# Sustaining Tradition

Design for a Contemporary Thai House in Northern Bangkok

by
Bundit Kanisthakhon
B.A., University of Washington
Seattle, Washington
December 1993

submitted to the Department of Architecture in partial fulfillment of the requirements for the degree of Master of Architecture at the Massachusetts Institute of Technology
February 1998

Signature of the Author. . . . . .
Bundit Kanisthakhon
*Department of Architecture*
*January 23, 1998*

Certified by . . . . . .
Hasan Uddin Khan
*Visiting Associate Professor of Architecture*
*Thesis Advisor*

Accepted by. . . . . .
Roy Strickland
*Departmental Committee on Graduate Students*
*Chairman*

Readers:

Eric Dluhosch
*Senior Lecturer, MIT*

Reinhard Goethert
*Principal Research Associate, MIT*

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## ABSTRACT

This thesis explores and documents the evolution of a Thai house, which has transformed drastically over the years to meet changes in social aspiration. The result of this investigation had generated the design principles for a new single family house, which can be used as a prototype for future development in Thailand. The application of the ensuing guidelines, which are responsive to the local climate, technology and culture, is presented as an alternative to current construction practice.

Thesis Advisor: Hasan Uddin Khan
Title: Visiting Associate Professor of Architecture

# A c k n o w l e d g m e n t

**Hasan Uddin Khan**, for the best semester at MIT, I found what I was looking for.....finally.
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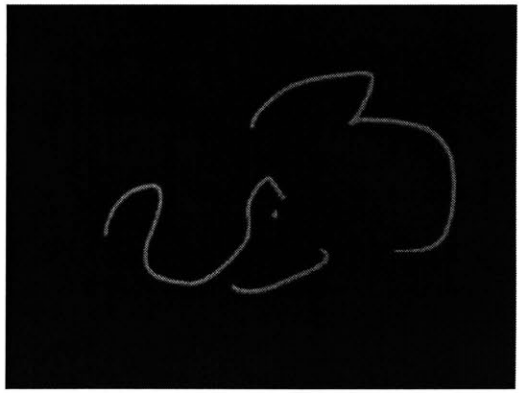
**Derek**, my running partner, I like that fish.
**ET**, you are a wonderful neighbor...
**Fausto the Fisherman**, I miss you.
**Tow Waits** and his early years.
**Pele**, for protecting me.
**Janice (HNJJ)**, for making me happy! And responding to all my rescue calls.



This Thesis is Dedicated to:
**My Family &**

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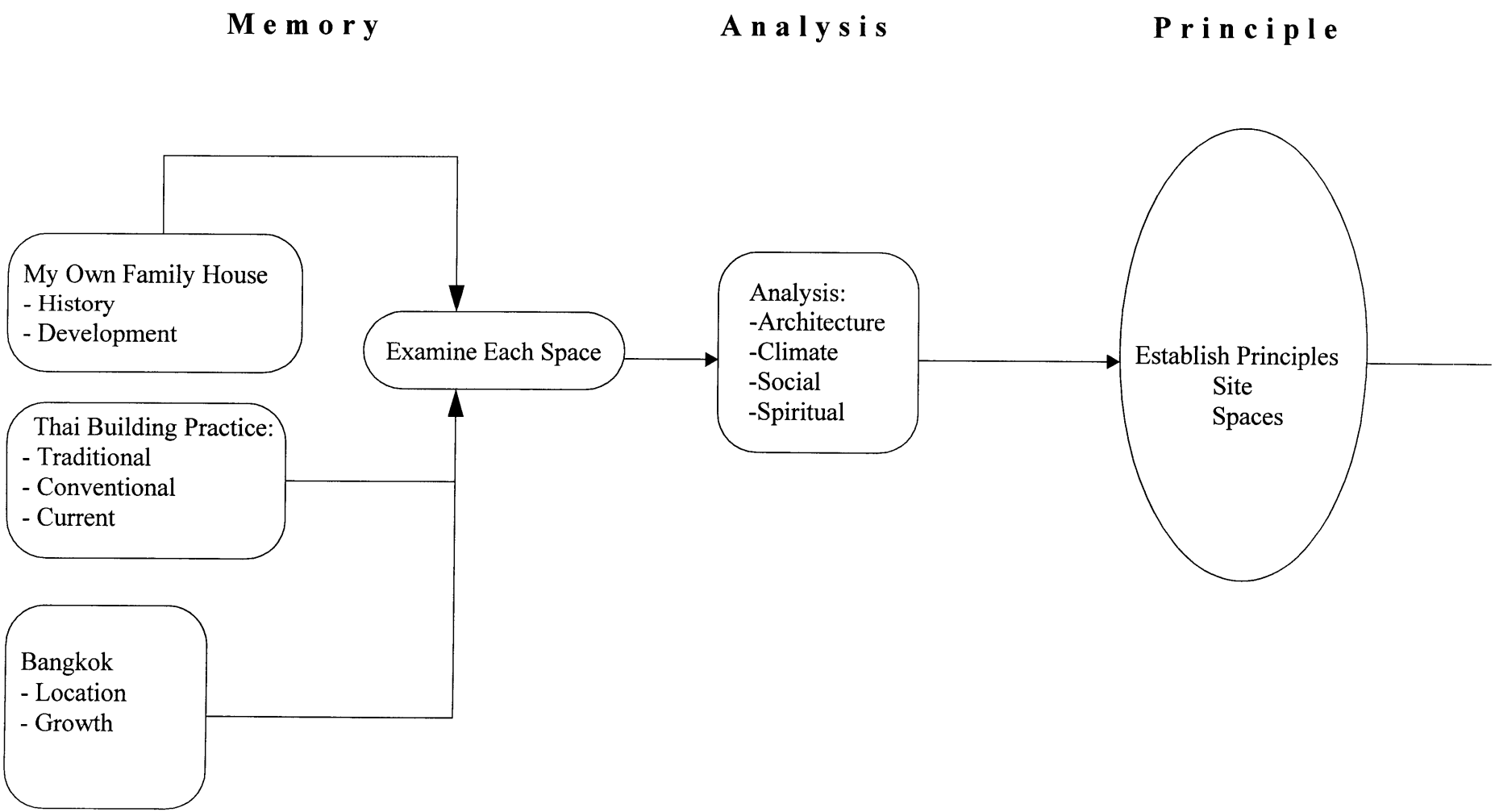
All photographs, drawings and translations are done by the authors unless otherwise noted.

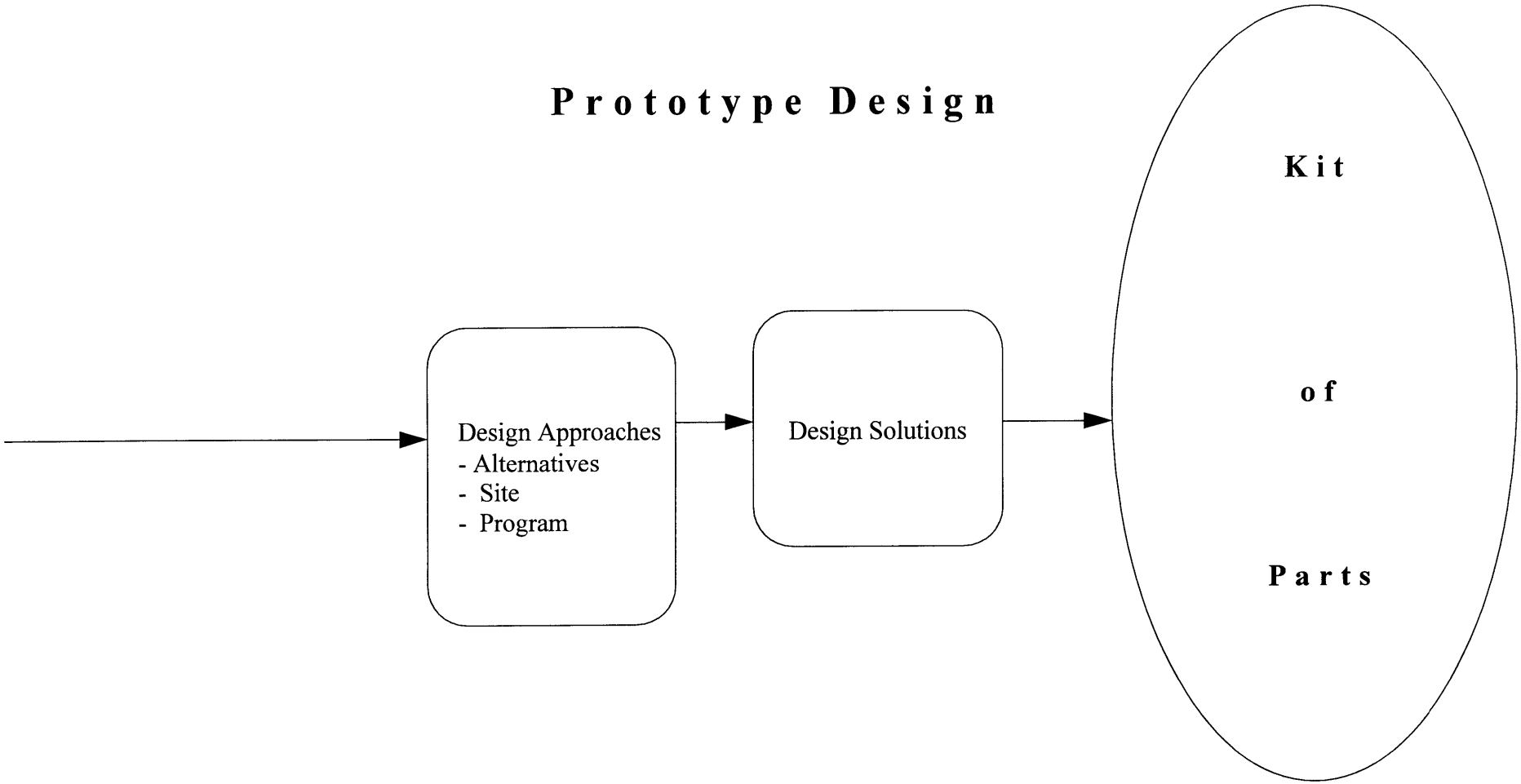
# 1

# Methodology

# A visual summary of the design process



# Prototype Design



# 2

# Bangkok

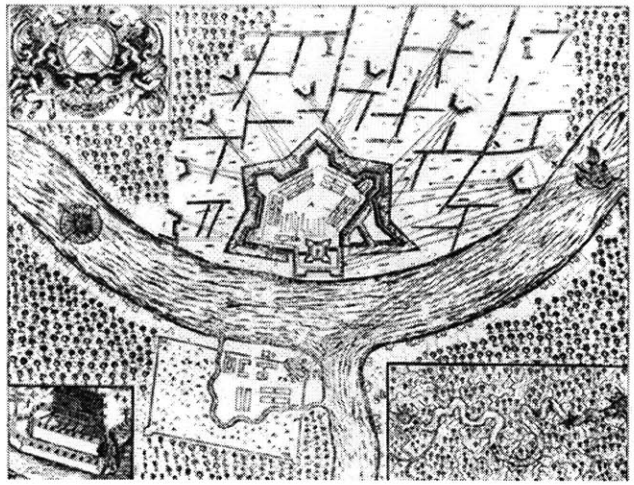


*Fig. 2.1 A late 17th century French plan of Bangkok on the left bank.*

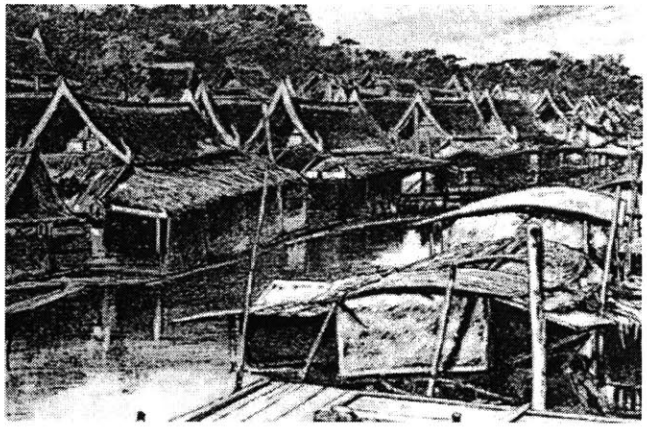


*Fig. 2.2 Canal scene in old Bangkok.*

# C i t y G r o w t h

When Ayudhya, the original capital city of Thailand was sacked by the Burmese in 1767, a new capital city was established in Bangkok by King Rama I. Because Bangkok is located on a flood plain with heavy monsoon rain season, the city was first designed and built as a floating city next to the Chao Praya River, connected by series of canals (klong), making it unique in the world. By the

middle of the nineteenth century, the center of Bangkok was said to contain some 7,000 floating houses and a floating population of 350,000 people.[1]

Architecturally, Bangkok has three main types of structures: floating, amphibious, and masonry. Floating houses are houses built on bamboo raft that float on the water. Amphibious architecture is built on stilts, scattered along the river and canal banks. As for masonry structures, which are usually ceremonial palaces and temples, are generally built on higher grounds or on solid podiums.

Land based urban development began to appear in 1887, when the first true road, Rama IV Road, was opened for public use, followed by the introduction by trams in 1887 and railways in 1890. Westernization took place in Bangkok in a rapid and undigested manner causing land based life style and technology to develop. As a result, Bangkok had become two towns, the floating and the land based, badly sewn together and contradict one another in cultures and functions.[2]

Thai architecture had earnestly assumed, at first, the quaint Western Neoclassicism but later nondescript styles sitting squarely on the ground. The Chinese, merchants who had migrated to Bangkok, reinforced the land based development by covering Bangkok with their unending rows of shophouses. Meanwhile, canals began to be filled in and replaced by roads and drainage.[3] Bangkok,

*Fig. 2.3 Early Western Style House.*

1. **Sumet Jumsai**, *NAGA: Cultural Origins in Siam and the West Pacific.* p.167.
2. **ibid**, p.169.

including the suburbs, grew from a city of 400,000 people in the last century to one of seven million today. Freeway infrastructures and highrise office towers have already altered Bangkok's skyline beyond recognition from the city of less than a generation ago. Bangkok's predicament is aptly expressed by Nietzche:

"Just as happened in the case of those sea creatures who were forced to become land animals....all of a sudden they found all their instincts devalued, unhinged. They must walk on legs and carry themselves, where before the water had carried them: a terrible heaviness weighed upon them. They felt inept for the simplest manipulation, for in this new, unknown world they could no longer count on the guidance of their unconscious drives...."[4]

*Fig. 2.4 Flooding in Bangkok*

3. **ibid**, p.170
4. **ibid**, p.171.

# Building Types

The houses in Bangkok may be divided in to three types, reflecting their construction techniques: Traditional, Conventional and Current.

## Traditional

The traditional Thai house was built as an one story wooden structure on stilts. These houses had rectangular high pitch roofs with extended overhang and were placed on wooden platforms. The house could be a group of buildings for a big family or a single structure for a married couple. In addition, there were many practical factors that determined the characteristics of the house type.

Geographically, Bangkok is a flood plain with the Chao Phraya River running through it. The river (Ma-nan: mother -water) and the canals (klong) became the primary route of transportation. Therefore, people built their houses along these waterways. These houses were built on stilts to avoid floods and to protect the inhabitants from reptiles. And when the land was dry, the space underneath the house could be used as a multi-purpose space, where family members worked, parked their boats, and stored tools. It is also where livestock was sheltered.

Houses in the tropical climate must be designed to allow natural ventilation, with high pitch roofs to shed water quickly, extended overhang to provide shading and to keep

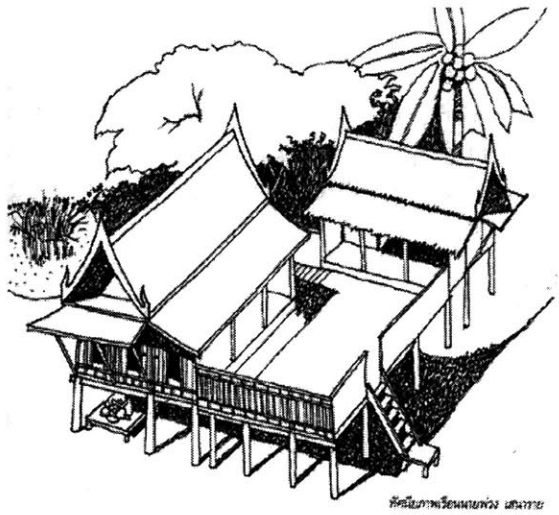


*Fig. 2.5 Traditional Thai House.*

*Fig. 2.6 Traditional Thai House During Flood.*

the rain off the walls.

In the past, wood was a material available locally and was used as the primary element in structure. Other materials, such as bamboo and thatch, were used for wall panels, which were prefabricated and then attached to the house structure. The house was often built in standard sizes using human proportion as a measuring tool, so that structural components can be assembled or dismantled quickly.

A single family house usually consisted of more than one unit: sleeping unit for the parents, another unit for children, a living unit and a cooking area. Although these units varied in size, they were built in the same basic form and joined together by the verandah. The verandah was a multi-purpose area for shared activities. Potted plants and vegetable were placed on the verandah next to the cooking area, where they can be used for cooking and as a sun shading device. And when extra rooms were needed, the verandah was used as adjoining platform that tied the whole house together.

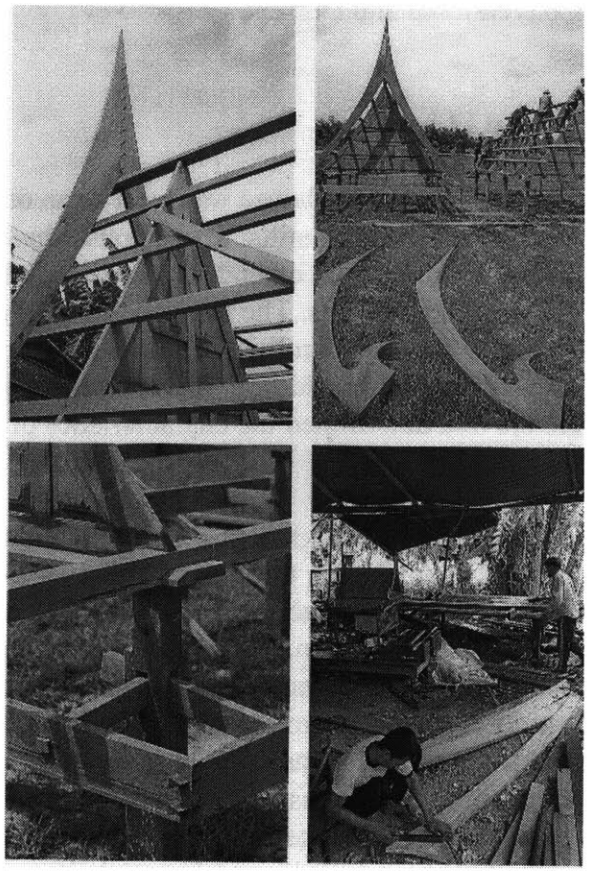


*Fig. 2.7 Construction Details of a Traditional Thai House.*

## Conventional

Most single family houses in Bangkok today are two stories concrete frame structures with brick infill. The construction materials and skilled labor for this type of construction are easily found locally. These houses usually have two to three bedrooms, three bathrooms, servant's room, living room, kitchen, dining room, and some with office and garage. Unlike traditional Thai houses, which consisted of a grouping of many structures, today's conventional home has all its functions housed into one single structure.

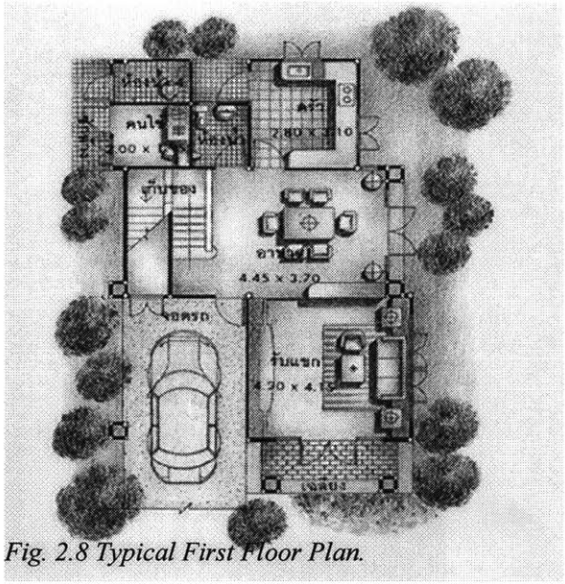


*Fig. 2.8 Typical First Floor Plan.*

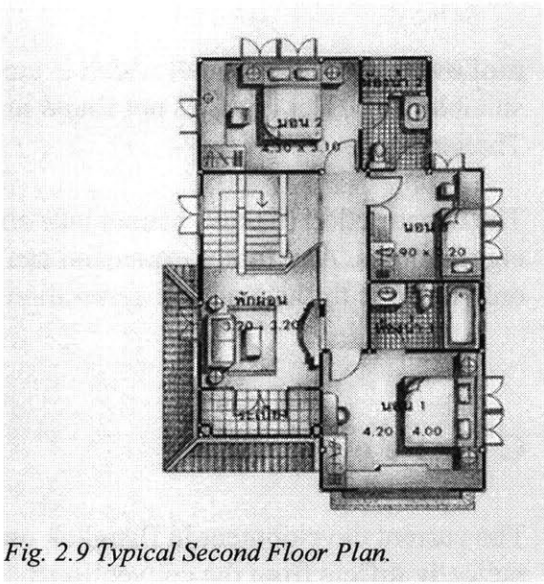


*Fig. 2.9 Typical Second Floor Plan.*

Unresponsive to site conditions, these houses can be chosen from real estate catalogs and can be built anywhere according to the owner's wish. Most of these houses are located at the outskirts of Bangkok in the gated communities. As these houses do not respond in any way to the region's climatic condition, most people experience flooding problems every year during the rainy season.


*Fig. 2.10 House During Construction.*


*Fig. 2.11 Finished House.*

In addition, the masonry walls of these houses absorb the heat from the sun during the day and then release it into the house at night which further encourage the use of air conditioning. Moreover there are few shading devices on the openings and the

roof overhang is very small which is more suitable for colder climates not found in Thailand.

The construction of these houses take about eight months. Any future expansion can only be done through ad hoc annexation.

## Current

The current development in Bangkok only radically differs from the conventional house in its construction material and method. Instead of a concrete post and beam system, these new houses are made of a system of steel studs and highly insulated walls. Therefore, the house has to be fully air conditioned at all time. These houses also come with the options of private sauna, jacuzzi and music studio. Given the higher costs, these houses are aimed at the upper income brackets and can be completed in four months at any time of the year.

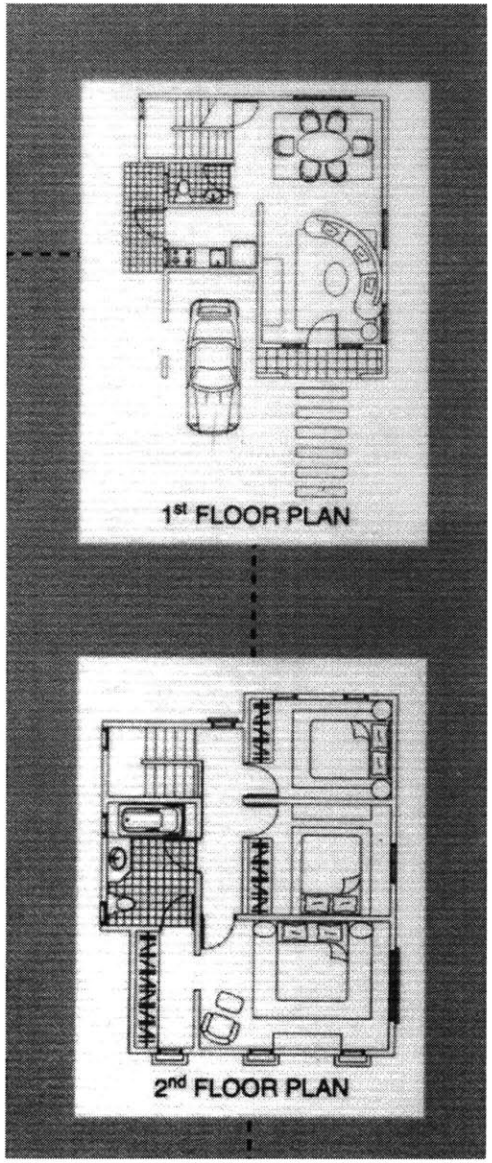



*Fig. 2.12 Typical Floor plan.*

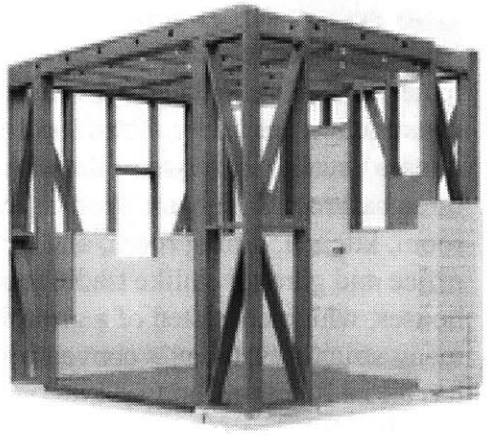


*Fig. 2.13 Current structure system.*

*Fig.2.14 Finished house.*

# Comparison Of Building Types and Systems

| System | Building Systems | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Structure | | | | | | | | | Building Envelope | | | | | | | | | Mechanical | | | | | | Interior | | | | | | | | | |
| | Primary | | | Roof | | Floor | | | | Wall | | | | Roof | | | | | HVAC | | | Lighting | | | Floor | | | | | Ceiling | | | Wall | | |
| | Wood Frame | Reinforce Concrete Frame | Steel Frame | Wood Frame | Steel Frame | Wood Frame/ Wood Panel | Pre-cast Concrete | Cast-in-place Concrete | Steel Frame/ Sub-floor | Wood Panel | Brick Masonry | Gypsum Board/ Insulated Styrofoam/ Finishing | Gypsum Board/ Insulated Microfiber/ T1-11 | Clay Tile | Wood Tile | Thatch Roof | C-pac (Concrete Tile) | Asphalt | Natural Ventilation | Electric Fan | Air Conditioning | Natural Lighting | Oil Lamp | Artificial Lighting | Wood | Parquet/ Hard Wood Floor | Carpet | Ceramic Tile | Rubber Tile | Exposed | T-bar Hung Ceiling | Dry Wall Ceiling | Wood Panel | Wall Paper/ Paint | Gypsum Board |
| S-1 Traditional | ● | ⊕ | ⊕ | ● | ⊕ | ● | ⊕ | ⊕ | ⊕ | ● | ○ | ⊕ | ⊕ | ● | ● | ● | ⊕ | ⊕ | ● | ⊕ | ⊕ | ● | ● | ⊕ | ● | ⊕ | ⊕ | ⊕ | ⊕ | ● | ⊕ | ⊕ | ● | ⊕ | ⊕ |
| S-2 Conventional | ◐ | ● | ○ | ⊕ | ● | ⊕ | ● | ● | ○ | ⊕ | ● | ◐ | ○ | ○ | ⊕ | ○ | ● | ◐ | ○ | ◐ | ● | ◐ | ○ | ● | ⊕ | ● | ● | ● | ◐ | ◐ | ● | ● | ⊕ | ● | ◐ |
| S-3 Current | ⊕ | ○ | ● | ⊕ | ● | ⊕ | ◐ | ● | ● | ⊕ | ○ | ● | ● | ○ | ⊕ | ○ | ○ | ● | ○ | ○ | ● | ◐ | ○ | ● | ⊕ | ● | ● | ● | ◐ | ○ | ● | ● | ⊕ | ● | ● |

● In Use

◐ In Use Sometime

⊕ No Longer In Use

○ Not In Use

# 3

# Memory

*Fig.3.1 Aerial photograph of Northern Bangkok with my neighborhood in circle.*


## M y N e i g h b o r h o o d

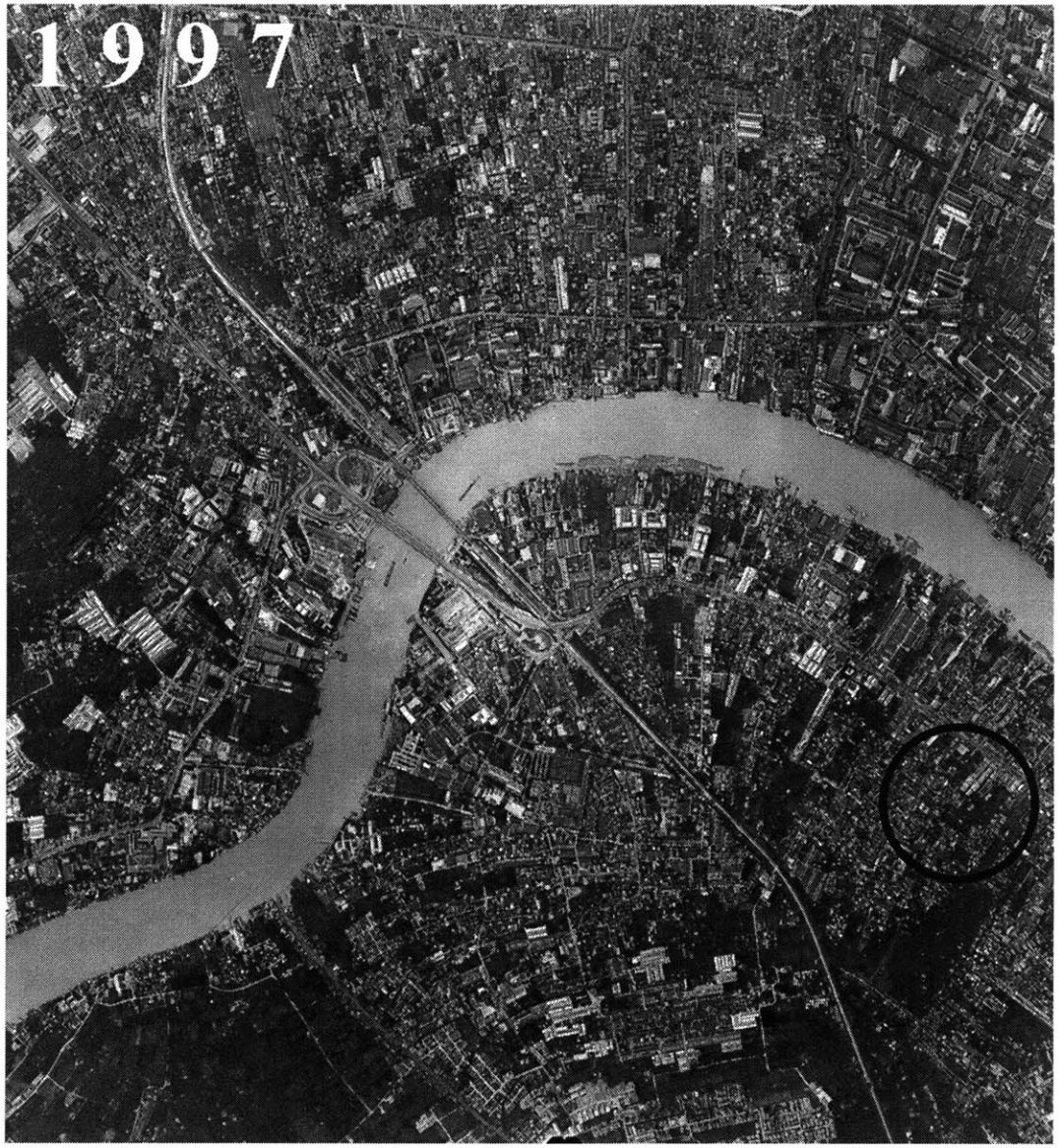
For me, this search for the fundamental design princ iples became a journey to my past by looking at the transformation of my own house and its neighborhood over time. My quest was to discover the truth in which to base my analysis upon. To find a personal truth is to go back to one's origins, to investigate why a opinion is held, to find out what is permanent. These are the result of my search.....

The following are the aerial photographs of my neighborhood in 1952, 1975, 1987, and 1997. With the evolution of my house, from when it was first built in 1966 to the present, each major physical change was recorded. The history of the house was passed down orally from my grandparents and also by my own observation.

The house is located in northern Bangkok, east of the Chao Praya River. The surrounding neighborhood was once farmland and fruit orchards. My house was once a farm too, passed down from generation to generation for nearly 200 years. There is a canal, one of the many branches off of the Chao Praya River, next to the house. The neighborhood was once named after the canal, Klong (canal) Manao (lime), because lime was the main farm product in this area. Today, the neighborhood is named Jaransanitwong 85, after the main road that cuts through the area.

The following pages contain quotations from my family during conversations that I had with them, about how we once lived. These became clues on which I based my design explorations.

*Fig. 3.2 Aerial Photograph of Northern Bangkok with my neighborhood in circle.*



We were all farmers, my mom, my dad, my grandmother, my grandfather....
duriens and mangos are the things that we grew.....
your dad was the first one to have the chance to attend school.....
toilet? We used an outhouse.....
Bathing? We did it in the klong.....washing? Still the klong.....transportation?
The klong.....to play? The klong.....food? The klong.
We had a small Ruan Kruang Phuk by the klong....we kept our ducks underneath it..... we stored our boats there too.

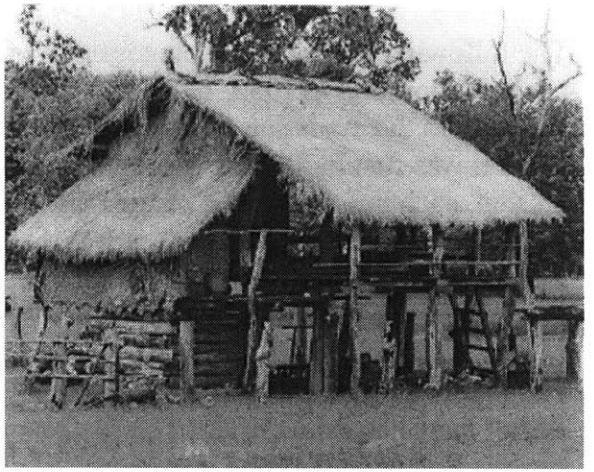
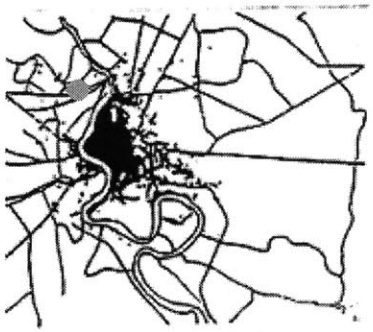


*Fig 3.3 Ruan Kraung Phuk.*

**1 9 5 2**

*Fig. 3.4*



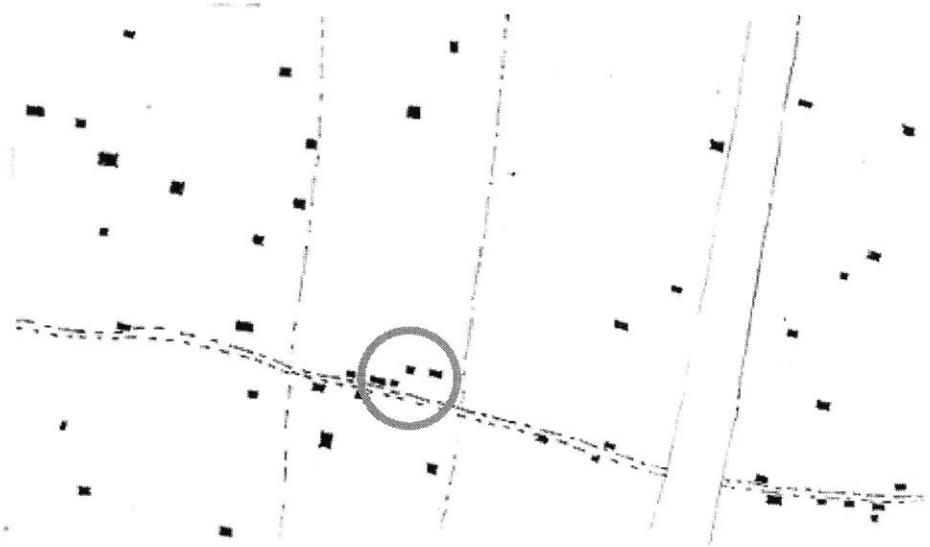


*Fig. 3.5*

Floods came very fast sometimes, but we never had to worry about it....it's just a part of our lives.

Bangkok was so far away.....

**- Grandmother**

*Fig. 3.4*
*My neighborhood in relation to the growth of Bangkok in 1952.*

*Fig. 3.5*
*Figure ground study of my neighborhood with my house in circle.*

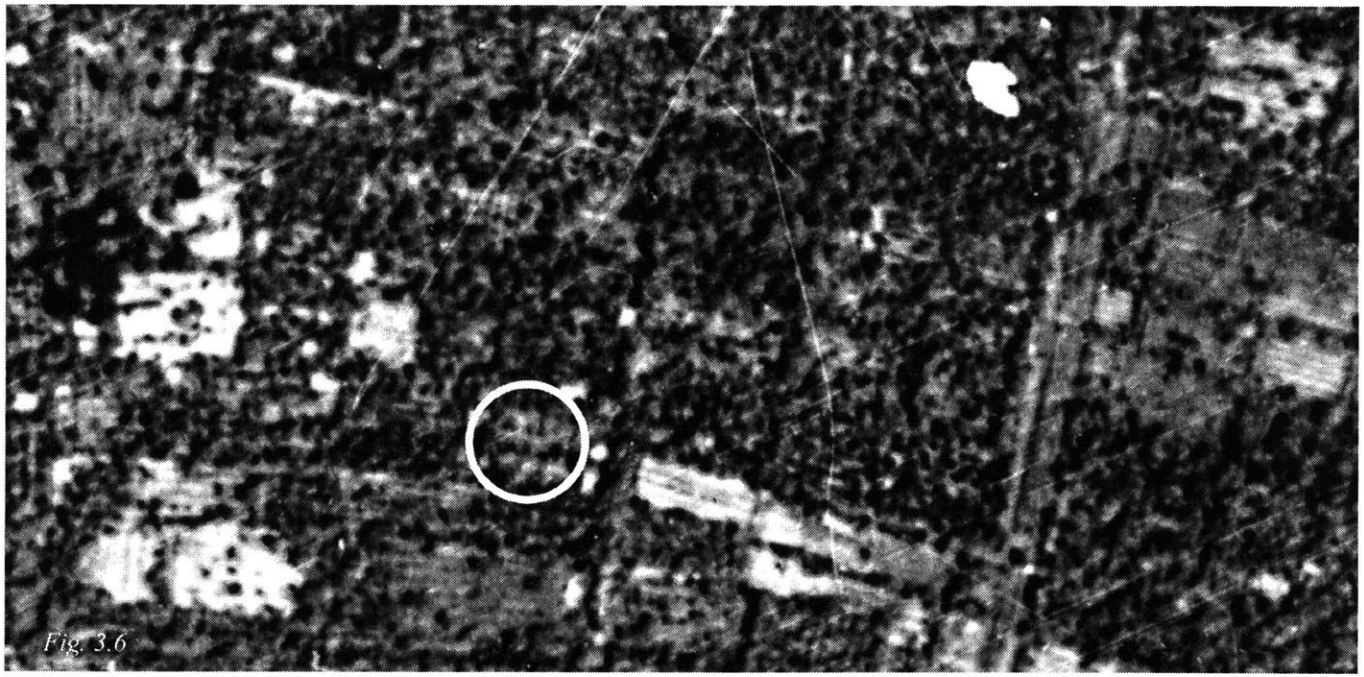



*Fig.3.6*
*Aerial photograph of my house.*

I used to jump into the klong every morning before I went to school.....that's my bath.....

I've been living on this piece of land for 63 years now.....I wouldn't think of living anywhere else.....

would you like a mango? I grew the tree myself....from when I was seven....

I built this house when your mom and I first got married.....right next to your grandmother's.....seven of my friends came and helped me build.....we did it in 2 months.....

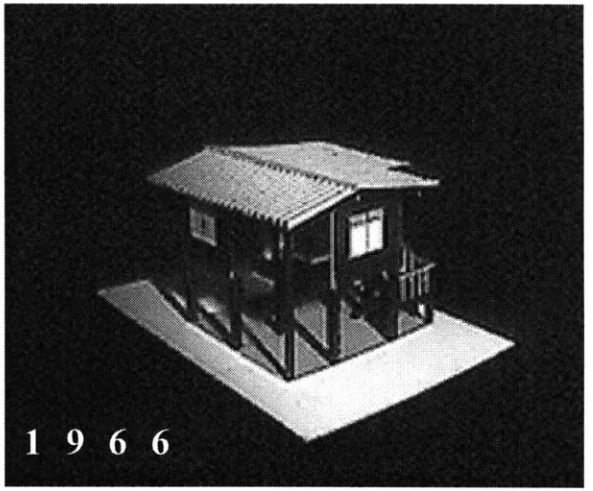



*Fig3.7 My house in 1966.*

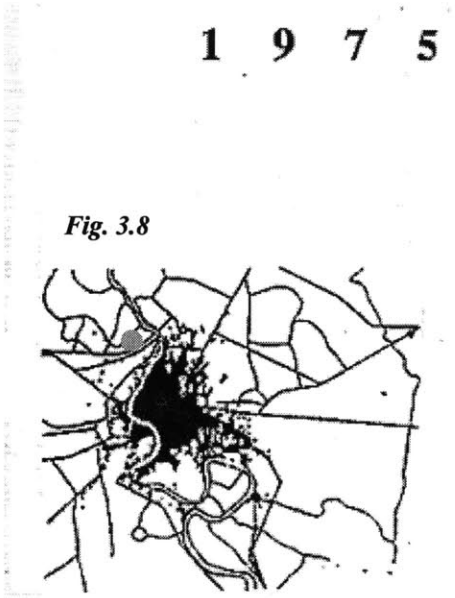



***Fig. 3.8***

***Fig. 3.9***

We bought our first car in the same year, so I could go to work in Bangkok.....it was too far by boat.

Then, your sister was born, followed by you.....and the schools that you went to were all in Bangkok, took about 20 minutes to get there back then.....

We needed more space in the house, so we enclosed downstair....added another bedroom for the servant.

Your mom just got a job across the river, your grandpa took her to work sometime on the boat.....it's faster that way when there's traffic.

**- Dad**

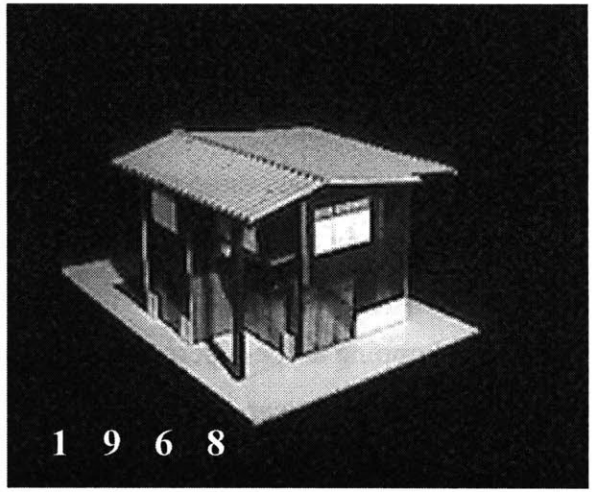



*Fig. 3.10 My house in 1968 with downstair enclosed.*

*Fig. 3.8*
*My house in relation to the growth of Bangkok in 1974.*

*Fig. 3.9*
*Figure ground study of my neighborhood with my house in circle.*

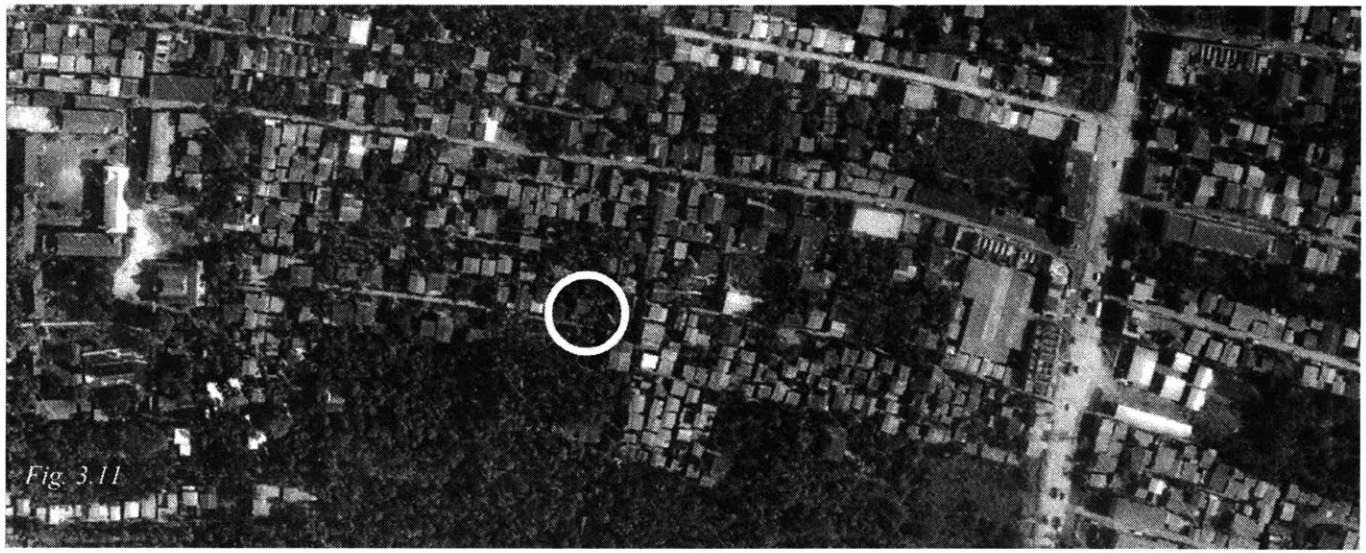



*Fig. 3.11*
*Aerial photograph of my neighborhood.*

I started driving to work because there wasn't any water in the canals anymore.....I also drove you, your sister, and your three cousins to school.
Your cousins moved in with us from Nonthaburi, they were going to schools in Bangkok..... we needed more room for them, so we subdivided the big room upstair into two bedrooms.....
I came home everyday from work to cook for you guys.....
I started shopping at the supermarkets because there's always parking, not like the farmer's market near our house.....

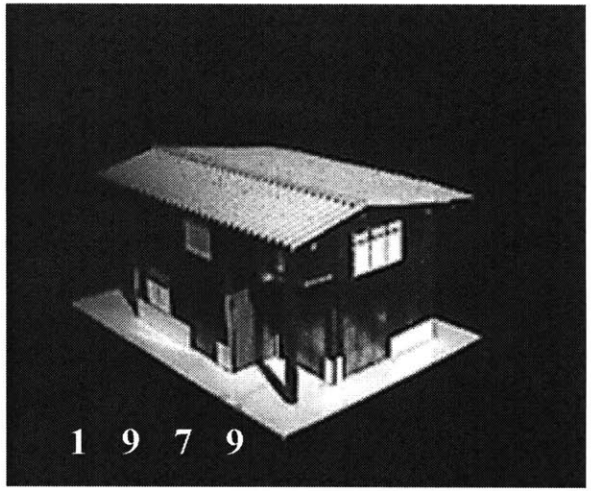



*Fig. 3.12 My house in 1979.*

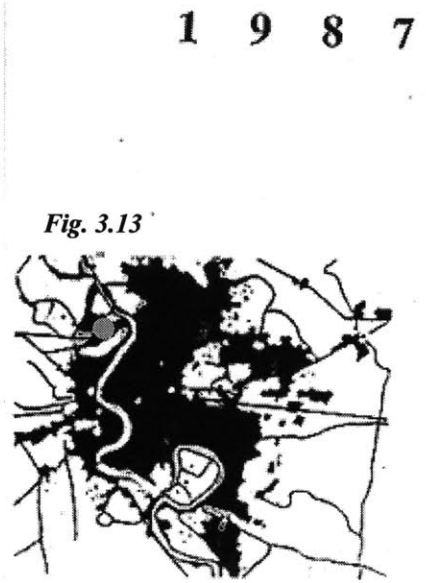



*Fig. 3.13*

*Fig. 3.14*

We also bought our first washing machine around this time because the servant got real homesick and left us.....so we hired the local builders to build us a laundry room at the back of the house....and also a bigger kitchen.....

**- Mom**

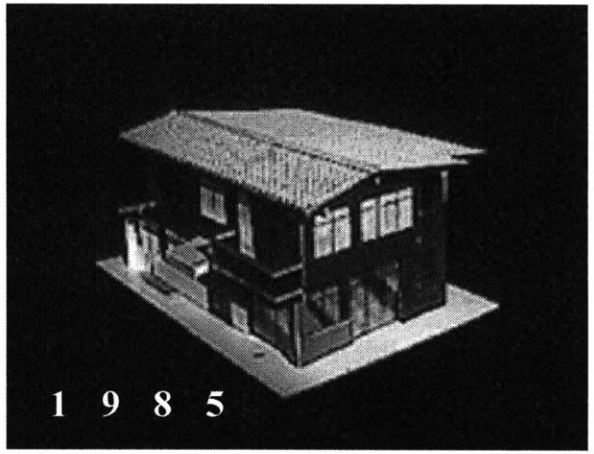



*Fig. 3.15. My house in 1985 with a laundry room added in the back..*

*Fig. 3.13*
*My neighborhood in relation to the growth of Bangkok.*

*Fig. 3.14*
*Figure ground study of my neighborhood with my house in circle.*

*Fig. 3.16*
*Aerial photograph of my neighborhood.*

After having been educated in the U.S. for five years, coming back to visit my family house, was a big surprise.....

My mom added another room that can be fully air-conditioned.....two modern bathrooms and a new modern kitchen.....well, more like a pantry.....now we have three refrigerators in the house.....

The house was raised up quite a bit since last time I saw it.....my parents had to hire some builders to jack it up because the ground of Bangkok is sinking....oh,

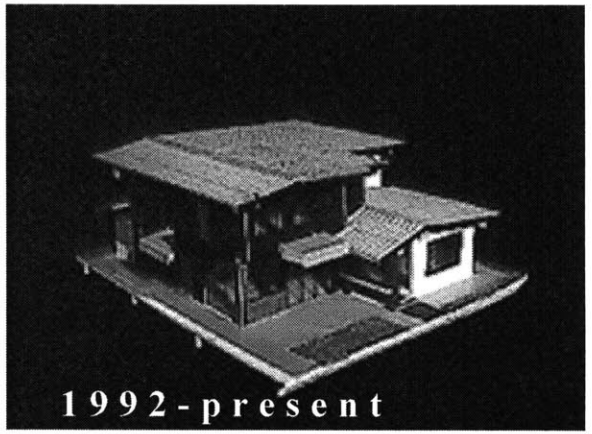



*Fig. 3.17 My house in 1997 with another room added in tne front.*

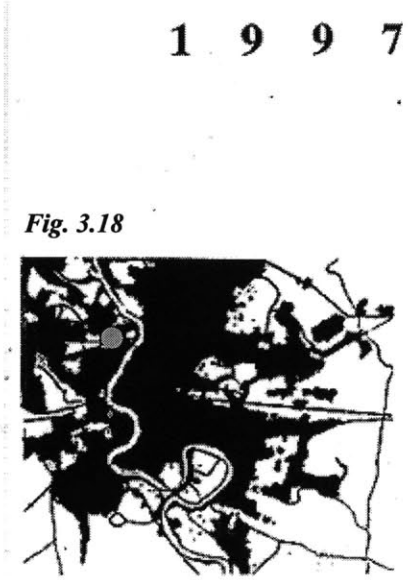



*Fig. 3.18*

*Fig. 3.19*

and also the floods.....

Since my sister got married, there's only 2 persons left in the house now, my mom and dad.....and they keep asking me: when are you coming HOME?

Where is my home? Bangkok? Seattle? Boston? Mexico?

- Myself

*Fig. 3.18*
*My neighborhood in relation to the growth of Bangkok in 1997.*

*Fig. 3.19*
*Figure ground study of my neighborhood with my house in circle.*

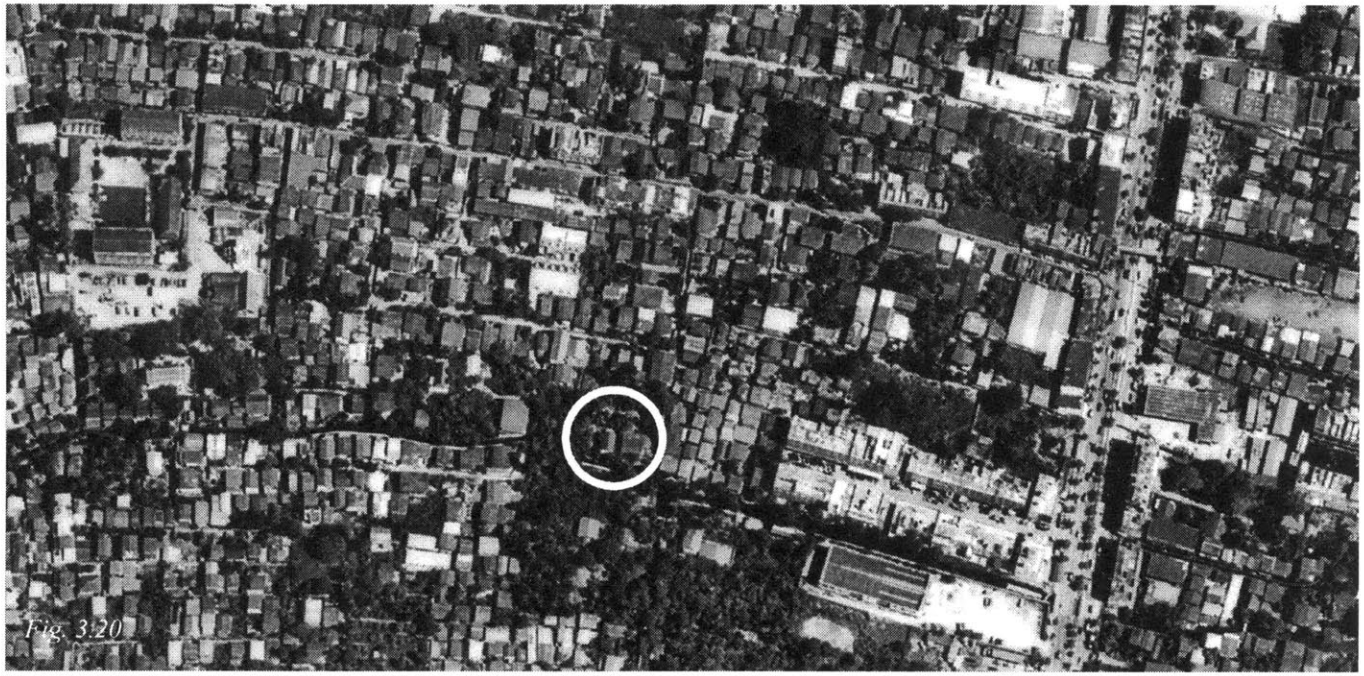
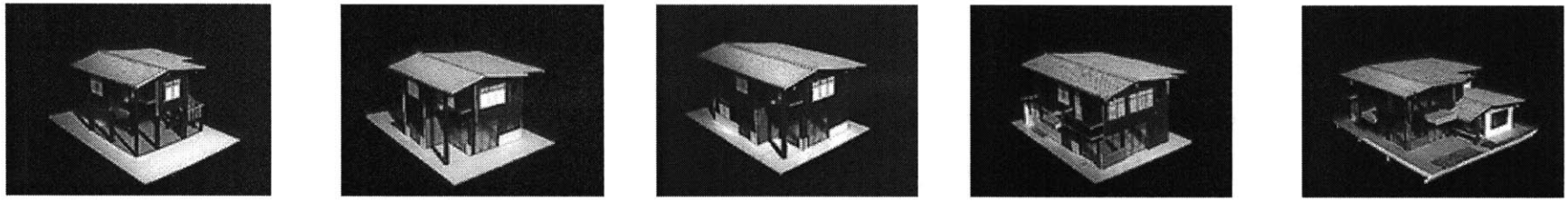


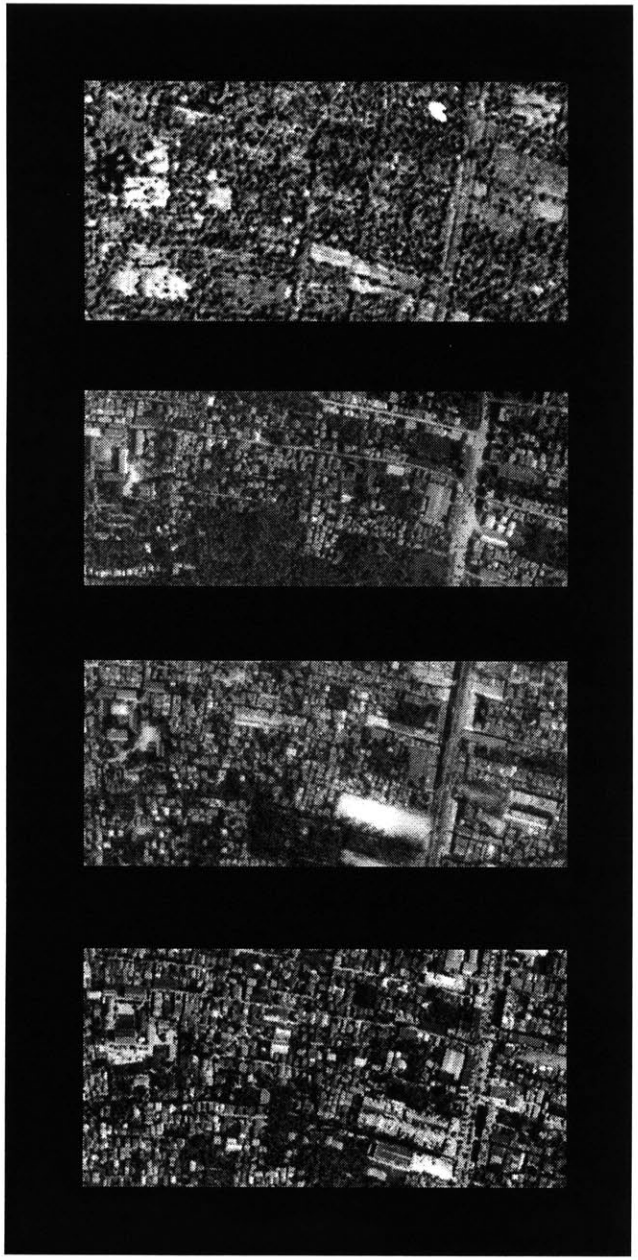

*Fig. 3.20*
*Aerial photograph of my neighborhood.*



*1966* *1968* *1979* *1985* *1992-present*

*Fig. 3.21 Growth of my house over time.*

*Fig. 3.22 The main facade of the house in 1997.*




"These longings were so urgent that home could sustain any number of violations and variations without losing its hold. Little did I know as a child how forcefully the world would encroach on me, giving me the strength to drive myself out of my house and transforming my understanding of home."

- Lucy Flint-Gohlke

*Fig. 3.23 Growth of my neighborhood over time.*

# 4

# Principles

The approach in this analysis is to examine each individual space in the various Thai building types and call it by its function. The building types include traditional, conventional, current, and my own family house. Then these functional areas are analyzed by the spiritual, climatic, social and architectural principles evolved. A new category deals with derived principles that are used to guide the prototype design.

# S i t e

**Traditional Conventional Current**

## Building

Spiritual: Avoid positioning the long side of the house facing West which symbolizes death

Climatic: Encourage natural ventilation around building envelope; take advantage of prevailing South and Southwest wind; raise to avoid flooding; Shade against the solar heat gain

Social: Allow a transitional zone between the house and the gate for social interaction

## Open space/Landscape

Spiritual: Certain trees have auspicious qualities based on linguistic reasons

Climatic: Provide shading for the house

Social: Place human- scaled, fragrant plants near entrance to provide a desirable place for social interaction;also use as a property marker

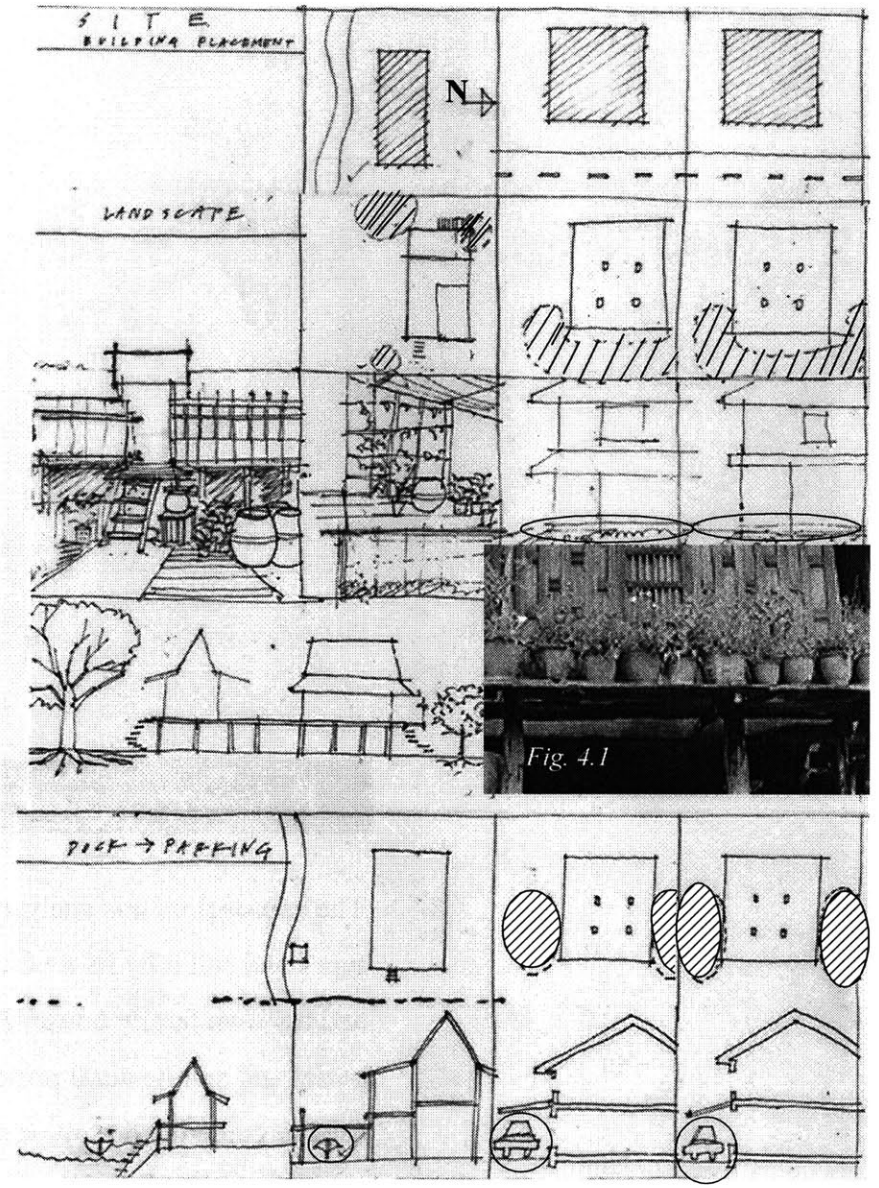
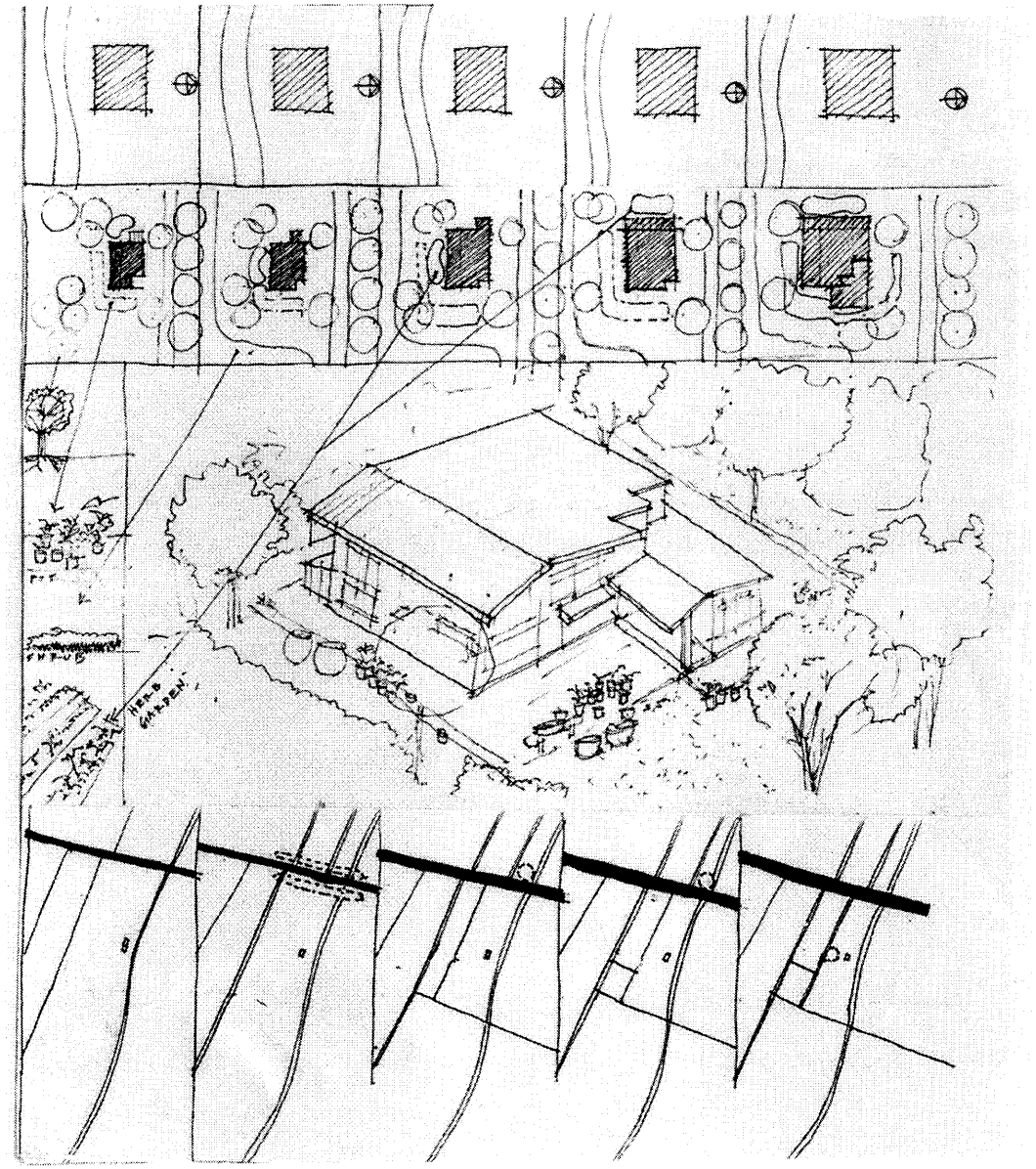



*Fig. 4.1*

| 1966 | 1968 | 1979 | 1985 | 1992 to present | Derived Principle |
|---|---|---|---|---|---|



**Building**

Position length of structure in the North South orientation lift up above ground; Set back from the gateway. Use screen and fins to facilitate ventilation. Shade house with large roof overhang to South.

**Open Space/Landscape**

Plant trees at East and West end; Locate plant with respect to their sizes and appearances; Place potted plants which can be removed during floods near opening to deflect the direct sunlight

**Water Container**

Spiritual: N/A
Climatic: Made to gather rain water and to act as a heat barrier
Social: Place near the entrance for to drink and wash

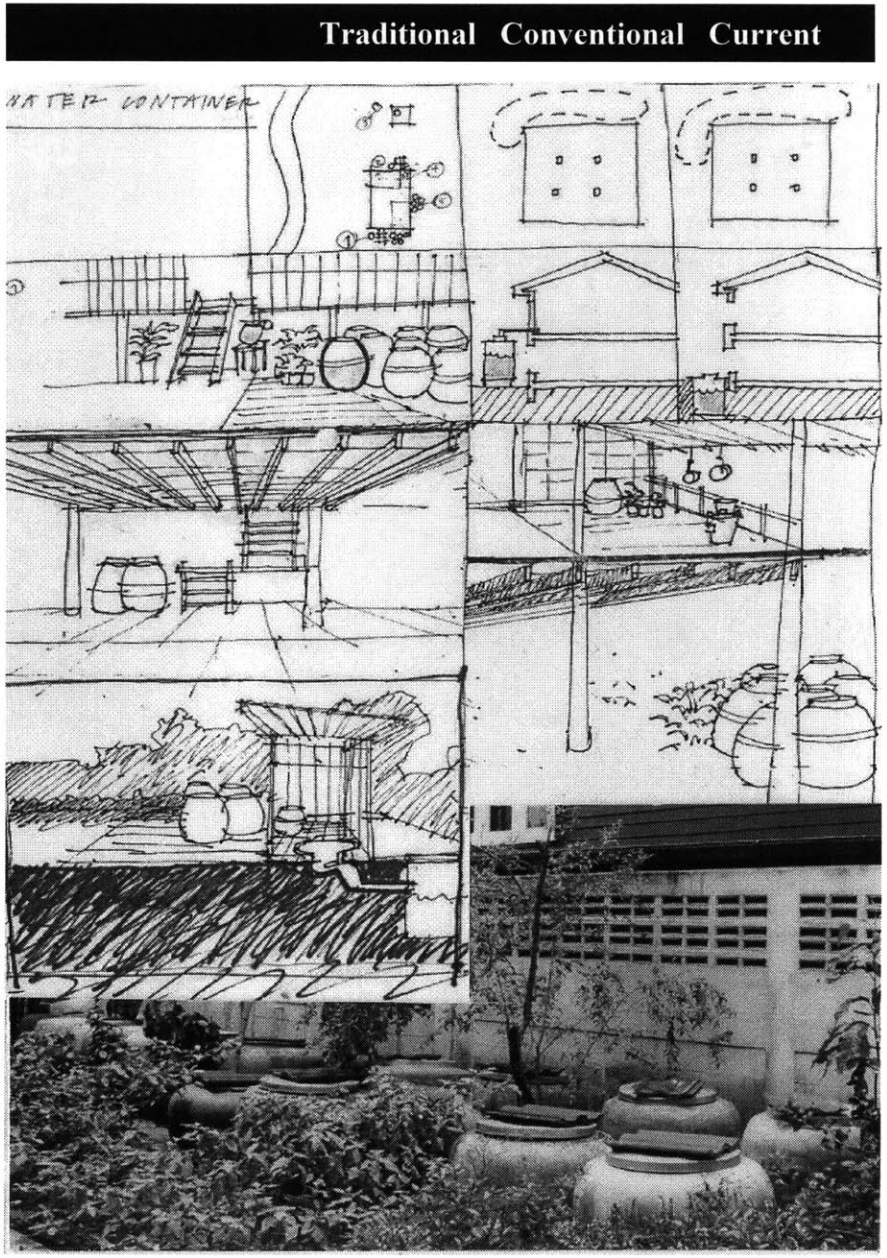
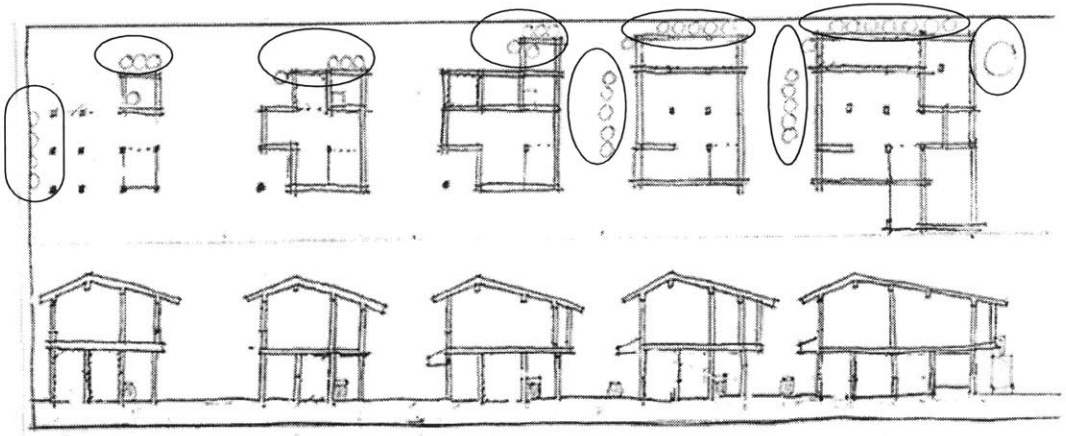



*Fig. 4.2 Traditional water containers.*

| 1966 | 1968 | 1979 | 1985 | 1992 to present | Derived Principle |
|---|---|---|---|---|---|



**Water Container**

locate on the roof or the highest point of the house

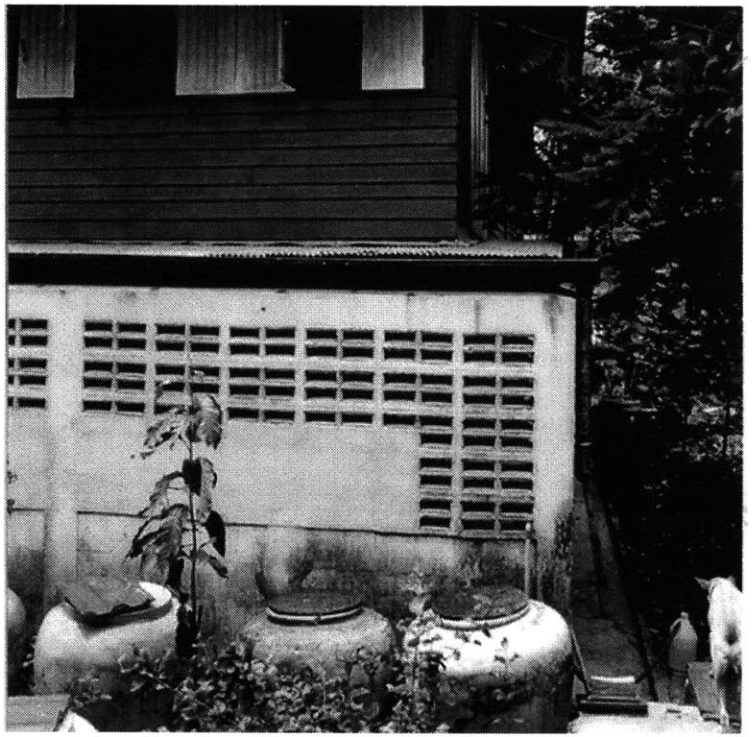
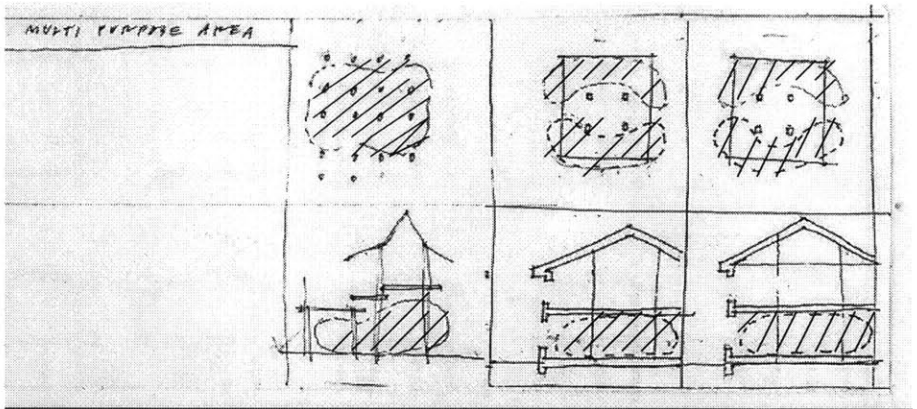


***Fig. 4.3 New commercially available water container.***

# H o u s e

**Traditional Conventional Current**




### Multi-purpose area

Spiritual: A space locate beneath another space is considered inauspicious, therefore it is suitable for the above uses

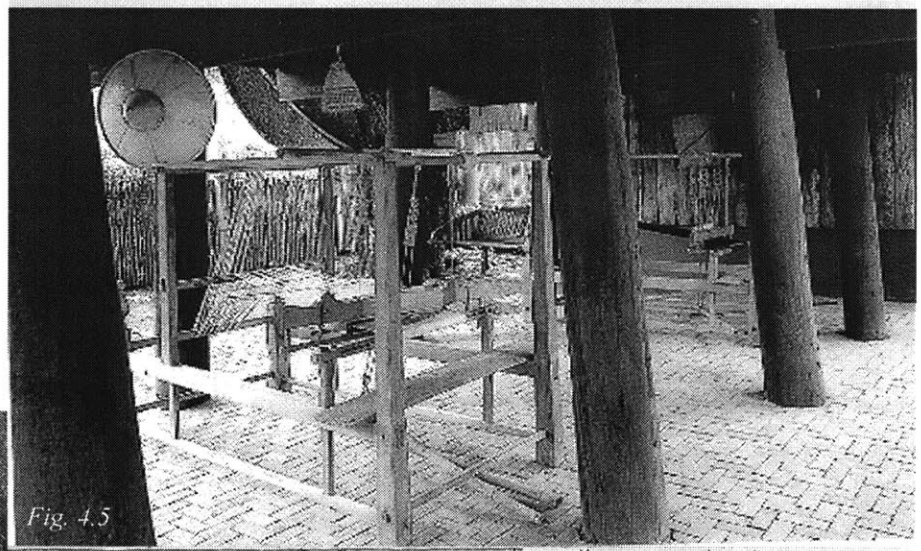


Fig. 4.5

### House Gate

Spiritual: N/A
Climatic: Provides shaded area
Social: Where shoes are taken off before entering the house

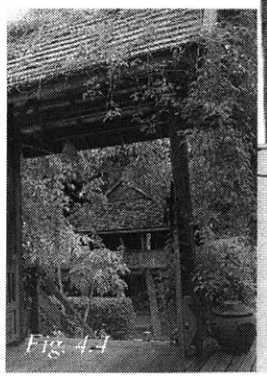
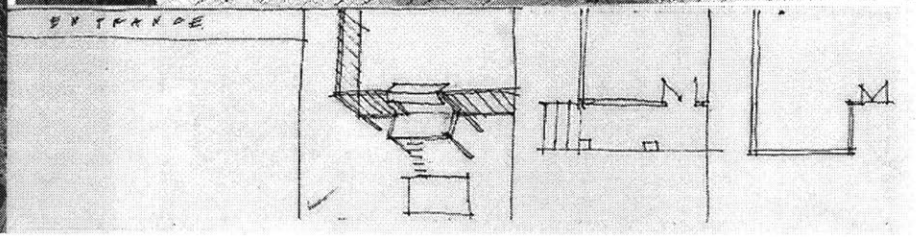


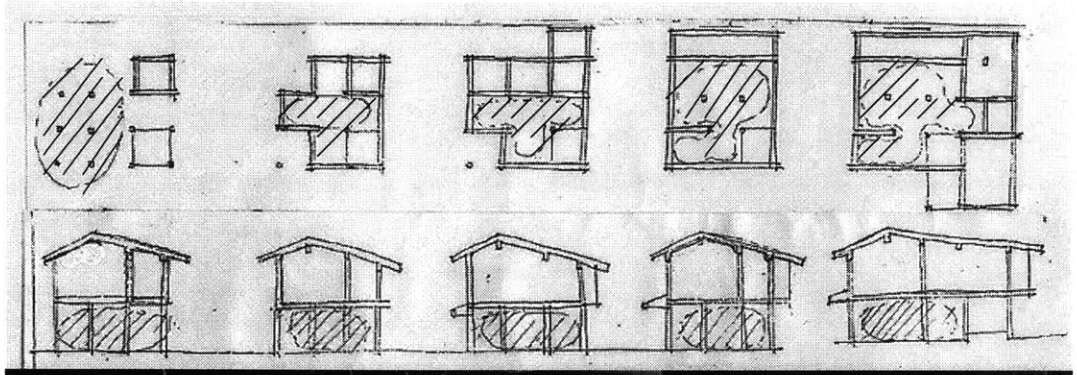
Fig. 4.4

### Entrance

Spiritual: West is considered auspicious
Climatic: Position to avoid the sun glare
Social: A place to receive guest



| 1966 | 1968 | 1979 | 1985 | 1992 to present | Derived Principle |
|---|---|---|---|---|---|



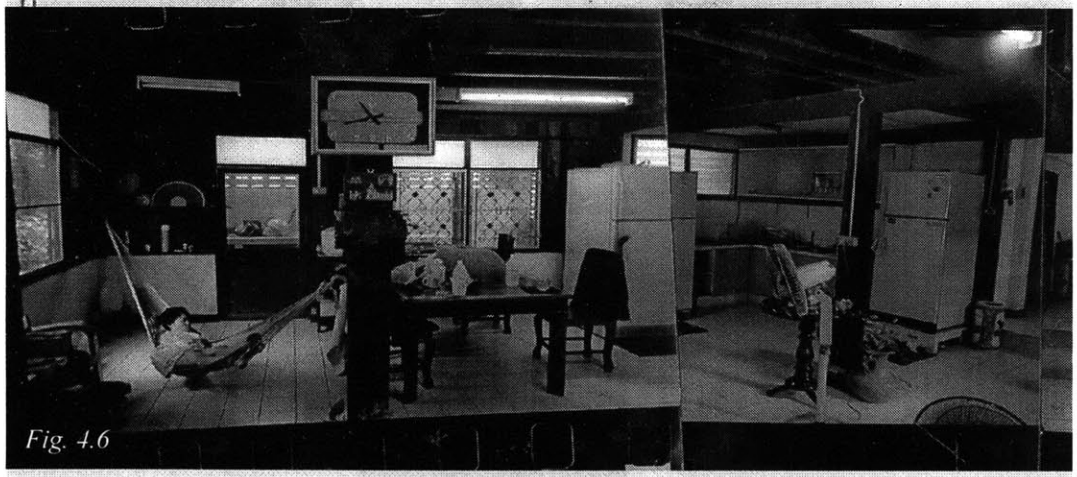
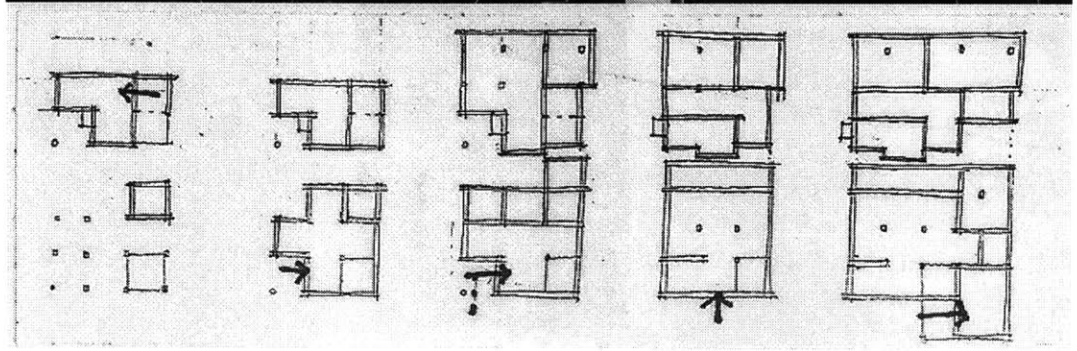


*Fig. 4.6*



**Multi-purpose area**

Place beneath the house, where washing area where garage, gathering space, storage, and additional rooms can be located

**House Gate**

Set back from the Site Gate; lifted above ground; small area to greet guests

**Entrance**

Avoid that points straight through the house building; never lead West to East

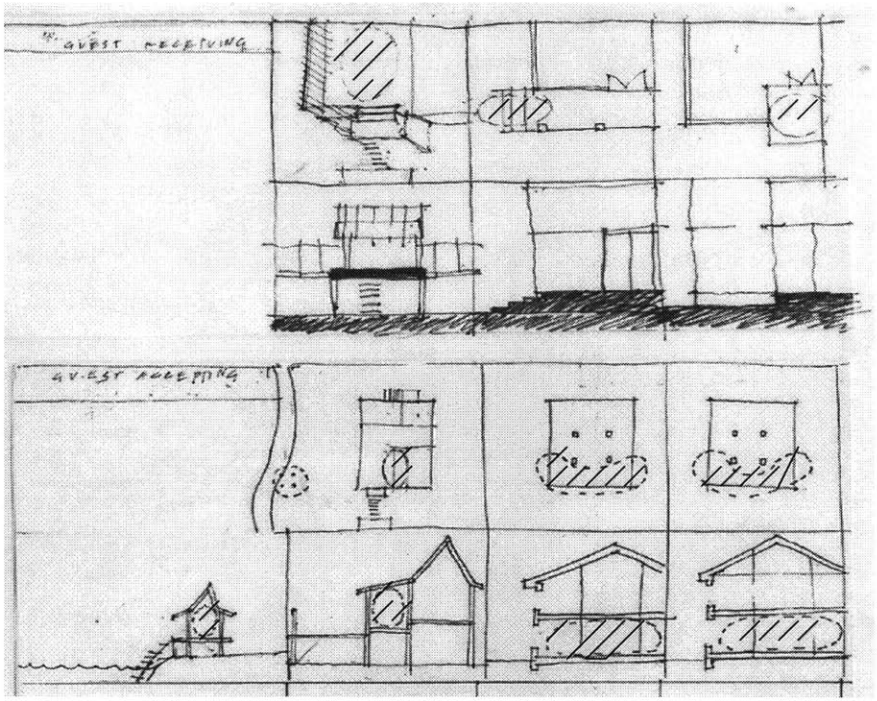
**Guest Receiving Area**

Spiritual: N/A
Climatic: Open and allow natural ventilation
Social: Place to receive guest

**Guest Accepting**

Spiritual: N/A
Climatic: position to catch the prevailing wind from the South and South West
Social: Where guests are entertained; serves as multi-functions room for the family

**Traditional Conventional Current**



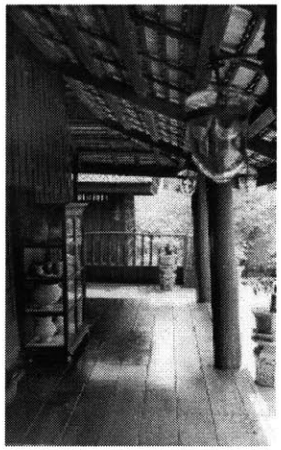
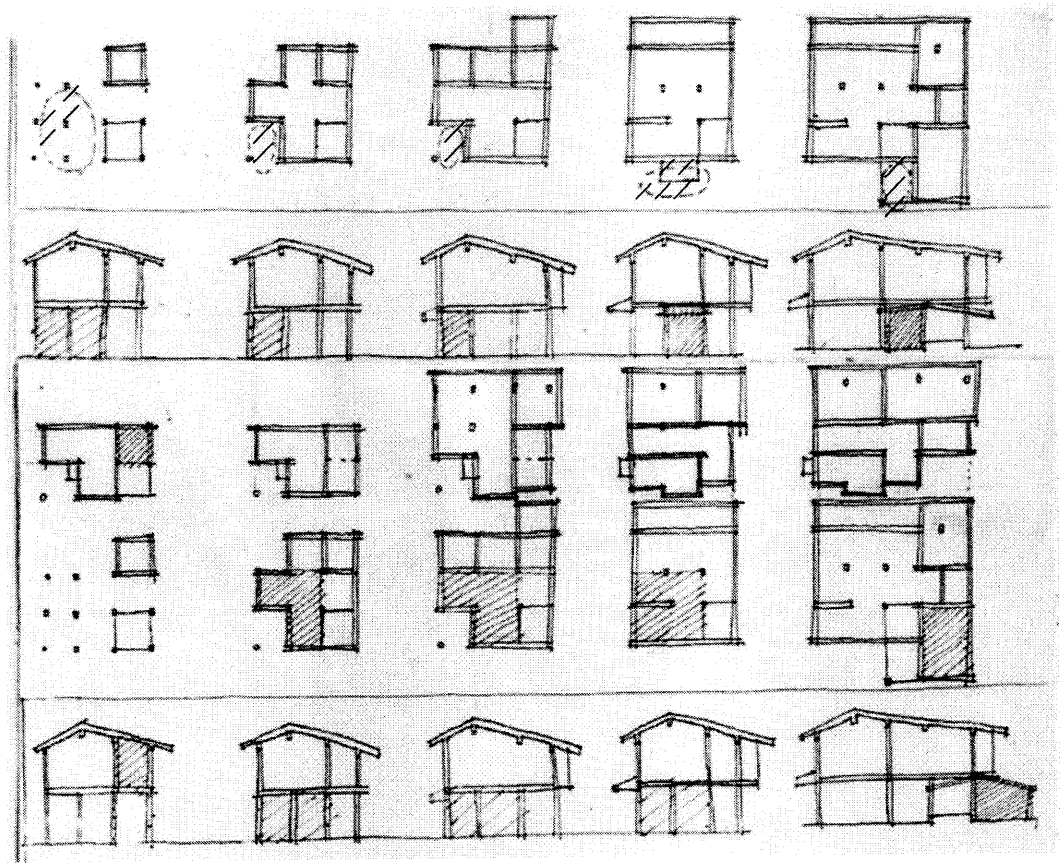


*Fig. 4.7*

| 1966 | 1968 | 1979 | 1985 | 1992 to present | Derived Principles |
|---|---|---|---|---|---|



**Guest Receiving Area**

Located near the entrance in shaded area; open but not enclosed

**Guest Accepting Room**

Shaded and located near the entrance; can be open and fully enclosed

**Cooking Area**

Spiritual: N/A
Climatic: Positioned to encourage natural ventilation
Social: Locate near entrance and children play are for security

**Eating Room**

Spiritual: N/ A
Climatic: Positioned to avoid direct sun light
Social: Together with the Cooking Area, this is the place where the family can interact



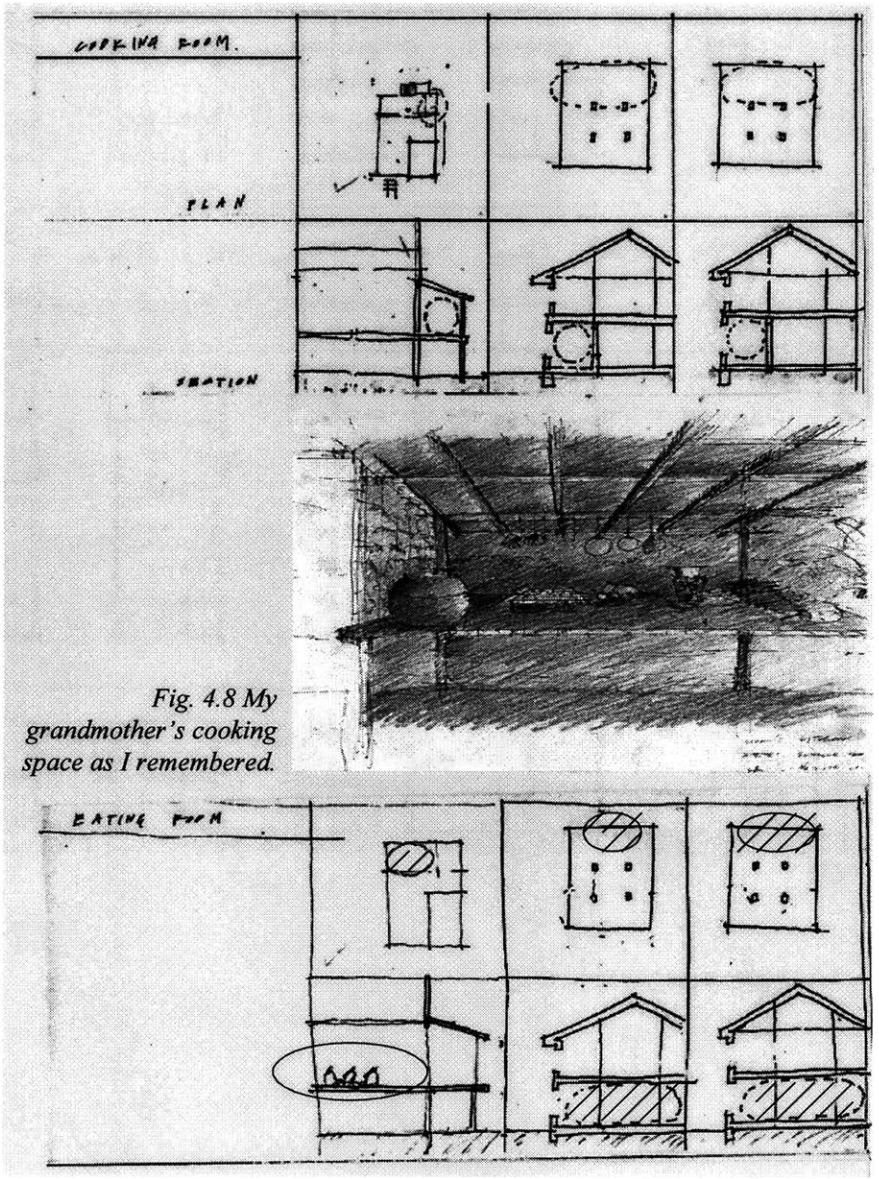
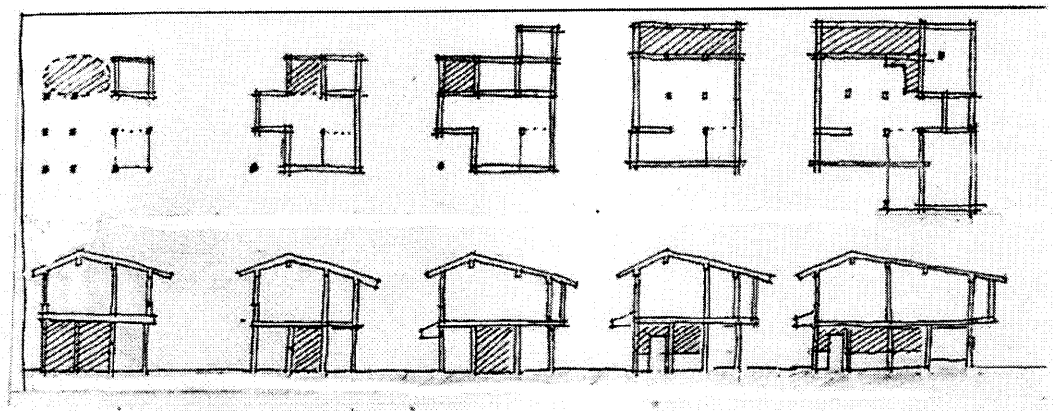


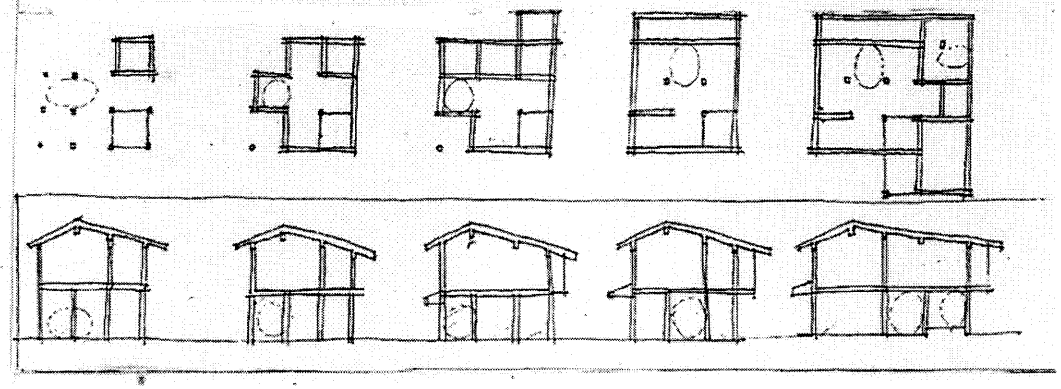

*Fig. 4.8 My grandmother's cooking space as I remembered.*

| 1966 | 1968 | 1979 | 1985 | 1992 to present | Derived Principle |
|---|---|---|---|---|---|



**Cooking Area**

Always located at the periphery of the house with independent structure



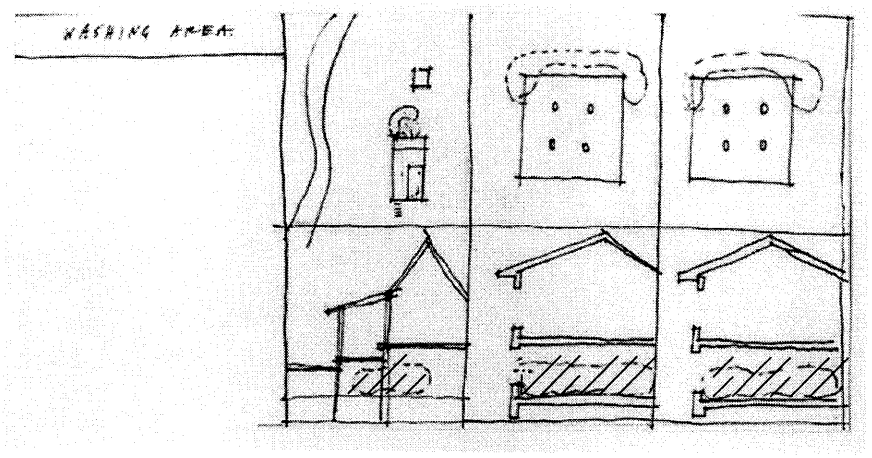
**Eating Area**

Locate away from the West with direct access cooking area

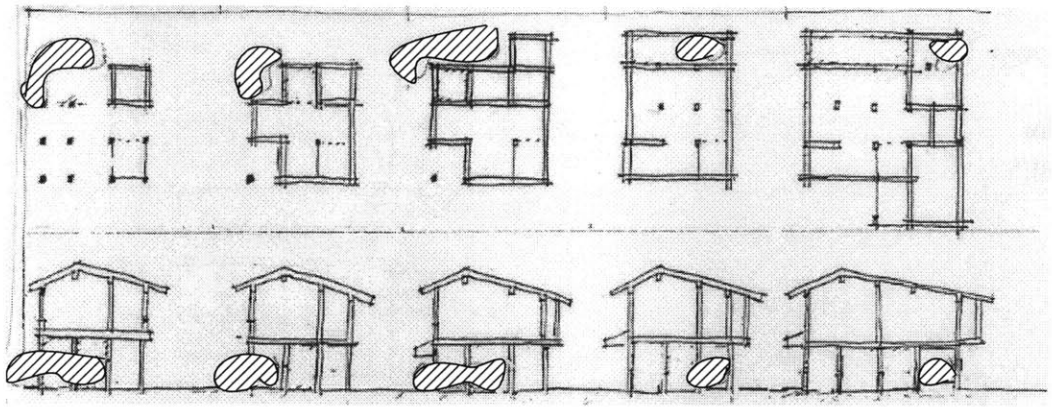
**Washing Area**

| | |
|---|---|
| Spiritual: | N/A |
| Climatic: | Natural ventilation to dry laundry; protected from the rain |
| Social: | Should be visually shielded from the public |

**Traditional Conventional Current**



| 1966 | 1968 | 1979 | 1985 | 1992 to present | Derived Principle |
|---|---|---|---|---|---|



**Washing Area**
Located to the West, covered but not enclosed

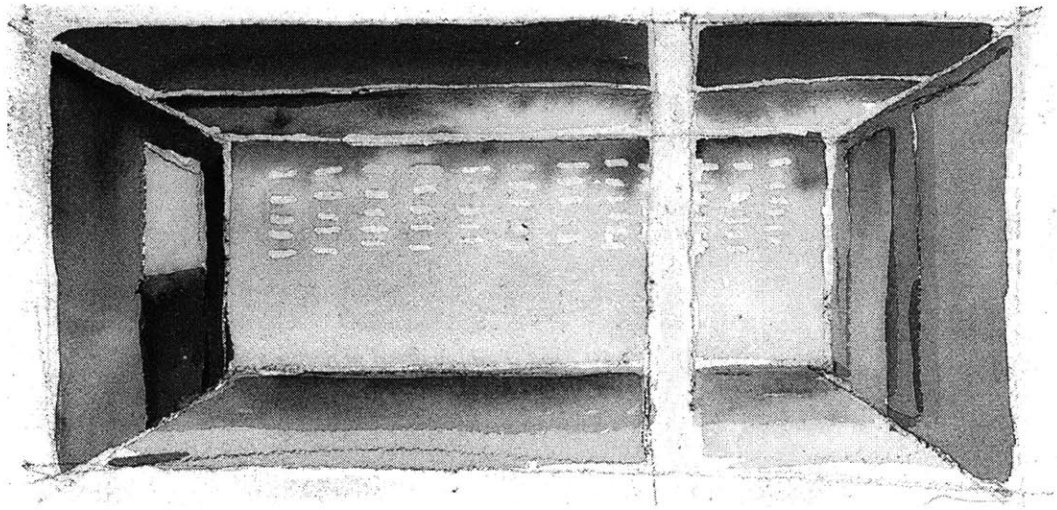


*Fig. 4.9 Watercolor of the washing area in my house (1997).*

**Water Room**

Spiritual: N/A
Climatic: Act as heat barrier and to encourage cross ventilation
Social: A private space; located away from the public area, yet close to the circulation

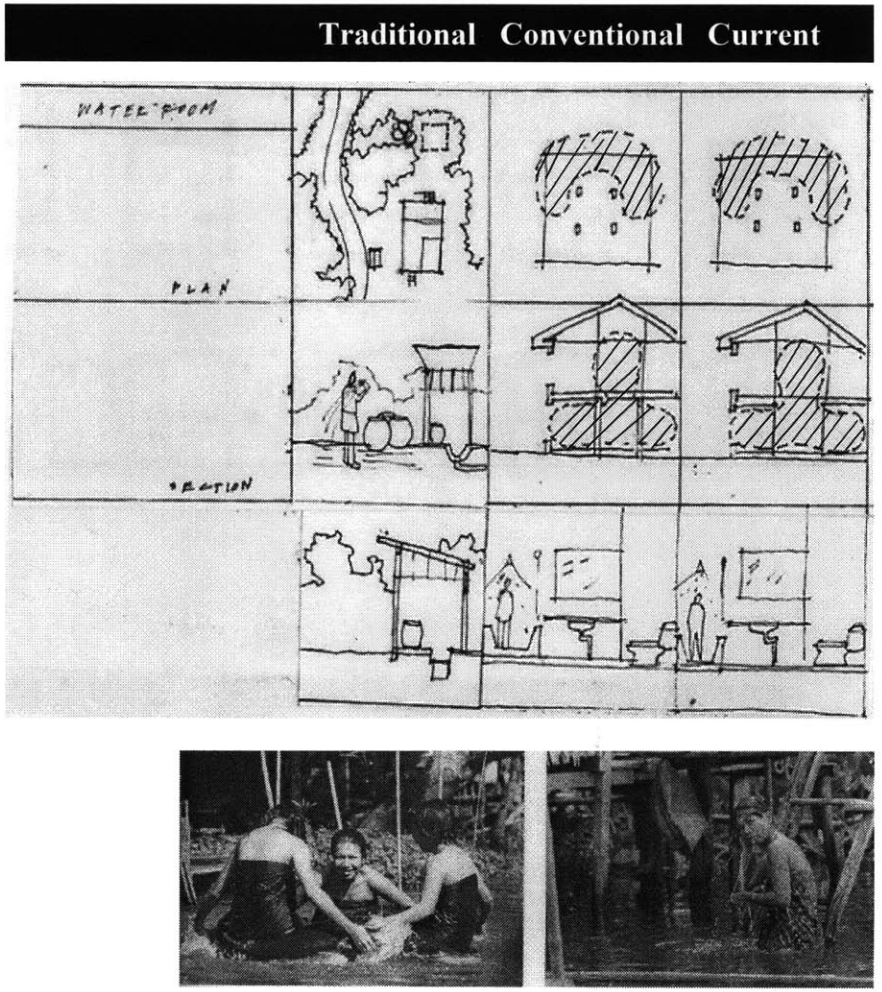
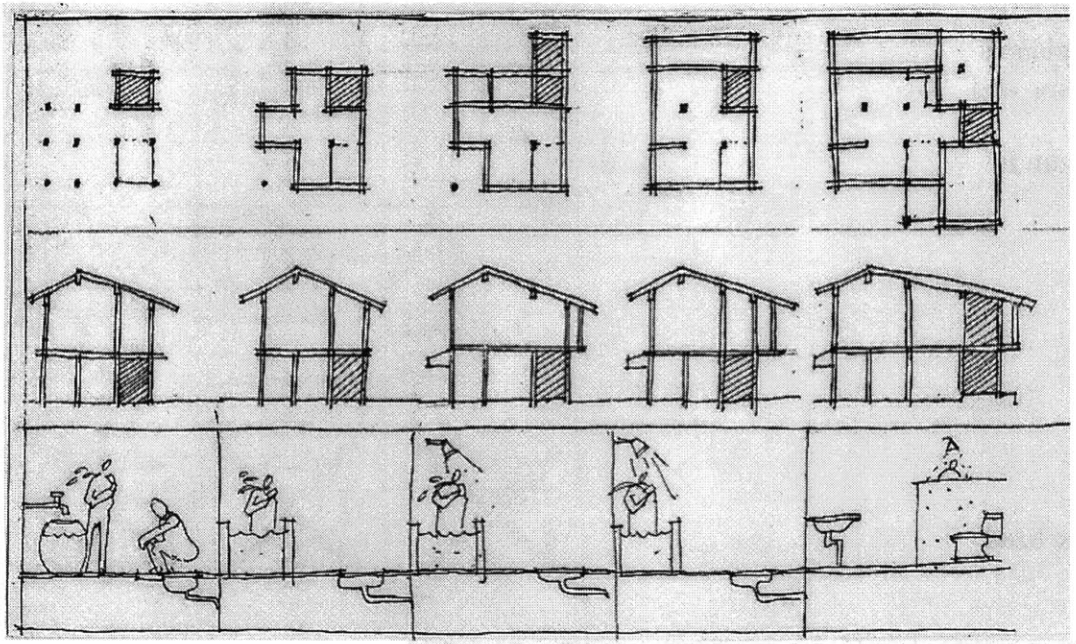



*Fig. 4.10 Traditional method of bathing in the canal.*

| 1966 | 1968 | 1979 | 1985 | 1992 to present | Derived Principle |
|---|---|---|---|---|---|



**Water Room**
Located at either the East or West end of the house where bathing and toilet occur.

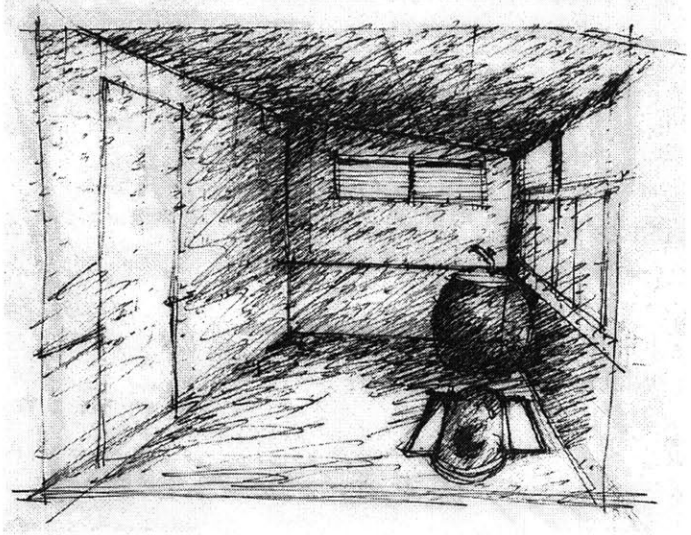


*Fig. 4.11 Drawing of the water room in my house (1979 from memory.*

**Sleeping Room**

| | |
|---|---|
| Spiritual: | East is considered auspicious and symbolizes life, while West is inauspicious |
| Climatic: | Positioned to optimize cross ventilation and to avoid afternoon heat gain |
| Social: | Considered to be the most private room in the house |

Bed Placement

| | |
|---|---|
| Spiritual: | Same as above |
| Climatic: | Positioned to avoid heat gain |
| Social: | Entry should be fully visible from the head of the bed for comfort and security |

**Spirit Shelf/Altar**

| | |
|---|---|
| Spiritual: | Upward side represents heaven, happiness and superiority; West is considered inauspicious |
| Climatic: | N/A |
| Social: | Should be a private and quiet space, hidden off of circulation |

**Traditional Conventional Current**

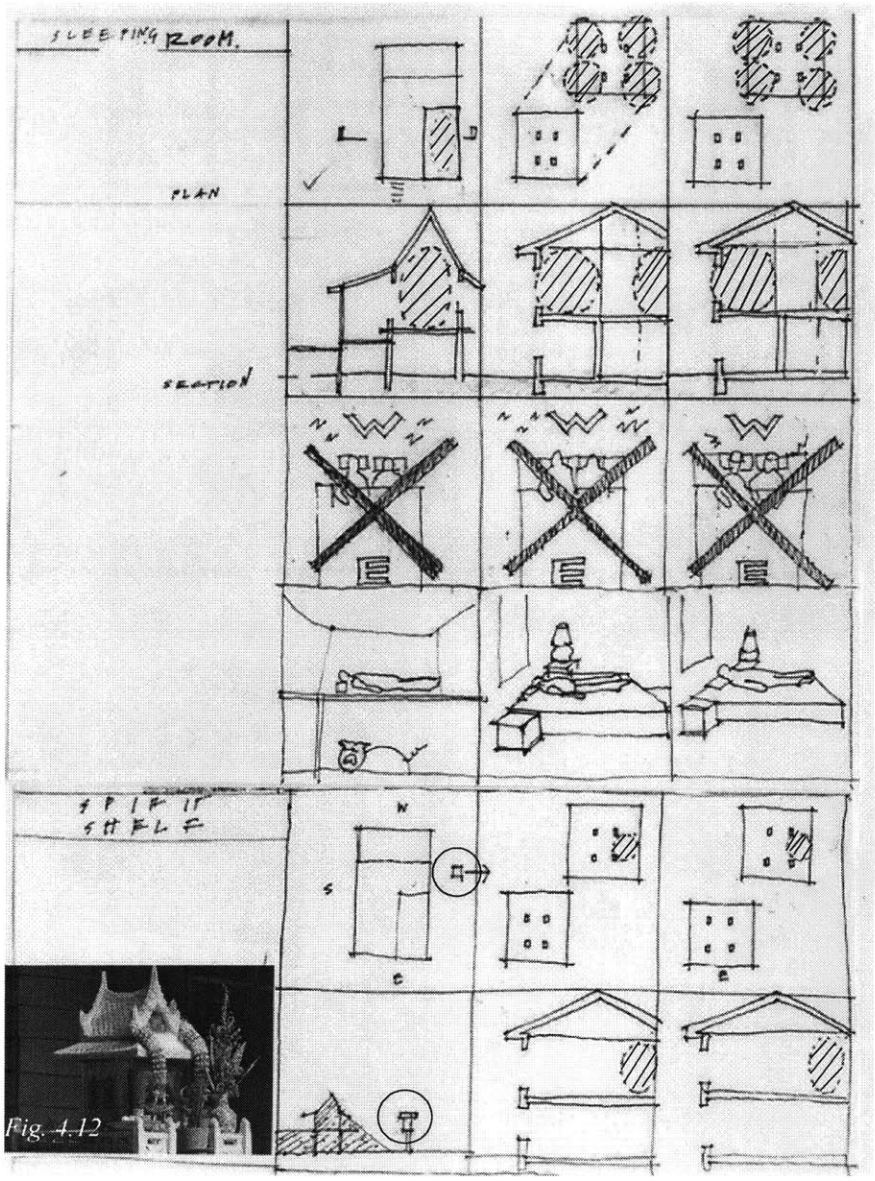
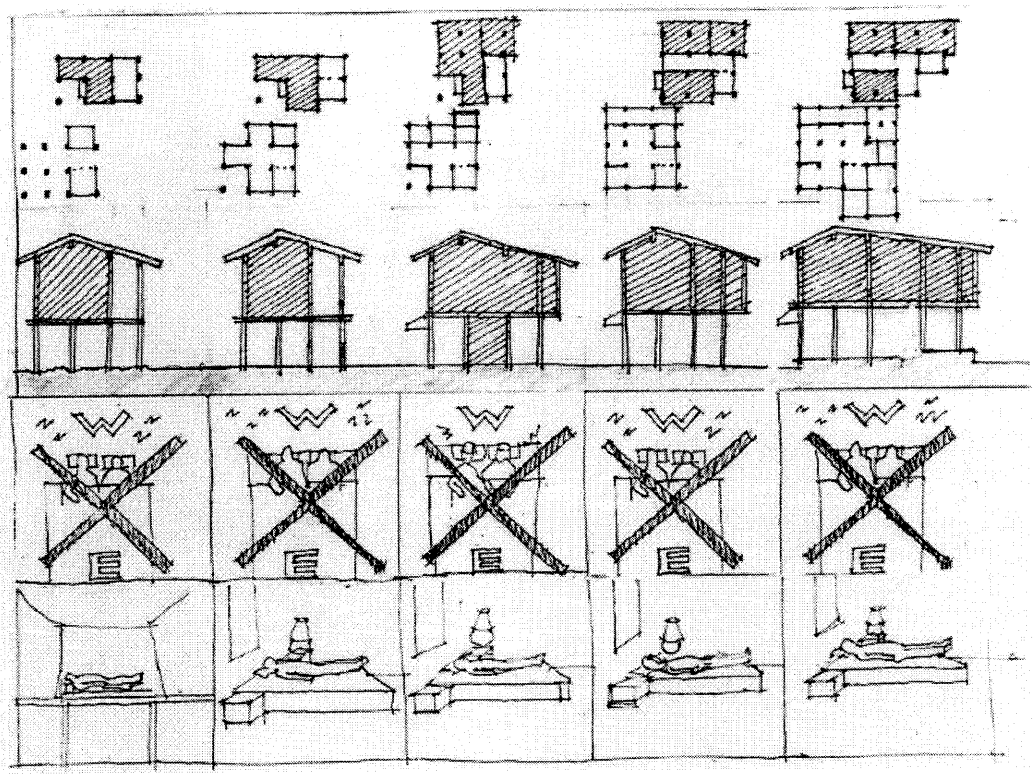



*Fig. 4.12*

| 1966 | 1968 | 1979 | 1985 | 1992 to present | Derived Principle |
|---|---|---|---|---|---|



**Sleeping Room**

Located at the East, never toward the West

Bed Placement

Never place the head of the bed toward the West

**Spiritual Shelf/Altar**

Place at the highest point and never facing West

# 5

# Prototype Design

# A p p r o a c h e s

The following are the design approaches since the beginning of the design process, from conceptual study to the exploration of the architectural design. There are six different schemes from which the design was developed. They are represented through diagrams, models and drawings. The presentation emphasizes two of the schemes as prototype designs.

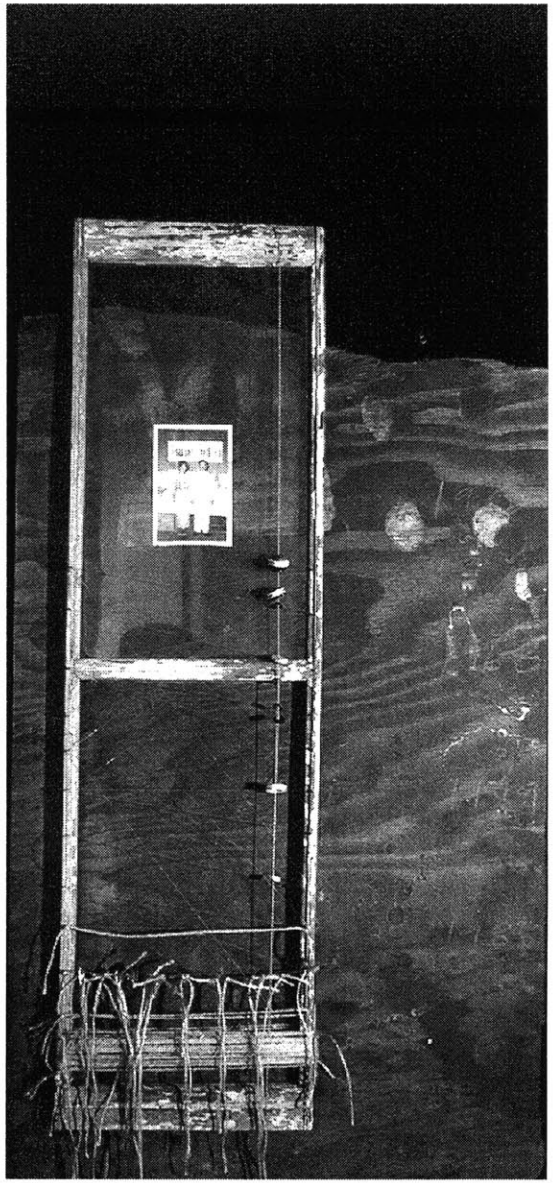
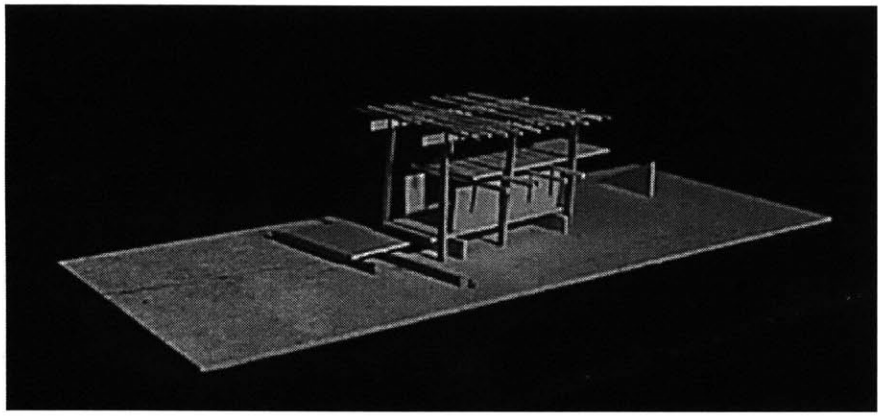


*Fig. 5.1 Conceptual Study.*

*Fig. 5.2 Preliminary Scheme 1 - model & diagram.*



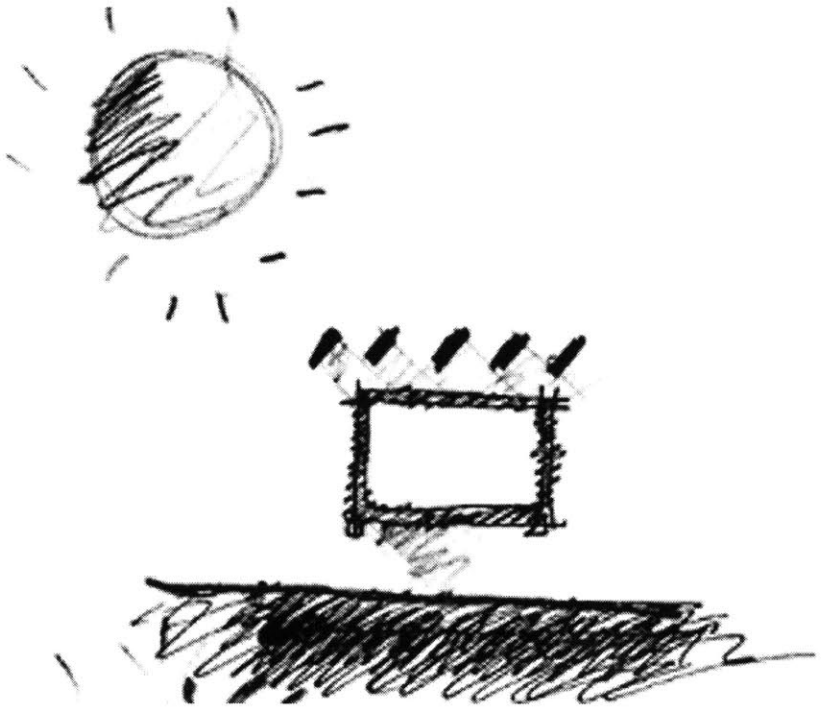
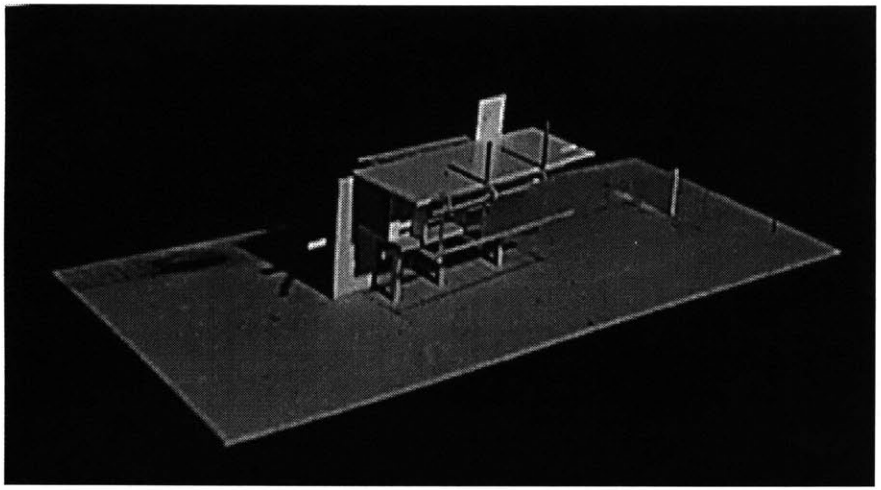
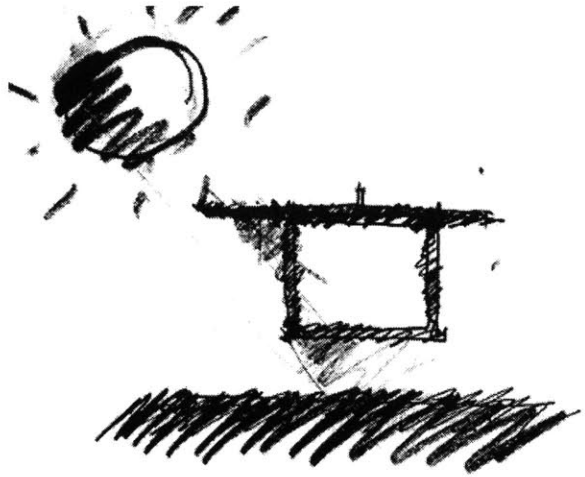


*Fig. 5.3 Preliminary Scheme 2 - model & diagram.*





# Sites and Program

Two sites were selected to encompass the two possible building orientations. One is East-West facing and the other is North-South facing. The location selected is situated in my neighborhood where a canal is paved over and turned into a road. The prototype schemes attempt to deal with these types of situations. The program of the house includes: a cooking area, an eating area, a guest accepting area, a home office, two water rooms, two bedrooms, a washing area and a multi-purpose area.

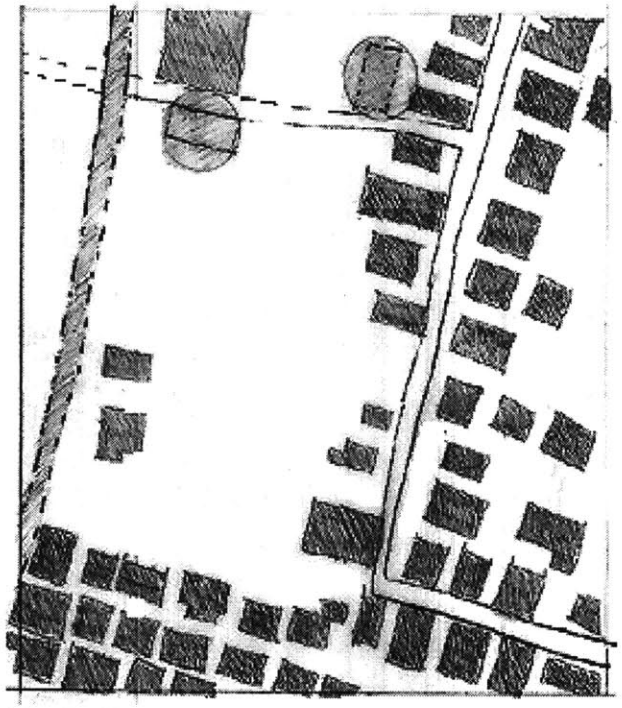
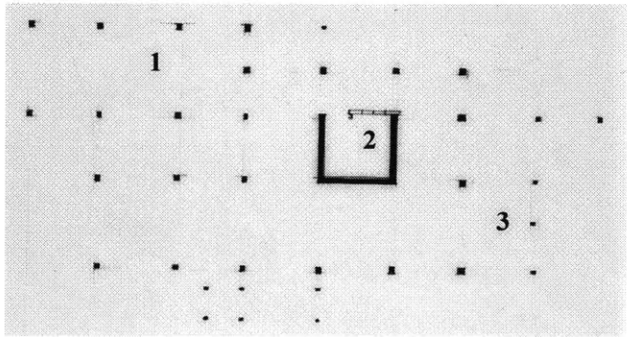


***Fig. 5.4 Site Plan.***

*Fig. 5.5 Ground Floor Plan.*



## North-South Facing

### Prototype Design 1

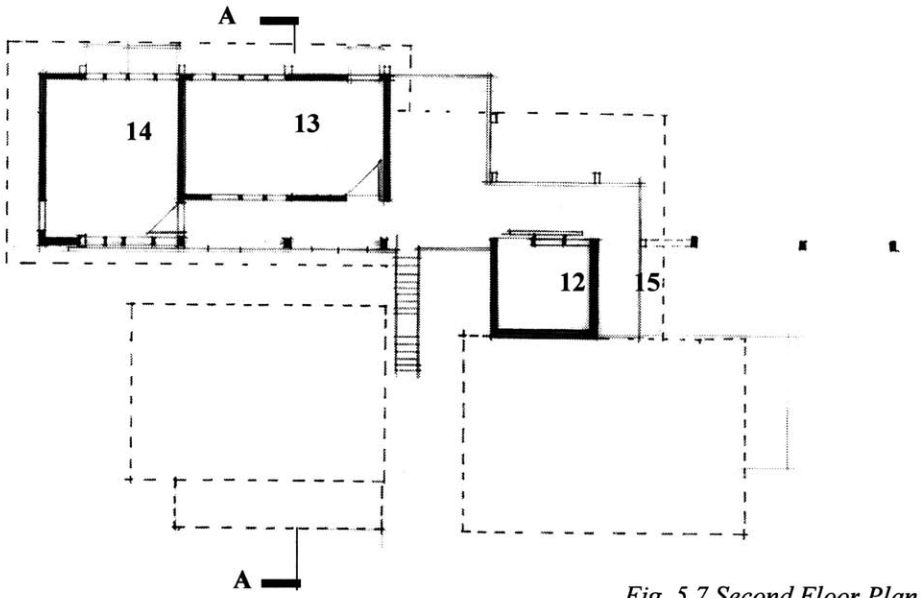
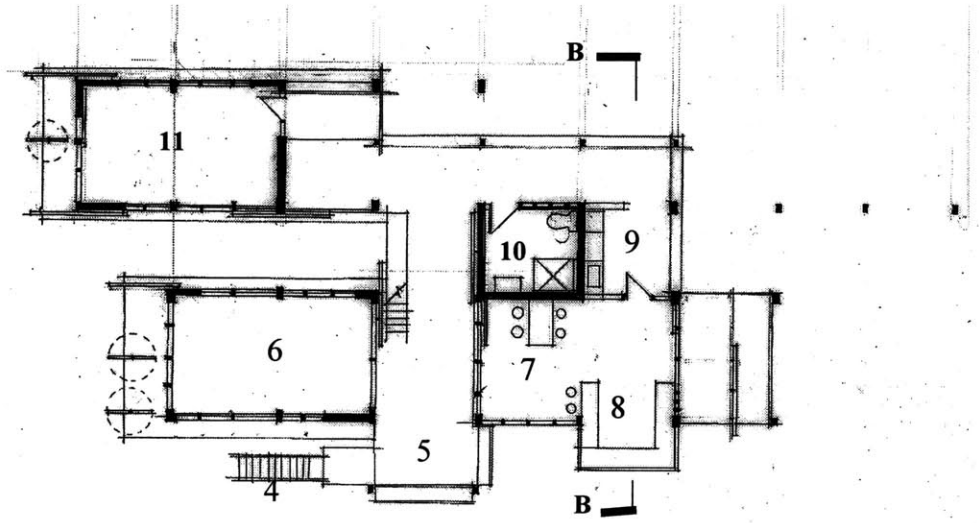



*Fig. 5.7 Second Floor Plan.*

*Fig. 5.6 First Floor Plan.*




*1) Multi-Purpose Area*
*2) Storage*
*3) Parking*
*4) Entrance*
*5) Guest Receiving Area*
*6) Guest Accepting Area*
*7) Eating Area*
*8) Cooking Area*
*9) Washing Area*
*10) Water Room*
*11) Office*
*12) Water Room*
*13) Sleeping Room*
*14) Sleeping Room*
*15) Water Container Area*

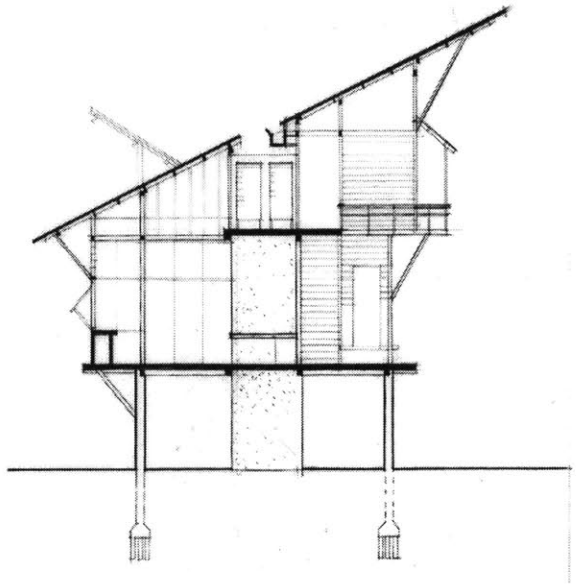
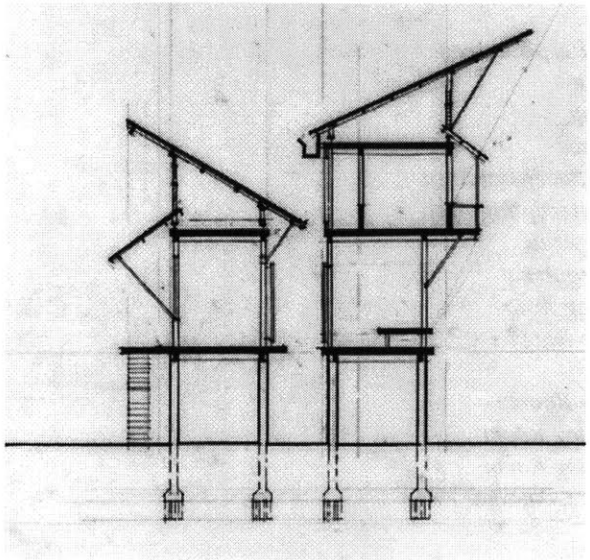


*Fig. 5.9 Section B-B*

*Fig. 5.8 Section A-A*



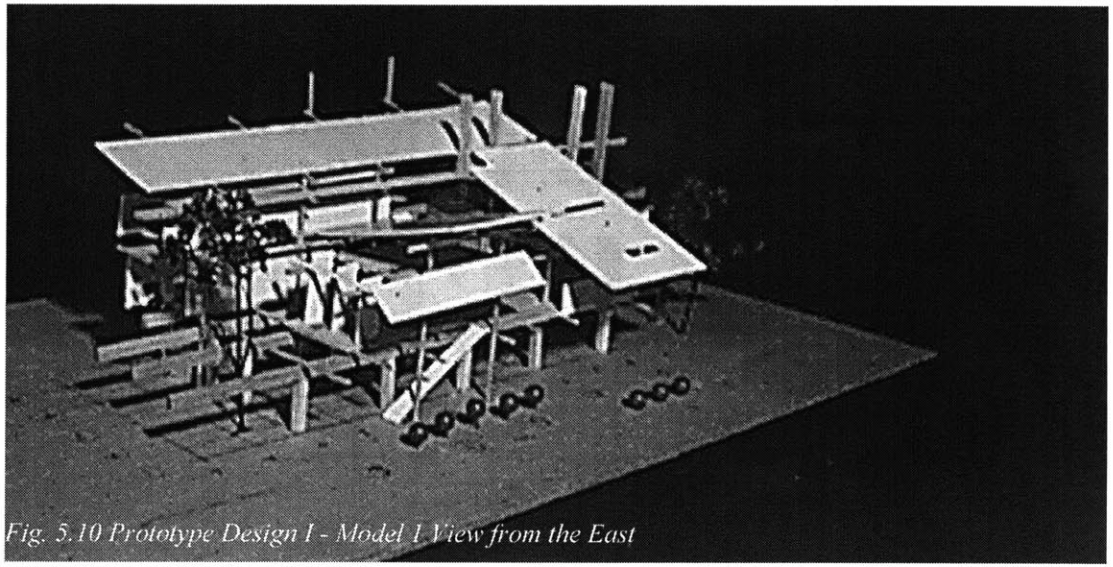


*Fig. 5.10 Prototype Design I - Model I View from the East*

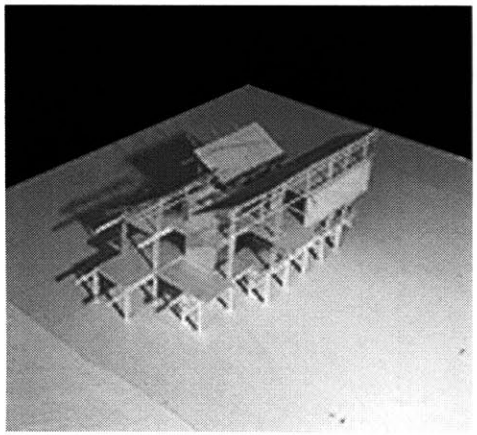


*Fig. 5.11 Prototype Design I Alternative Study Model 2*

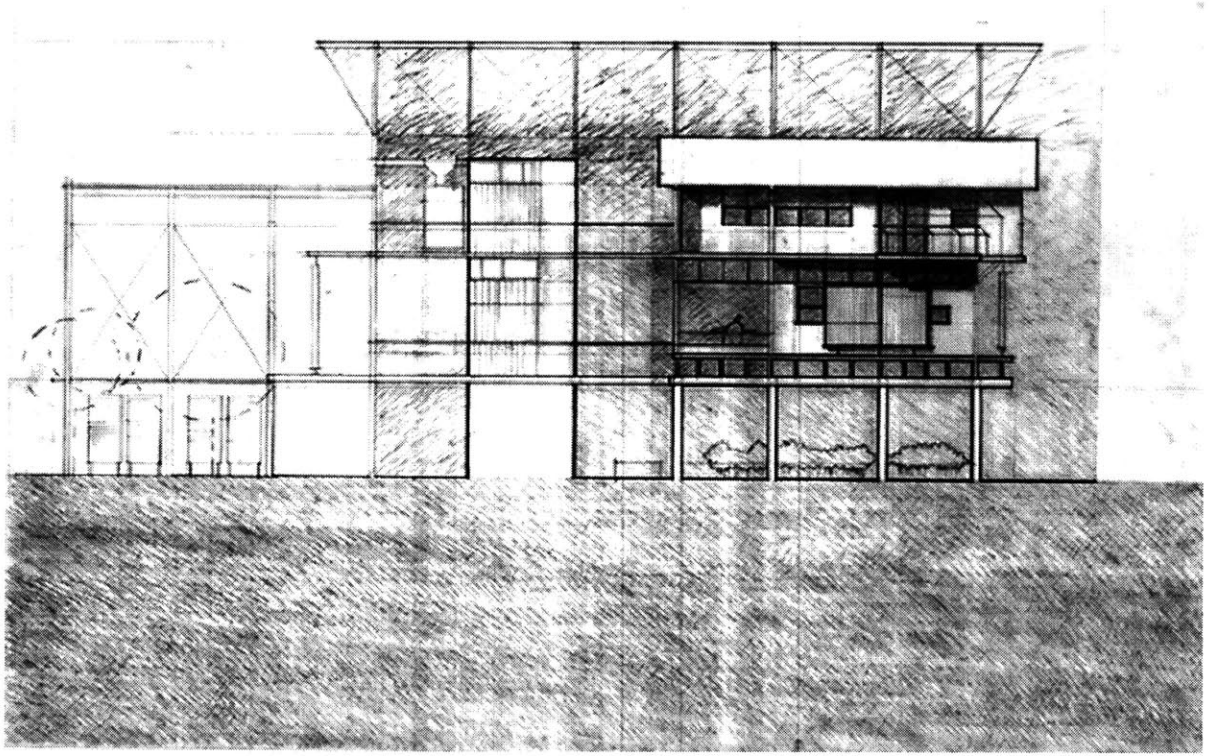


*Fig. 5.12 South Elevation*

*Fig. 5.13 Prototype Design I Model 1 Looking from the West*

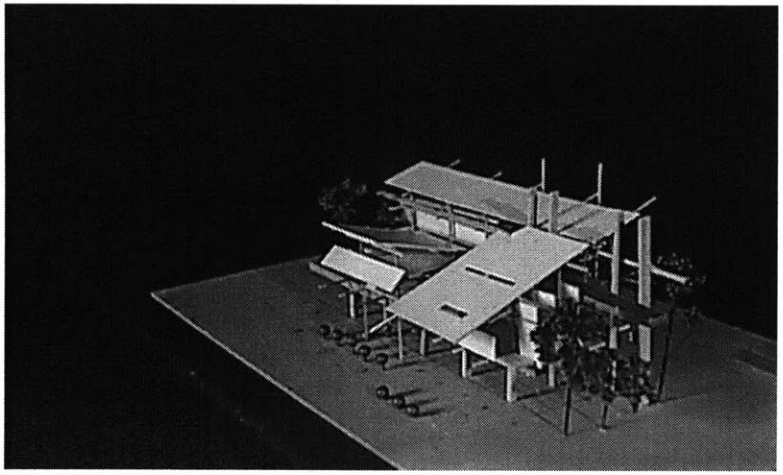
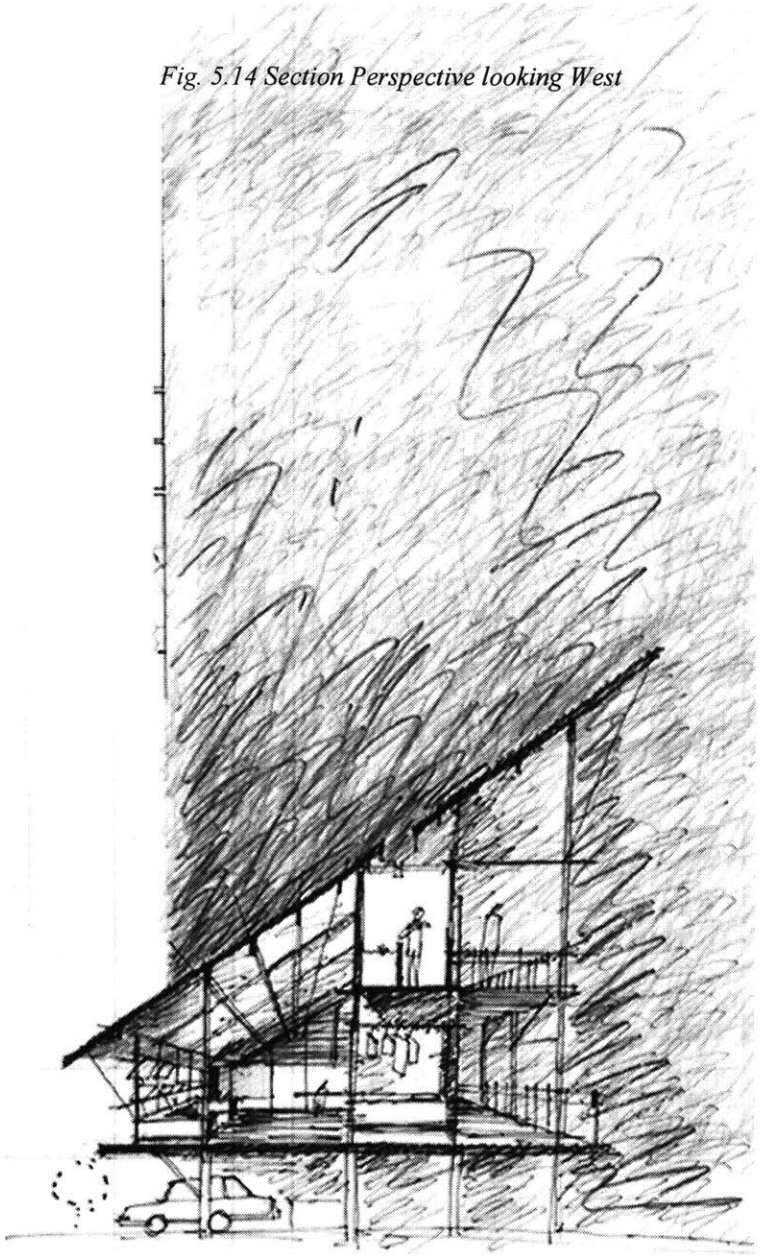


*Fig. 5.14 Section Perspective looking West*



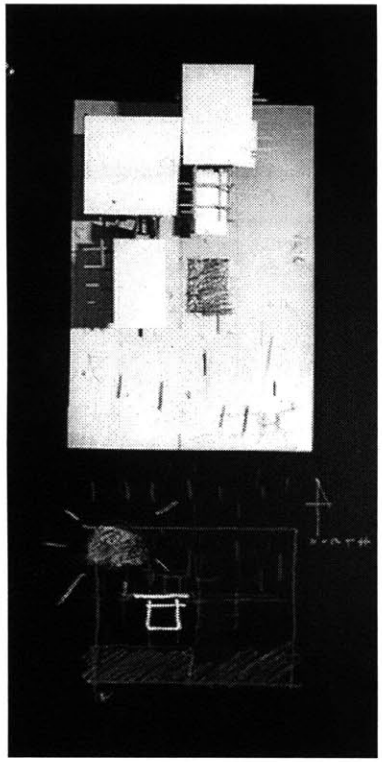


*Fig. 5.15 Early Scheme Model 1*

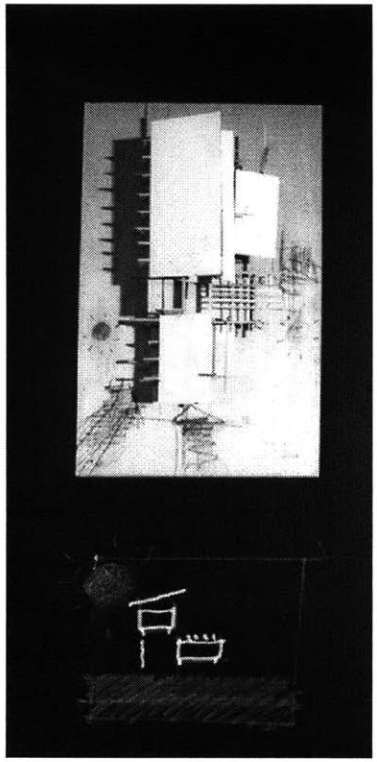


*Fig. 5.16 Early Scheme Model 2*

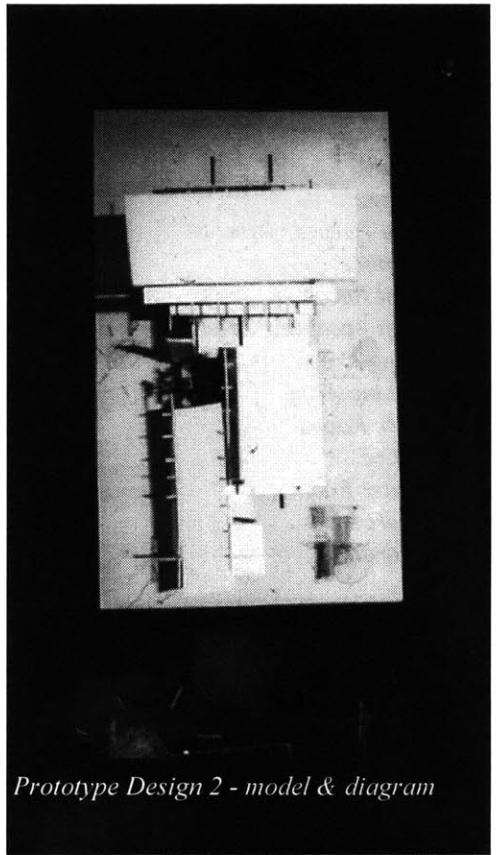
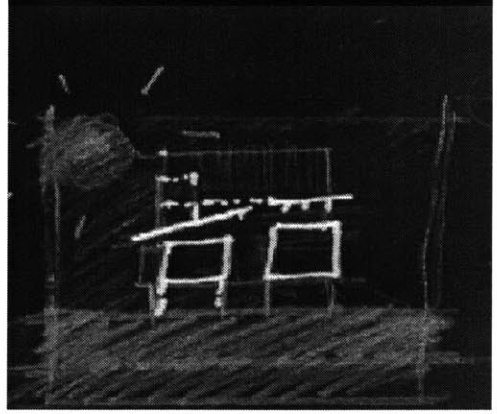


*Fig. 5.17 Prototype Design 2 - model & diagram*



## East - West Facing

### Prototype Design 2

*1. Garage*
*2. Storage*
*3. Multi-Purpose Area*
*4. Entrance*
*5. Guest Receiving Area*
*6. Guest Accepting Area*
*7. Eating Area*
*8. Cooking Area*
*9. Water Room*
*10. Office*
*11. Water Room*
*12. Bedroom*
*13. Bedroom*

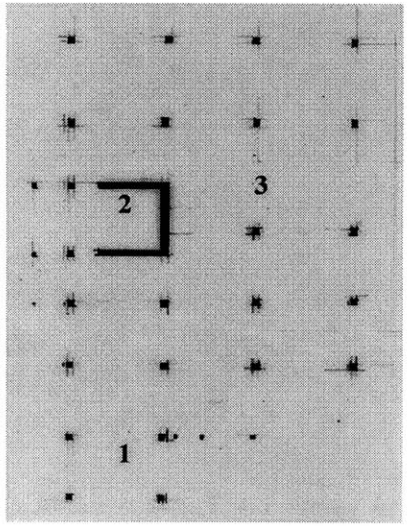



*Fig. 5.18 Ground Floor Plan*

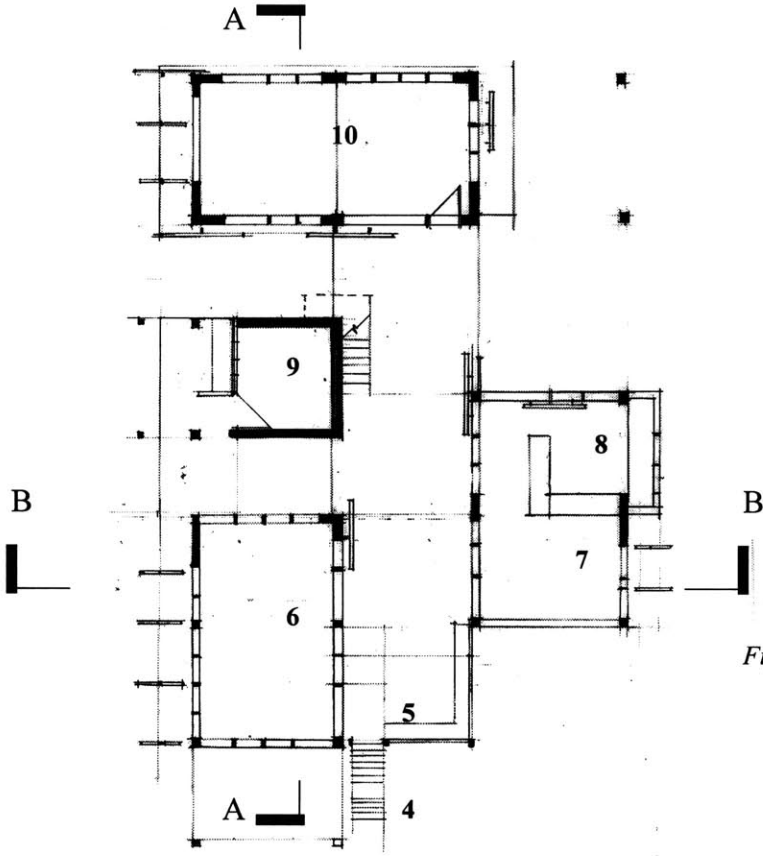



*Fig. 5.19 First Floor Plan*

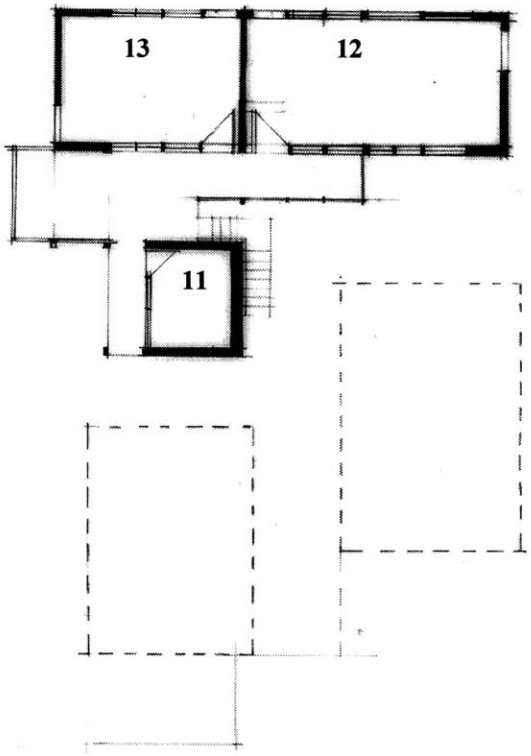



*Fig. 5.20 Second Floor Plan*

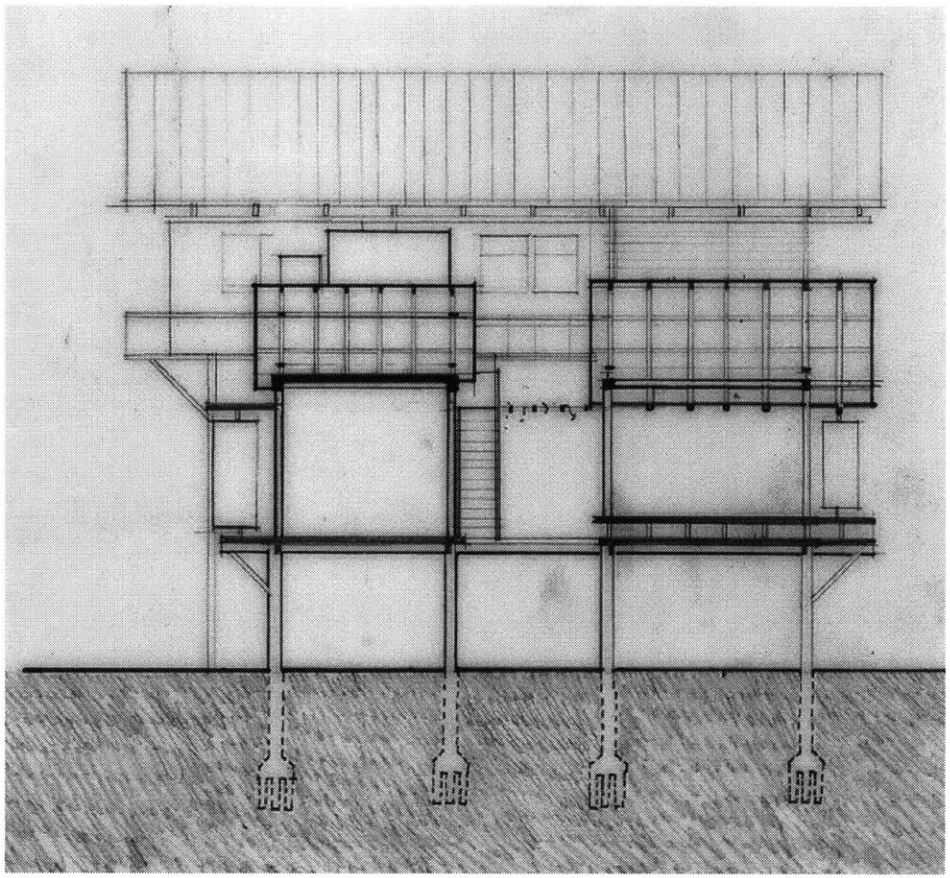


*Fig. 5.22 Section B-B*

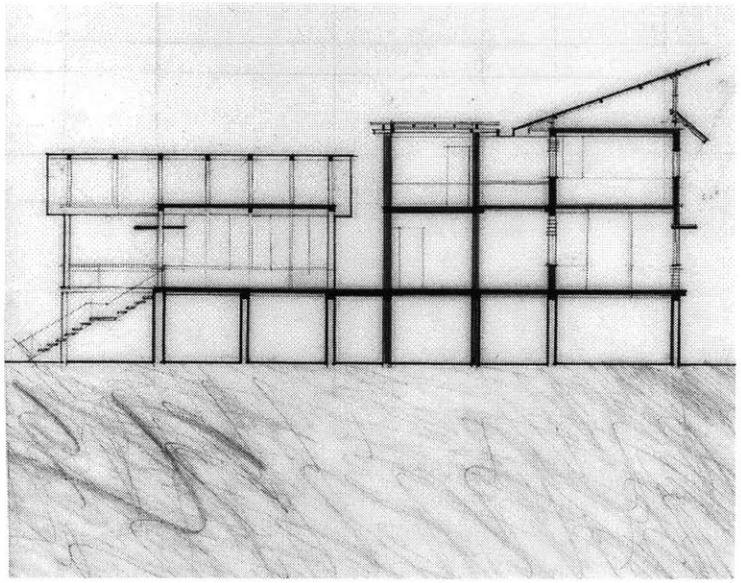


*Fig. 5.21 Section A-A*

# 6

# Kit Of Parts

## New Design Principles:
### *Kit of Parts*

A set of design principles developed for the hot and humid climate of Thailand was used to guide the design process in this thesis. These principles are in part based on my childhood memories of my own home and on the examination of Thai building practices. Today, traditional life-styles are augmented by new uses such as the garage and home office. Traditional design elements that are sustainable and still applicable to the modern way of life were identified and appropriately re-integrated into the design of the new house.

The house is broken down into three inter-dependent primary building elements which are based on the three different dwelling zones; ground, middle and roof. These three elements are conceived and designed to allow possible future vertical and horizontal expansions. These elements are connected and related to each other but yet follow their individual building and spatial logics. That

means the user can choose to alter one of the elements according to his/her exigencies within any zone and not affect the other two zones. Highly flexible secondary components of partitions, screens and other supporting parts are then integrated into these primary structures.

Climactic forces combined with my own childhood memories are the overriding influences that shaped the principles that guide the design decisions for both the primary and secondary elements of the house. Decisions about orientation, openings, facade design, water system and landscaping are very much shaped by the external forces of nature; the wind, the sun, the earth and water.

Though primarily based upon the principles of traditional Thai dwellings, the primary elements are designed to take into account future changes in sizes and activities within the house.

**G r o u n d**

The ground zone, traditionally called *"tai tun ban"*, was used as a multi-purpose, open-air space for flood protection, animal shelter and family gathering. The ground level should be left as open as possible to allow for maximum ventilation and to avoid damages from the continued flood problems in Bangkok. Instead of keeping animals, the lower open structure can accommodate new uses such as an open garage. However, a vertical expansion to the ground level by partly enclosing this area can satisfy possible future spatial needs if necessary.

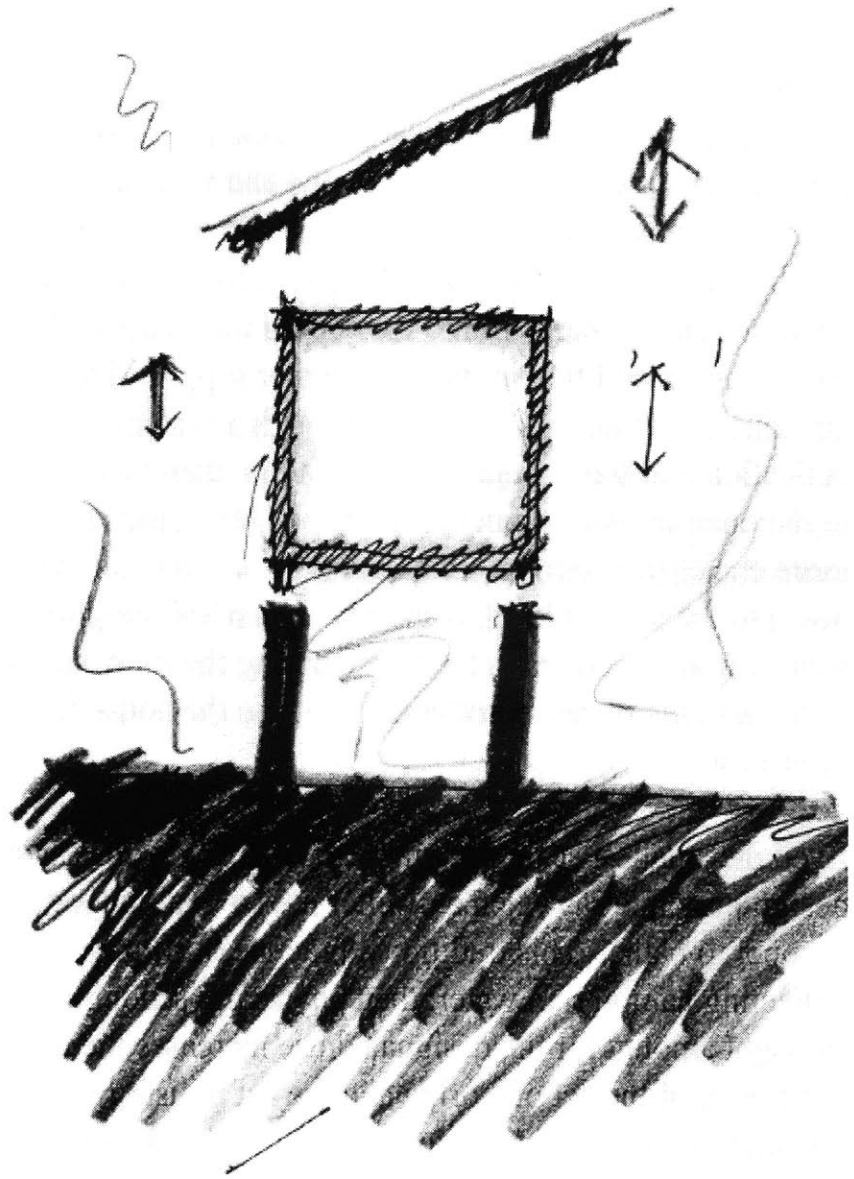


***Fig. 6.1 Sketch of the three elements.***

## M i d d l e

The first level or middle zone of the house is where the majority of the living spaces are. An open column structure encourages flexible partitioning of the space. The partitions are designed to a maximum size to allow four people to carry the pieces into the house without the use of heavy machinery. This is an important consideration because many of the residential streets in Bangkok are still narrow and cannot accommodate large trucks. Though this zone is designed with openings that exploit natural ventilation, given the almost non-existent breeze in Bangkok's current urban environment, the entire level can also be enclosed to accommodate an mechanical air conditioning system.

## R o o f

The roof is designed like a cap that can be easily moved up for more usable space. This new and flexible feature of the roof structure is a direct response to Bangkok's dwindling open land and the resultant high land prices. A one-story house that used to be able to expand horizontally can now be expanded vertically by raising the roof to create a second dwelling level. Being the hottest area of the house, the roof zone or the new second level should be left open to allow for maximum ventilation and to let hot air to escape. In addition, abundant sunlight creates possibilities for the installation of photo voltaic panels on the roof structure.

## Secondary components

Secondary components such as screens and other sun-shading devices are also integral parts of the house design. Vertical and horizontal sun-shading devices are not only designed to protect dwellers from the sun but are also designed to capture the prevailing winds for maximum ventilation. Screens are designed for privacy as well as sun protection.

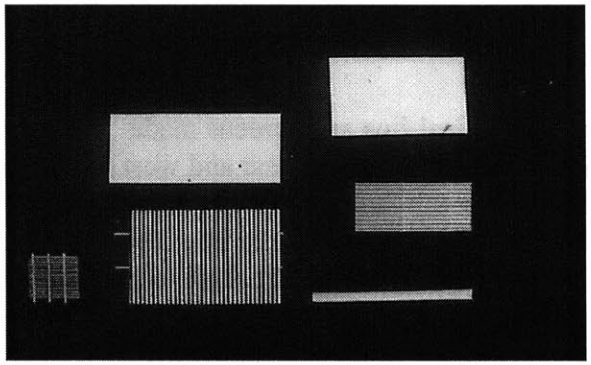


*Fig. 6.2 Horizontal Components*

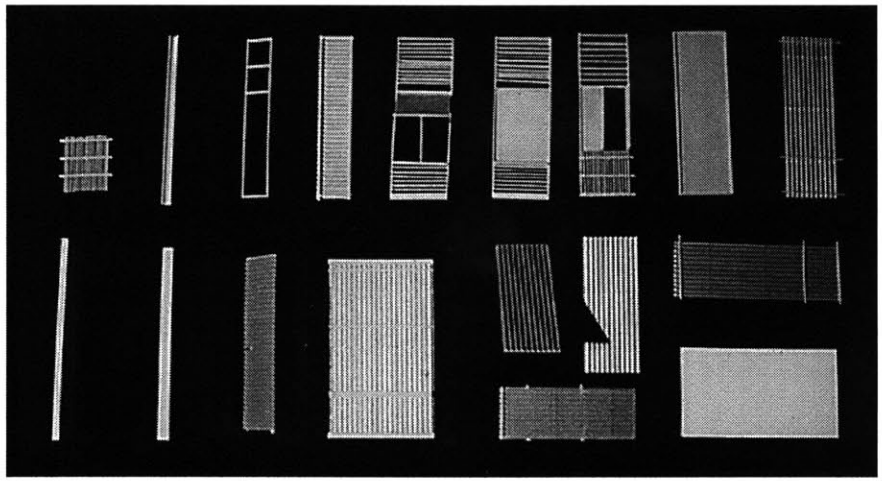


*Fig. 6.3 Vertical Components*

## Openings and Shading Devices

Given the low sun angles, vertical fins and screens made up of vertical elements are designed for the east and west facades. As for the north and south facades, openings are screened by horizontal elements to protect them from the higher sun angles. Low openings on the south facade and higher openings on the north facade are designed to capture and channel the prevailing south and southwest winds.

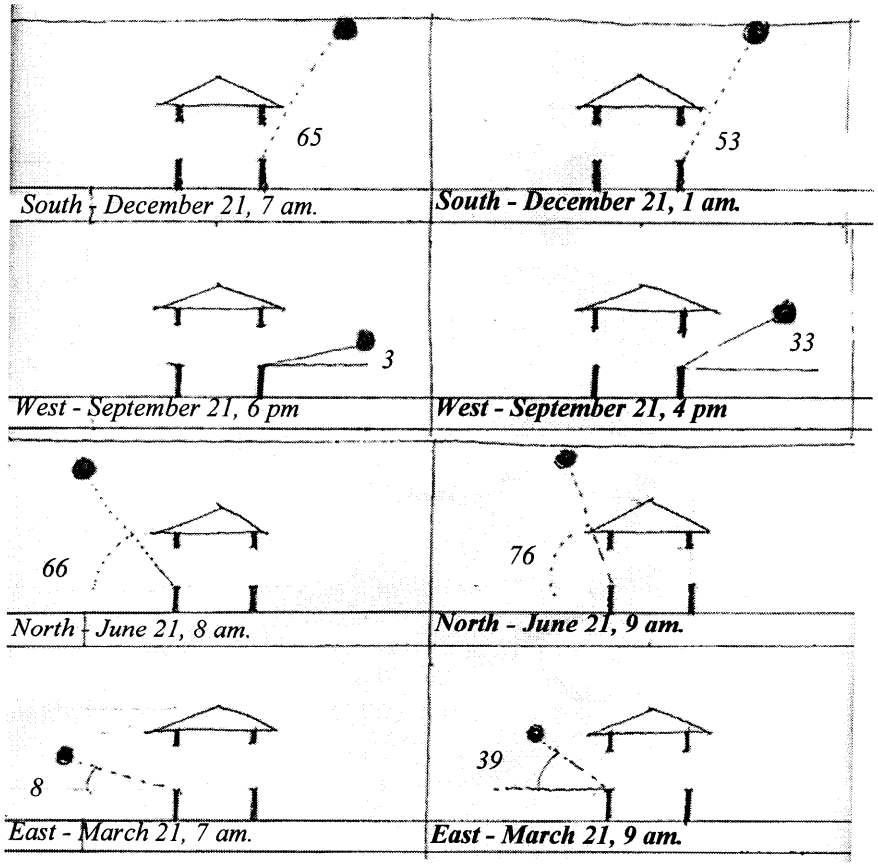



*Fig. 6.4 Critical profile angles for windows on each facade of house in Bangkok.*

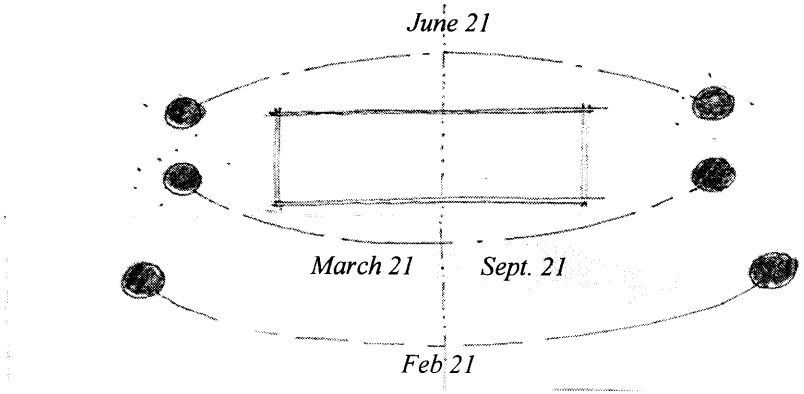



*Fig. 6.5 Sun path diagram of Bangkok.*

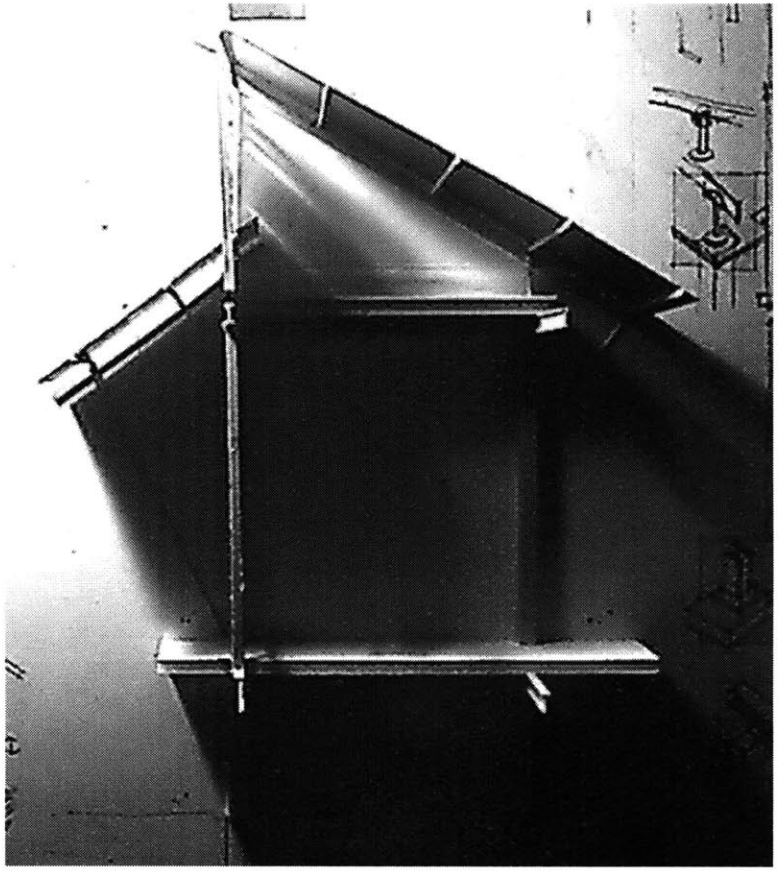
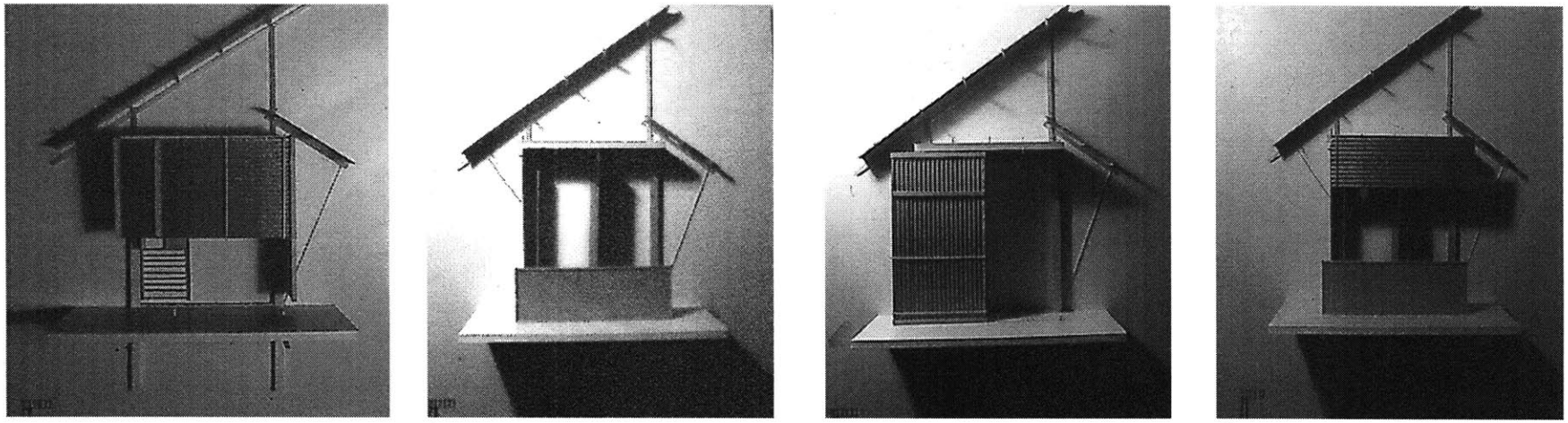


*Fig. 6.6 House of Three Elements - a sectional study based on sun angle in June 21, 8am on the north facade.*



a b c d

*Fig. 6.7 West facade study - different schemes with both the vertical and horizontal secondary components.*
*a - in December 21 at 5 pm.*
*b, c, d - in June 21 at 4 pm.*

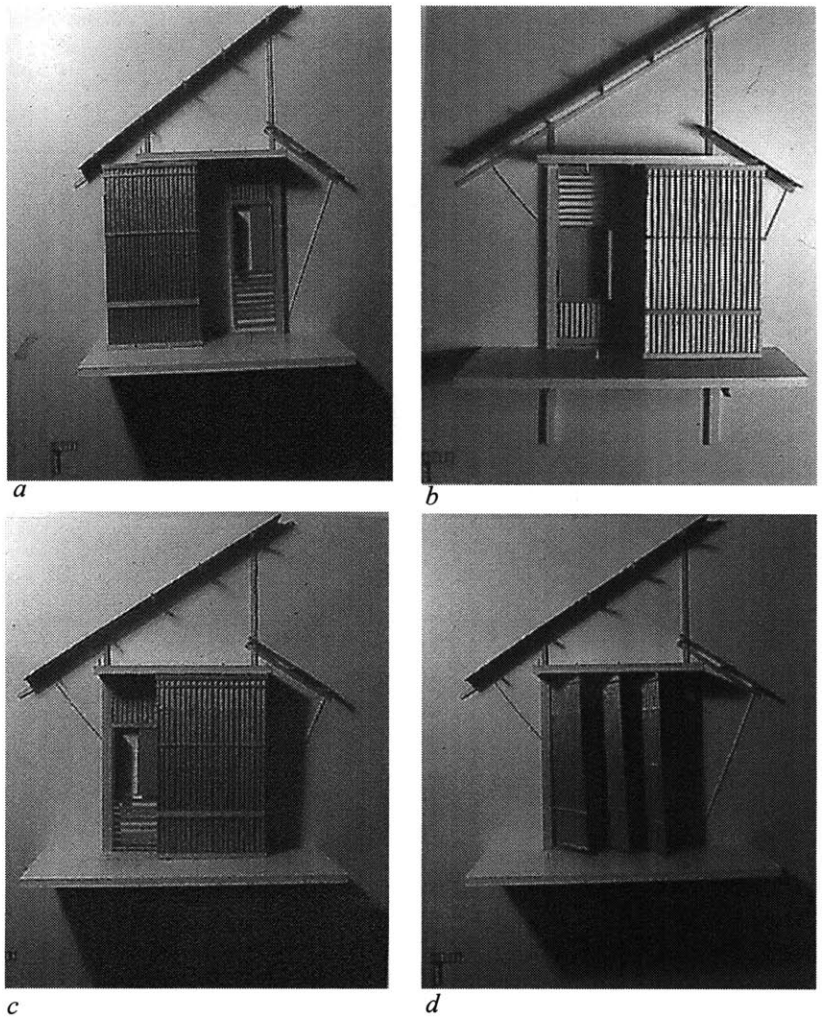


*Fig. 6.8 - West facade study - schemes with adjustable sun shading components, thus offering the best solutions.*
*a, b, c - Same scheme with double sliding doors at different sun angles. This scheme can block the sun before it enters the house and can be used year round. Users can adjust the amount of light entering into the house.*
*d - Scheme with vertical fins. This scheme has the same attributes as the other and in addition, the fins can be used as wind scopes.*

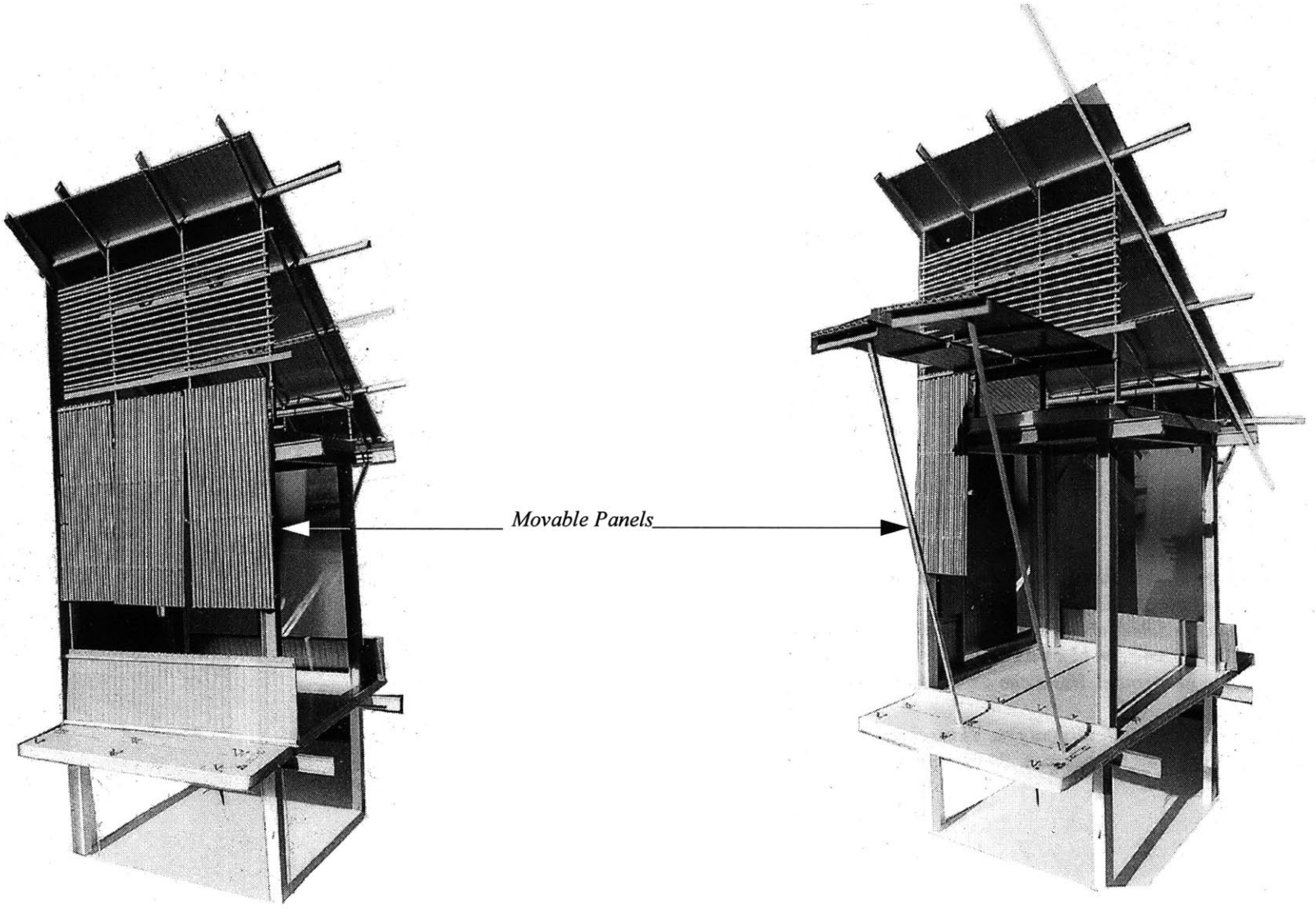



*Fig. 6.9a*

*Fig. 6.9b*

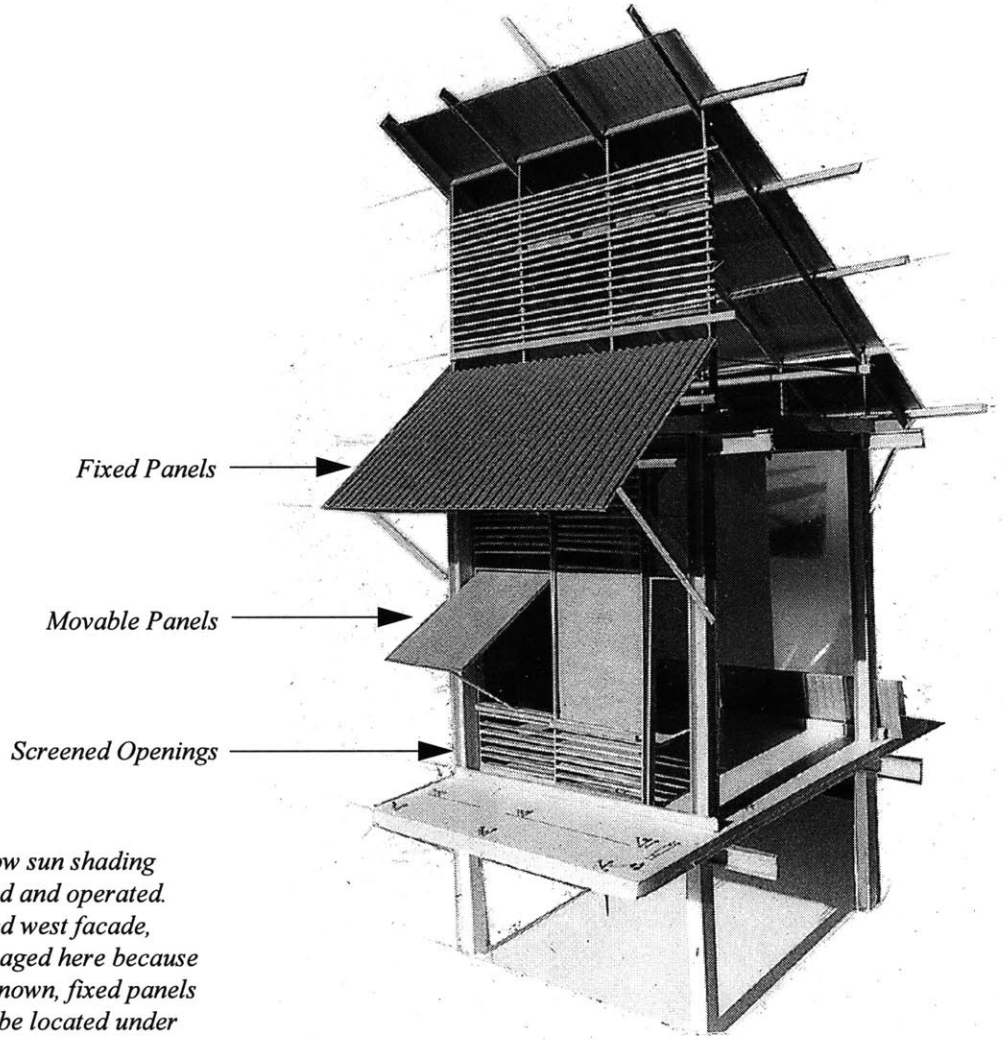



*Fig. 6.9, 6.10 North Facade Study - scheme showing how sun shading device on the north and south facade should be designed and operated. Unlike the vertical fins and sliding doors on the east and west facade, panels that can be extended forward and up are encouraged here because of the higher sun angles. If the critical sun angles are known, fixed panels can also be use. In addition, screened openings should be located under the panels to facilitate natural ventilation.*

*Fig. 6.10*

*Fig. 6.11 Interior Space facing west with vertical fins.*

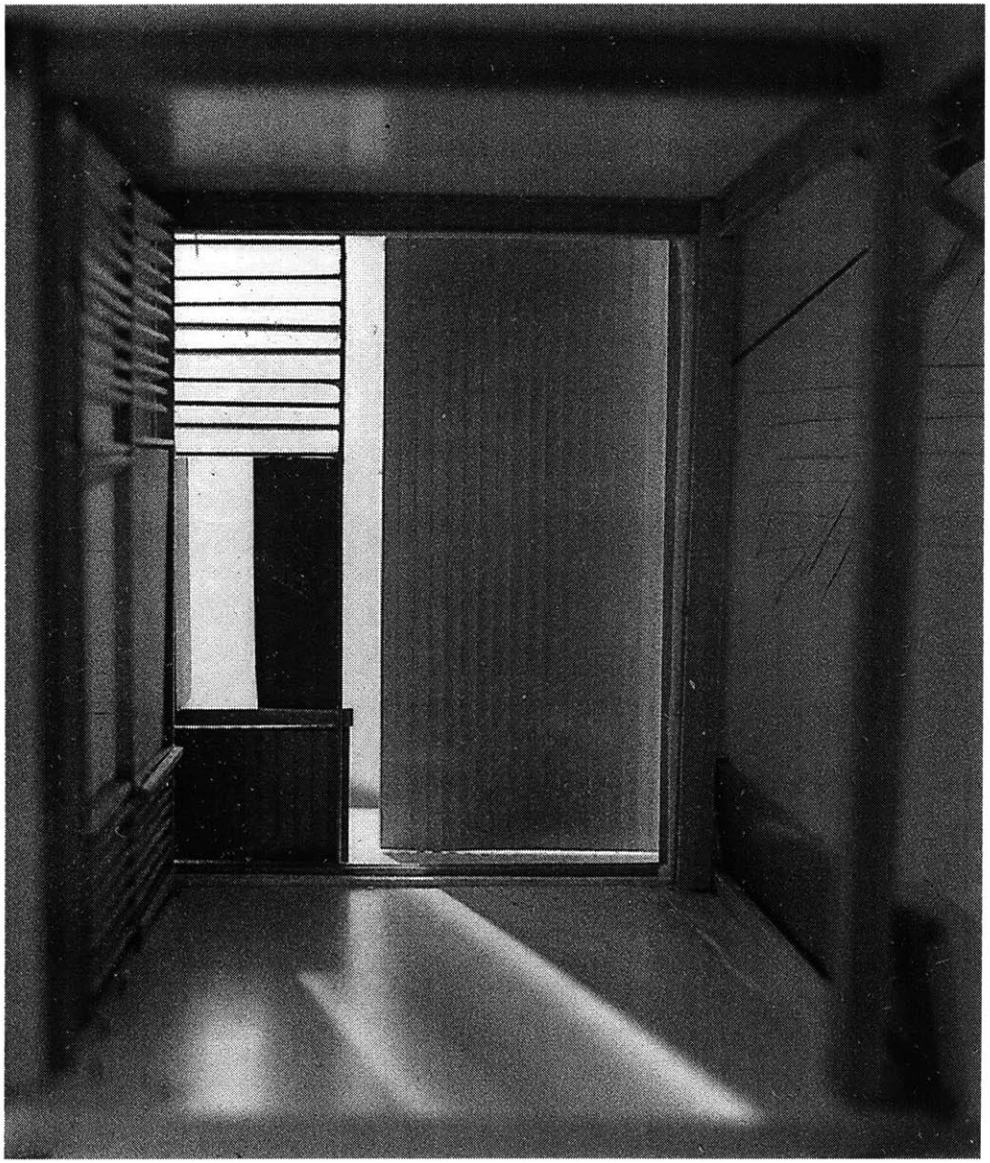
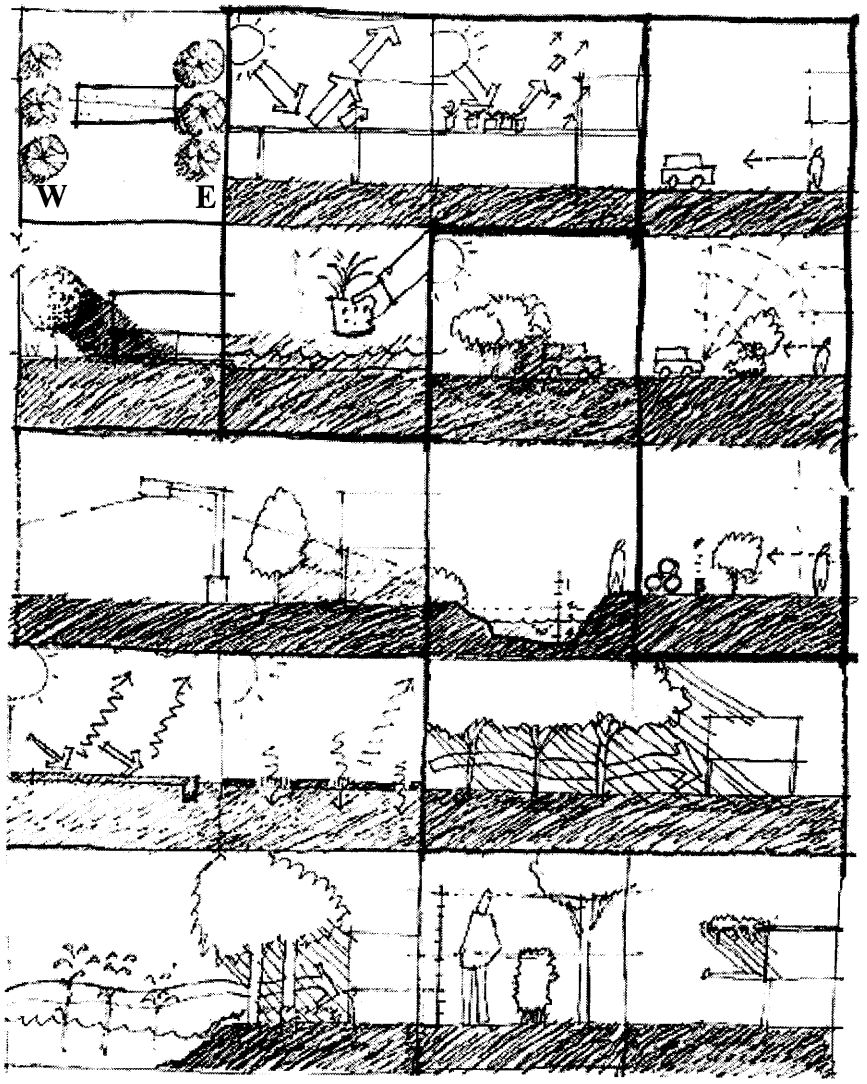


*Fig. 6.11 Interior Space facing west with double sliding doors.*

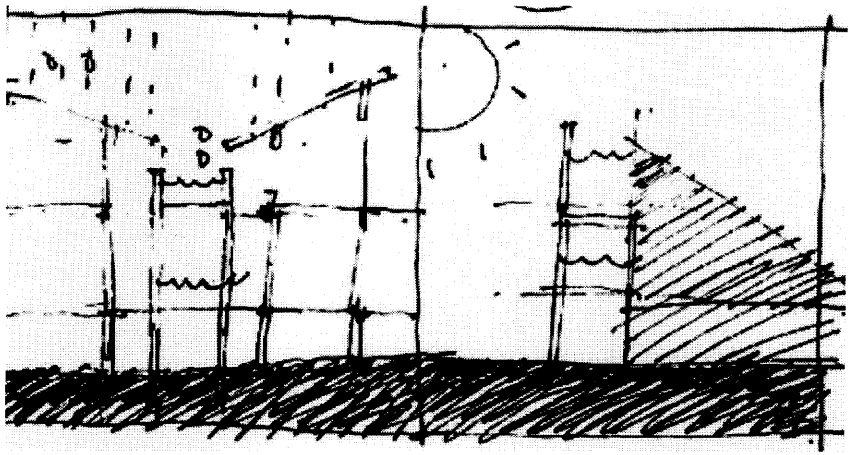
**Landscape**

Trees are planted near the east and west facades to provide additional shading and increase privacy. Planting trees near the house also makes the dweller to be more in touch with nature and its seasonal changes. In addition, potted plants, which can be removed during floods, should be placed near openings to deflect direct sunlight.

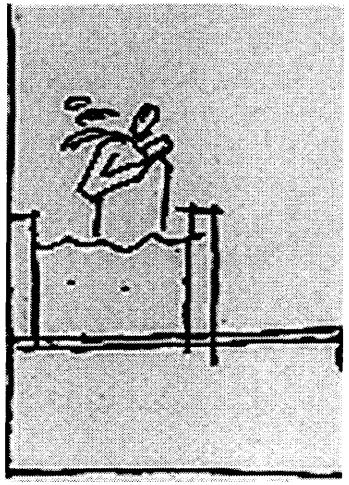


**Water System**

Traditionally, water jars are placed outside the house to collect rain water for dwellers to bathe and wash all year round. Based on the same principle of rain water collection combined with the exigencies of modern living, rainwater containers are integrated into the core of the structure for the new house in addition to the city's water supply. The re-introduction of rain water usage, through a system of water collection that starts from the roof gutters. then flows down to the open-air washroom on the second level, then to the more enclosed bathroom in the middle zone, and all the way down to the ground level, is gravity driven and supplies water for all functions in the house during the rainy season. Extra water is stored in containers outside the house for future uses.



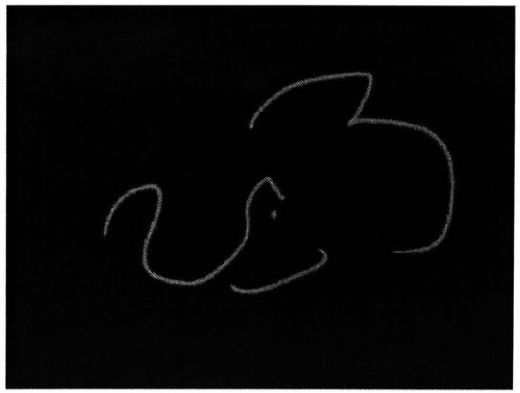
Even the smallest scale used in the house follow the same design principles as when a dweller uses a 'kan' or water scooper to bathe. This traditional practice of, firstly, collecting natural rain water, then physically scooping just the right amount for the designated use increases the user's awareness of the act of storing and the act of using water. In this manner, all the design decisions in the are attempts to capture the fundamental principle of re-integrating everyday life back with its natural surroundings.



# a n d  i t  c o n t i n u e s . .

The most important starting point and catalyst of the design methodology employed in this thesis was a personal focus on myself and my own experience and memories, which helped me to make decisions on what is worth keeping or sustaining. I arrived at that decision by examining the house that I had grown up in, by relying on my childhood memories and by learning the tradition from my parents and grandparents. My design process was informed by my own personal understanding of each and every space in my family house and the surrounding landscape. Giving the manageable scale of the project, a house based on these principles can be readily built in Bangkok today - something that might be a next step for me.

I hope my thesis will remind fellow designers to sustain their good memories of the spaces/places that they had experienced and utilize them as an anchor and a guide in their design process.



# 7

# Reference

# N o t e d  F i g u r e s

All aerial photographs courtesy of the Royal Survey Department in Bangkok, Thailand.

2.1 **Sumet Jumsai,** *NAGA: Cultural Origins in Siam and the West Pacific.*

2.2 **ibid.**

2.3 **Barry Broman,** *Old Homes of Bangkok.*

2.4 **NAGA.**

2.5 **Ruthai Chaichongrak,** *Ruan Thai Derm.*

2.6 **NAGA.**

2.7 **William Warren.** *Thai Style.*

2.8 **Chaiya Pruk Real Estate Catalogue.**

2.9 **ibid.**

2.12 **Noble Home Catalogue.**

2.13 **ibid.**

3.3 **Pirom, Temepan, Ratanajorana, Srisuroe.** *Baan Thai.*

4.1 **NAGA.**

4.4 **Baan Thai.**

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4.10 **Old Homes of Bangkok.**

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