products such as plywood and veneer. Iron export was short-lived, and the years 1972-73 showed no export of this material. Major countries to which Malaysia exports its materials are Japan, the United States and Singapore.

Imports include food, manufactured goods and transport equipment. Food imports are slowly declining, and the import of transportation equipment, which represents 30% of all imports, is increasing. Plastics and chemical imports are also increasing.

1.2 Architecture in Malaysia

Architecture, as a profession, is a relatively new field in Malaysia. Prior to the advent of professionalization, buildings were built by master carpenters. It is believed that professionalization began during the colonial period when the British brought in their own architects to design buildings which served their administrative as well as other purposes. Facilities for architectural training were not available during that period (1786-1957).

When the colonial government left in 1957, British architects were slowly being replaced by Malaysians who returned from studies abroad. It was by such a development that a new vocabulary in buildings, derived from the Modern Movement, was introduced into Malaysia, replacing the Classical colonial architecture. Schools of architecture which were set up during this period even adopted their own version of the Bauhaus curriculum.[10]

Despite the acceptance and practice of Western ideals, the concern for generating local architecture sensitive to the vernacular tradition was never completely abandoned.

With the demise of the Modern Movement and the rise of the Post Modern era, Malaysian architects, not immersed in the Classical traditions, started to look for their own roots in the attempt to create "Malaysian Architecture." When it was realized that "of all architecture available [in Malaysia], the

10. This is based on the experience at the Institiut Teknoloji MARA. The institute's aims were similar to Bahaus' utilization of craftsmanship "as a means for education of modern designers, capable of giving industrial products a definite formal basis." Benevolo, History of Modern Architecture, vol.2, p.415.

Malay house stood as a monument to good design . . .,"[11] Malaysian architects, lacking the training in local building practices and having neglected the influence of the indigenous environment, began to incorporate "stylistic" Malay artefacts, such as the keris, a legendary Malay warrior's weapon, the batik and the traditional spinning top, into their designs. Elements of the Malay house, for example, were applied as ornaments to the facades of new high-rise designs.

Schools of architecture concerned with discovering the sources of local architecture documented a substantial number of Malay houses, but these documents are little known among the practicing profession of today.

11. Jay R.Carow, With the Peace Corps in Malaysia, AIA Journal, no.44, 1965, p.62.

1.3 Housing in Malaysia

Projections of housing needs in Malaysia vary from one study to another. It is estimated that there is a need for 2 million more units from 1970 to 1990.

There are 1.63 million living quarters in Malaysia. 24% are urban and the rest are in the rural areas. Out of the total number of units, 98.5% are private homes, of which 81% are single family and 10% are apartment units. Of the total number of units, 44% are equipped with electricity, 48% have running water and 80% have some form of toilet facilities.

Assuming that rural houses are owner-built, the majority of houses in Malaysia, 76%, are built without architects. Owner-built houses are found in urban areas as well. In Kuala Lumpur, for instance, squatters, which make up 30% of the city's population, build their houses without any help from the professionals. These houses, urban and rural, range from primitive shacks to elaborately ornamented houses, a majority taking the form of one or the other traditional Malay house type.

Formal house-building by professionals and housing authorities makes up 24% of the total housing stock in Malaysia. Out of this, 46% are built by the public and 54% by private developers. Houses built by private developers consist of row-houses, duplexes and single family units. These are constructed using "conventional" techniques with reinforced concrete frames which are filled in with brick walls, glass louver windows and wooden doors. Tiles are used for roofing. Public developers employ self-help, pre-cut, site-assembled techniques as well as other techniques, ranging from "conventional"

to fully prefabricated buildings. Despite the sophisticated technology required in the latter, in some of their projects public developers have allowed people a measure of participation in terms of self-help.

The public sector has also experimented with industrialized housing in Malaysia. This began in the early '60s when studies of European system were made by the Public Works Department. By the end of the decade, two pilot projects were executed, one in Kuala Lumpur and the other in Penang, consisting of blocks of high-rise, reinforced concrete panel buildings. Due to various legal and technical problems, industrialized housing was later abandoned. Existing factories were shipped to Africa and Singapore. Based on this experience, industrialized housing has not been viewed with great favor since.

2. THE MALAY HOUSE

2.1 Definition

2.2 History

2.3 Description

2.1 Definition

It is difficult to define what the Malay house is. This is due to the meaning of the word "Malay," which is not clear. Legally, Malay is defined as "a person who professes the Muslim religion, speaks the Malay language, conforms to Malay customs. . . ."[12] If a Malay house is a house that is owned or lived in by this person, then this definition does not hold true, because there are many instances when these houses are not lived in or owned by a person so defined. Therefore, it is difficult to legally define a Malay house.

Malay is also defined as "a member of the people of the Malay peninsula, Eastern Sumatra, and some adjacent islands."[13] By this definition, many ethnic groups such as Achehnese, Batak, Bugis, Kerinci, Minangkabau, Rawa and Mandiling are included. These people have developed their own distinct house types, therefore making it even more difficult to define a so-called Malay house.

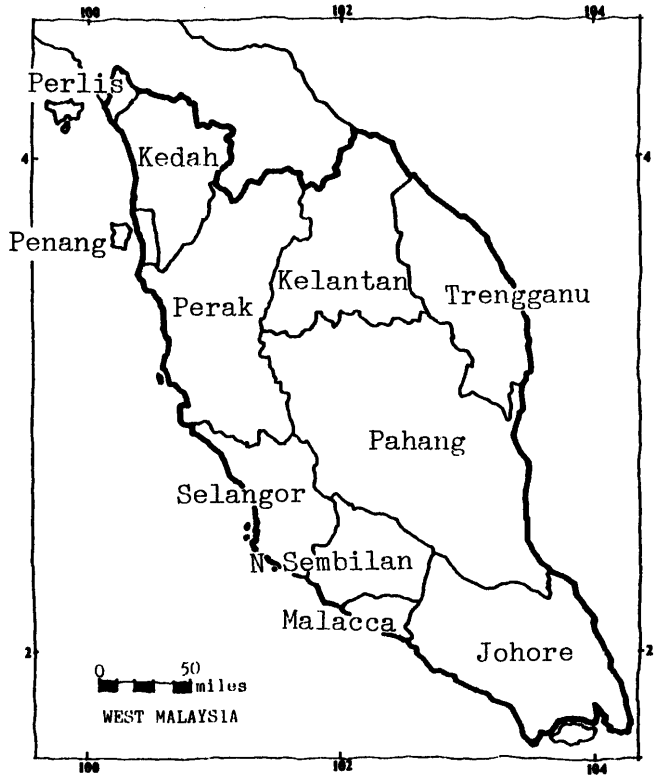
Maybe it is erroneous to assume a single meaning for the term Malay house. Nevertheless, this study assumes a definition generally accepted by authors dealing with this subject, both for the sake of simplicity and operational use.

From this assumption and based on the different groups of people who had immigrated and settled in the different states in Peninsular Malaysia, the Malay

12. L.A.Sheridan and Grove, The Constitution of Malaysia, Oceana Publications, 1967, p.218.

13. Webster's Third New International Dictionary, C & G Merriam Co., MA, 1966.

house may be divided into three types: Malacca-Negeri Sembilan, Kelantan-Trengganu, and Johore-Selangor-Perak.[14] It is not the aim here to define or expound each of these types, but be it sufficient to say that there are indeed distinct differences in the treatment of these houses which make such a categorization useful and necessary. It is also understood that within each category, a differentiation can be made between the houses so as to require further classification.[15] Nevertheless, for the purpose of this study, only the types mentioned above will be recognized.



14. People in Malacca and Negeri Sembilan, from the Minangkabau district in Sumatra carried the traditions of Minangkabau architecture. Those in Kelantan and Trengganu propagated the architecture of the kingdom once centered in Cambodia. People from other parts of Indonesia and the Malay archipelago settled in Johore, Selangor and Perak. They are believed to have brought with them the style which differed from the groups of people mentioned above.

15, Emrick showed that there are distinct differences between the Malacca and Negeri Sembilan houses suggesting that there are further classifications in each of the house types shown here.

2.2 History

Long before the founding of Malacca which marked the present history of Malaysia, there already was a civilization in Peninsular Malaysia, derived from the Dong San civilization in Cambodia. Since it was regionalized and is not known to have had any major influence on other cultures of the world, especially the western, and since archaeological work on this civilization are recent, little is known about it or its architecture. Still less is known about its vernacular tradition. Despite the existence of Indian culture influence in Kedah since 2nd century A.D., it has been assumed, mainly due to the exclusively religious nature of the Indian influence, that the way of building in this area was not affected by it. The origin of the Malay house can therefore be assumed to be along the evolutionary lines generated by the aborigines in the remote areas of Malaysia today.

The rise and fall of nation-states and the shift of their control centers created the intra-regional movement of people, and vice-versa. The 7th century saw the Sriwijaya Kingdom centered in Palembang and Melayu (Jambi). The State of Melayu centered in Jambi separated from the Sriwijaya Kingdom at the end of the 11th century. This kingdom was later conquered by the Majapahit Empire, centered in Java, At this time, smaller na-

tion-states were formed. The State of Minangkabau was centered in Palembang and the Siamese Kingdom in Patani. What had happened to the development of the vernacular tradition is as yet, not clear. Nevertheless, it is assumed here that the changes in the dominance of the different Malay cultures had brought with them the different house forms from different regions to major centers of the empires.

When Malacca was founded by Parameswara in 1403, the Indian culture derived from the Hindu Majapahit Kingdom where Parameswara was from, became more pronounced in the region. As Malacca developed and became more important as a trade center, it also became a place where different cultures merged. One influence came from the Arabs which led to the Islamization of the Malacca Sultanate shortly after its founding, and

spread through the empire in the mid-1400s.

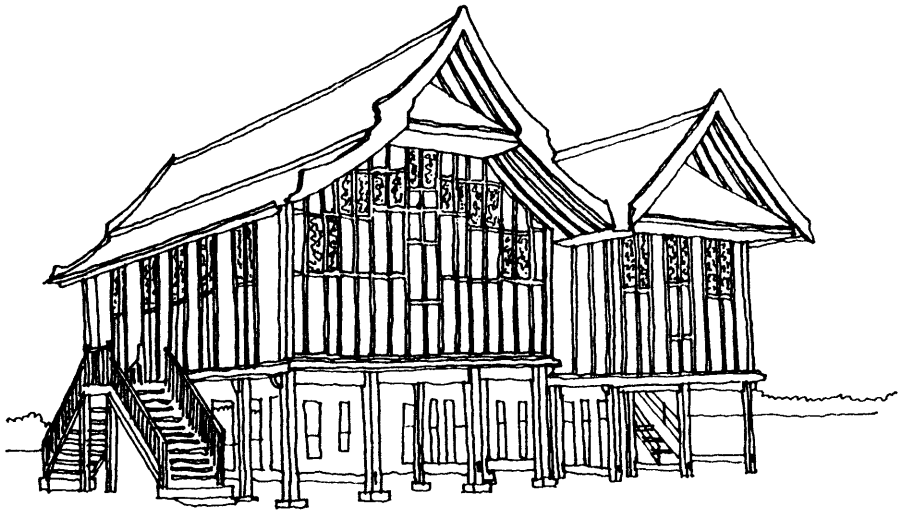
Another influence came from China by a delegation led by Admiral Cheng Ho, which left Malacca with a community of Chinese at about the same time. With the fusion of these cultures, it has been postulated that the design and technology of buildings were already superimposing Indian, Arabian (Persian) and Chinese cultures on top of the indigenous Malay culture. Although the spe

specific extent of these influences is yet to be studied in depth, houses and house-building rituals, which seem to bear the influences from a mixture of these cultures, are still evident in Malaysia today.[16]

The European culture came to Malaysia with the fall of the Malacca Sultanate at the hands of the Portuguese in 1511. This was followed by the Dutch, who took over Malacca in 1641 who were later succeeded by the British in 1786. The magnitude of the Portuguese contribution towards the evolution of vernacular architecture in Malaysia is still not certain and demands further study.[17] It

16. Roof tiles are believed to be introduced by the Chinese. Wall tiles used on the steps in some houses are Dutch and roof forms are British. Rituals in the house construction are derived from Hindu and Islamic practices.

17. The Portuguese, through building the fortress Famosa in Malacca, had taught the people the art of masonry in quarries in Batu Pahat, Johore.

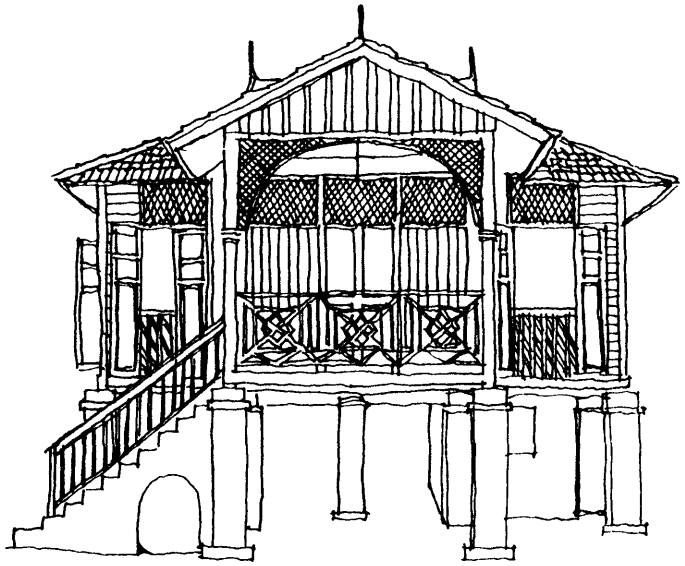


is certain, however, that the Dutch had affected, among other things, woodcarving and furniture through their pattern copybooks.[18] The English colonialization of Malaya, which was synchronous with the birth of the modern world, brought with it the classical and later the international traditions, which had

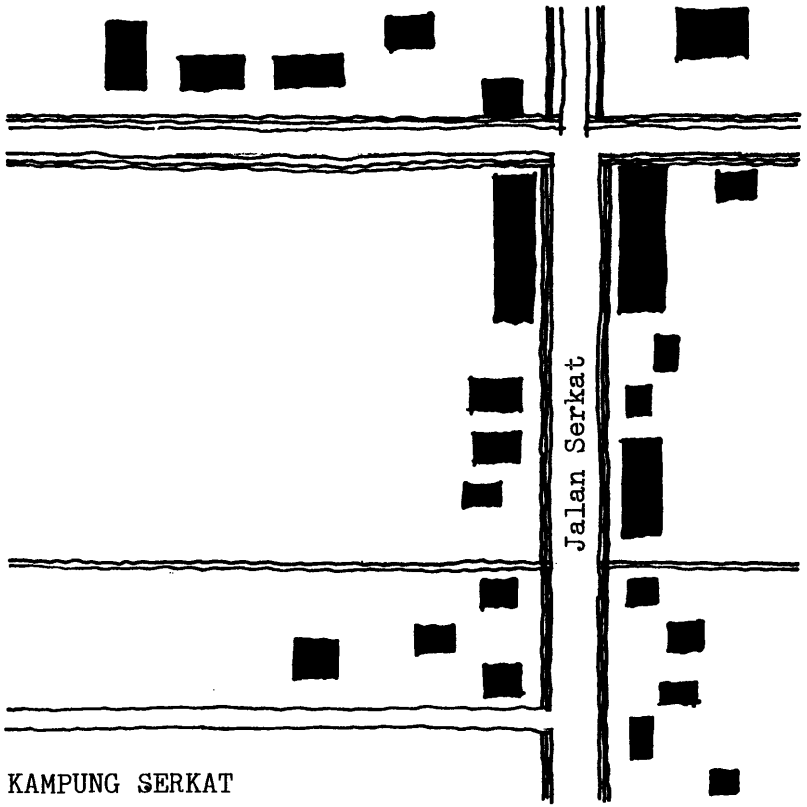
18. It is believed that this was the case for Indonesia. See Wilfred Neill, The Peopling of Indonesia, Columbia University Press, 1973.

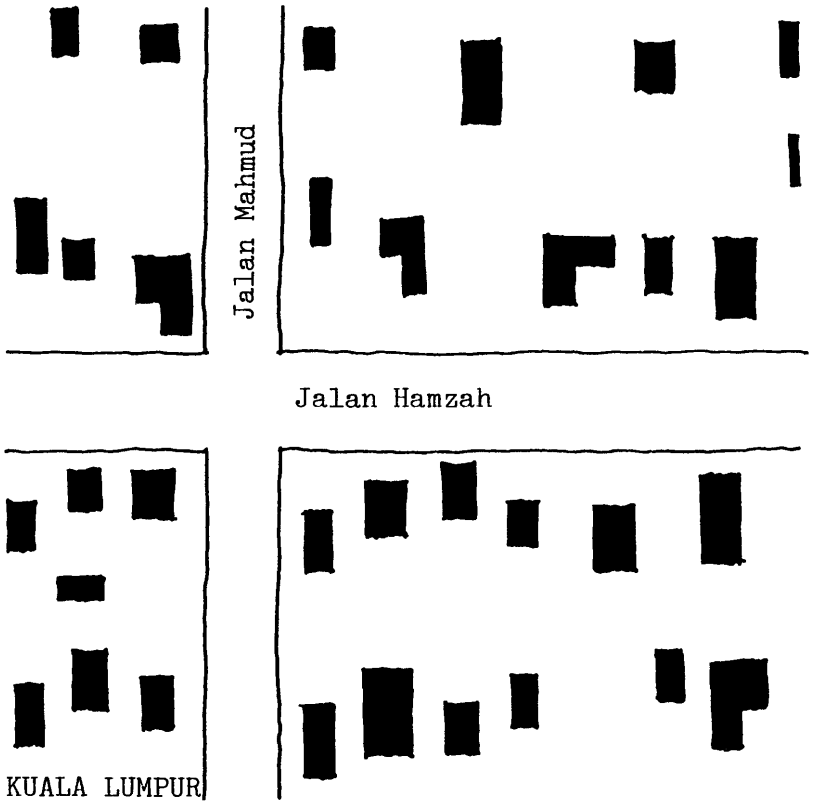
deep effects on vernacular architecture in Malaysia.

Western culture which had been introduced by the colonial powers. In the move toward 'progress,' more and more buildings were designed and built by the professionals who were trained in Western countries, thus strengthening Western cultural influences in Malaysia. Foreign design concepts and technologies were extensively employed in housing schemes, generating house forms alien to the country. Despite this, the Malay house evolved in its own ways, selectively adapting itself to changing times.



2.3 Description



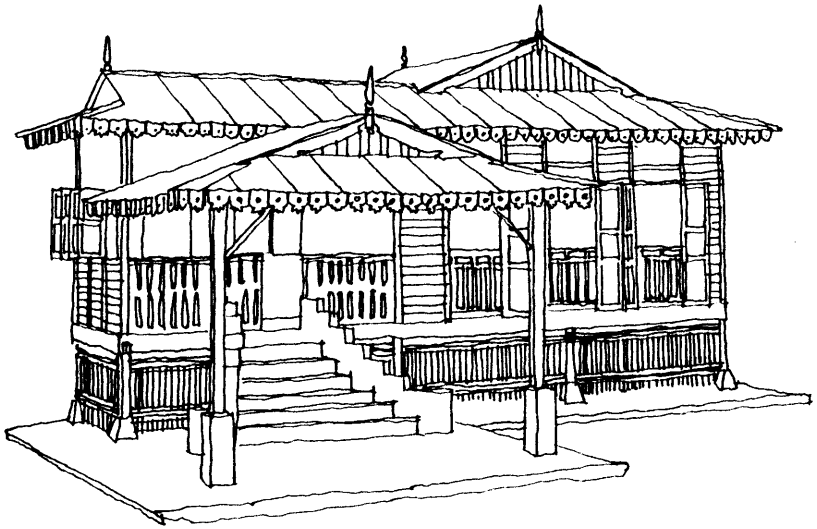


Malay houses are found in both urban and rural areas in Malaysia. The rural area shown is that of Bandar Serkat, a village center in Mukim Serkat. The village is about 9 square miles with a population of 3000. Each house is lived in by a family. The urban area is that of Kampung Bahru, located in metropoli-

tan Kuala Lumpur, a city of 35 square miles with a population of 456,000 (1970). Each house can be lived in by several families after extensions are made to the existing house.

Although Malay house forms may vary greatly, certain basic similarities exist due to the natural forces that the houses have been subjected to over a long period of time. They are generally built in wood, although thatch, bamboo, betel-nut palm and other indigenous building materials are often used. These materials are light and of very low thermal capacity and are used to alleviate the intense heat in this region.

Roofs are generally pitched to quickly drain the large amount of water brought by heavy rainfalls. To protect the residents from floods caused by these rainfalls, floors are raised above the

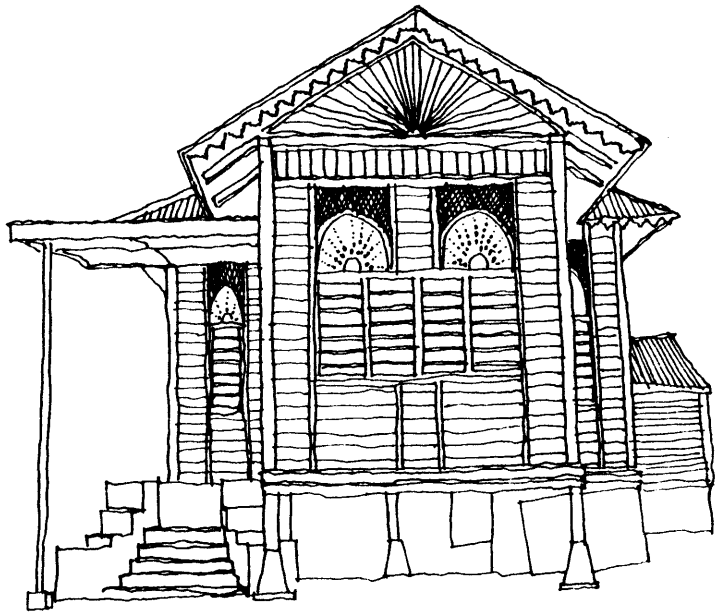


ground on stilts. Raised floors also help with the ventilation of the houses by creating cool air pockets under the house. Cooler air is sucked into the house as the hot air rising into the attic space is drawn away by winds directed by ventilators on the gable boards.

Ornaments are an integral part of the house. However simple or small a house

may be, ornaments can be found in various parts of the house, e.g., on the roofs and walls. Other elements are also ornamented. These ornamentations generally take the form of woodcarvings.

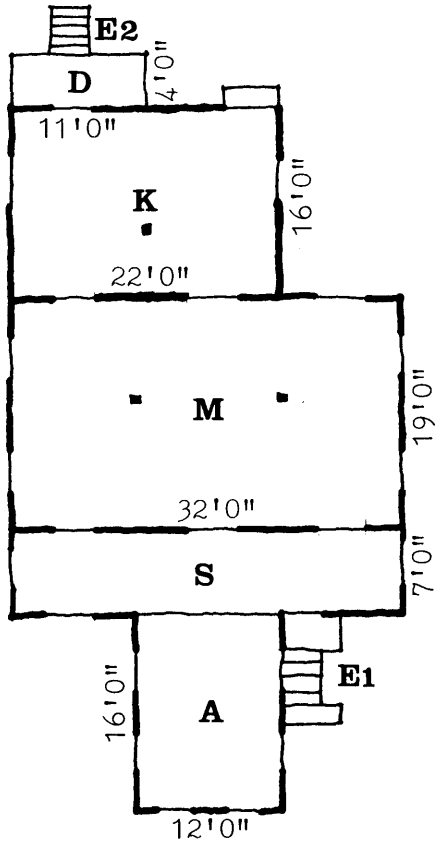
A Malay house is built by a master-carpenter who is usually given a set of verbal specifications by the prospective owner. The master-carpenter then pre-cuts all the components required to make up the house. On the day that the house is to be erected, a group of people are invited to give a hand in the process called gotong-royong, or mutual help, to assemble all the components which make up the framework. Once this structure has been erected, the master-carpenter proceeds with the assembly of the other parts of the house. The owner can intervene at any stage in this process of building by issuing instructions or by making clarifications as to his wants, while the house is taking shape.



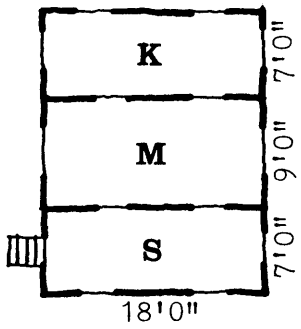
The necromantic aspects of the construction process can get very elaborate and involved. From the choice of site, house form, the choice of materials and finishes, each step of the process has to be checked and counterchecked with almanacs, visions and other forms of mystical lore such as dreams, to make

sure that everything proceeds in perfect order and harmony. Even the process of moving into the house is based on instructions given by the master-carpenter.

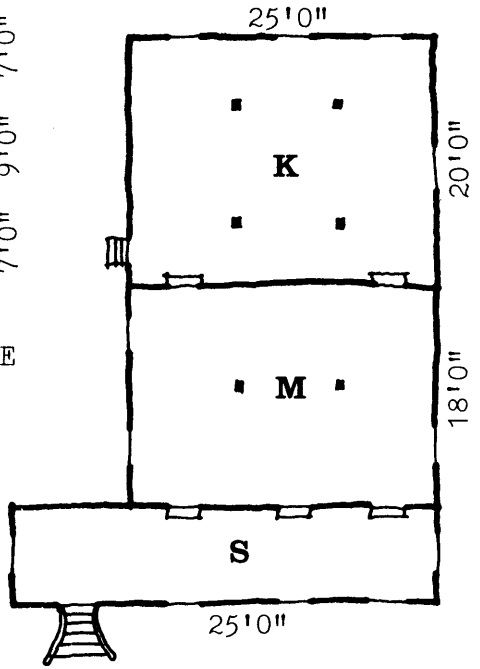
Houses are of open plans and traditionally curtains are used as space dividers whenever they become necessary. These spaces are not rigidly fixed in their functions and can be used for any purpose, within certain limitations imposed by the culture. Kitchens are usually separated from other living spaces, and toilet are never attached to any part of the house but are available in the vicinity of the house. Shower spaces are also detached from the house, because of the need to be in close proximity to the pond or well for water supply. These perigi are also places where women do their washing of clothes.



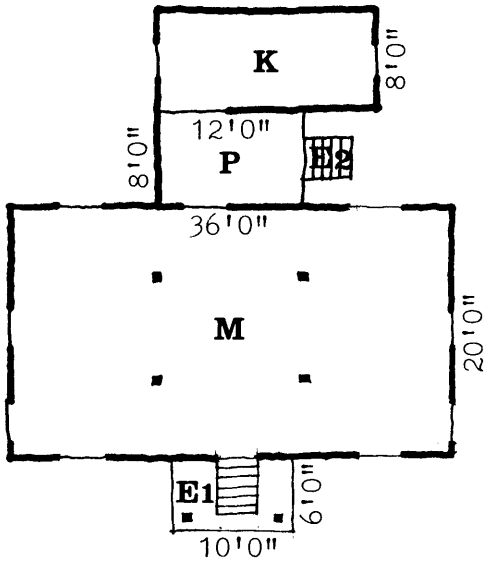
RUMAH LIMAS BUNGKUS
(Sheppard)



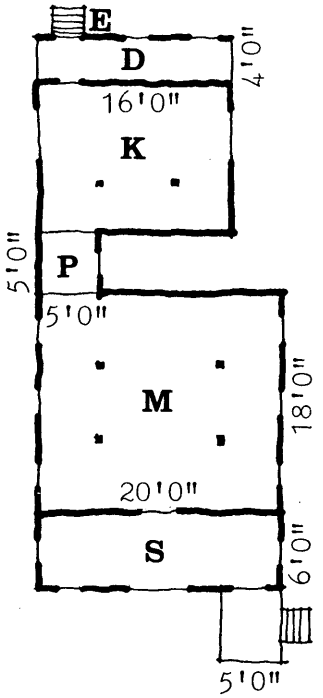
BASIC MALAY HOUSE
(Hilton)



MALACCA HOUSE
(Morley)



HOUSE AT BOTA KIRI
(Morley)



MALAY HOUSE
(C.W.Lim)

Except for the toilet, which is fixed in its function, other spaces in the Malay house can accomodate varying activities. Except for the dapur, which is synonymous to the kitchen, other spaces do not have Western equivalents. Serambi, for instance, is defined as "a vestibule just within the front door."[19] Its extension, placed perpendicularly to the main axis of the house, is called the anjung (see page 29).

19. Hilton, Ibid., p.143.

The front entrance is called pintu depan or the "front door" and the rear entrance is called pintu dapur or "kitchen door." The main spatial component, ibu rumah, literally means "mother of the house."

Another space, the deck, is translated from the words pelantar and jemuran, which mean an outdoor platform and a platform used for drying objects in the sun. There is also a generic space, bilik, meaning room.

Other than these spaces in the house, the space outside the house is very often used for a variety of purposes. The jamban (toilet) and bangsal (shed) are also located here.

Usually, a family of three generations resides in the house. There are many behavioral rules that relate each member of the family to others. For Muslims, the separation between male and female members of the family and visitors is very pronounced and significantly affects the activities in the house.

3. ANALYSIS

3.1 Physical Elements

3.11 The Elements

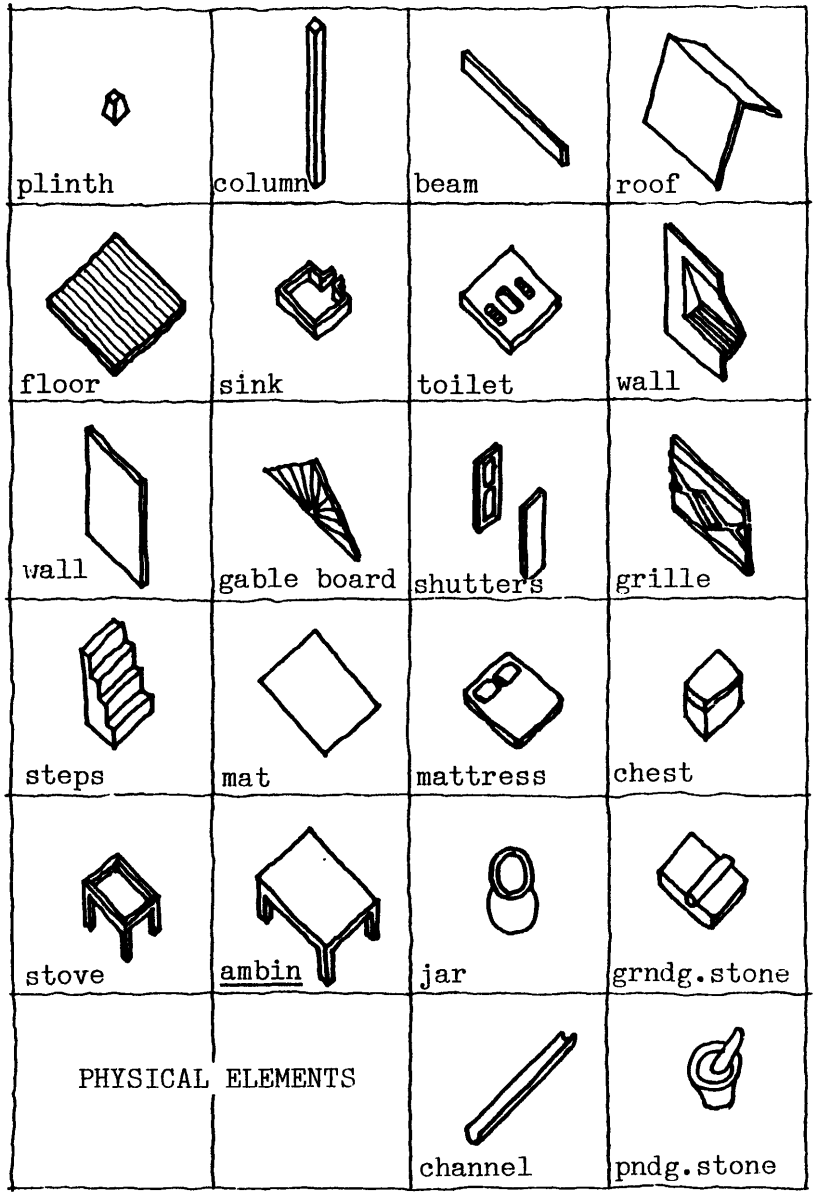
3.12 Relations and Rules

3.13 Variations

3.11 The Elements

A physical element is the smallest whole component that is recognised as an integral part of a house. In the Malay house, elements range from the structural frame to household utensils. The frame is made up of plinths, columns, beams and roof. Plinths are generally made out of granite or concrete. Columns and beams are made out of timber, and so is the roof structure. Roofing materials are atap or tiles, although corrugated galvanized sheets, nowadays, are frequently replacing more traditional materials.

Floors are timber. Concrete floors are also used in the kitchen when the floor is not raised. Walls are of woven bamboo or vertical or horizontal timber weatherboarding. Timber screens, elaborately carved, are also used.



Furniture includes mats, mattresses, chests, stove and an ambin or platform. Utensils include those used for cooking and water collection. Some examples of water-transporting channels made out of split betel-nut palms or bamboo.

The physical elements shown can be divided into six systems. They are as follows:

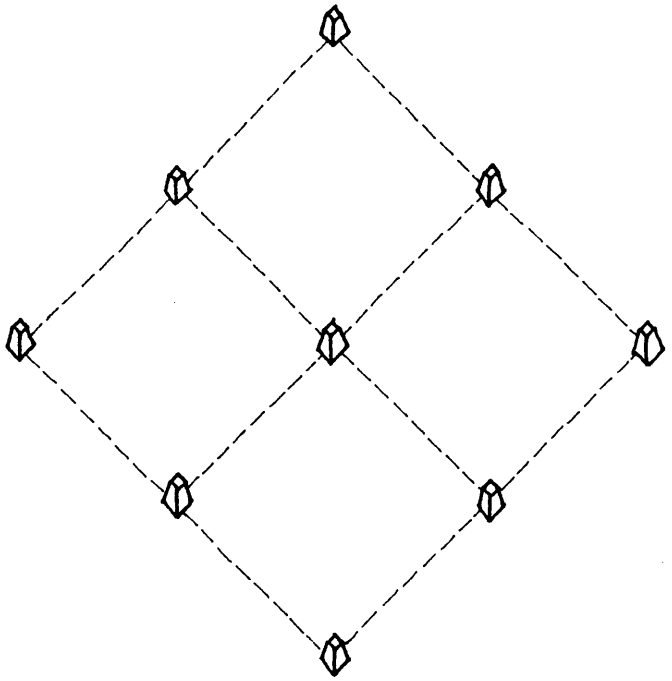
1. Frame: This consists of the plinth, column, beam and roof.
2. Floor: This consists of the raised floor, floor-sink and the toilet floor.
3. Wall: This consists of wall panel, gable boards, shutters and grilles.
4. Vertical Circulation: This consists of steps. It could also include ladders or boxes used as objects to step on from one level to another.
5. Furniture: This consists of mats, mattresses, stove and ambin, a wooden platform usually placed in the kitchen.
6. Utensils: This consists of earthenware jars, grinding and pounding stones.

The physical elements that make up the basic house itself belong to four systems: frame, floor, walls and vertical circulation systems, the other two, furniture and utensils being contained in the base house. All of these elements are pre-cut prior to their erection. When the position of the center column, tiang seri, is determined on a site, plinths are placed there, and on all points where the columns will be positioned. Columns are then erected. Beams are slotted into oversized mortices in the columns to tie the frame and the level is adjusted using wedges placed under the beams going through the mortices. This also provides rigidity to the frame. The roof is then placed on top of the frame. Floors are then

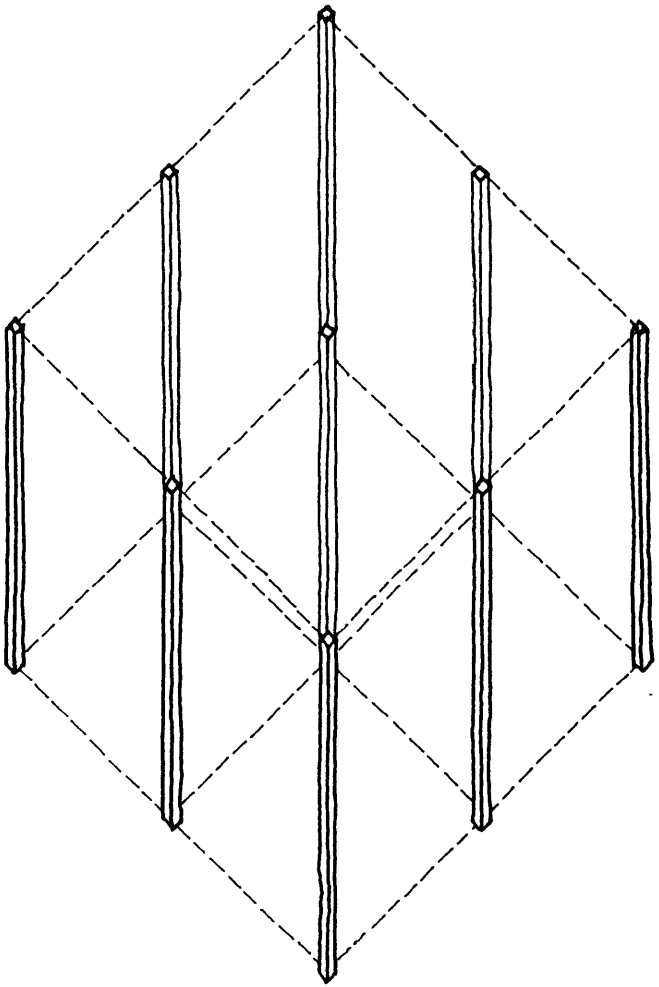
constructed and walls, shutters and decorative elements are then installed. Finally the vertical circulation elements are put into positions.

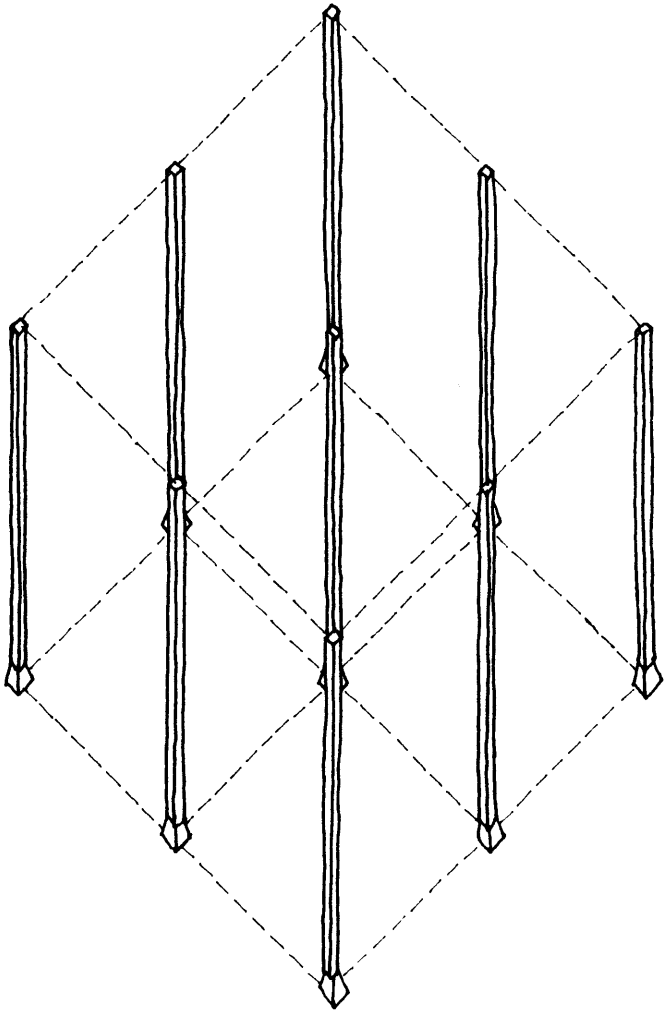
When all the elements in the four systems have been assembled, the two other systems are constructed or brought into the house.

This section shows the relationship of the elements in the four systems, as they relate to the process of construction enveloping a hypothetical volume.

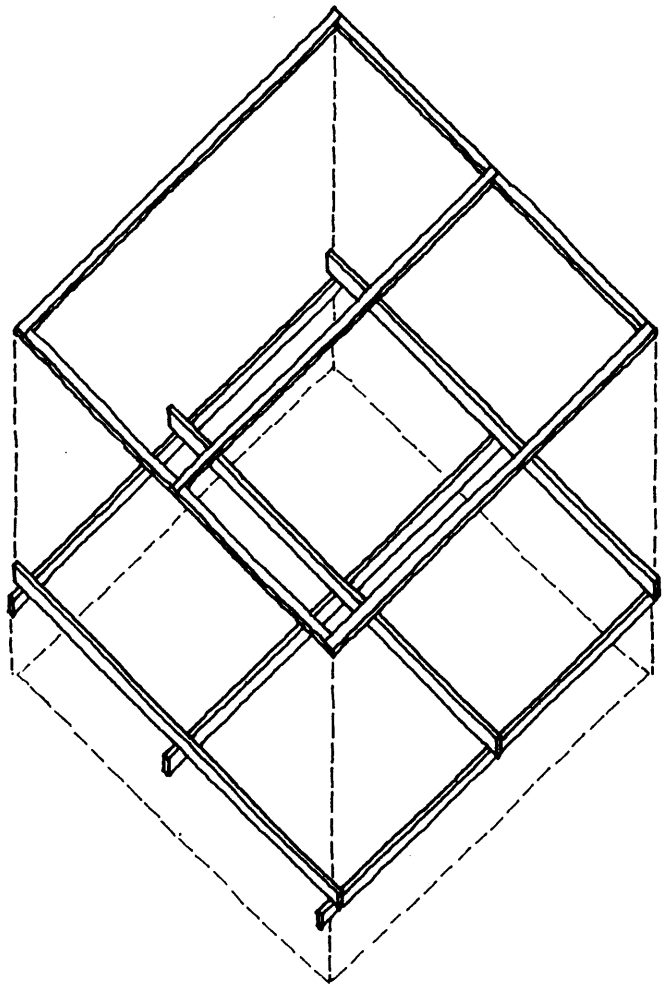


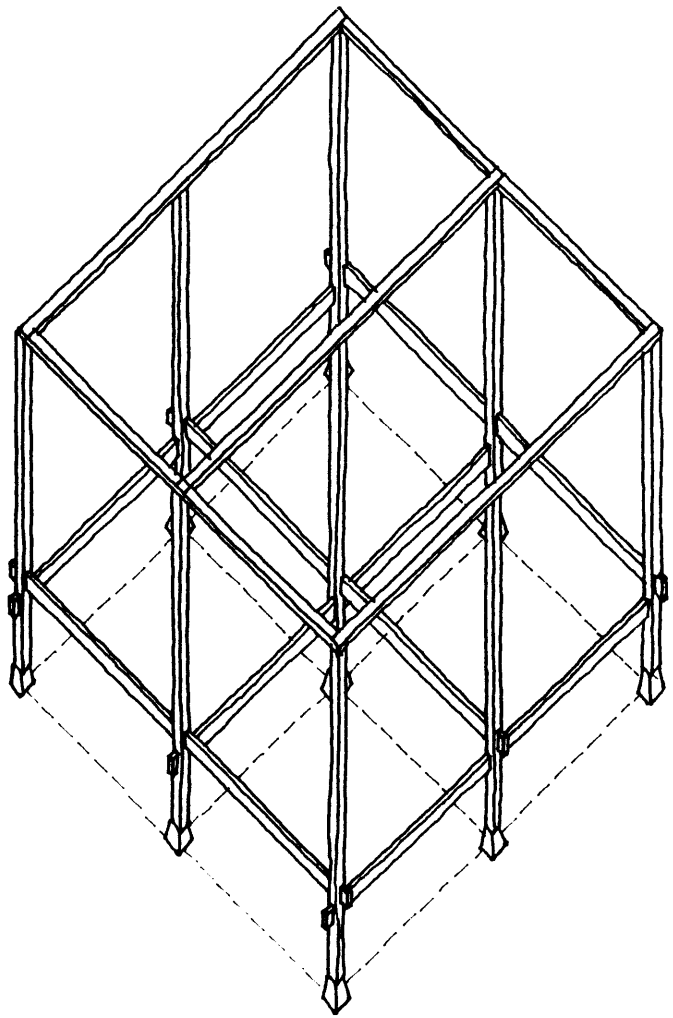
PLINTHS



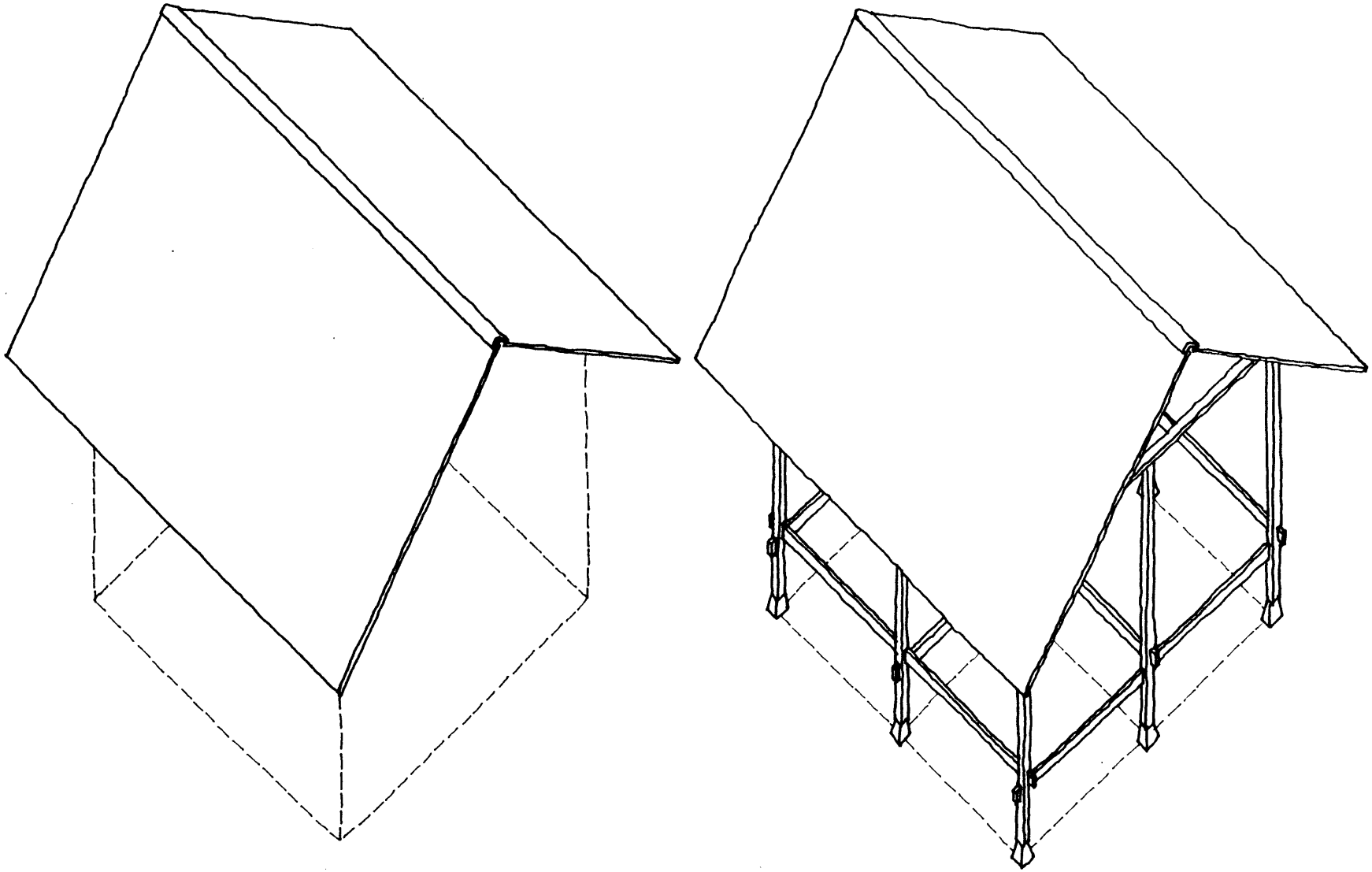


COLUMNS

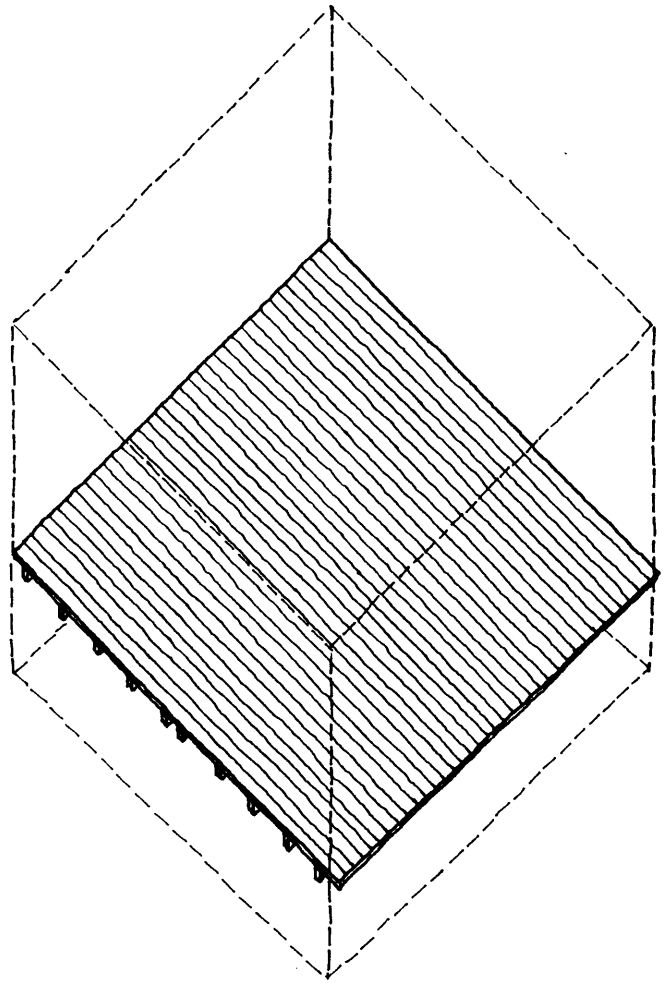


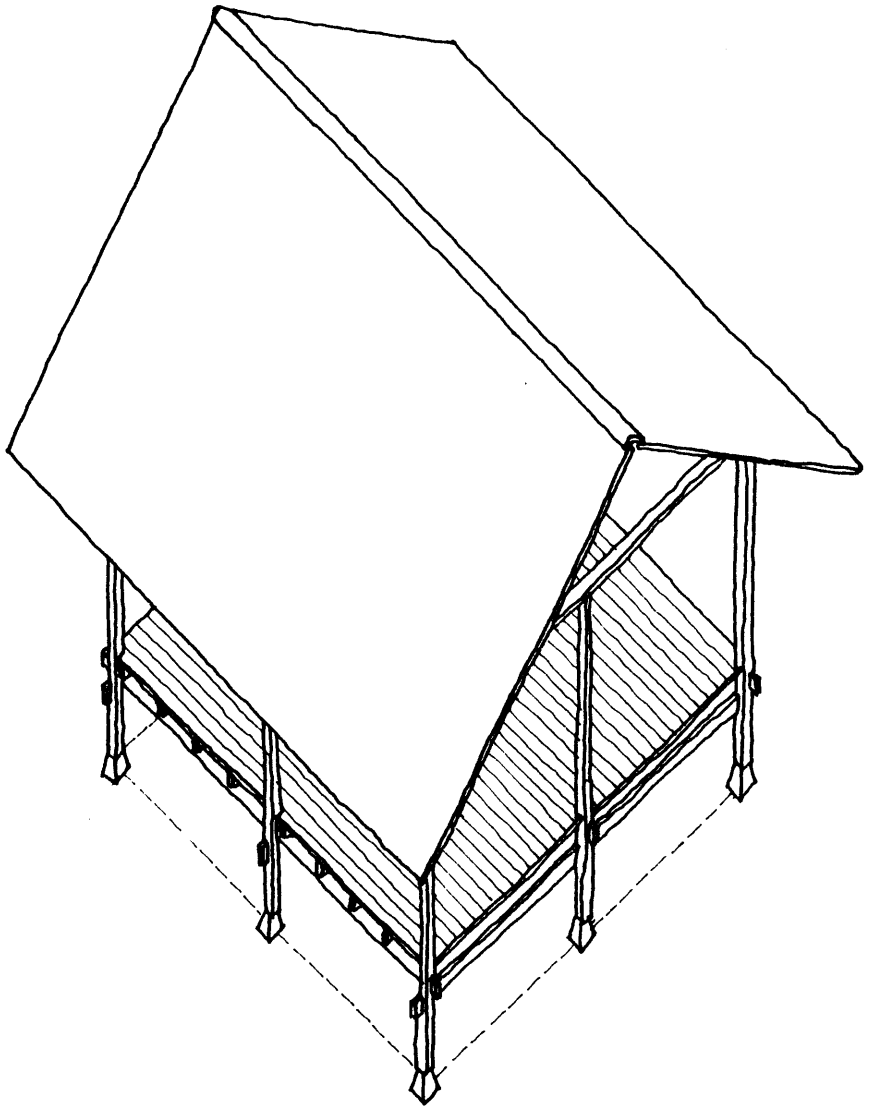


BEAMS

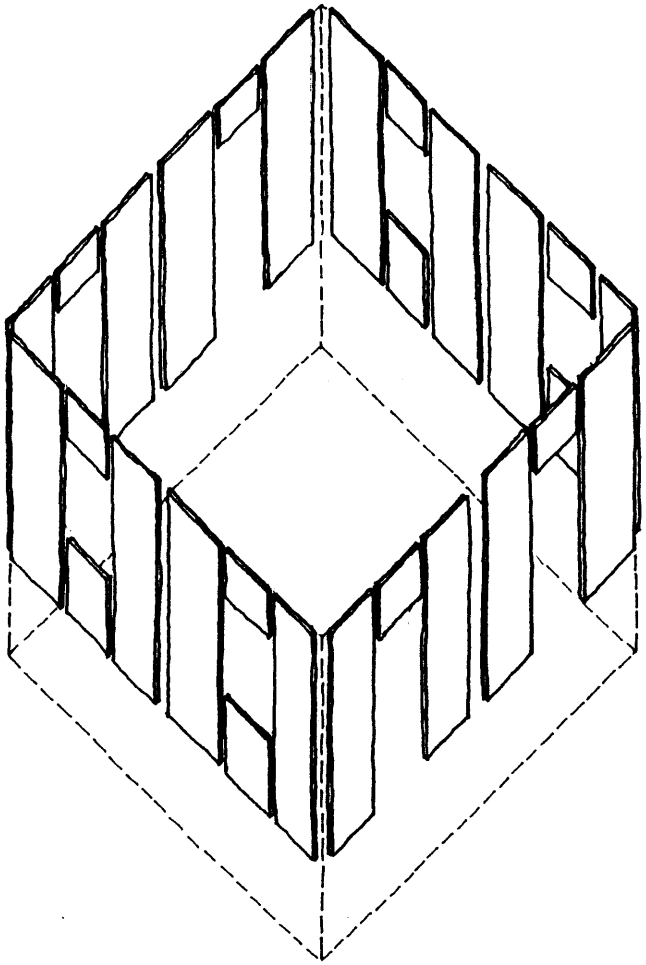


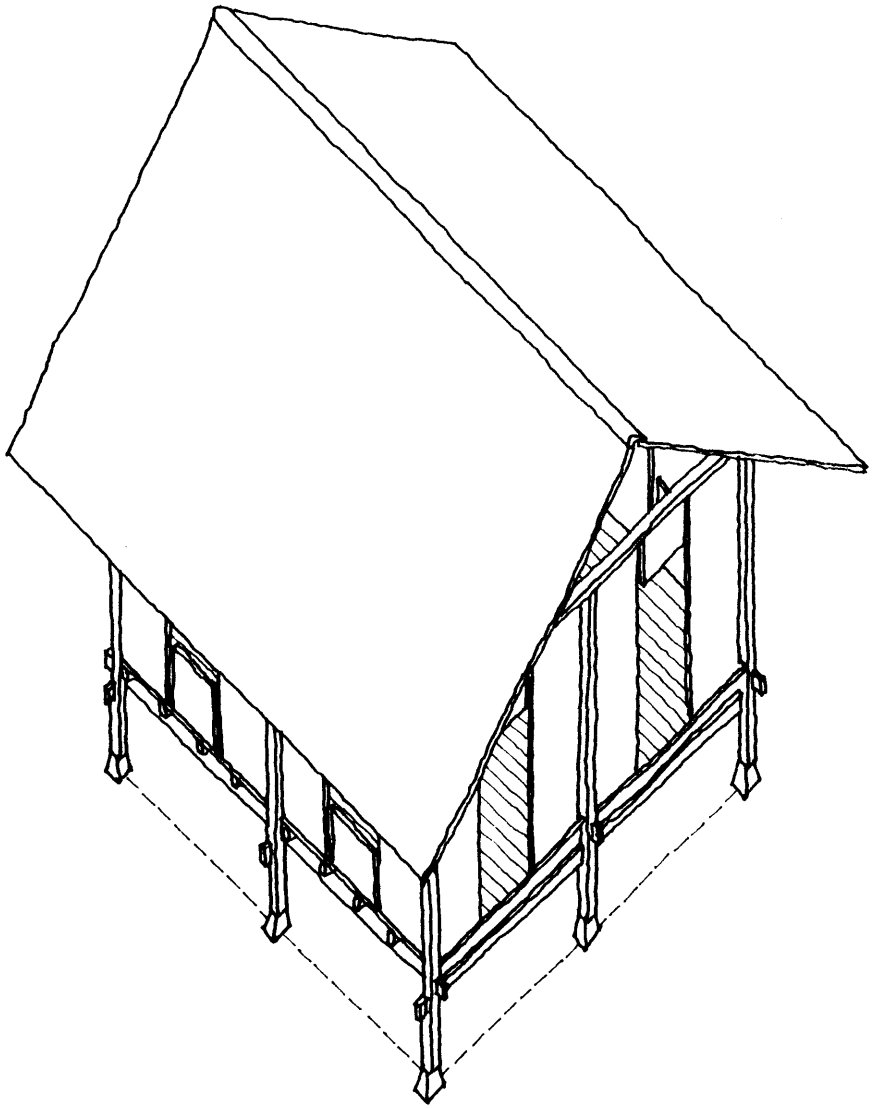
ROOF



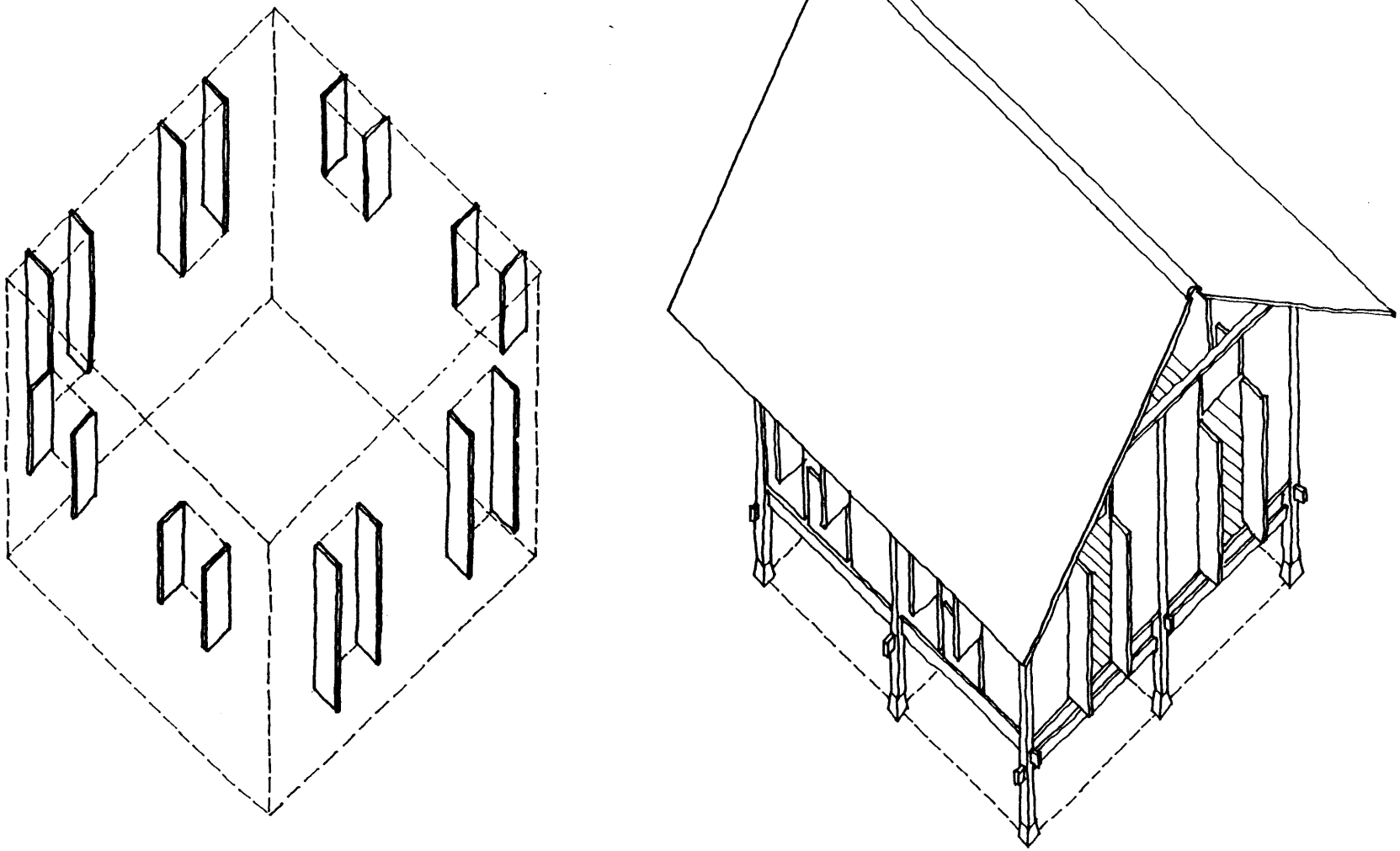


FLOOR

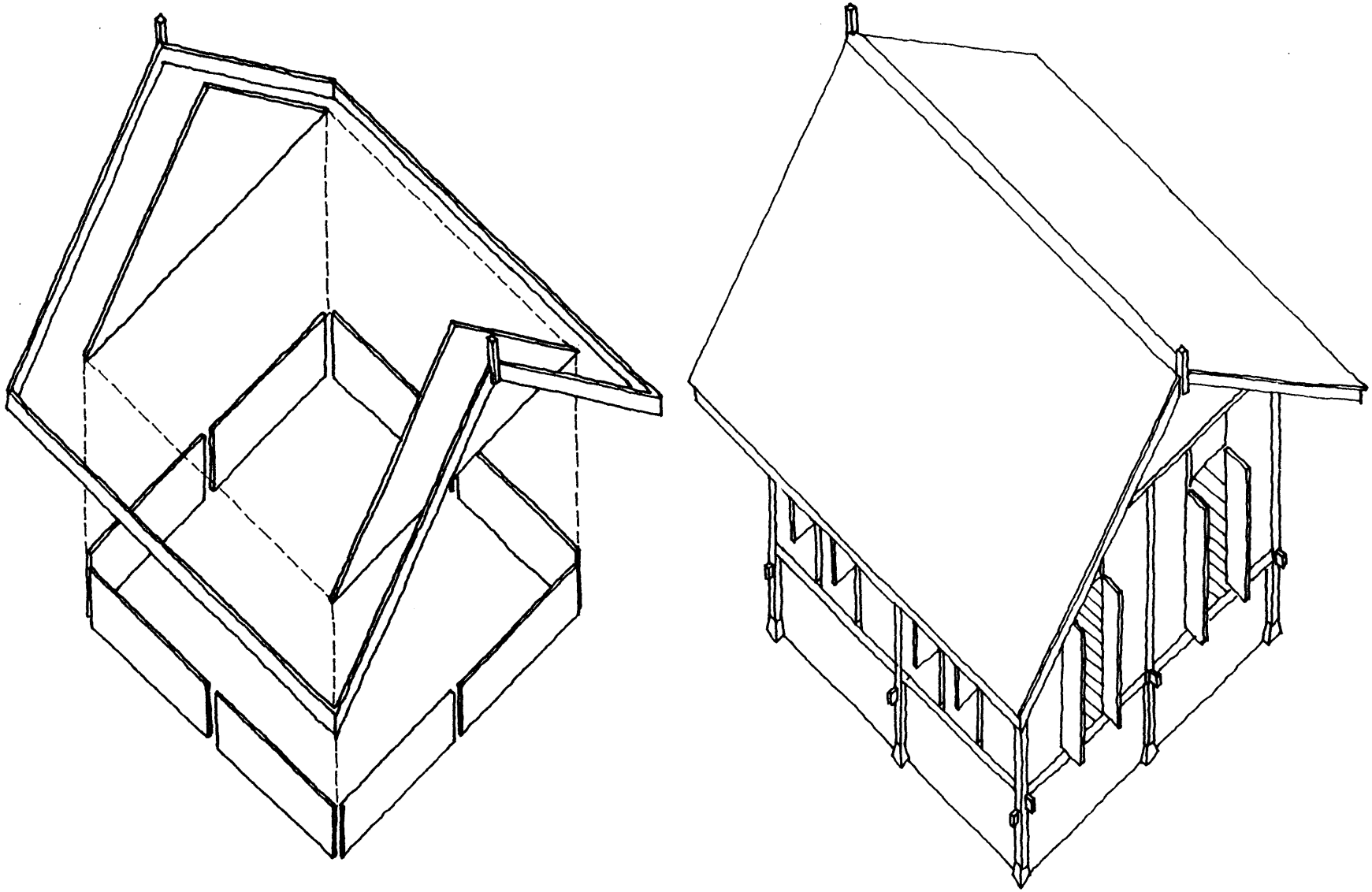




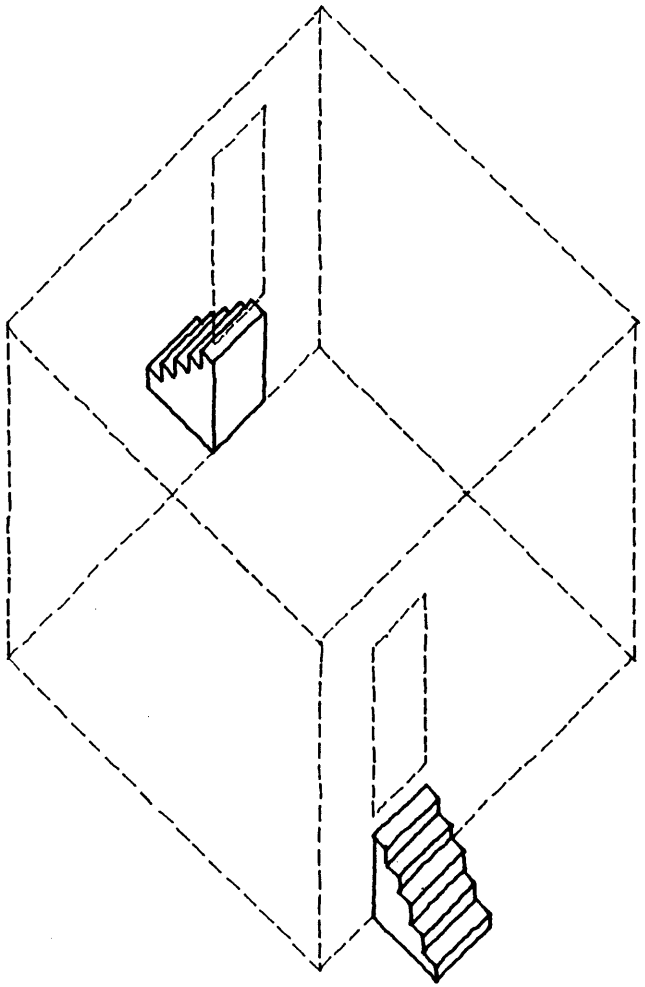
WALLS

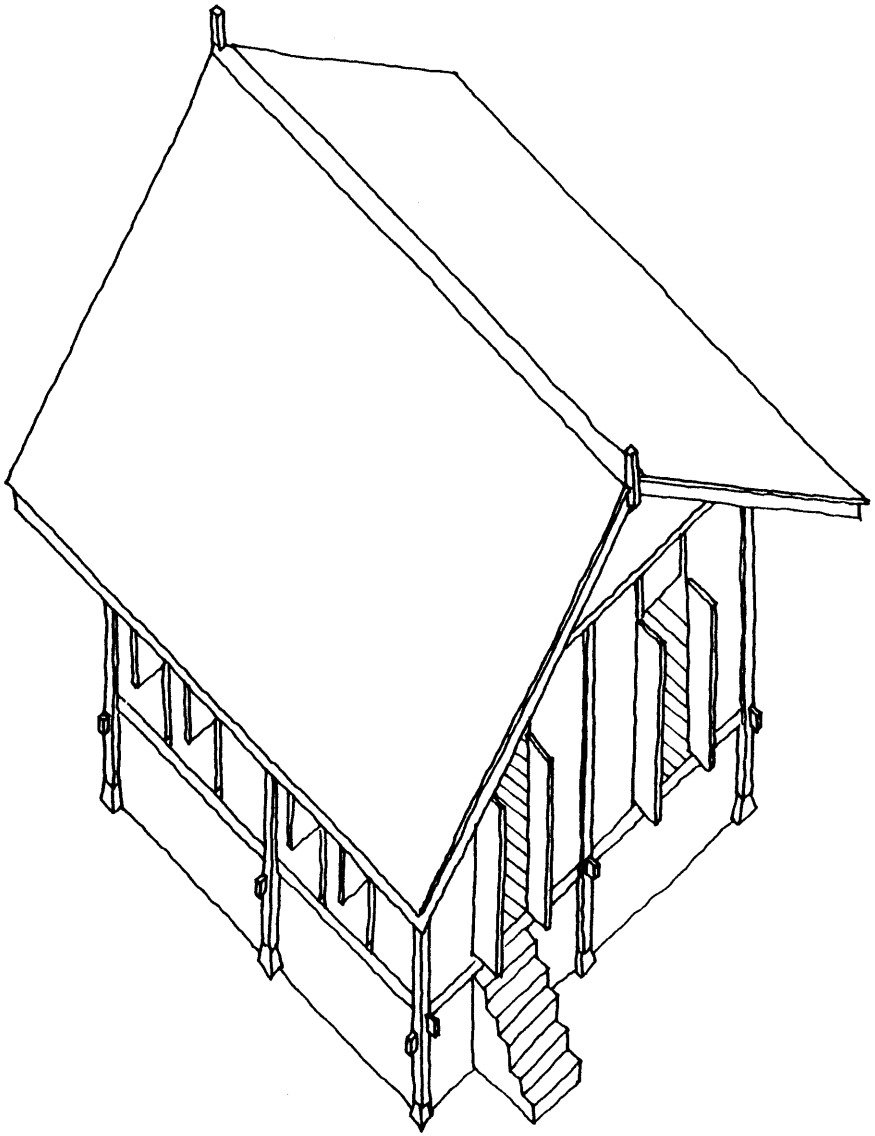


SHUTTERS

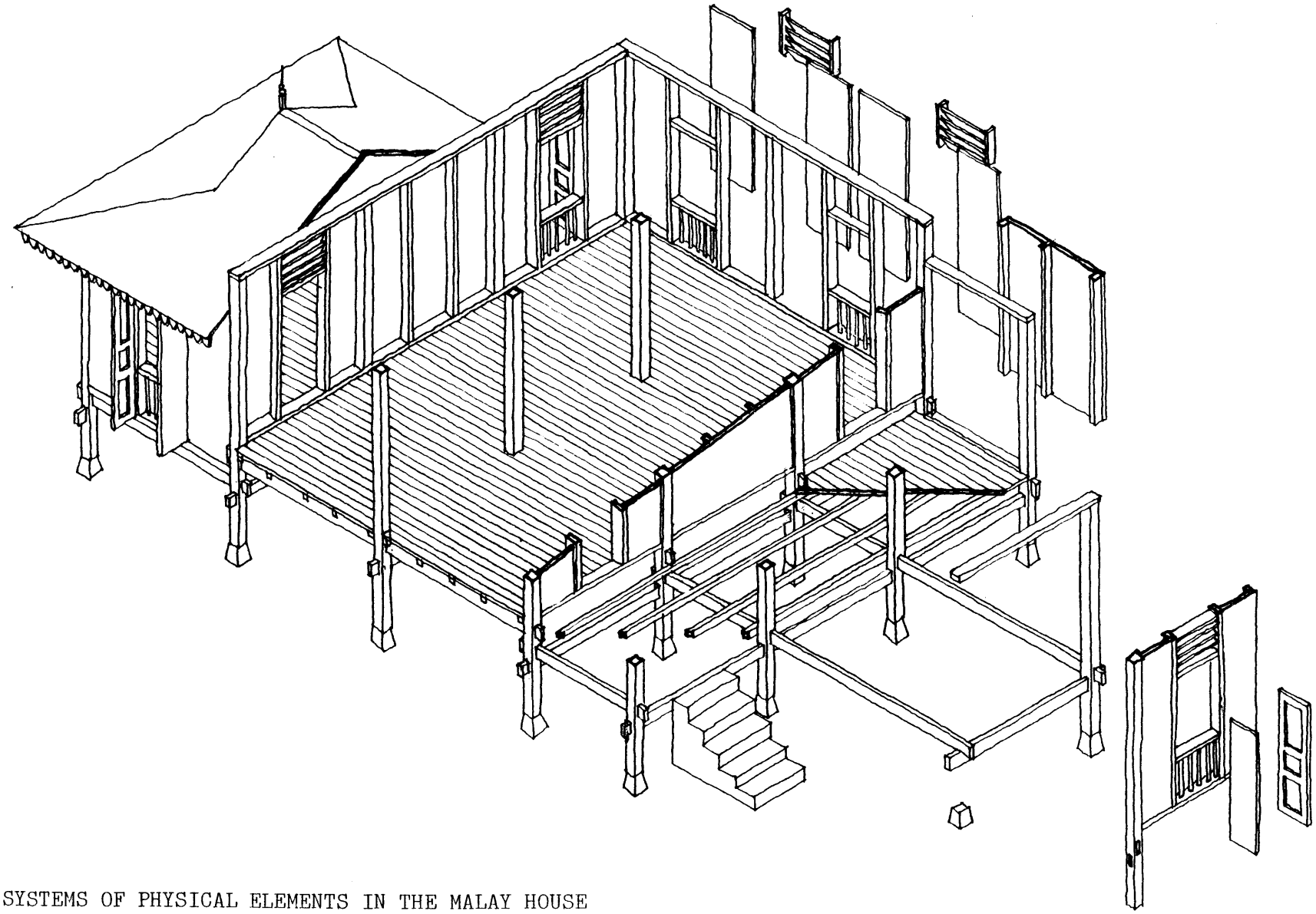


DECORATIVE ELEMENTS





VERTICAL CIRCULATION ELEMENTS



SYSTEMS OF PHYSICAL ELEMENTS IN THE MALAY HOUSE

3.12 Relations and Rules

Levels

Physical elements in the Malay house can thus be categorized into levels which represent "a sense of 'height' of a particular issue in a hierarchic set up."[20]

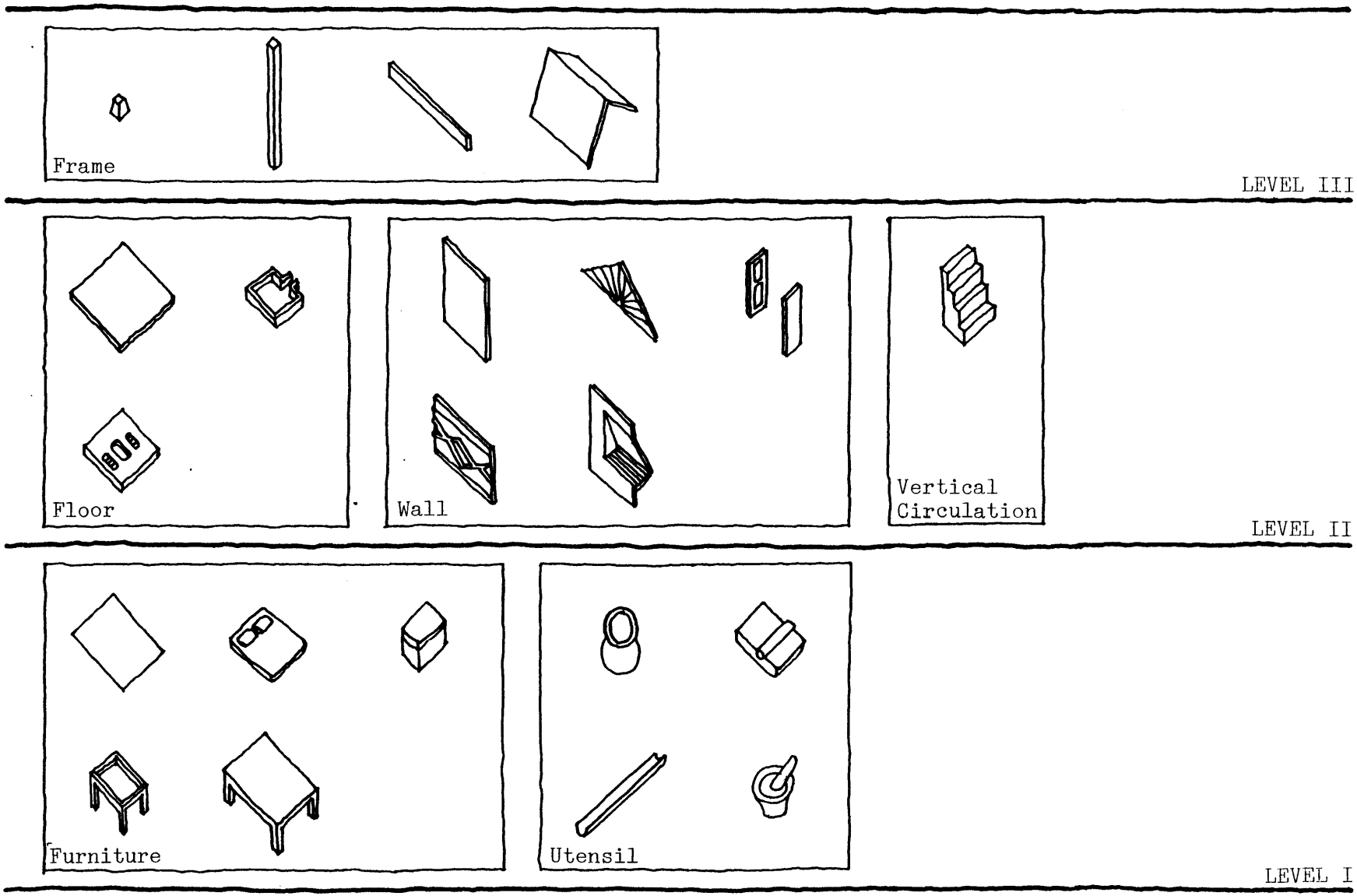
20. J. Kapteijns gave the following examples to illustrate levels:
"Suppose we have two elements, A and B, and that if we change element A (in position or dimension) it follows that we have to change element B. And that conversely if we change element B we also have to change element A. From the point of view of change, elements A and B are apparently interchangeable; we then say that they have the same level.

We have two elements A and C. If we change A, it does not follow that we have to change C, we do have to change A. In this case the two elements are not interchangeable, and we say that they are at different levels. In fact, we say that C is at a higher level than A, because changes in C always cause changes in A, but not vice versa."
SAR Levels and Tools, Stichting Architecten Research, Eindhoven, p.37.

The hierarchy of the levels of physical elements in the Malay house is shown on page 47. Elements in level III are freestanding and form the basic components of the house. An example of one of these elements is the column which can be erected without depending on or being preceded by or controlled by a wall (level II element) or a mat (level I element). This shows that elements in levels II and I do not exercise control over level III elements.

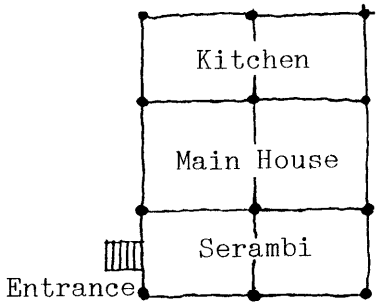
Elements in level II are those which have control over level I elements but are controlled by level III elements. An example of one of these elements is the floor which cannot be installed without the beams (level I element), but can exist without a mattress (level I element).

Elements in level I are those which are under the control of both levels I and



LEVELS OF PHYSICAL ELEMENTS

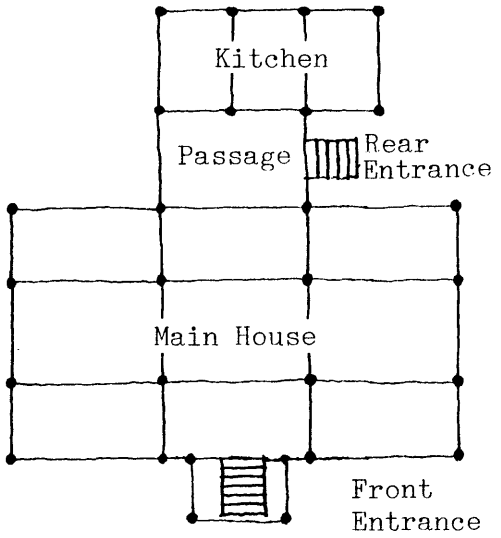
II. An example of a level I element is the platform, which cannot be used without first having to have a floor (level II element), which in turn cannot be installed without all level III elements as shown above.



Basic Malay House

Column

Although hexagonal grids may be found in the Malay house, most columns defining a spatial element are placed on rectangular grids. Columns must be placed in straight lines, perpendicular to one another.



House at Bota Kiri

Roof

Roofs in the Malay house must be pitched and must have at least a gable board.

COLUMN LAYOUT

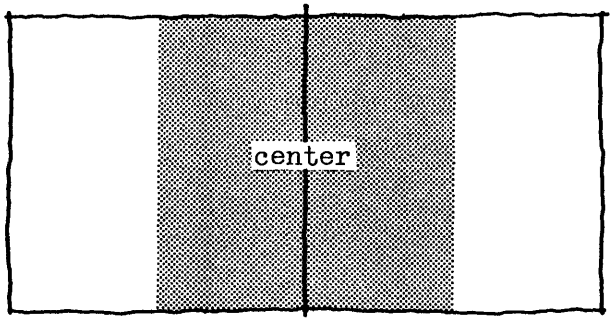
Wall

There are three wall elements and an opening from which doors and windows are derived (see page 50).

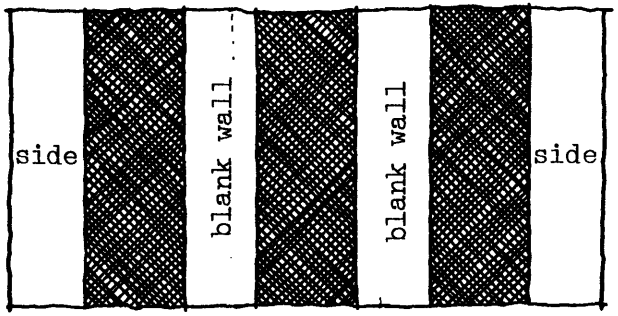
Openings must be symmetrically located on a vertical axis in the center of the wall.

There can be more than one opening, but each opening must be separated from the other by a wall panel of at least the height of the opening.

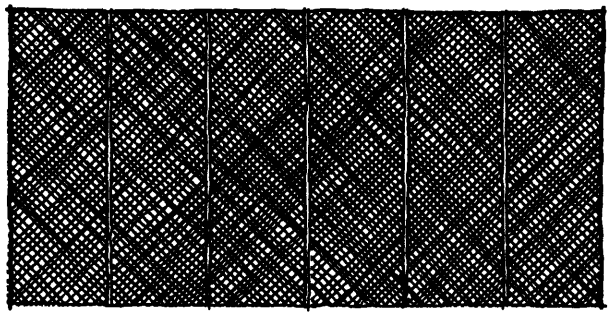
Openings can be made to cover the whole length of the wall. In this case, the wall panels used are those which block the openings and not those which separate them from each other.



OPENING PLACEMENT ON FACADE



FACADE WITH MORE THAN ONE OPENINGS



OPENINGS FOR WHOLE LENGTH OF FACADE

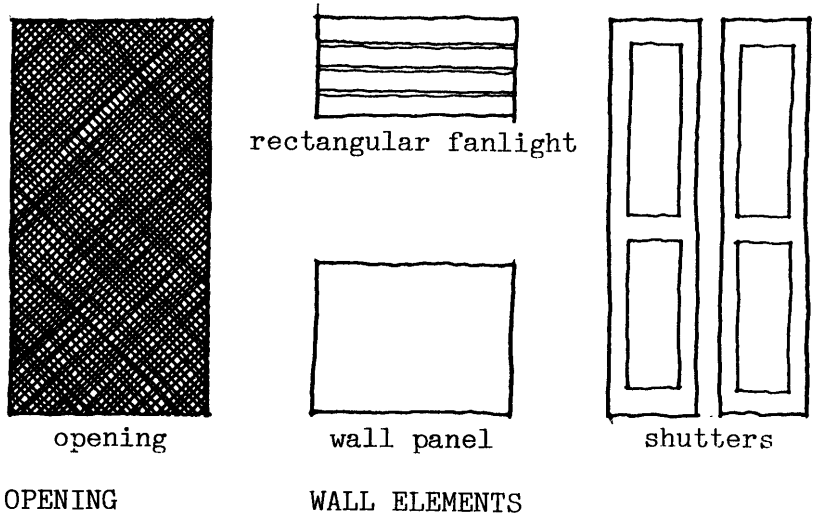
Openings can be blocked by wall panels or be left unblocked. When openings are blocked, they become windows. Otherwise, they are doors.

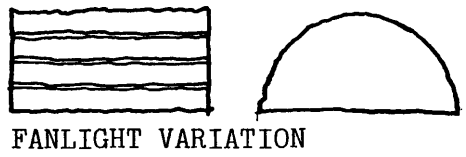
An opening or door in a partition wall is called a connector. It can be with or without shutters. A window in a partition wall must have shutters.

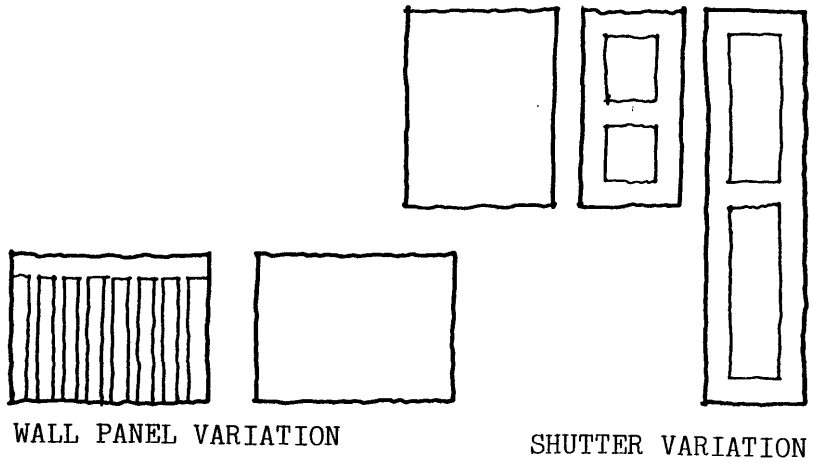
Fanlights must be placed above openings. They can be semi-circular or rectangular and can vary in their intricacy of ornamentation,

Wall panels can be solid or balustraded. The use of either of these panels determines the type of shutters used for the opening.

Shutters are available in three types: tall side-hung, short side-hung, and short top-hung. The use of any of these shutters depends on whether the openings



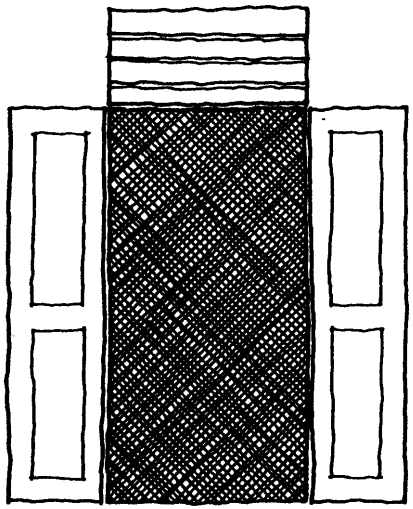

FANLIGHT VARIATION


WALL PANEL VARIATION

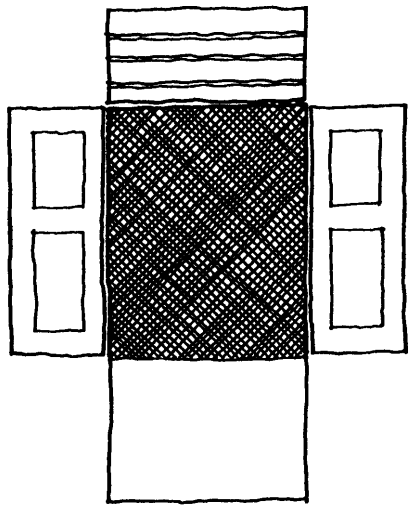
SHUTTER VARIATION

are blocked or unblocked and whether the walls are solid or balustraded.

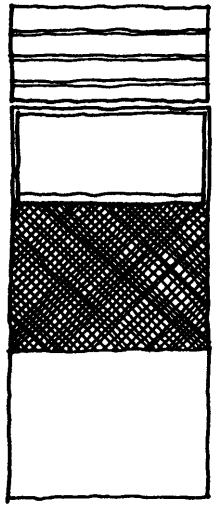
When an opening is not blocked by a wall, long side-hung shutters are used.
When an opening is blocked by a solid wall, short side-hung or top-hung shutters are used.
When an opening is blocked by a balustraded wall, tall side-hung shutters are used.



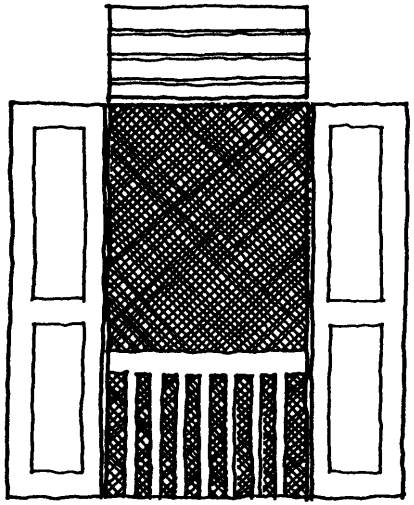
Unblocked Opening (door)
Long side-hung shutters



Opening blocked by
a solid wall (window)
Short side-hung shutters



Opening blocked by
a solid wall (window)
Top hung shutters



Opening blocked by
an open wall (window)
Long side-hung shutters

3.13 Variations

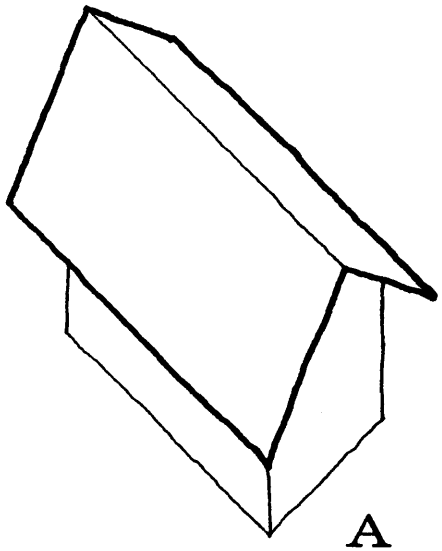
Each physical element in a system exhibits several variations.

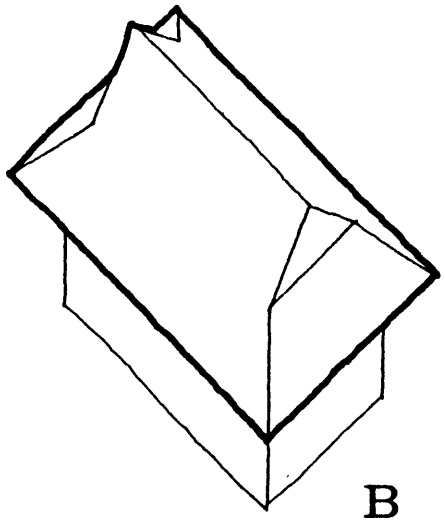
Vertical Circulation

There are three varieties of vertical circulation elements: solid, open and box.

Roof

From the diagram of the basic and additional roof forms (see page 53), a number of roof form variations are possible in the Malay house. Roof forms not possible are those that do not accommodate the required gable board.



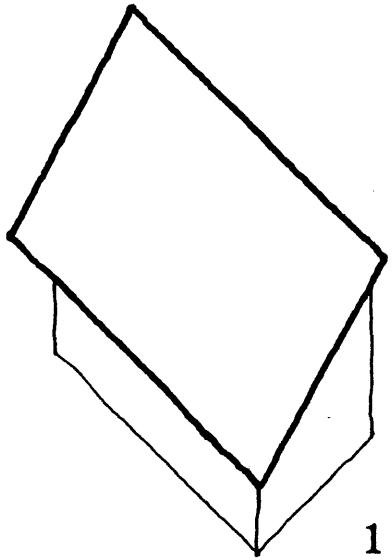


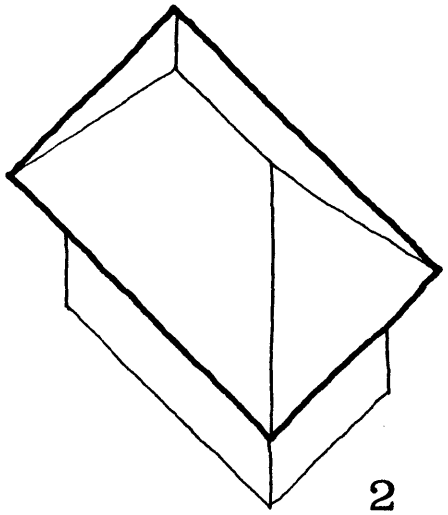
BASIC ROOF FORMS

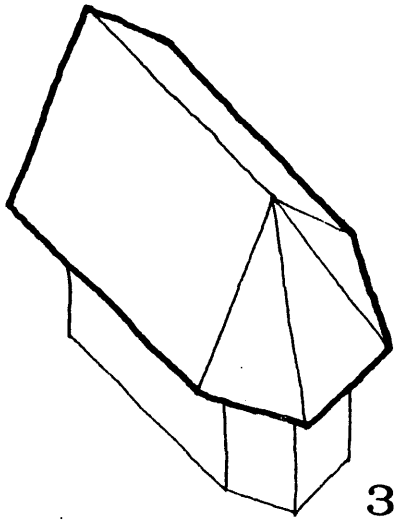
forms over other spaces	roof forms over main house				
	A		1	2	3
A	AA	AB	A1	A2	A3
B	BA	BB	B1	B2	B3
1	1A	1B	roof forms do not exist		
2	2A	2			
3	3A	3B			

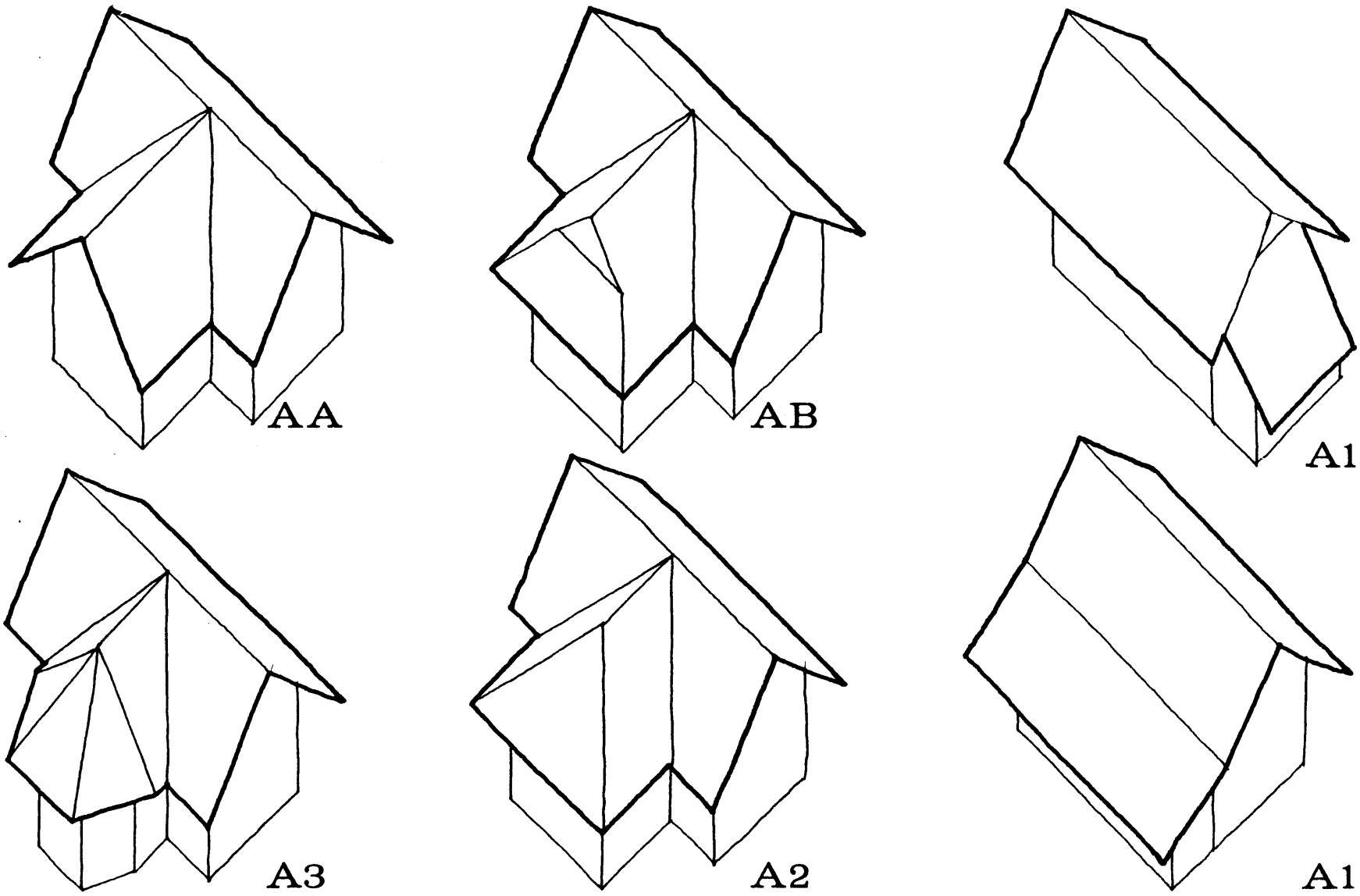
POSSIBLE ROOF FORMS

ADDITIONAL ROOF FORMS









ONE POSSIBLE ROOF SET

3.2 Spatial Elements

3.21 The Elements

3.22 Relations and Rules

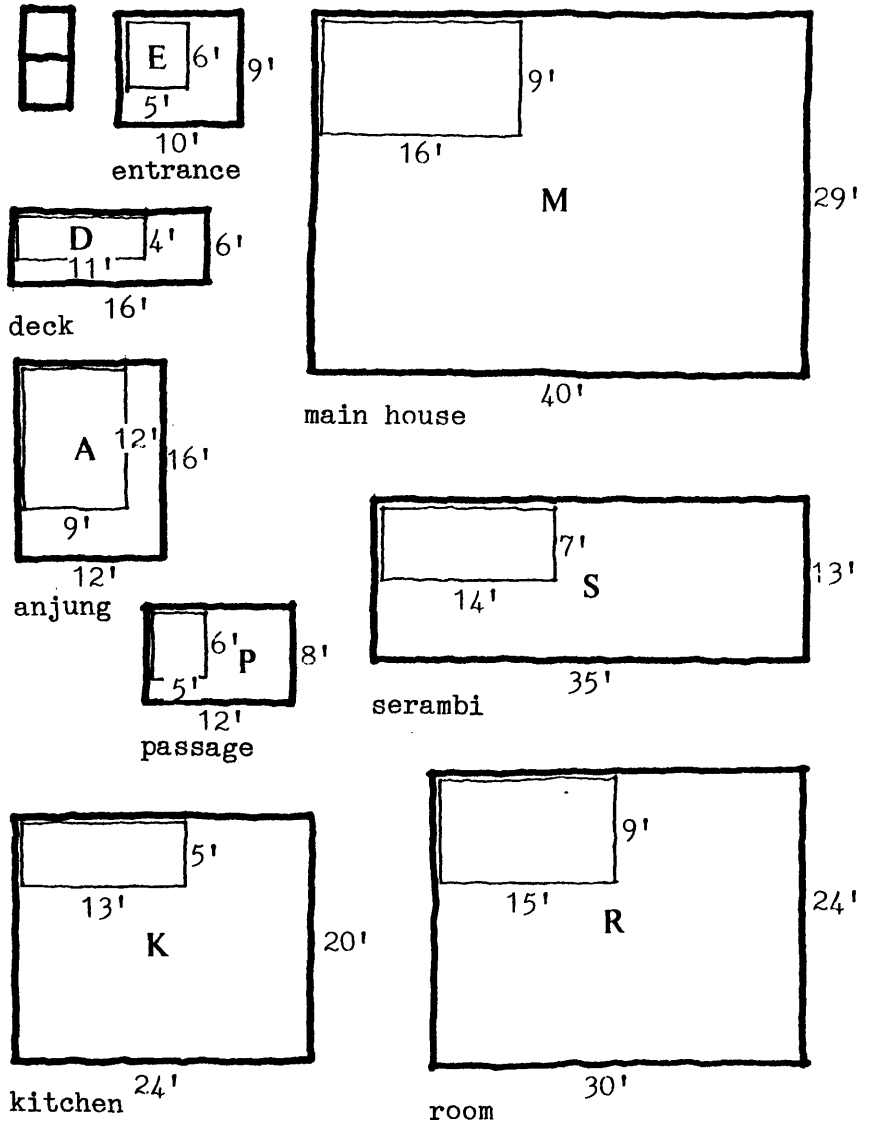
3.23 Variations

3.21 The Elements

The Malay House may consist of some or all of the elements listed and notated below:

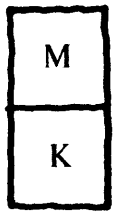
1.	Front Entrance	E1
2.	Rear Entrance	E2
3.	Anjung	A
4.	Serambi	S
5.	Main House (Ibu rumah)	M
6.	Passage	P
7.	Kitchen	K
8.	Deck	D
9.	Room	R
10.	Outdoor	O

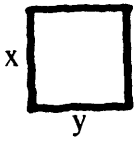
Taking the relative positions of M and K as a constant, the minimum and maximum dimensions of the spatial elements are found. As shown on this page, the minimum dimensions are shown framed in the maximum dimension boxes. All dimensions are derived from the plans of the houses shown before (see pages 29 and 30).



MINIMUM AND MAXIMUM DIMENSIONS OF SPATIAL ELEMENTS

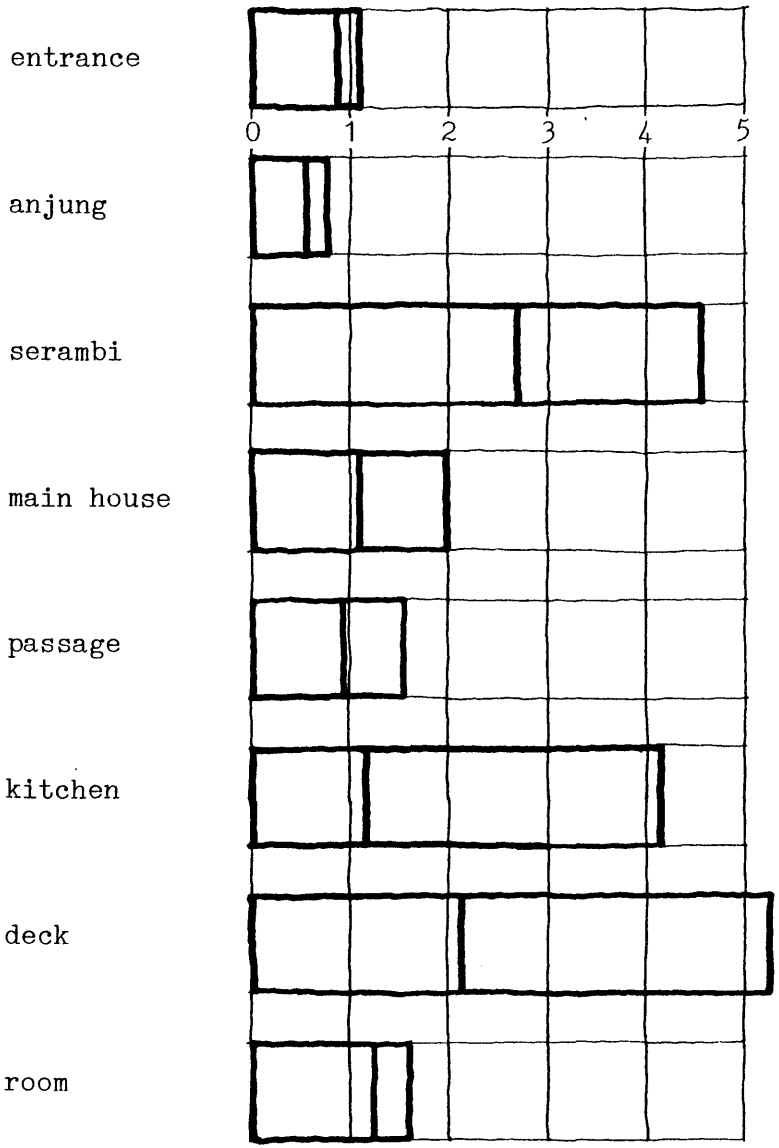
From these dimensions, the minimum and maximum proportions of the spatial elements are found. This is done by taking the positions of M and K as a constant. One side of an element parallel to the axis running through M and K is called x and the side of an element perpendicular to the axis is called y.





The proportions, x:y, are shown below.

	MIN	MAX
Entrances	1:0.8	1:1.1
Anjung	1:0.6	1:0.8
Serambi	1:2.6	1:4.6
Main House	1:1.1	1:2.0
Passage	1:0.8	1:1.5
Kitchen	1:1.2	1:4.2
Deck	1:2.2	1:5.3
Room	1:1.3	1:1.7



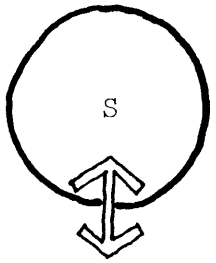
SPACE PROPORTIONS

3.22 Relations and Rules

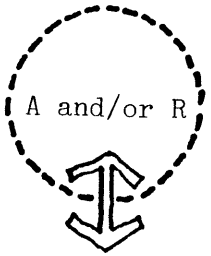
Connection

Spatial elements are related to one another in different ways. Based on the houses shown earlier, it is found that some spatial elements must be connected to other elements, while some others are not. These rules are shown below, using the following symbols:

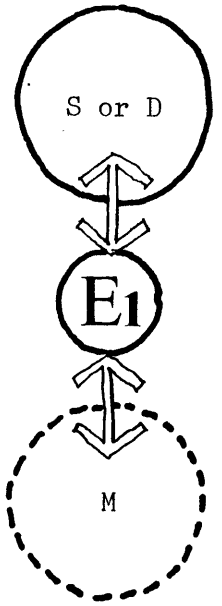
This symbol shows the spatial element in question. The notation in the small circle varies with the element being considered in each diagram. For example, E1 in the small circle indicates that the spatial element in question is the front entrance.

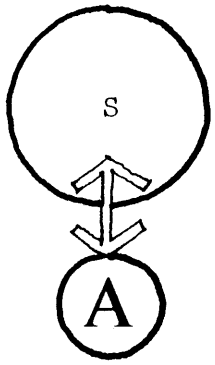


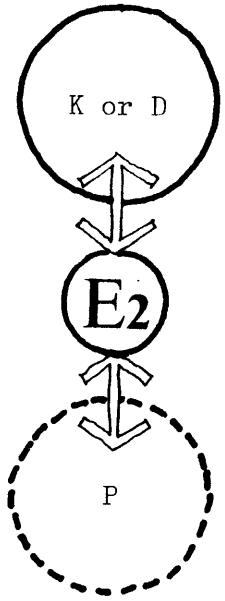
This symbol shows the element/s that must be connected to the space in question. For example, to an anjung (space in question), the serambi must be attached.

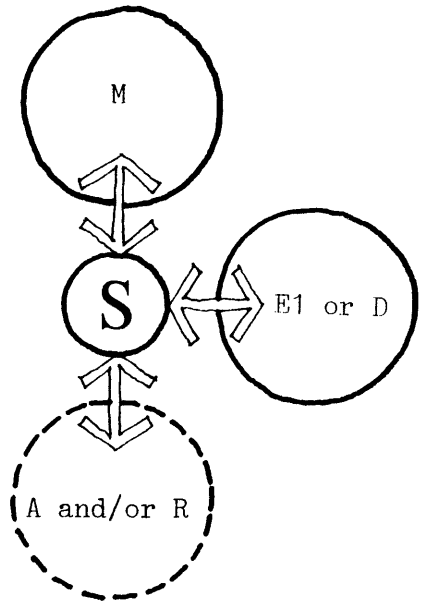


This symbol shows the element/s that are not necessarily but may be attached to the space in question. For example, to the serambi (space in question), anjung, room or angung and room is not necessarily, but may be attached.









It is to be noted that spatial elements which are not mentioned in each relationship rule are never connected to the element in question.

Front Entrance, E1

Must be connected to serambi or deck. May be connected to M (this is only possible if a house does not have a serambi).

Rear Entrance, E2

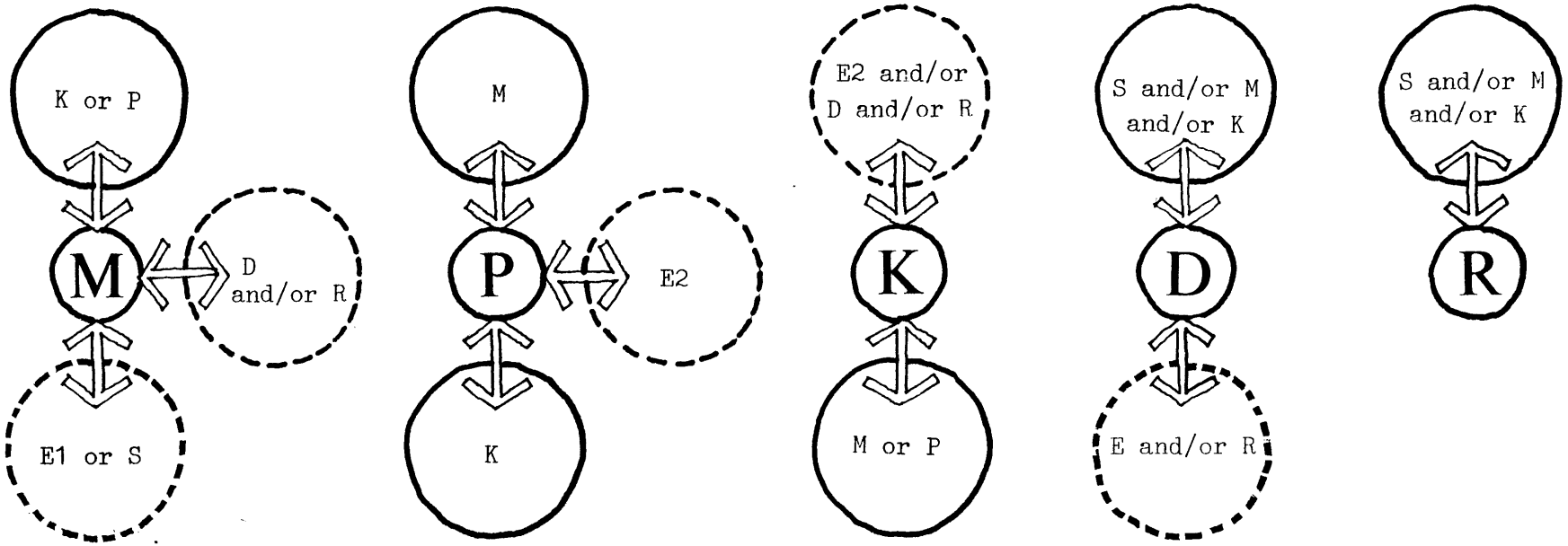
Must be connected to kitchen and/or deck. May be connected to passage.

Anjung, A

Must be connected to serambi.

Serambi, S

Must be connected to main house and front entrance or deck. May be connected to anjung and/or room.



Main House, M

Must be connected to passage or kitchen. May be connected to serambi or front entrance and/or deck and/or room.

Passage, P

Must be connected to main house and kitchen. May be connected to rear entrance.

Kitchen, K

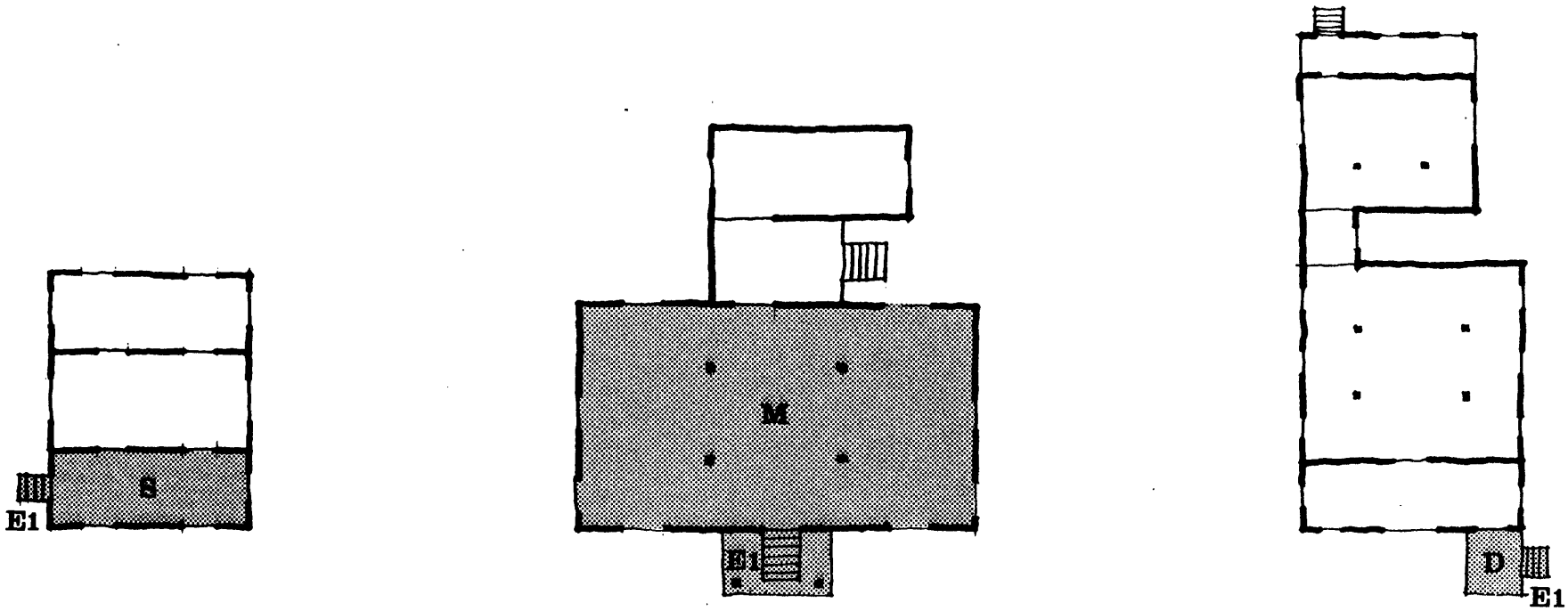
Must be connected to passage or main house. May be connected to rear entry and/or deck and/or room.

Deck, D

Must be connected to serambi and/or main house and/or kitchen. May be connected to entrances and/or room.

Room, R

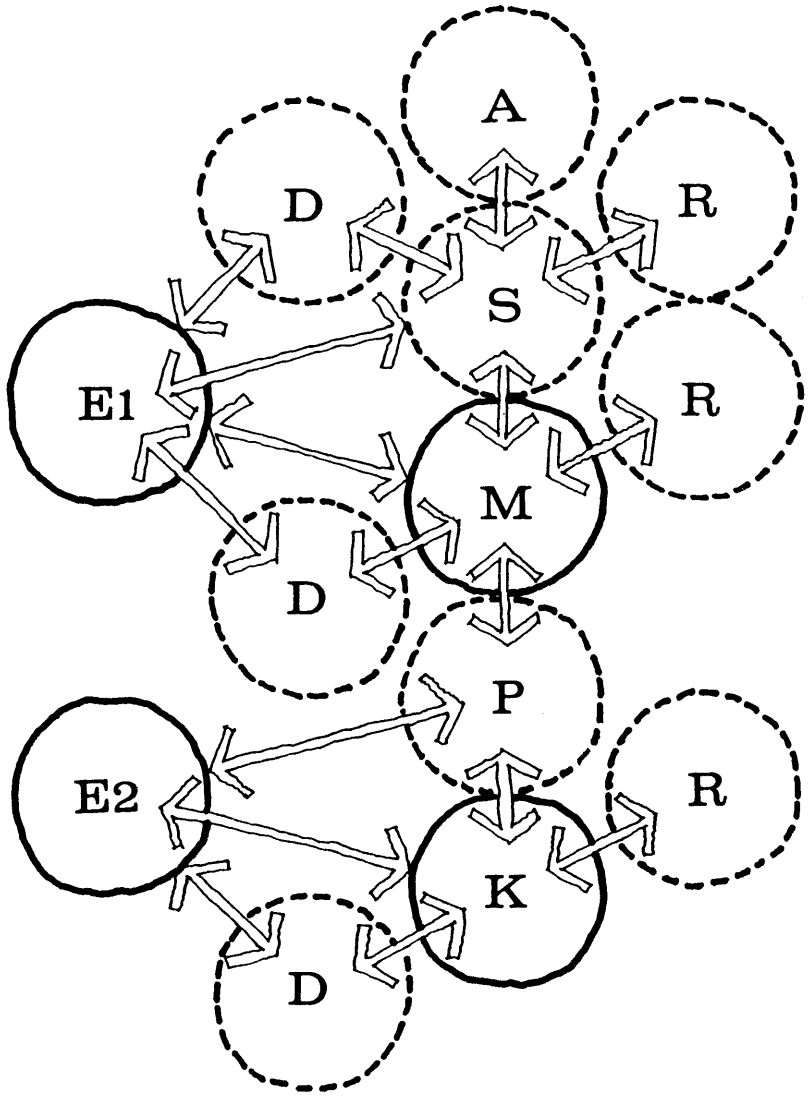
Must be connected to serambi and/or main house and/or kitchen.



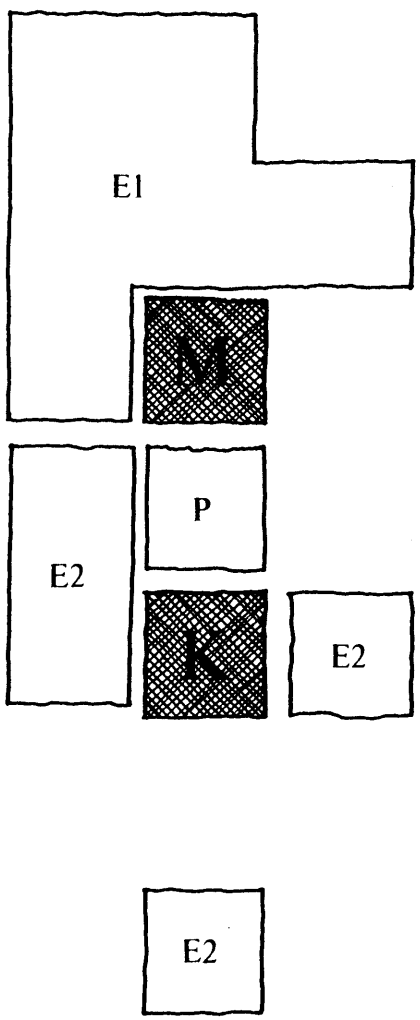
RELATIONSHIP BETWEEN FRONT ENTRANCE AND OTHER ELEMENTS

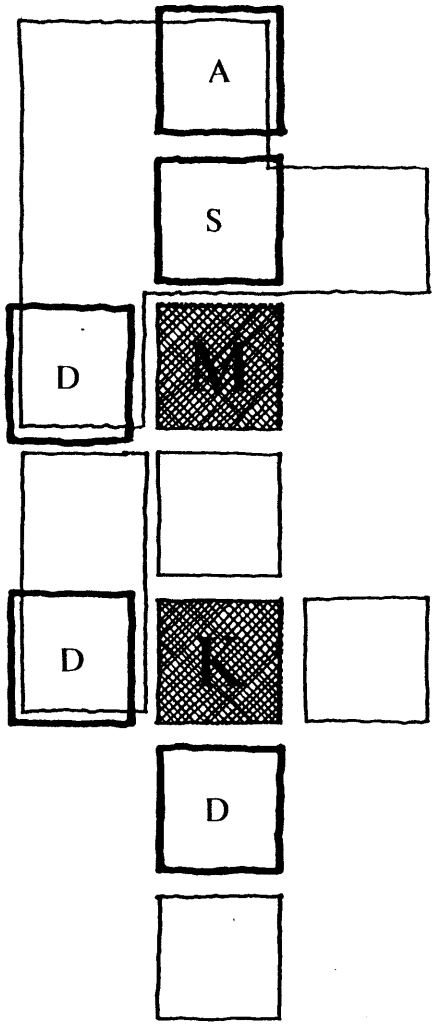
Three examples of one of the relationships in the Malay house are shown here. The front entrances of the three houses shown are connected to three different spatial elements, S, M and D. It is to be noted that El may only be connected to M if a house does not have S. If S exists, El cannot be connected to M.

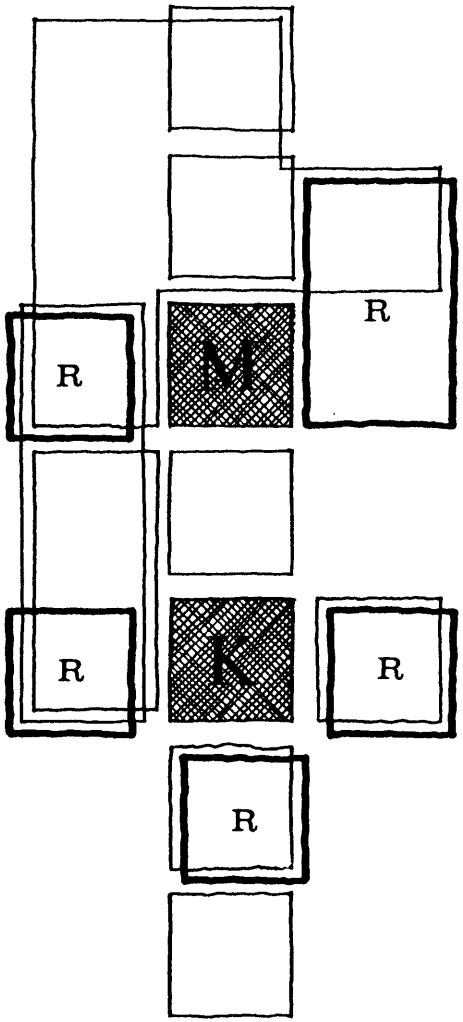
When the relationship diagrams are combined into one diagram to arrive at the interrelationship between the spatial elements, it is found that the essential elements in the Malay house are the entrances, main house and kitchen. These elements are those that all other elements must be connected to. The combination of all these four elements, front and rear entrances, main house and kitchen, is called the Basic House.



SPATIAL ELEMENTS INTER-RELATIONSHIP







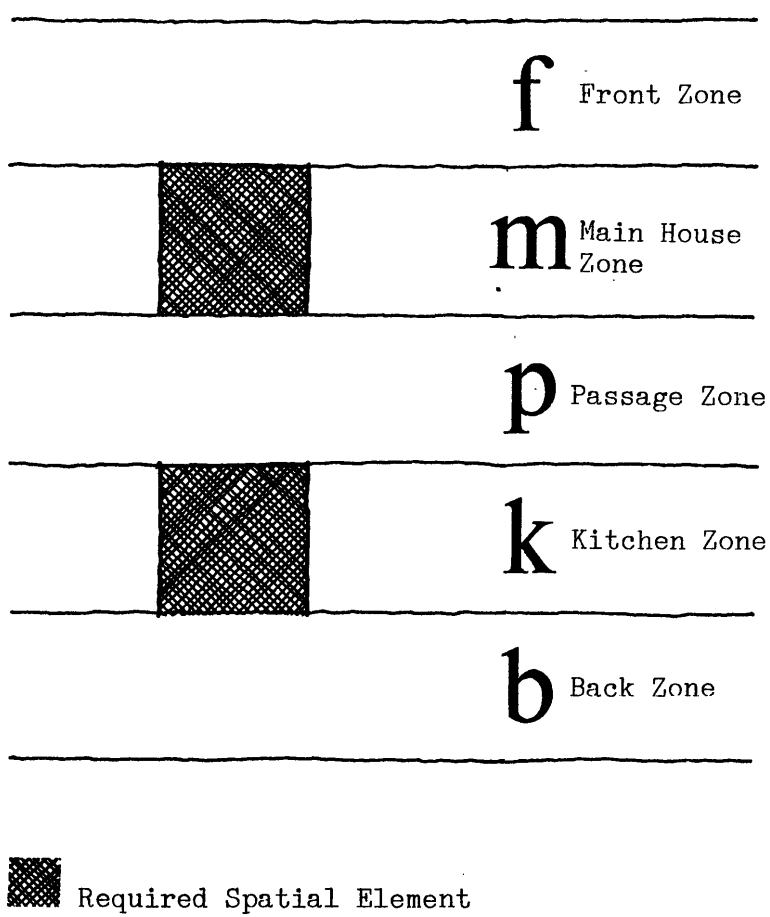
Location

Based on the description and plans of the Malay houses shown earlier, the location of elements relative to the main house and kitchen are shown above. Note that the room, R, has been added to the list of spatial elements.

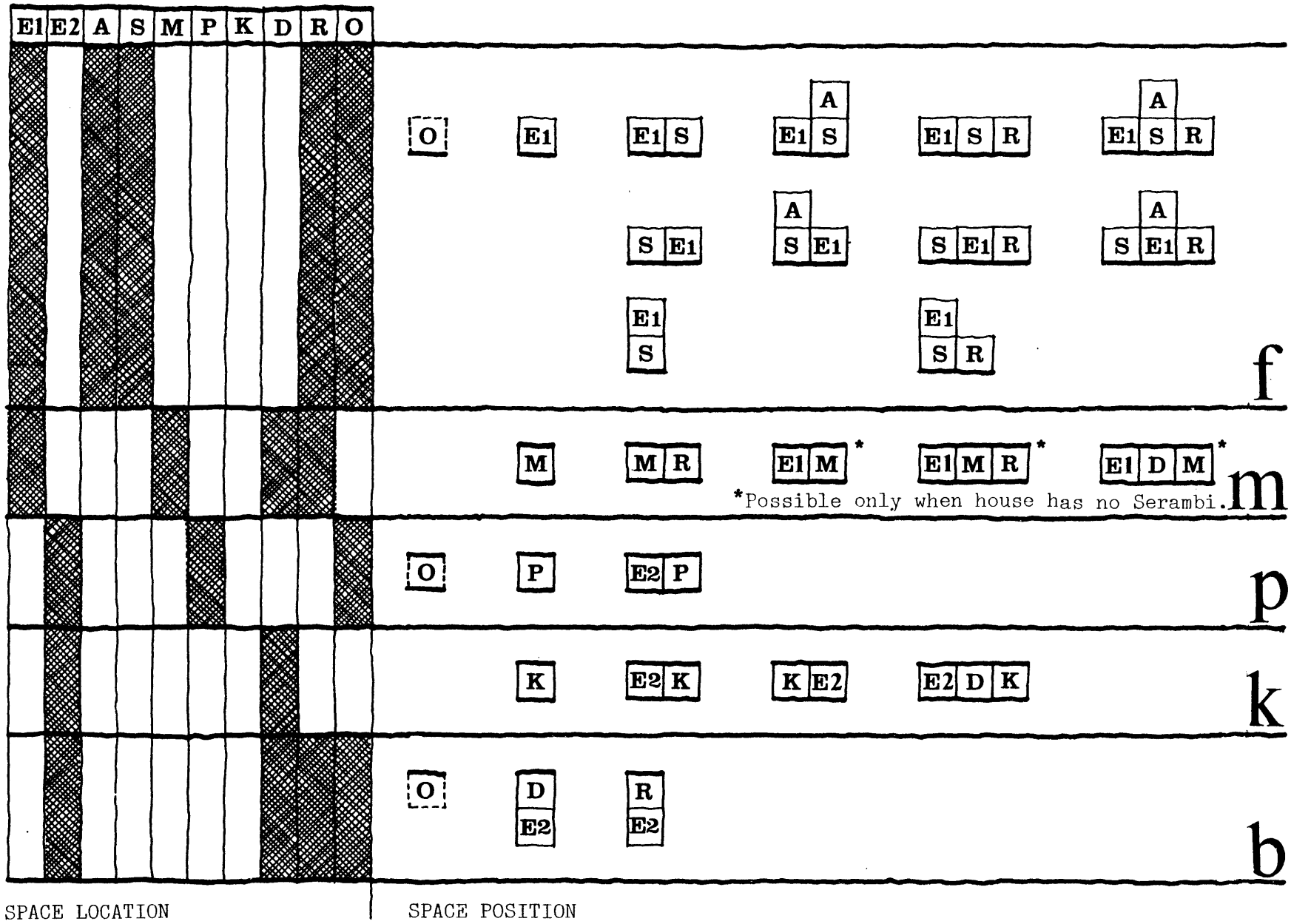
From the locations of these elements, the locational structure of the spatial elements can be adduced. They are interpreted in terms of zones or a spatial matrix within which the spatial elements are located. As shown on this page, the matrix consists of the Front, Main House, Passage, Kitchen and Back zones.

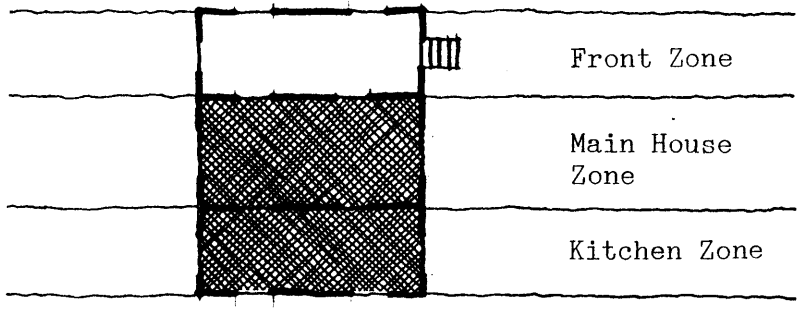
Within this structure, two spatial elements, M and K, must be present as a required constant.

Examples of these zones in three houses are shown (see page 66). The dimensions of zones may vary. When a spatial element is not assigned to a given house plan, the zone is eliminated. For example, Passage zone = 0 when the passage has not been included in the house layout (see Basic Malay House and Rumah Limas Bungkus).

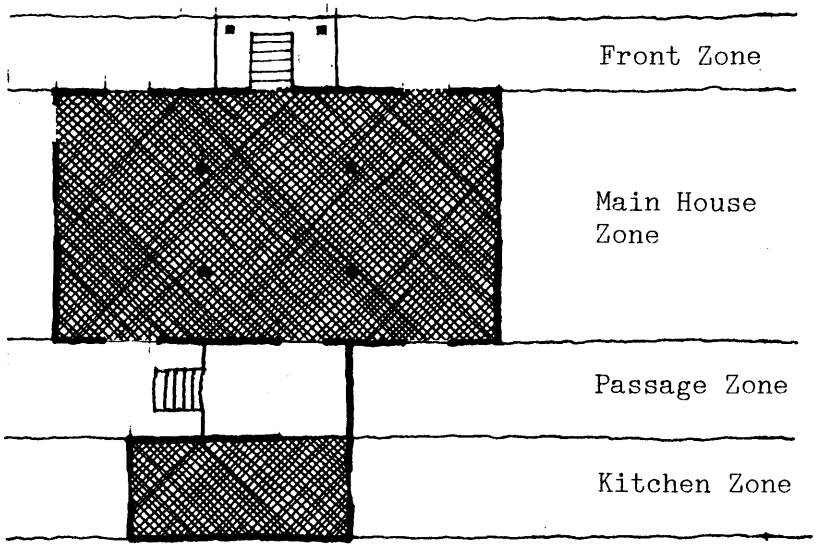


ZONES FOR SPATIAL ELEMENTS

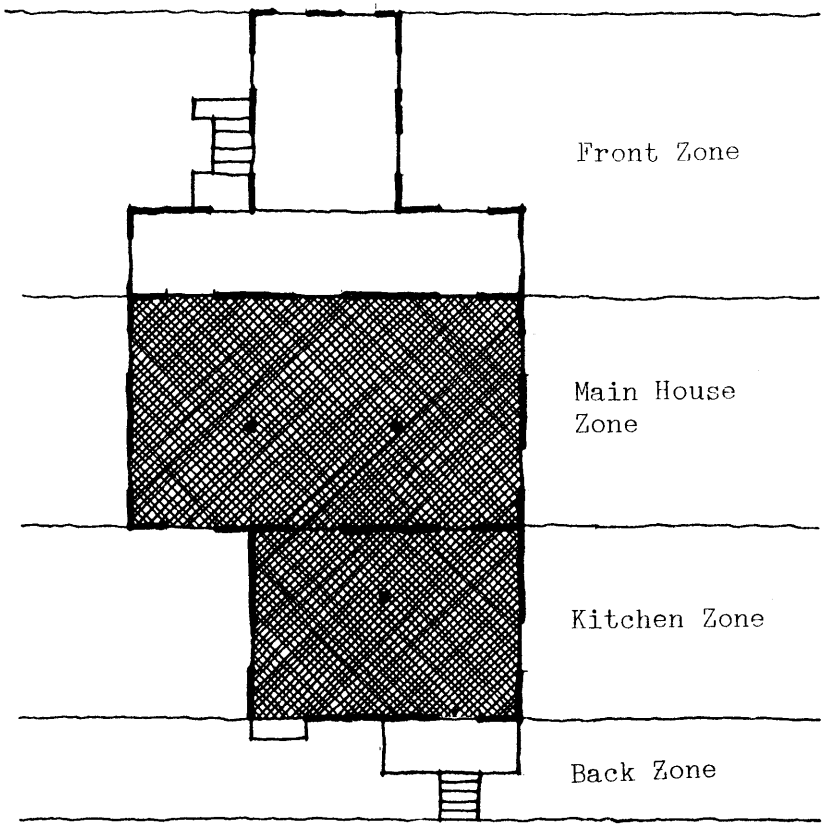

E1 E2 A S M P K D R O
O
E1
E1 S
A
E1 S
E1 S R
A
E1 S R
S E1
A
S E1
S E1 R
A
S E1 R
E1
S
E1
S R
f
M
M R
E1 M *
E1 M R *
E1 D M *
*Possible only when house has no Serambi.
m
O
P
E2 P
p
K
E2 K
K E2
E2 D K
k
O
D
E2
R
E2
b
SPACE LOCATION
SPACE POSITION



BASIC MALAY HOUSE



HOUSE AT BOTA KIRI



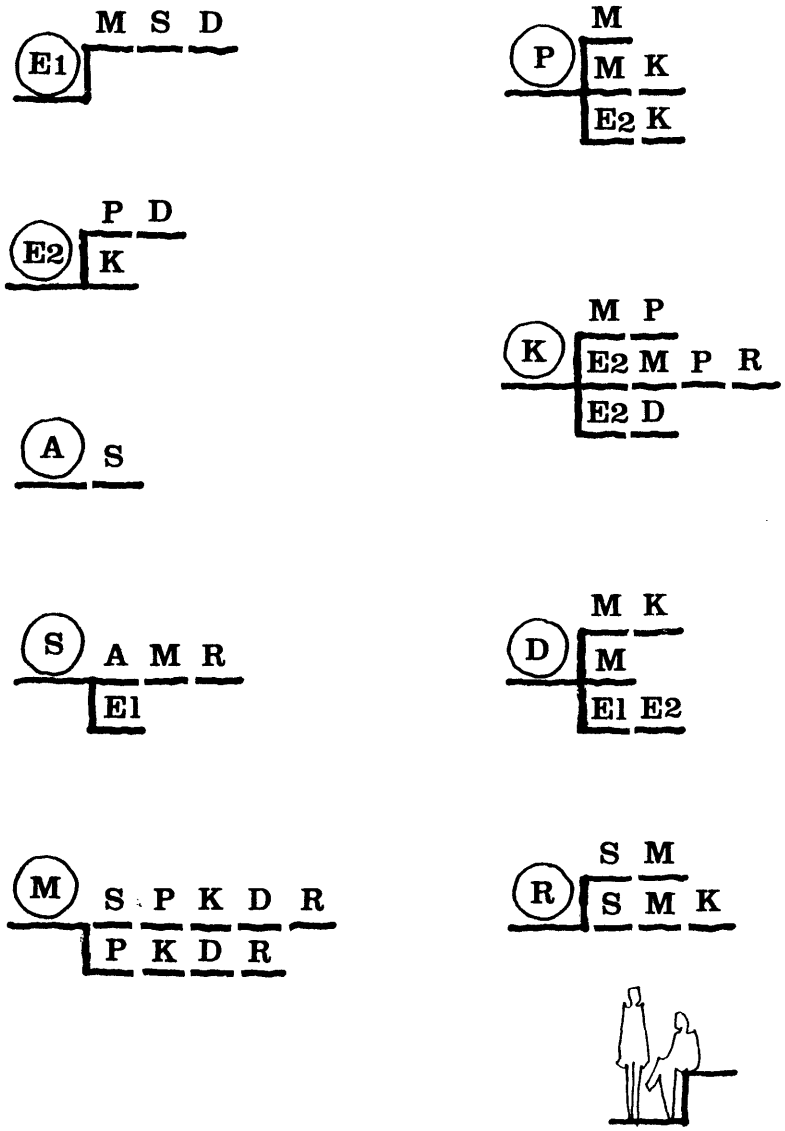
RUMAH LIMAS BUNGKUS

Spatial Level[21]

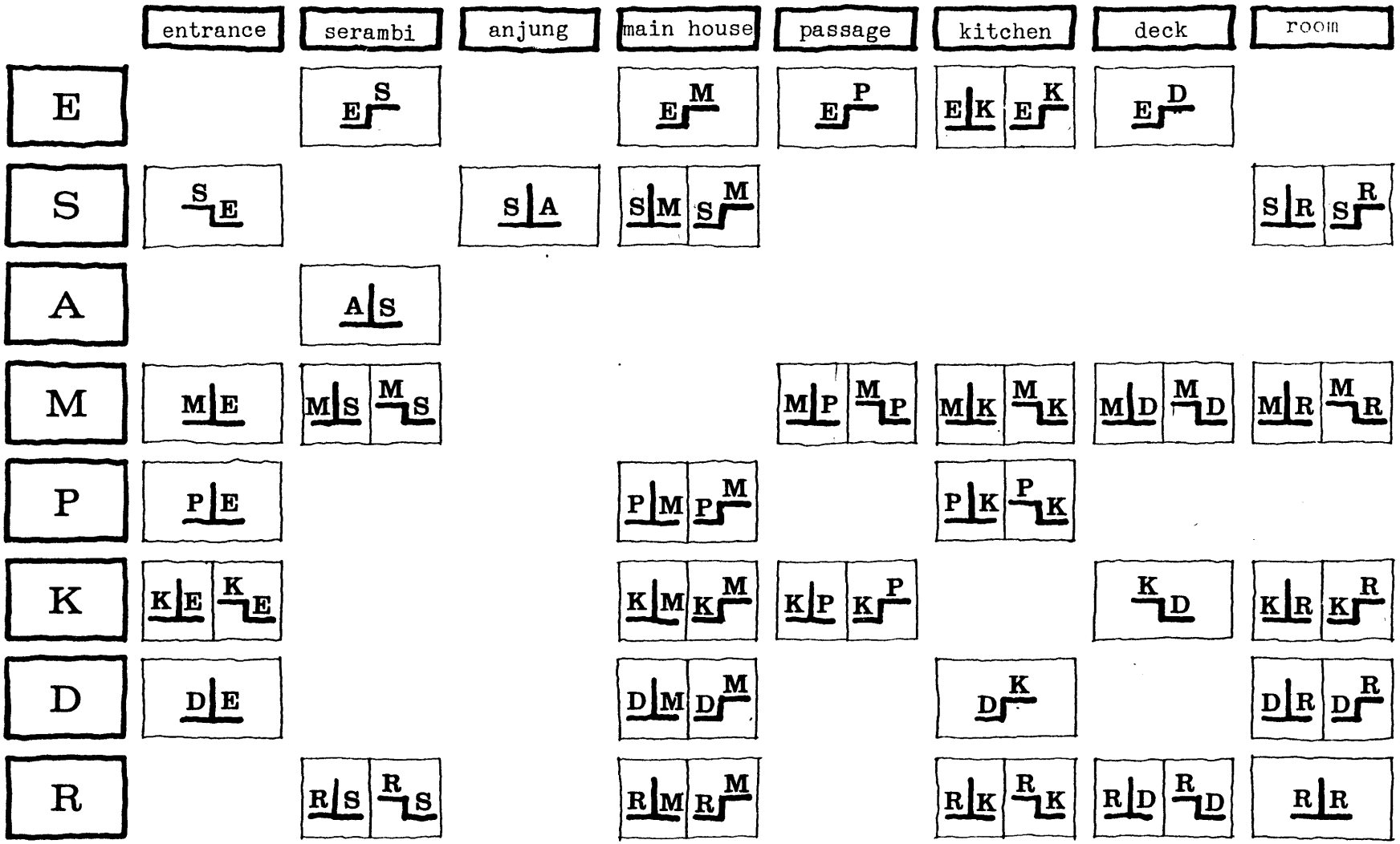
When spatial elements are connected to one another, level changes can be observed. These changes, relative to each space, are shown here.

Circled letters indicate the elements in question which are on levels indicated by lines below them. Other spaces which must or may be connected to the spaces in question are not circled, and their levels are also indicated by lines below the letters.

A spatial element can be at the same level, higher or lower than the element in question.

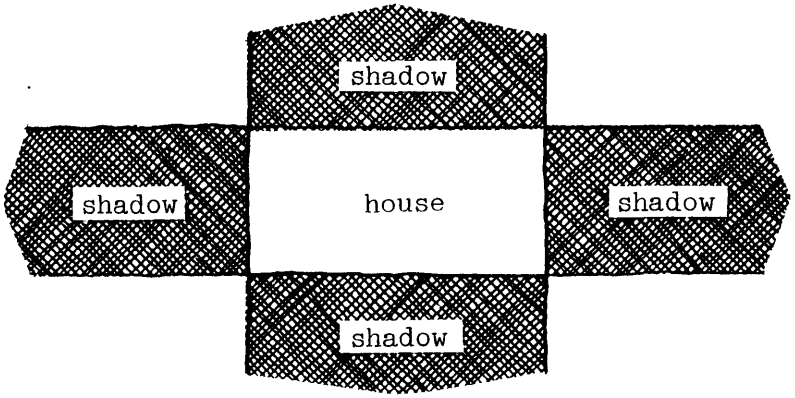


21. Levels as it is used here, refers to the physical floor surface. It can be on the same level, higher or lower than the floor surface of another spatial element.



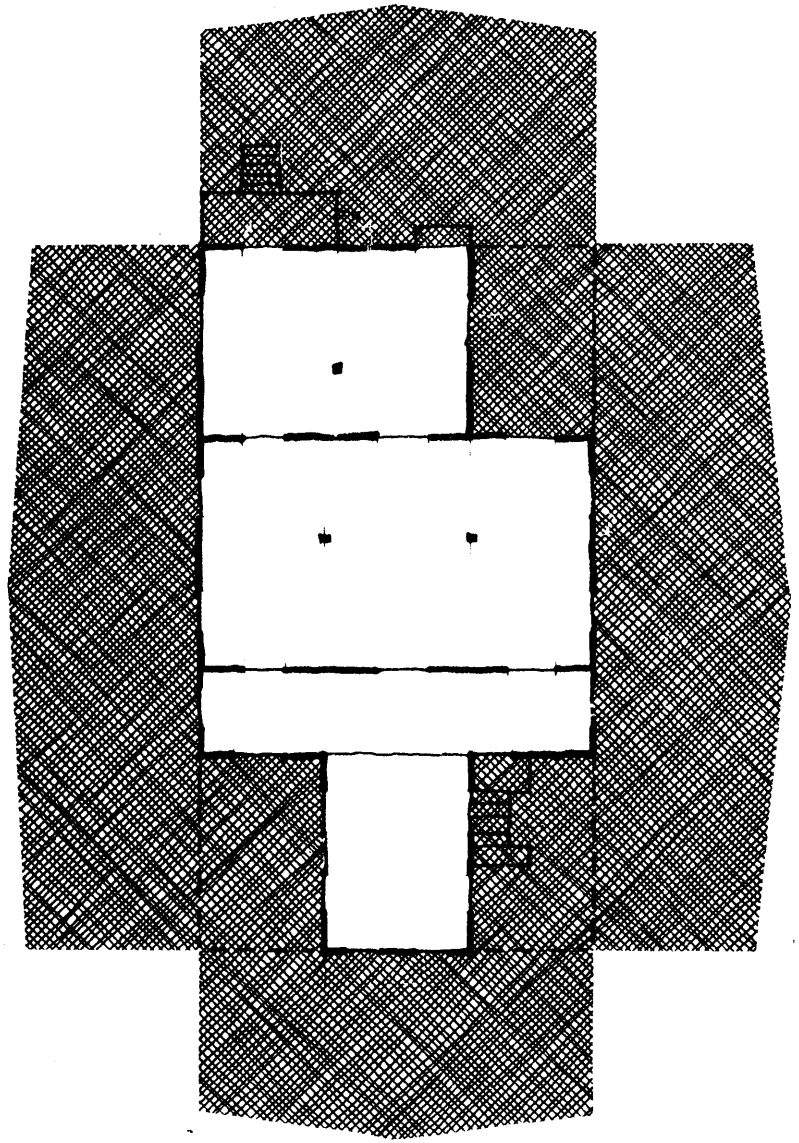
LEVEL VARIATIONS

Traditional Rule



BAYANG RUMAH

Toilets and ponds cannot be placed in the bayang rumah or "shadow of the house." The "shadow" describes areas adjacent to the spatial elements that accommodate cooking, eating/entertainment and sleeping (see pages 72-82). There is no limit to the length of the shadow (see above).



RUMAH LIMAS BUNGKUS

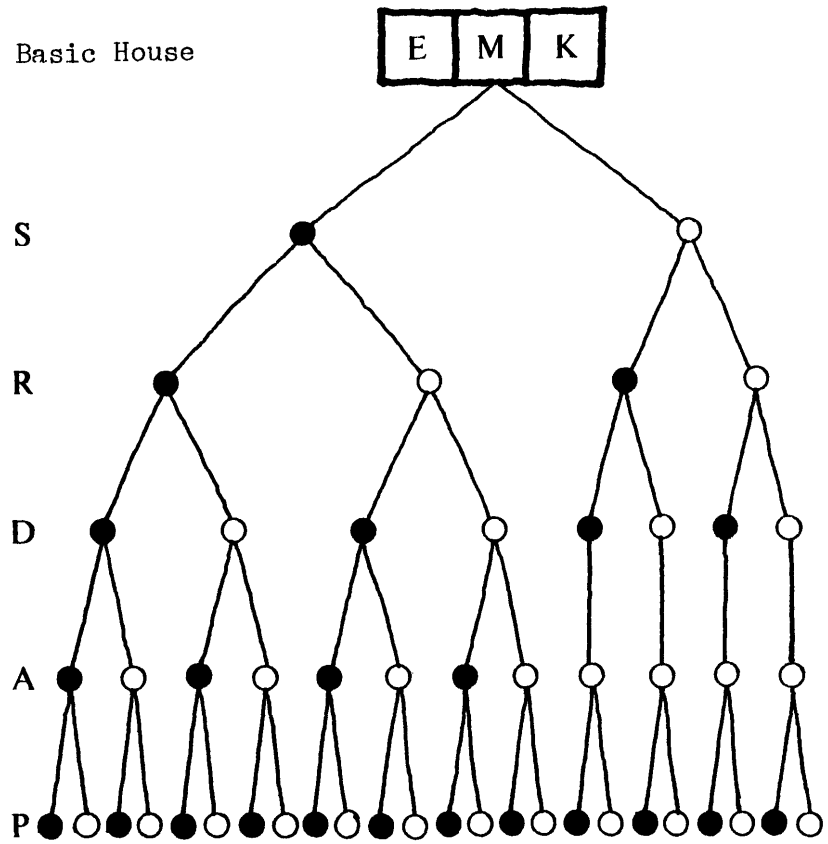
3.23 Variations

Connection

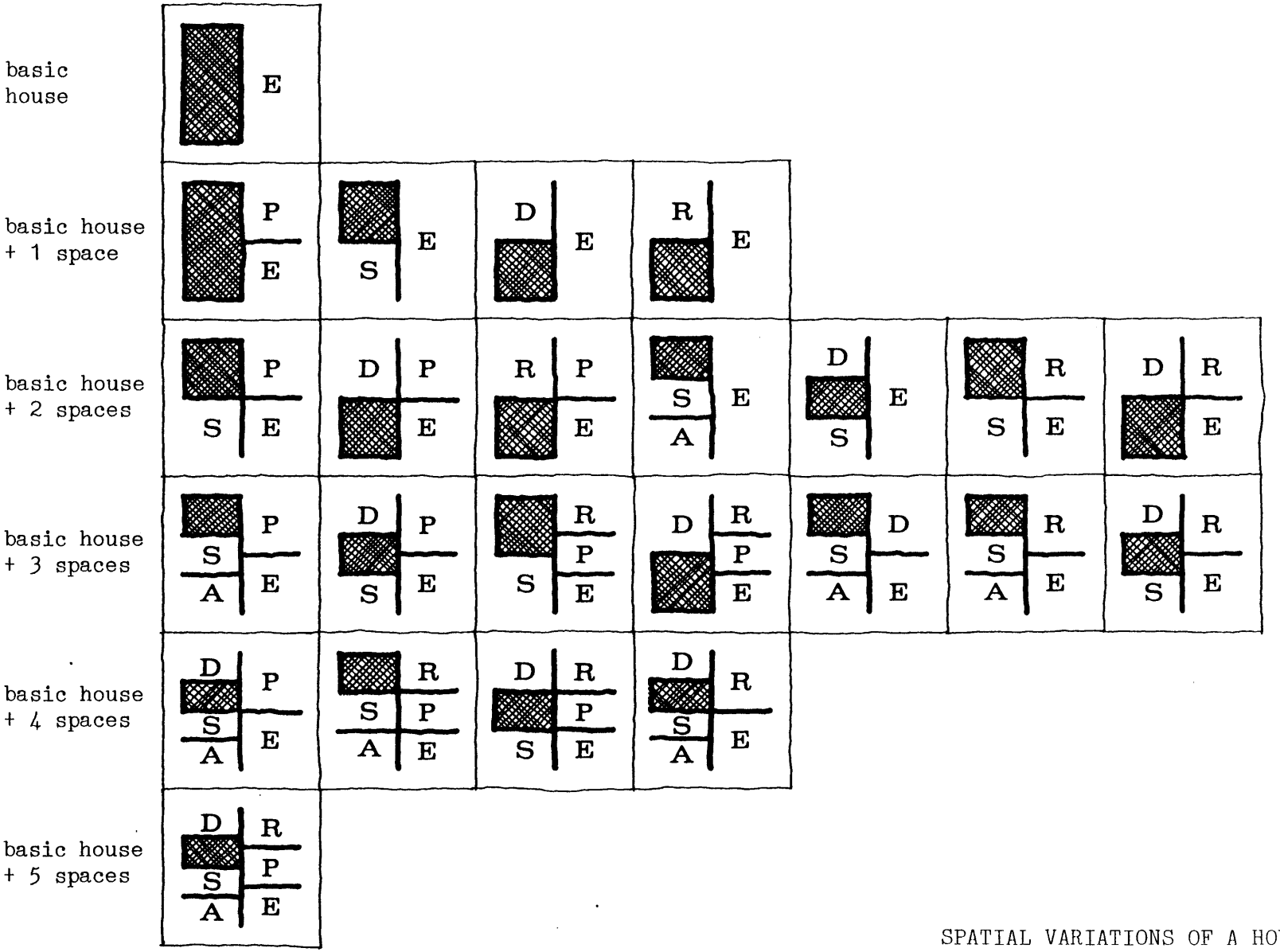
From the elements and the rules stated earlier, variations of the elements can thus be arrived at.

The spatial layout in the Malay house is based on the addition of spatial elements to the Basic House, which can be combined in a number of ways. The rule that governs a given combination is that the anjung is only possible if a serambi exists. Other than this rule, elements can either be added or not added to the house.

The morphological tree shows the variations in the combination of the spatial elements. What this means in relation to the Basic House is shown in the Spatial Variations of a House chart which follows (see page 71).



COMBINATION OF SPATIAL ELEMENTS



SPATIAL VARIATIONS OF A HOUSE

3.3 Functional Elements

3.31 The Elements

The following functional elements exist in the Malay house:

1. Entry/circulation
2. Cleaning
3. Cooking
4. Eating/entertainment
5. Sleeping
6. Storage
7. Work

1. Entry/circulation

Entering and moving in a house varies depending on whether one is a male or female, guest or host. Usually male guests and/or visitors enter the house through the front entrance, separate from the females, who enter through the rear entrance.

Activity patterns also determine where and how the entry into the house is placed. For example, food supplies are never brought into the house through the front, whereas the body of a deceased member of the family must leave the house through the front entrance.

2. Cleaning

Personal Cleaning:

For purposes of defecation, toilets are used. Depending of type, usually a bucket of water is brought into the toilet. The water is used both to clean the bottom and subsequently to flush down waste. For the elderly, defecation is sometimes allowed to happen in the main house. A loose floorboard, displaced, then serves as a hole for this purpose. Usually each family has its own toilet. However, sometimes a toilet is shared by several families. There is no difference in the use of toilets whether one is male or female. Visitors are not expected to use the toilet.

Showers are taken by the pond or well. Water is drawn from the pond or well using buckets and then is used for cleaning the body. Ponds and wells are also used for washing clothes, by women, who would clean themselves immediately after washing the laundry. Males and females wash themselves separately. Males have their showers early in the morning and the females do their washing after them.

General Cleaning:

For small-scale domestic purposes, dishwashing and wet food preparation is done by the women in the floor sink. Water is brought to the sink by the men using buckets. Male visitors or guests do not usually go to the kitchen. If they do, they are never allowed to do any form of general cleaning.

Large-scale ceremonial washing and food preparation is usually done outdoors. Women prepare the food and the men wash the dishes.

3. Cooking

There are two types of cooking: small-scale family cooking and large-scale ceremonial cooking. Small-scale family cooking can happen for as many meals as a family requires. Women cook, but female guests are not allowed to do so. Female visitors are allowed to help with the food preparation.

Large-scale cooking is done for feasts, which usually happen several times a year. On these occasions, cooking is done by the males.

4. Eating/entertainment

Except for daily family meals (breakfast, lunch, and dinner) which take place at fixed times, food is served at

any time of the day. This is usually to entertain visitors or guests. Therefore, the entertainment of visitors is synonymous with eating.

Meal size ranges from regular daily meals to large feasts. Eating patterns vary depending on whether food is shared among members of the family or with guests or visitors. Men and women must eat separately, either in different space, or at a different time.

5. Sleeping

Sleeping can take place in many areas of the house. In the Basic House, the family sleeps in the main house. Three groups are usually formed before bedtime: parents and babies, males, and females. These groups proceed into their respective mosquito nets, which are removed during the day.

When there are guests staying over, only two groups are formed: males and females. Males sleep in the serambi and females sleep in the main house. Mats and mattresses are rolled out before bedtime and both groups retire. Like the main house, the serambi is used for other functions during the day.

6. Storage

In order to make room for activities in the house, objects are put away in storage. Often things are stored to avoid embarrassment on the part of the host if these things are seen by guests. For instance, the bed must be rolled up when it is not in use. Storage serves as a means to show off what a family owns. Expensive crockery or cutlery, which is not normally used, is stored in open cupboards where it will be seen by visitors and guests.

7. Work

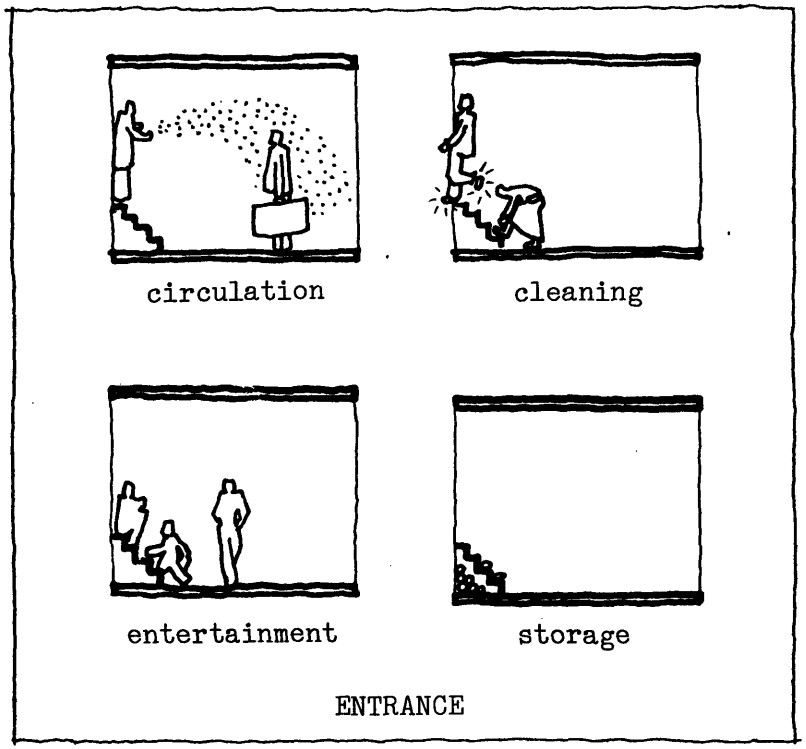
This is a general category and includes everything that is done in the house other than those activities mentioned earlier. Work may be for earning a living or just for leisure. Some of these include reading, writing, sewing, wood chopping and the like.

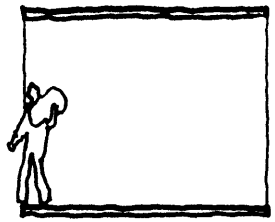
Work in the Malay house stops immediately upon the arrival of guests or visitors who have to be entertained. Work resumes once the guests or visitors leave. Men perform "heavy work" such as lifting, carrying and cutting, while women perform "light work" such as sewing and decorating.

3.32 Relations and Rules

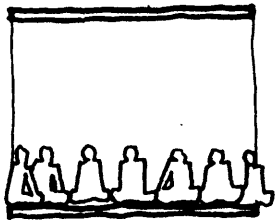
Location

The following section shows the various relationships between spatial and functional elements. These relationship may be taken as rules which relate these elements. For example, the entrance must have facilities that will enable the functional elements (entry/circulation, cleaning, entertainment and storage) to take place.

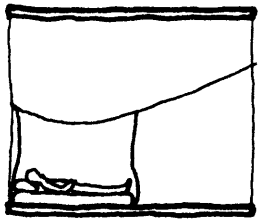




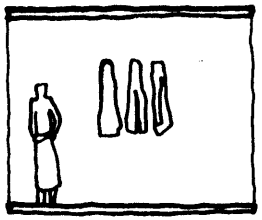
circulation



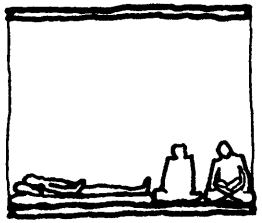
eating/entertainment



sleep

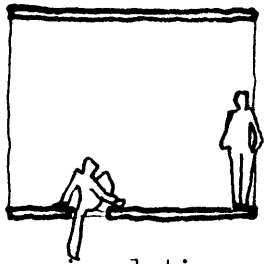


storage

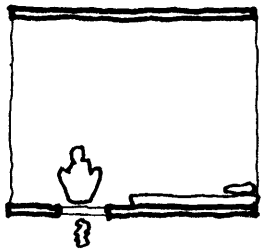


work

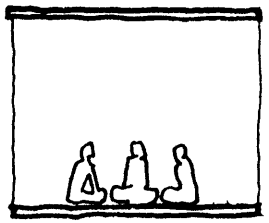
SERAMBI



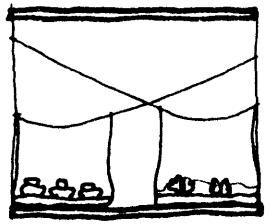
circulation



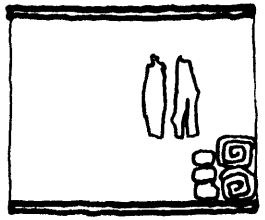
cleaning



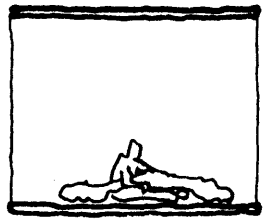
eating/entertainment



sleep

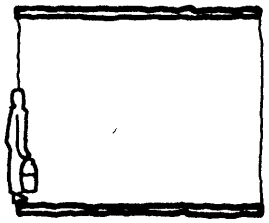


storage

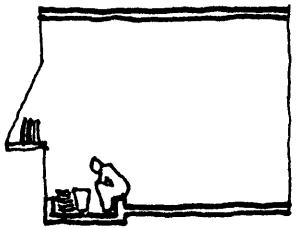


work

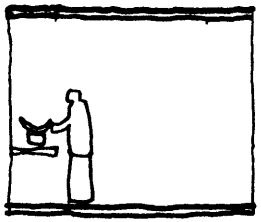
MAIN HOUSE



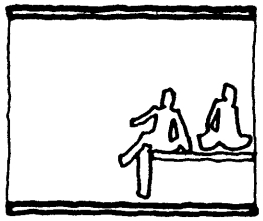
circulation



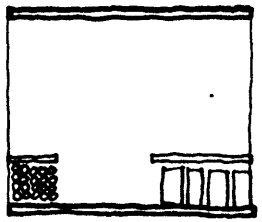
cleaning



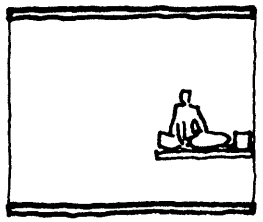
cooking



entertainment

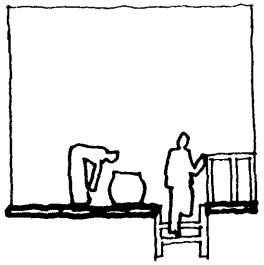


storage

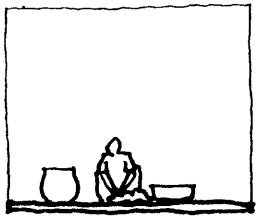


work

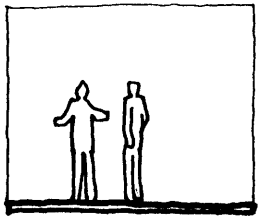
KITCHEN



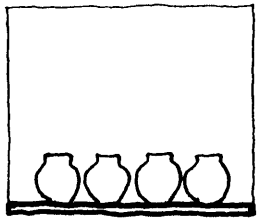
circulation



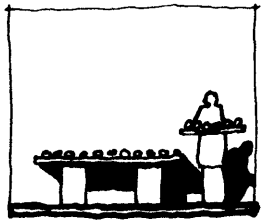
cleaning



entertainment

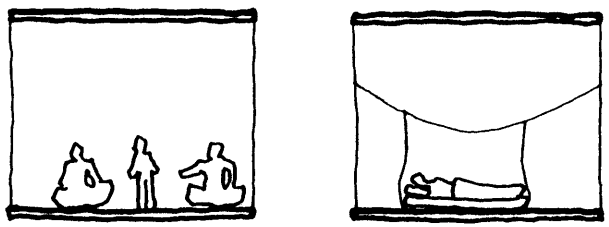


storage



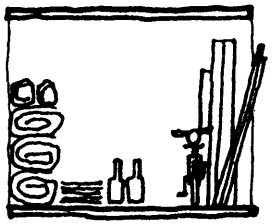
work

DECK

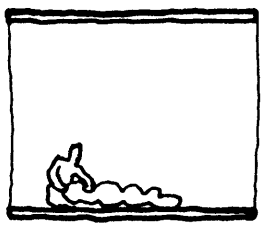


eating/entertainment

sleep

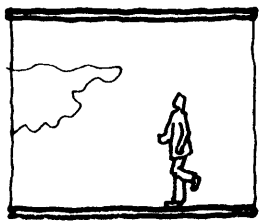


storage



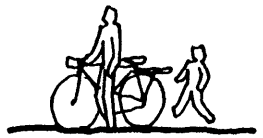
work

ROOM

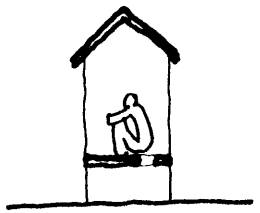


circulation

PASSAGE



circulation



cleaning

cooking

eating/entertainment

storage

work

OUTSIDE

This table shows the relationship between functional and spatial elements in terms of the locations and frequency of space use. The weight factor used is based on the number of hours the spatial elements are used for the functions mentioned. The order of spaces in terms of their intensity of use is also shown.

The relationship between functional ele-elements and behavior can also be shown (see pages 82 and 83). The behavior shown is that which relate to gender, guest, age and other activity patterns which is representative of the behavior of Malay house dwellers.

Variations in functional elements cannot be shown in this study.

		CIRCULATION	CLEANING	COOKING	EAT/ENTNMNT	SLEEP	STORAGE	WORK	WT FACTOR X POINTS	IMPORTANCE
1	ENTRY	2	2	0	1	0	1	0	132	6
2	ANJUNG	0	0	0	2	1	1	1	97	8
3	SERAMBI	2	2	0	2	2	1	1	162	3
4	MAIN HOUSE	2	2	0	2	2	2	2	194	2
5	PASSAGE	2	0	0	0	0	1	0	72	9
6	KITCHEN	2	2	2	2	1	2	2	196	1
7	DECK	2	2	0	1	1	1	2	108	7
8	ROOM	0	1	0	1	2	2	2	138	5
9	OUTDOOR	2	2	2	2	1	2	2	149	4
	WT FACTOR	24	4	6	4	8	24	8		

0 Does not happen
1 Happens sometimes
2 Happens frequently

SPACE FUNCTION RELATION
Intensity of use

	Entry	Circulation	Cleaning	Cooking
Gender-related	Males and females cannot enter through the same entrance.	Males and females circulate in f, m and b zones.	Personal: Males clean first. General: Usually done by females.	Small-scale: Women cook. Large Scale: Males do all forms of cooking.
Host-related	Guests must enter through E1	Guests and visitors only move in f zone. Host can move in any space except where the guests are.	Personal: Visitors do not clean. General: Guests and visitors are not allowed to help with the cleaning.	Guests and visitors are not allowed to to cook or help with the cooking.
Age-related	The elderly and the young can enter through any entrance.	The elderly do not move through all spaces in the house. The young can move through any space in the house.	Personal: The elderly can have spaces which no others can. The young can clean in any location, General: Elderly are not allowed to help with the cleaning. The young are trained.	The elderly and the young are not allowed to cook.
Activity Pattern	Food supplies enter through E2. Garbage leaves the house through E2.	Only celebrated people move through the house. Non-celebrated people move outside	Cleaning done in special ways devised for festivities.	Cooking for festivities are done outside.

FUNCTION BEHAVIOR RELATIONSHIP

	Eating/entertainment	Sleeping	Storage	Work
Gender-related	Males eat before females. They may be separated.	Males sleep together. Must be separated from females.	Males store personal belongings where females do not.	Males do "heavy" work. Females do "light" work.
Host-related	<u>Daily meals</u>: Guests eat in areas where family usually do not. <u>Feasts</u>: Guests eat in special shelter outside the house.	Guests must sleep in same areas as hosts.		Guests are not allowed to work in the house.
Age-related	<u>Daily meals</u>: The elderly get special food. they can eat alone or with the family. The young eat first. <u>Feasts</u>: The elderly eat when they want. The young eat before guests do.	The elderly can sleep alone or with the young. The young can sleep in any space.	The elderly can store things in any space. The young cannot store things in any space.	The elderly are not allowed to wo work. The young may work.
Activity Pattern	During fruit seasons for example, eating happens where the fruits are.	Sleeping can happen outside the house during festivities.	All forms of storage during festivities are located outside the house.	

FUNCTION BEHAVIOR RELATION

4. SCENARIOS

4.1 Testing the Rules

Adrienne is an American. She knows little about Malaysia, less about Malays and still less about the Malay house. After seeing images of the Malay house, she became curious about how the house is put together. She came across this study and wanted to see if she could put together what is supposed to be a Malay house.

With the exception of structural adjustments and the placement of roof, she went through the process by herself. Otherwise, what she did was entirely based on her own value judgements. The steps she took were as follows:

1. A house type was chosen based on the Spatial Variations of a House Chart (p 71) and the spaces were selected.
2. Spaces were located in the Zone Chart (p 64) based on the data found in the Space Location Table (p 65).
3. Using the same Zone Chart, spaces were positioned based on the rules given in the Space Position Table.
4. Connections between spaces were made based on the rules shown in Space Relation (pp 59-60).
5. The Connector Type (p 50) was chosen.
6. Dimensions for each of the spaces were specified using the Minimum and Maximum Dimensions of Spaces Chart (p 56) as a guide.
7. These dimensions were counterchecked with the Space Proportion Chart for (p 57) for compliance.
8. Spaces were laid out and a plan form was decided.
9. Structural adjustments were made for her.
10. From Level Variations Chart (p 68), the levels of each space relative to the others was chosen.
11. The roof was selected from Roof-Type Table (p 53).
12. The roof was placed on the plan form.

13. Openings were selected from the Opening-Type Chart (p 51).
14. The openings were placed on the Opening Variations Chart (p 50).
15. Stairs were selected from the Vertical Circulation Variations Chart (p 51).

Thus with very little help, Adrienne had recreated a Malay house.

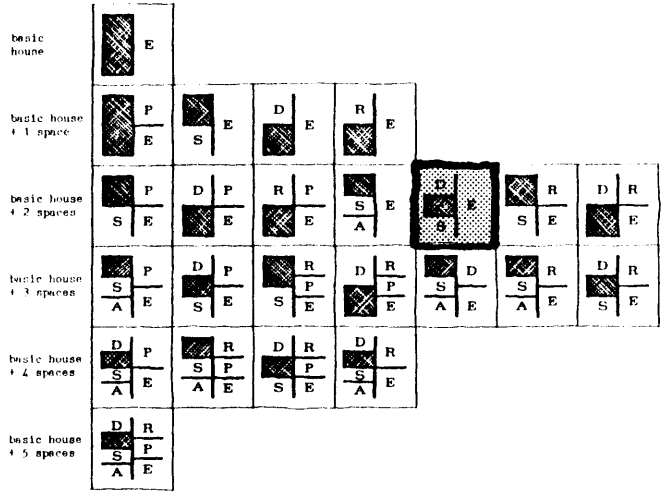
The following section shows what her decisions were, what adjustments were made and what the Malay house turned out to be.

1. House-type and Spaces

House-type: Basic House + 2 spaces

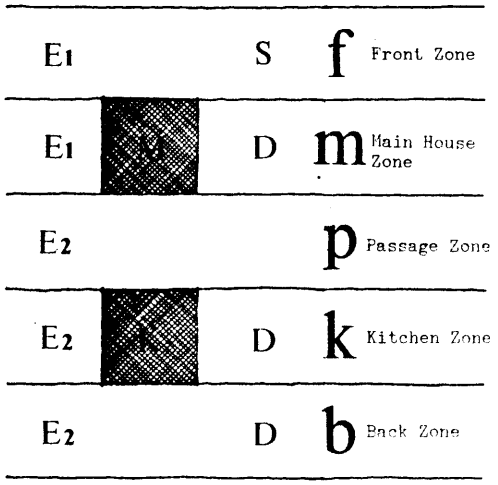
Spaces:

Front Entrance, E1	Kitchen, K	
Back Entrance, E2	Serambi, S	and
Main House, M	Deck, D	

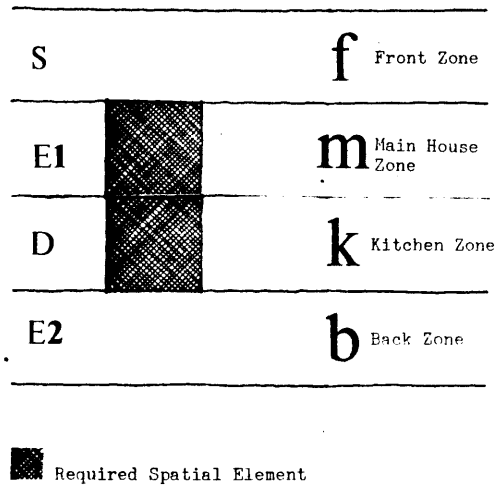


2. Space Location

Possible space locations were found.

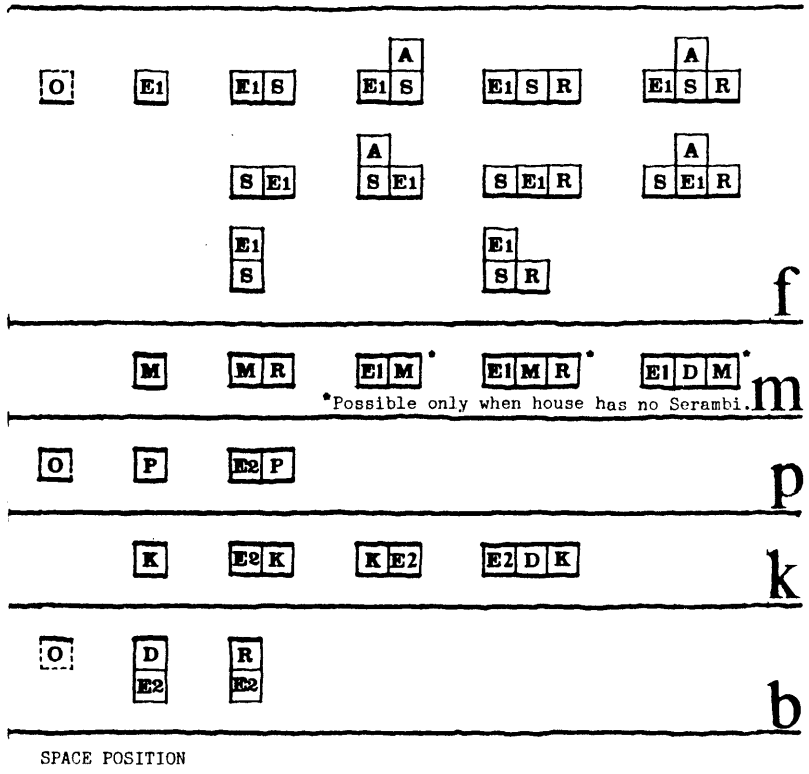


Chosen Locations*



*P-zone disappears because P was not selected to be one of the spaces in the house.

3. Space Position

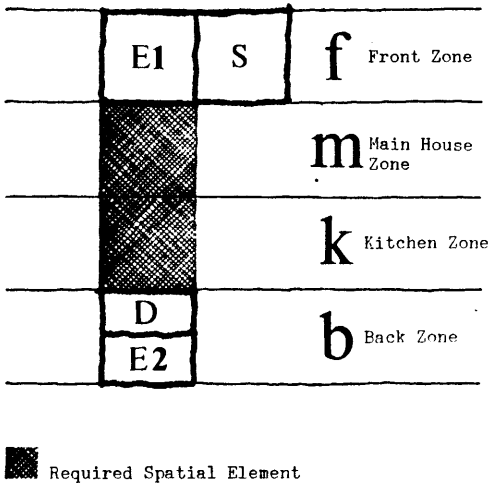


SPACE POSITION

The table above shows that E1 cannot be placed in the M-zone because the serambi, S, exists. Therefore E1 had to be placed in the F-zone.

The table also shows that D cannot be placed in the K zone unless E2 is also in the same zone. Two options were available:

1. E2 had to be placed in the K-zone, or
2. D had to be placed in the B-zone.



Chosen Positions

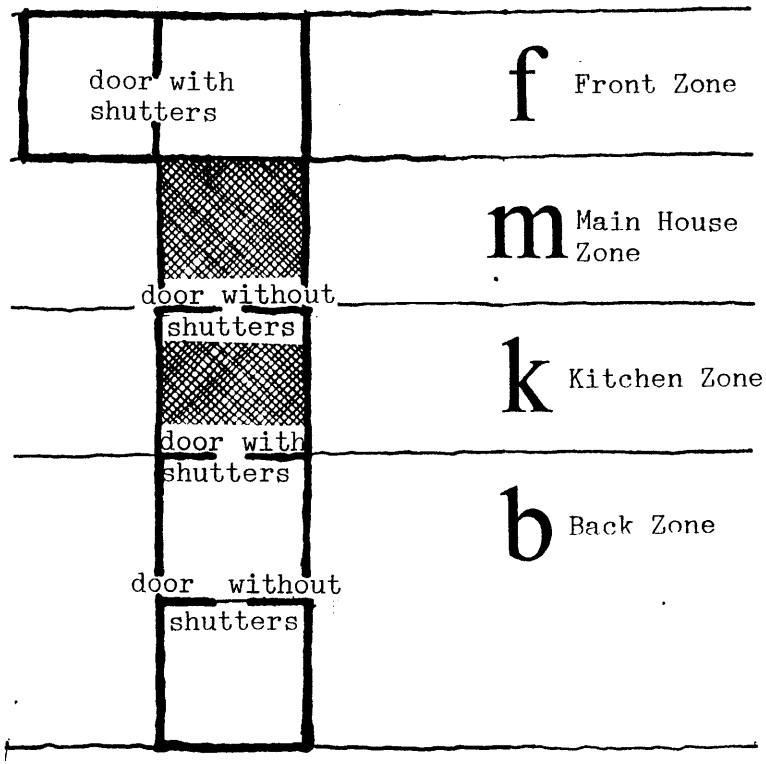
4. Space Connection

Rules were noted and connections were made.

1. E1 must be connected to S or D. Therefore, E1 was connected to S.
2. E2 must be connected to D. Therefore, E2 was connected to D.
3. S must be connected to M and E1 or M and D. Therefore, S was connected to M and E1.
4. M must be connected to K. Therefore, M was connected to K.
5. K must be connected to M. Therefore, K was connected to M.
6. D must be connected to S, M, K, S and M, M and K, S and M and K. Therefore, D was connected to K.

5. Connector type

The chosen connector types are as shown:



6 & 7. Dimensions and Proportions

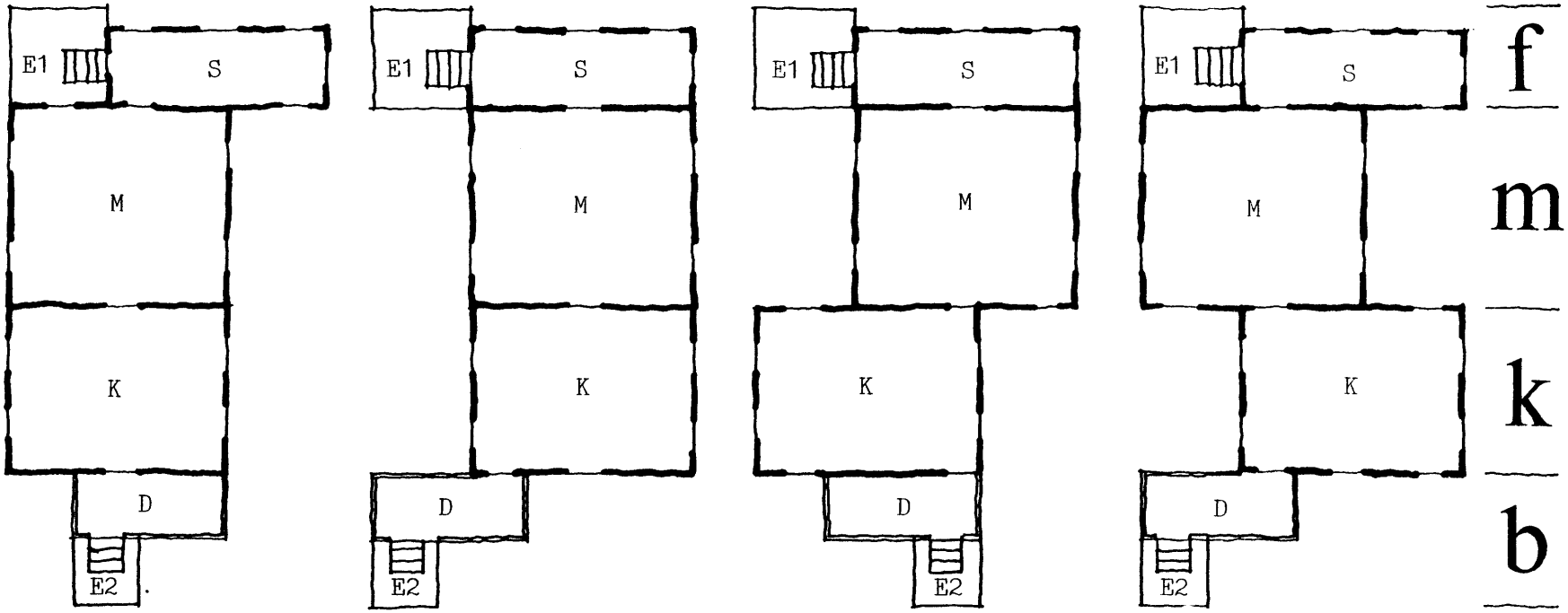
Space	Chosen Dimensions x by y	x:y	Allowable Proportions	Check
E1	9' X 9'	1:1	1:0.8 to 1:1.1	OK
E2	6' X 6'	1:1	1:0.8 to 1:1.1	OK
S	8' X 20'	1:2.5	1:2.6 to 1:4.6	No good
M	20' X 20'	1:2.5	1:1.1 to 1:2.0	No good
K	15' X 20'	1:1.3	1:1.2 to 1:4.2	OK
D	6' X 12'	1:2	1:2.2 to 1:5.3	No good

Dimensions of S, M and D had to be changed to comply with the proportions specified in the table.

Space	Adjusted Dimensions x by y	x:y	Allowable Proportions	
S	7' X 20'	1:2.8	1:2.6 to 1:4.6	
M	18' X 20'	1:1.1	1:1.1 to 1:2.0	
D	6' X 14'	1:2.3	1:2.2 to 1:5.3	

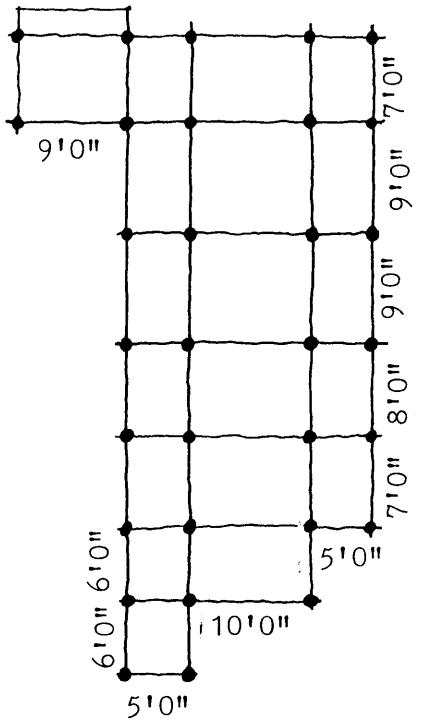
Adjusted Dimensions and Proportions

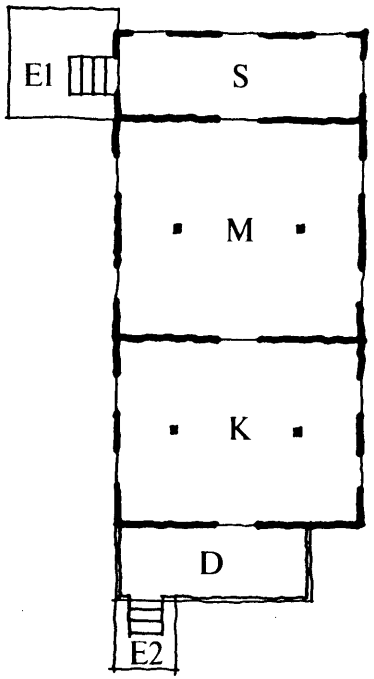
8. Plan Forms



House I House II House III House IV etc.

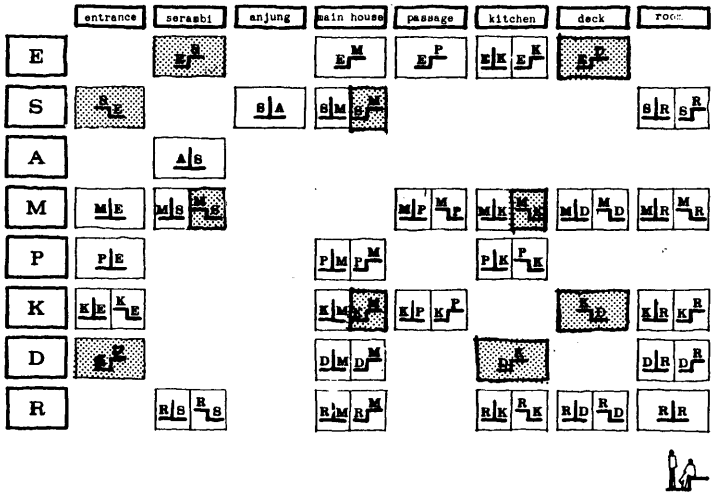
9. Structural Adjustments



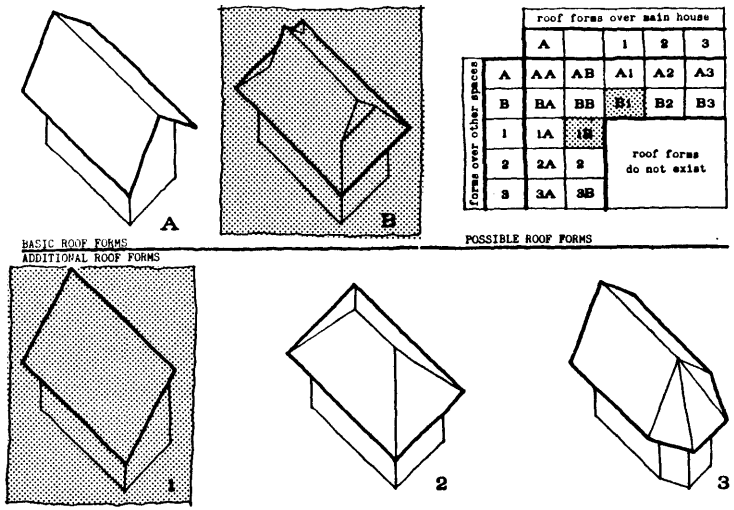


Structural adjustments made based on the minimum and maximum dimensions of the structural grid. New dimensions will have to follow the grid layout.

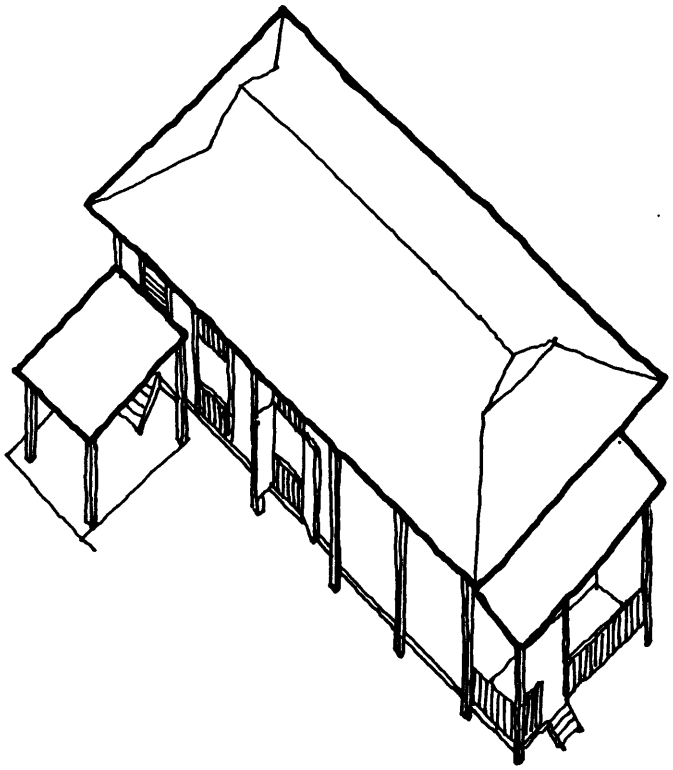
10. Levels



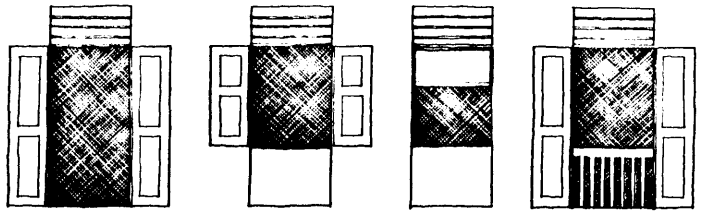
11. Roof Type



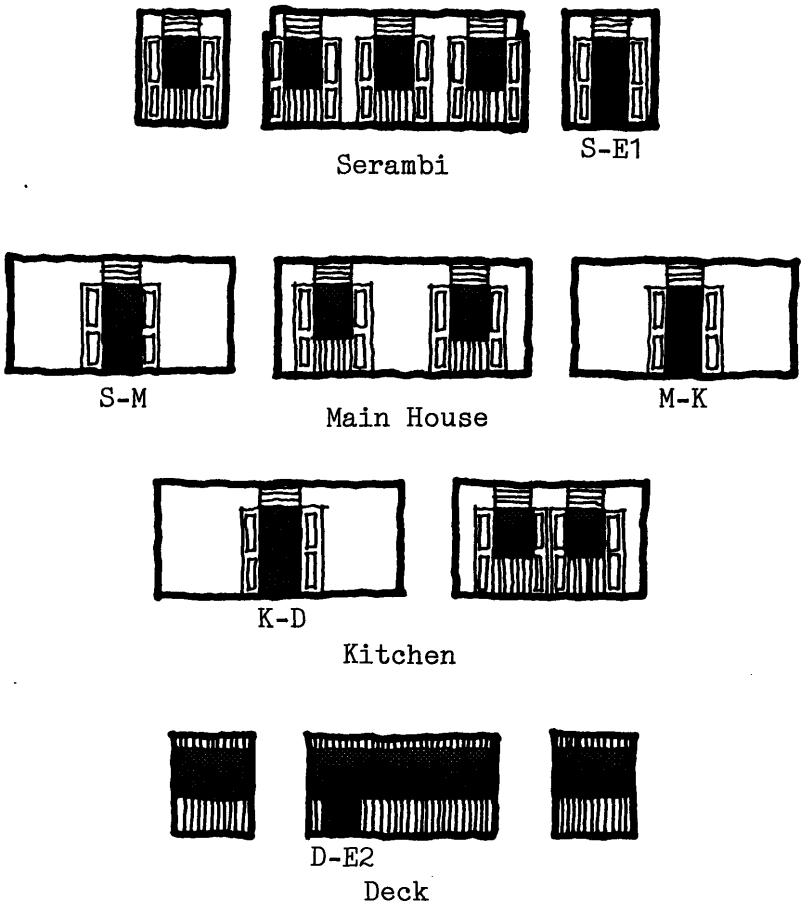
12. Roof Placement



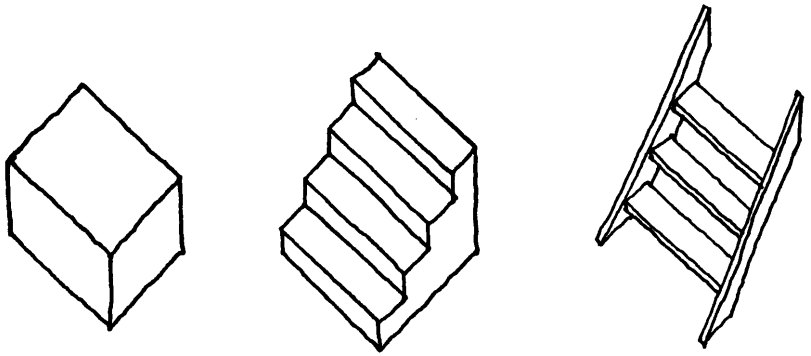
13. Openings



14. Placement of Openings



15. Vertical Circulation Elements



4.2 Introducing Changes

After finding out that it is possible to recreate a Malay house by herself, Adrienne is now interested in building one that would suit her own personal requirements. In order to do this she would like to see some possible variations of layouts of the house to choose from.

She describes herself as a designer. Besides designing, she paints, sculpts, and does some gardening. Most of the time she prefers to be alone with her plants and cats, although occasionally she entertains a lot of friends. Other than friends, she also receives her art and design clients in the house.

The following steps were taken to provide her with an individualized Malay house design.

1. Requirements in terms of spatial, functional and physical elements and their needed performance was tabulated.
2. These performance requirements were translated into the special requirements for a Malay house.
3. Steps in Scenario I (pp 84-93) were repeated to generate possible variations. Where it was not possible to repeat the steps, they were skipped and noted down.
4. Steps which were skipped were dealt with using Traditional Rules (see p 69, for example).
5. The final configuration was selected from several alternatives. It was tallied against the performance requirements from step 1 to ensure that all requirements were met.
6. Requirements which were not met by the house represented changes which the Malay house had to incorporate in order to make the house suitable for Adrienne.

1. Performance Requirements

SPATIAL ELEMENTS	FUNCTIONAL ELEMENTS	PHYSICAL ELEMENTS	PERFORMANCE REQUIREMENTS
Bathroom	Circulation Personal Cleaning Storage	WC Bath tub/shower	About 60 sq.ft. Direct access to bedroom. Accessible to other spaces. Private A lot of storage room.
Bedroom	Circulation Sleeping Storage	Bed	About 120 sq.ft. Accessible to owner only. A lot of storage room.
Dining	Circulation Eating Storage	Tables/chairs Cabinet	About 120 sq.ft. Be part of and accessible to one studio and kitchen. A lot of storage room.
Garage	Storage	Cars Garden/auto tools	About 450 sq.ft or for 2 cars. A lot of storage room.
Front Entrance Studio Entrance Rear entrance	Circulation Storage Circulation Circulation	Umbrellas/raincoats	Direct access from Studio and Living Room. A lot of storage room Large enough to bring sculptures and materials in and out. Direct access to outside space.

SPATIAL ELEMENTS	FUNCTIONAL ELEMENTS	PHYSICAL ELEMENTS	PERFORMANCE REQUIREMENTS
Kitchen			About 150 sq.ft. "Western"
	Food Preparation	Counter Top	A lot of work room.
	Cooking	Stove	Natural gas
	Dishwashing	Sink	A lot of work room.
	Storage	Cabinet/pots/pans	A lot of storage room.
Living Room			About 200 sq.ft.
	Circulation		Isolated from studios.
	Entertainment	Couch /Sofa	
Studio I	Circulation		About 400 sq.ft.
	Circulation		A lot of natural lighting.
	Circulation		Isolated from guests.
	Painting	Easels/canvas	
	Storage		A lot of storage room.
		Shutters	Allows control of light.
Studio II			About 400 sq.ft. A lot of natural lighting.
	Circulation		Isolated from other work space. Accessible from outside.
	Woodworking		
	Sculpting		
	Storage		A lot of storage room.

SPATIAL ELEMENTS	FUNCTIONAL ELEMENTS	PHYSICAL ELEMENTS	PERFORMANCE REQUIREMENTS
Studio III	Circulation Designing Business transaction Storage		About 180 sq.ft. Isolated from guests. Direct access from entry. A lot of storage room.
Vestibule	Circulation Storage	Tables Chairs Wall cabinets	About 120 sq.ft. Direct access from Front Entrance. Living Room and Studio III. A lot of storage room.

REQUIREMENT TABLE

2. Translation of required elements into their Malay house equivalent

Functional Elements

The translation of functional elements into the Malay house equivalents is based on the description of the functional elements in the Malay house.

Example: In the Malay house, entertainment is synonymous with eating. Therefore, the required functional element entertainment is translated into eating/entertainment. The list of the translated elements is shown below.

Required Elements	Malay house equivalent
Circulation	Circulation
Dishwashing	Cleaning
Personal Cleaning	Cleaning
Cooking, Food Preparation	Cooking
Entertainment	Eating/Entertainment
Eating	Eating/Entertainment
Sleeping	Sleeping
Storage	Storage
Painting	Work
Woodworking	Work
Designing	Work
Sculpting	Work
Transacting Business	Work

Spatial Elements

The translation of the required elements is based on the functions of the required spaces shown in the Requirement Table.

From the Space Function Chart (p 81) it is found that many spatial elements can accommodate the translated functions. Therefore, a cross reference is made to Space Function Diagrams to find the

similarities between the required spatial element and its counterpart element in the Malay house. By eliminating other elements which are inappropriate, the selected spatial element then becomes the translated version of the required spatial element.

Example: The bathroom functions as a space for personal cleaning. The equivalent functional element in the Malay house is cleaning. Based on the Space Function Chart (p 81), cleaning happens in five spatial elements: entry, main house, kitchen, deck and room.

The choice of the translated version of the required element is then made by referring to the Space-Function Diagram. (pp 77-80). The bathroom, which accommodate defecation and shower, happens most often, outside of the Malay house (p 80). Therefore, bathroom is translated to outside.

The list of translations is shown below.

Required Elements	Malay House Equivalents
Bathroom	Outside
Bedroom	Main House, Room
Dining	Kitchen, Deck or Room
Front Entrance	E1
Rear Entrance	E2
Studio 2 Entrance	E3*
Garage	Outside
Kitchen	Kitchen
Living Room	Anjung/Serambi
Studio I	Main House, Deck or Room
Studio II	Main House, Room or Outside
Studio III	Main House or Room
Vestibule	Room or Deck

Physical Elements

Required physical elements can be categorized by level as follows:

Level I: Furniture

Wardrobe/closet/cabinet/countertops

Table/coffee table/chairs/sofa/couch

Stove/refrigerator*

WC/bathrub/sink/wash basin**

Level I: Utensils

Tools/easels/raincoats/umbrellas/ footwear

Cars

Sculptures

3. Steps from Scenario I

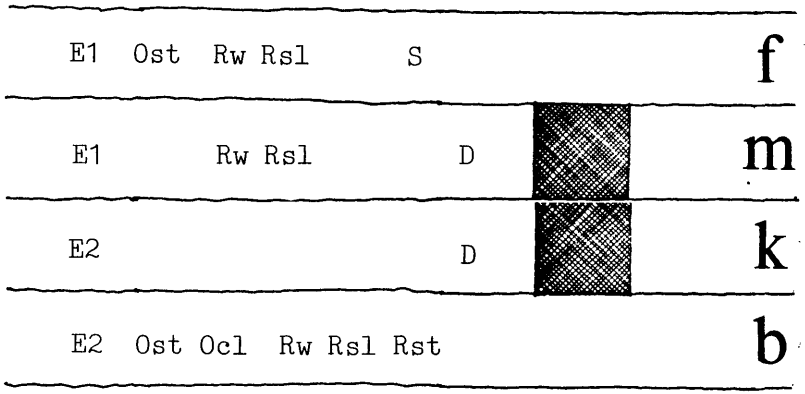
3-1 Choice of Spatial Elements

Required Spatial Element	Chosen Translated Spatial Element
1. Front Entrance	El
2. Rear Entrance	E2
3. Studio II Entrance	E3
4. Bathroom	Ocl (Outside, cleaning)
5. Bedroom	Rsl (Room, sleeping)
6. Dining	De (Deck, eating)
7. Garage	Ost (Outside, storage)
8. Kitchen	K
9. Living Room	S
10. Studio I	M
11. Studio II	M
12. Studio III	Rw (Room, work)
13. Vestibule	Dst (Deck, storage)

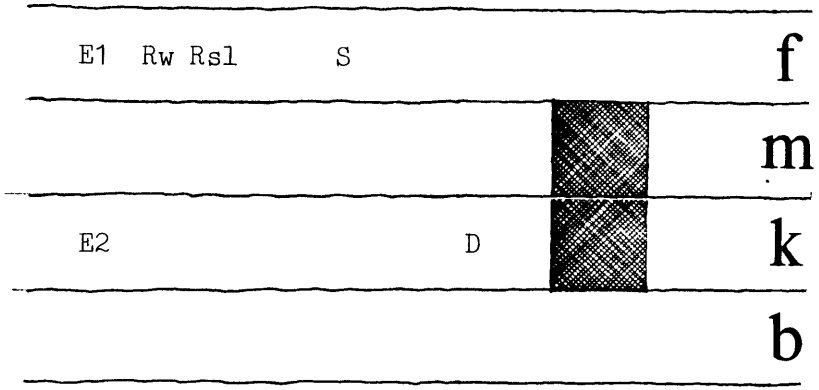
*Implies the need for electricity

**Implies the need for water supply and drainage

3-2 Possible Locations of Elements

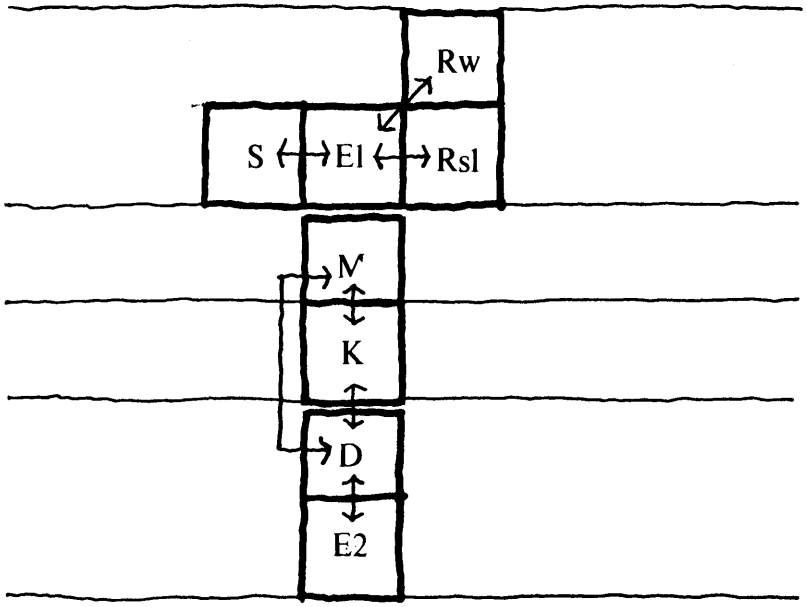


Chosen Location



Required Spatial Element

3-3 Space Positions



3-4 Space Connection

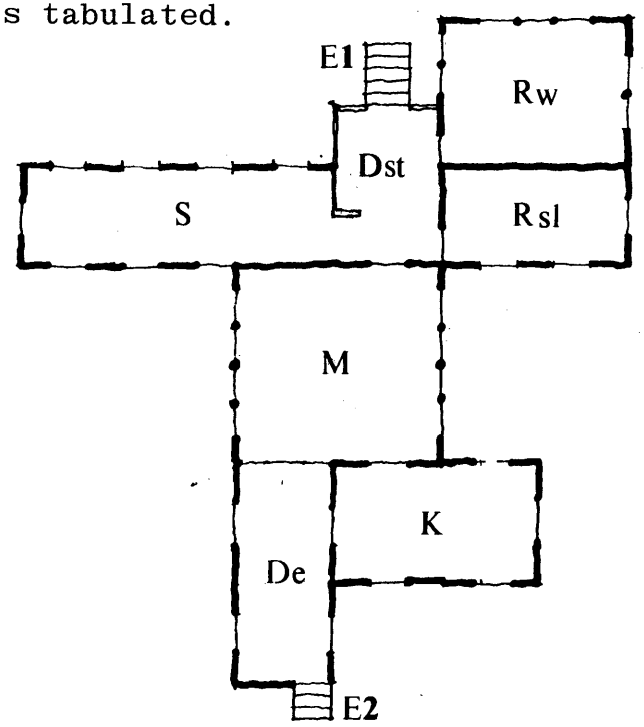
Where a connection requirement is not required, the Malay house connection rules are used (pp 58-60). Where there are no rules, this is noted.

1. E1 must be connected to S and Rw (required).
2. E2 must be connected to D.
3. E3 has no rule.
4. S must be connected to M and E1 or M and D.
5. M must be connected to K.
6. K must be connected to M.
7. D must be connected to K and (M or Rw) (required).
8. Rs must be connected to Oc (required).
9. Rw must be connected to E1 (required).
10. Oc must be connected to Rs.
11. Os has no rule.
12. De must be connected to E1, S and Rw.

3-5 through 3-15

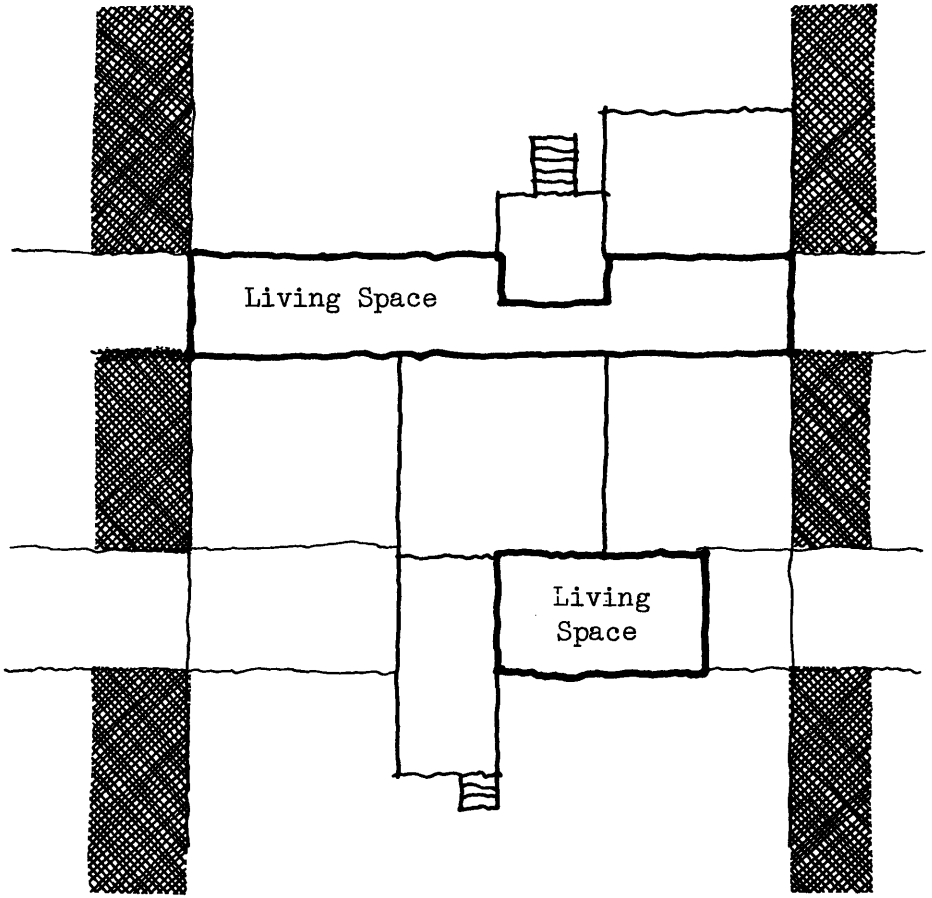
From here on the steps taken are the same as those taken in the earlier scenario.

Based on what has been shown earlier, it is possible to come up with layouts that would meet the performance requirements tabulated.



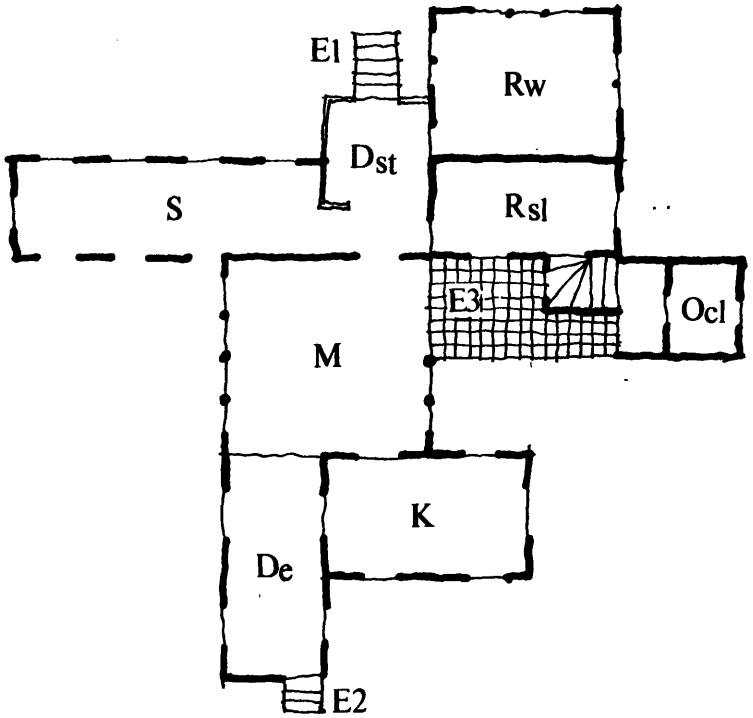
Note: This configuration was derived by omitting spatial elements that could not be incorporated into the house using the given rules.
Ocl had to be brought into the house using traditional rules shown on page 69.
E3 can be placed where necessary, in this case, connecting M to an outdoor space.

4. Traditional Rules



Areas that Ocl (toilet and bathroom) can be placed

5. Final Configuration



Ocl was placed outside of the "shadow of the house" and E3 was placed so that Ocl has access to other parts of the house.

6. Changes that the Malay house must make to fulfill performance requirements.

4.3 Speculating Other Changes

After seeing that changes can be introduced without affecting the systems in the Malay house, Adrienne is interested in knowing how the house would be affected by changes other than those she had observed.

It may be assumed that one major phenomenon affecting the change of the Malay house is technology. Change in technology affects the Malay house in such areas as:

1. building materials
2. building systems
3. building construction techniques.

It is part of the hypothesis of this study that, however radical changes may develop in the future, this will not necessarily mean that the underlying reasons for the layout and organization of spaces in the Malay house, cannot adapt to these changes. It does not mean that, the Malay house would lose its meaning and character should it adopt the changes. In fact, the Malay house can adapt to the various ways and means by which building technology develops.

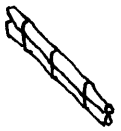
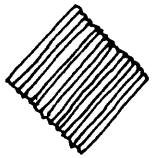
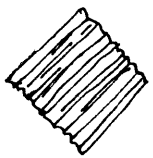
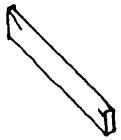
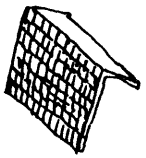
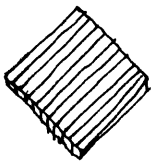
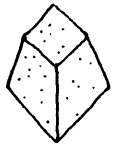
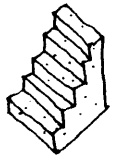
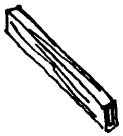
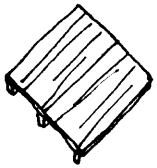
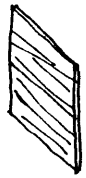
The following pages show some of the building materials that could be incorporated into the Malay house context without destroying its intrinsic character.

From the Levels of Physical Elements Chart, elements in level I are limited to furniture and consumer products. Therefore , only variations in materials of elements in levels II and III are shown (p 10).

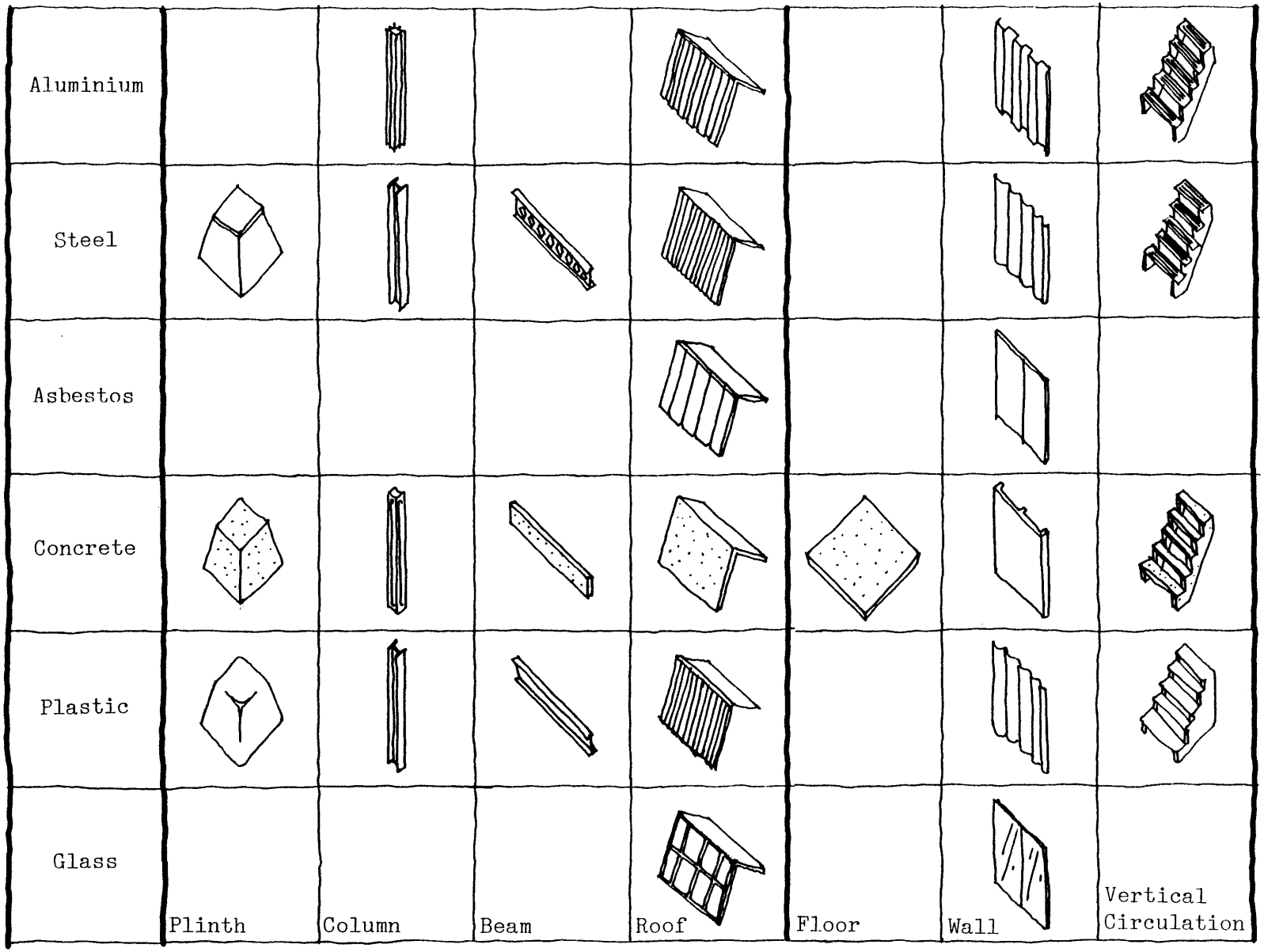
At this point, the examples shown are almost hypothetical, since further research and experimentation will be re-

quired to do justice to the full range of possibilities in using new materials and methods for the creation of an indigenous Malay house type.

Changes in building systems and construction techniques, including tools and transportation equipment in the building industry, would also require an in-depth study which is beyond the scope of this work.

	Level III				Level II		
	Plinth	Column	Beam	Roof	Floor	Wall	Vertical Circulation
Bamboo							
Palm							
Wood							
Stone							
Plywood							

MATERIALS FOR PHYSICAL ELEMENTS


Aluminium
Steel
Asbestos
Concrete
Plastic
Glass
Plinth
Column
Beam
Roof
Floor
Wall
Vertical Circulation

Conclusion

Within the limits of available information based on the assumptions made in this study, it has been shown that the essential characteristics of the Malay house can be derived from its elements, rules that govern them and the variations which are possible based on the application of the rules to the positioning and dimensioning of the elements.

It has also been shown that once these underlying principles are understood, changes in requirements can subsequently be incorporated into the house plan without necessarily inhibiting culturally contiguous concepts, basic processes and methods in construction.

It is hoped that this effort has opened up new areas for research directed towards a deeper and more sophisticated understanding of the Malay house. First, is its history, which needs to be traced from the full understanding of the elements which may have been excluded, to find out more about the rules governing change. Thus the origins and laws governing Malaysian architecture will be rediscovered, and made part of a living tradition able to absorb change, without losing its genius.

Whereas the Malay house has always allowed owner intervention and participation in the building process, modern houses, built in the recent past and

based on imported notions of design and decision-making, have not. Other studies have yet to be done to find out the levels at which developers and dwellers should intervene and/or participate in the building process. Perhaps, the rediscovery of the information leading to the planning of the Malay house and applied in this study, represent a first step in restoring within the Malay culture, a process of dwelling that will involve the active participation of the dweller, while at the same time enhancing the role of the new professionals and providing an integrated model for adapting to changes.

The introduction of industrialized housing systems to Malaysian conditions have not responded too well to the existing social, economic and other conditions of the country. Much research is needed to adapt the housing systems to the geography, climate and lifestyle of the people. Only an adaptation of rules, such as these developed on the preceding pages, to the design and production of industrialized building elements could lead to a more rationalized and sensible approach to architecture and housing design in Malaysia.

This thesis is not meant to be a complete compendium of how to build a Malay house. Nor does it pretend to reveal the full range of tradition of the master-builders who have been handing down the rules of house-building for generations, for it is not the main purpose of this study. What is important is the attempt to show that the Malay house is not to be viewed as a romantic relic of some lost age or culture, but a living tradition which can be understood and evaluated in rational and contemporary terms, and which is capable of adapting to changes in the needs and aspirations of contemporary Malaysians.

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