THE STUDY OF THAI TRADITIONAL ARCHITECTURE AS A RESOURCE FOR CONTEMPORARY BUILDING DESIGN IN THAILAND

By
Wattana Boonjub

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree
DOCTOR OF PHILOSOPHY
Program of Architectural Heritage Management and Tourism
(International Program)
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The Graduate School, Silpakorn University has approved and accredited the thesis title of "The study of Thai traditional architecture as a resource for contemporary building design in Thailand" Submitted by Mr. Wattana Boonjub as a partial fulfillment of the requirements for the Doctor of Philosophy in Architectural Heritage Management and Tourism.

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Traditional Thai architecture has recently become popular among Thai people. However, the design and the construction of buildings that show Thai architectural features have limitations because of the lack of guidelines for the incorporation of traditional characteristics in modern buildings. Even though some architects attempt to apply Thai features in contemporary architecture, they have not been able to find prominent characteristics of Thai architecture or lack confidence in those Thai features. Therefore, it becomes necessary to investigate modern Thai architectural characteristics by studying three types of award winning buildings namely: residential buildings, institutional buildings and hotel and resort buildings. The study, done with buildings in four regions (north, central, northeast and south), is aimed at finding characteristic Thai features, which are accepted and incorporated in the design of those buildings. Then, the research findings can be used as the guidelines for the development of characteristic Thai features for other types of contemporary buildings.

According to the survey, both architects and laypeople agree that characteristic Thai features have evolved from architectural features of traditional buildings with some adaptation to suit modern day life styles and new technology. However, when the characteristic Thai features are classified by their physical appearance and impressions from the characteristics, focusing primarily on functions and then forms, it shows that architects and laypeople have different opinions about an acceptance of these features in contemporary buildings. Most architects still pay attention to the relationship between form and function, based on fundamental philosophies of traditional Thai architecture, while laypeople tend to be interested in the forms of characteristic Thai features of modern architecture.

The research findings show that architects need to take into account the importance of form and function and also explain to laypeople about characteristic Thai features so that Thai architectural wisdom and philosophy can be preserved and developed properly.

Additionally, there should be an application of Thai architectural characteristics in the architecture of contemporary buildings, including an adaptation of local design for the buildings in respective regions based on climate, local belief, construction materials and technology for energy efficiency.

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Student's Signature……..
Thesis Advisor's Signatures ……. ……..

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Chapter 1

Introduction

Significance of the Problem

Architecture has always played an important role in society, especially in terms of habitations that closely connect to the people as one of the four requisites – The Shelter. It is also regarded as human's "Material Culture" (Wiwat Themiyabhandu, 1997).

Thailand developed as an agricultural society; therefore, the dwelling of the people were not big in size and were usually found on the low land near waterways. The house was mostly built above the ground on high posts and made with local material easily found in the area. The house occupants can perform most home activities in the house without going down to the ground. Moreover, the traditional Thai house has a high level of security as the dwellers can elevate the ladder up to the house terrace at night to avoid animals or thieves.

According to Prof. Choti Kanlayanamitr, traditional Thai house architecture clearly expresses the relationship between the life style of Thai people and the natural environment. The different regional environment, culture and local traditions have a big influence on the architecture of Thai houses.

Thailand today is going through a lot of changes and development. We are more westernized, with development in education, social structure, economy and the physical environment. Technological development is the major factor that affects traditional Thai architecture, and has a great influence on the diversity of Thai architecture to meet with the requirement of the dwellers to support their life style and usability. There are varieties of building types: lodging, residence, shop houses, hotels, resorts and institution buildings such as government offices and educational institutes.

The trend of Thai contemporary design is awaking during the past years to fulfill the taste, character and also to support the business usability. However, most of those buildings do not appropriately feature the relationship between the traditional identities and the prestige of Thai architecture. The Thai traditional architecture design is limited and mostly appears in the form of temples, palaces and houses. The design of some specific buildings such as hotels and resorts could utilize traditional architectural forms. However, not all aspects of Thai traditional building are accepted by people.

Taking into consideration the above matters, has brought me to this study - The Study of Thai architecture for use in adaptation for contemporary Thai building design. The study is focused on the general point of view of the architects who design the

buildings in regards to the value and social acceptance of Thai architecture. The study will suggest directions for developing Thai style building design so that its value and dignity gain true acceptance from society.

Goal and Objective

1. Study the typical Thai character of traditional Thai architecture in all regions as knowledge base for the research.
2. Identify, both concrete and abstract, the typical Thai character of the notable features of the case study buildings which are Thai contemporary architecture.
3. Study the design concepts and opinions regarding the character of contemporary Thai architecture and the development direction of the case study buildings.
4. Study the social acceptance of the residents of the case study buildings in regards to Thai contemporary design.
5. Develop guidelines for appropriate use of traditional design elements in Thai contemporary architectural design.

Hypothesis

The concrete characters and abstractive character of traditional Thai architectural work must be involved in the process of traditional Thai characters recognition

Scope of the Study

1. Study of the character of traditional Thai architecture using relevant documents both published and unpublished, including interviews with architects who designed those buildings.
2. Categorizing the Thai contemporary buildings into 3 types; the residence, hotels or resorts, and institutional buildings covering four regions of the country: the central plain, the northern, the northeastern and the southern region. The study will examine at least one building in each region and those buildings which have been awarded or published in the magazines or architectural journals as well as ones that that are of outstanding value and prestige. For example;

The Central Plain

The Residence
- Nichada Park, Nonthaburi Province

Hotels / Resorts
- The Marriott Royal Garden Riverside, Bangkok

Institute Buildings
- Ayudhya Historical Center, Ayuthaya Province

The Northern

The residence

- Baan Jang Nak, Chiang Mai Province

The Hotels / Resorts

- The Four Seasons Chiang Mai, Chiang Mai Province

The Institute's Buildings

- Tu Rieng Kiln Conservation Center, Sukhothai Province

The Northeastern

The residence

- Baan Suan Tor Rung, Khon Kaen Province

Hotels / Resorts

- Sofitel Racha Orchid Hotel, Khon Kaen Province

Institute Buildings

- The Golden Jubilee Convention Hall, Khon Kaen University

The Southern

Residence

- Vanich Bay Front View, Phuket Province

Hotels / Resorts

- Le Meridien Phuket, Phuket Province

Institute Buildings

- Phuket National Museum, Phuket province

Research Methodology

Quality Research by doing survey, interviewing and answer the questionnaire

Process of the Study

1. Studying and gathering data about concepts, theories and relevant research from books, textbooks, journals, critique and other type of media.
2. Determining the structure of the research
3. Field data collection of the physical characteristic of the case study buildings by surveying and interviewing.
4. Data analysis to summarize the keystones for questionnaire in order to test the result of the study that covering the content of the study;
   - The social acceptance of the Thai Contemporary Architecture from the architects and public.
   - The opinions from group of architects and public concerning the direction in developing the Thai contemporary architecture.
5. Setting up questionnaire testing to the professional architect to find reliability ratio and retesting to improve the questionnaire before distribution to the public. Five sets of the questionnaires are prepared.
6. Distribution of the improved questionnaires to the target individuals; 10 professional architects and 100 individuals using the buildings.
7. Statistic approach Data analyzing by software SPSS and evaluation.

Summary and suggestions

- Summarize the study in regard to the social acceptance and the direction in developing of Thai contemporary architecture by the professional architects and individuals.
- Suggestions for future study.

Chapter 2

Philosophy of Traditional Thai Architecture

The word philosophy which derives from an ancient Greek word *Φιλοσοφία* can be separated into two words, *φιλε v* meaning ``love'' and *σοφία* meaning ``knowledge.'' When combined, the word means ``love of wisdom'' or the desire to acquire knowledge or wisdom.

Knowledge can be divided into two areas:

- That involved with nature like physics which is an experimental science that aims to create theories and analyse nature including cosmology, biology which aims to study living creatures, and chemistry which is the science concerned with the composition, structure, and properties of matter.

- That dealing with social matters including economics, the science of economic systems; political science, the science of governments; law, Philosophical studies cover knowledge and truth in every science and field of knowledge in the world and results from the study can be used as reference in every science and field of knowledge.

It can be said that philosophy is the principle of knowledge that is also the principle of truth. Those who study and understand philosophy can apply the knowledge to all sciences and all subjects as well as all happenings in everyday life.

Architecture is an art form that is displayed in the form of buildings and shelters. It is involved with town planning, landscape, interior decoration and design. It is a large scale form of art and requires several people working together on it. It is a long-lasting structure and also a process of land allocation to make use of vacant land as needed. It is related to other sciences, including engineering, science, sociology, anthropology, art and aesthetics.

The value of architecture depends significantly on harmony in land allocation and land use, on making architectural designs that fit with needs, as well as the use of proper and harmonious materials.

When the word ‘Thai’ is referred in any structure, it means the works of art in Thai tradition, including Thai traditional house, which is different in each region; religious structures in Thai temples such as Vihara, Ubosot, bell chamber, Chedi; as well as palace and fort.

The following part will examine the philosophy of Thai architecture focusing on knowledge that relates to works of art in Thai construction.

Element of Thai Architectural Philosophy

It is evident that all kinds of art are created out of basic needs of humans, including shelters, food, medicine, and clothes. Originally, human beings did not display creativity in making those materials. However, when society became more complex, people began to beautify their utilities in accordance with taste and beliefs. Eventually, each society developed its own artistic identity. There is a saying that art is made from the inner push of an artist. It can reflect ideas and various feelings such as hotness, coldness, suffering, sadness, joy, and gladness. It is a form and a medium of communication of each artist's inner self without using words. Art knows no limits in form, or technique.

Fig. 1 Rice fields.Trees are left to provide shade and used as fense.
(Source : Thai Houses)

Artistic contents tend to reflect beliefs, feelings, state of being in a society and they evolve into new forms.

When searching for a philosophy of art and architecture, one must initially believe that there exist theories in architecture, before posing questions or setting up hypotheses. One must try to read the mind of ancient craftsmen to find an answer. When one eventually achieves logical answers and evidence, that means one discovers theories or principles adhered to by our masters. This is to confirm that there are theories, rules and

formulae in Thai architecture and that works of art are not merely a matter of an individual artist's feelings. This is the reason why there have been no changes or new forms in Thai architecture, resulting in the criticisms that it is outdated and cannot respond to present needs. Some even argue that this architecture should not be preserved or restored.

It can be said that changes in art are largely driven by three factors, including the influence of natural settings, religious beliefs, and the acceptance of foreign civilisation, either direct or indirect. This, too, is applicable to theories of Thai architecture.

Relationship of elements create the philosophy form

Thai architecture has a definite identity. It is created by artists who transform imagination to reality. These artists pass on the knowledge through generations. Thai art means works that are created in accordance with tradition and custom with specific form and identity. Thai art has evolved and changed due to socio-economic condition and people's education.

Art in Thai architecture was made out of artists' wisdom, which combined natural beauty with religious beliefs, classic literature, and people's livelihood through creativity, ideal imagination, and national identity. It exudes peace and serenity both in form and substance and reflects the inner gentleness of Thai artists. The following explains unique characteristics of Thai architecture, which were derived from wise adaptation of architectural work, resulting in harmony of livelihood and natural environs:

Thai Architecture Textbook

Generally the knowledge of Thai architecture has been passed down through direct learning from the masters. There was no textbook that offered theories or guidelines. Two important books, *Siamese Buddhist Chedi* book, composed by Prince Damrong Rachanuphap, and *History of Architecture* in Thailand by Ajan Nart Phodhiprasat cannot be counted as theories in Thai architectural design.

This makes Thai architecture different from other subjects such as traditional medicine, astrology, *Promchart*, and black magic – all of them have a record in the form of khoi or larn dry-leaf inscription. There are some related textbooks that deal with finding auspicious times for house construction, or how to determine spots in pillars whether they are good or bad to house owners. Despite the lack of architecture textbooks, construction of buildings in Thai style continued into the Rattanakosin era without major changes. That there are few - or any change - in Thai architecture reflects that there must be philosophy or custom that keep the knowledge intact.

The Philosophy influence in Traditional Thai Architectural Character

Natural Setting

Fig.2 Stilt structures
(Source : National Archive)

1. Inclined Stilt structures

Thailand's agrarian community is situated on low-land flood plains and adapts to the setting to make a living. In general, people settled in fertile river basins that provided sufficient water for farming. That made it necessary for people to build houses on high stilts on high ground to stay above the water during floods. The importance of water for Thai society has led to the coining of the term ``water season'' in addition to summer, winter and rainy seasons.

It should be noted that Thai builders do not erect the stilts at a 90-degree angle from the ground. Instead, each stilt leans a little toward the centre of the house structure. This makes Thai houses more resistant to strong water flows or winds and is an efficient way of ensuring structural integrity.

Another advantage of stilt construction is the provision of under-floor space for various activities, including rice grinding and weaving. The space serves as storage for

cart wheels and farming tools. It can also be used for storage of cattle when surrounding areas are flooded.

In terms of construction technology, the inclined stilt construction method produces a triangulation effect, which is stronger and more rigid than parallelogram forms. Besides, the pre-fabricated walls can be assembled without nails and bolts. No matter how old and dilapidated the house becomes, the structure will remain intact as the forces on each side of the structure automatically press into one another.

2. Ventilation

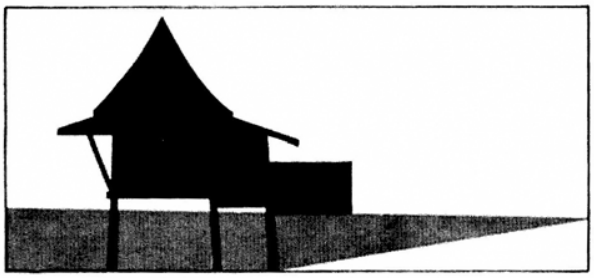


Fig.3 Flow of space on elevation of Thai house

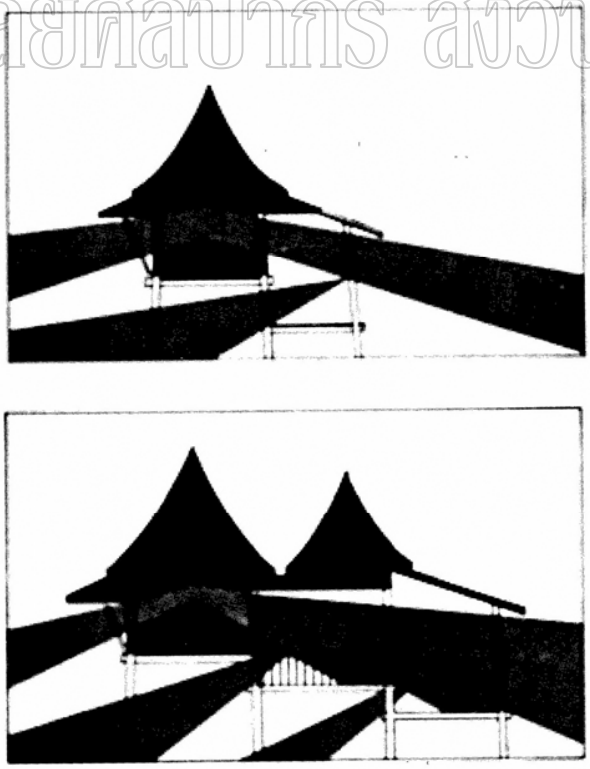


Fig.4 Flow of space on section of Thai house

Traditional Thai houses are well known for their ventilation, thanks to the elevation of the floors from the ground. More importantly, Thai houses are designed to ensure both horizontal and vertical ventilation flows.

Vertical ventilation is possible with the use of thatch for the roof, which is the house's hottest spot. Hot air rises and eventually flows through the thatched roof and is replaced by cool air drawn through the spaces between wooden floor planks.

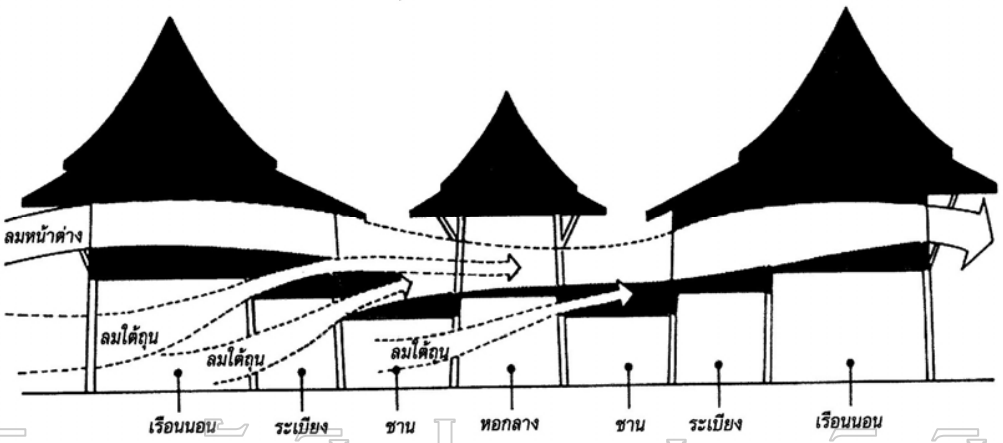


Fig.5 Air flow and Ventilation of Thai house

Different floor levels facilitate horizontal ventilation. An elevated open-decked platform is the lowest part of the house while the upper part is the *Ruen Palai* platform in front of the rooms, which are the house's highest part. Between the levels, there is space for wind to flow into the house unimpeded.

In addition, the open space enables people in the house to monitor activities on the ground. Some argue that the balustrade on the open-decked platform may form a barrier, preventing wind low. In reality this is not the case as traditionally architects understood the problem and place the wooden grill on the upper half of the balustrade. More importantly, some fences or *Ruen Palai* walls take the form of Fa Lai (sliding panels) that can be slid open when fresh air is needed.

Thanks to the above-mentioned design, there are no unventilated spots in Thai houses.

3. Positioning of the house

The ventilation system is one of the great successes of traditional Thai craftsmen. In addition, the positioning of the house and roofing play a key part in heat reduction. Ideally Thai houses face north, while the structure parallels to the eastern and the western side. In this position, the surface of the roof at any given time - even noon - will not

receive direct sunlight and thus will not absorb the heat. This position allows the house to fully receive the southern wind.

Even if builders cannot put the house in the desired position, there will be no big problem if the structure is roofed with thatch as it is not heat-absorbing material. Such a positioning is advantageous in that the longer sides will not receive direct light, which directly goes to the surface of the walls' shorter sides only in the morning and late afternoon, the time when the light becomes favourably soft. Therefore the positioning and architectural design contributes a great deal to house ventilation and heat reduction.

Looking at Thai house architecture, it is evident that Thai builders are well aware of climate and wisely select construction materials. They develop the structure to make it suitable to the surroundings. Traditional houses depend on natural wind and since all the houses are elevated, the wind is able to pass through the entire village without impediment. In some communities where houses adjoin those of close relatives there are no fences. The fence, if any, is meant primarily to mark the boundary, or to protect the property from animals and thus is designed to facilitate wind flow.

If modern builders were to adapt the advantages of traditional architecture, there would be no close and unventilated spots in houses, and occupants would depend much less on air-conditioning and electric lighting. However, modern Thai houses possess few traditional features. Nowadays, house owners opt for concrete or masonry as fence and house construction material. Houses are no longer elevated, and they become wind blockages themselves.

4. Open-decked platform or *Chan Ruen*

Fig.6 Chaan Ruen
(Source : National Archive)

Since traditional Thai houses have no fences and the land can sometimes be flooded, occupants need an open-decked space to sun-dry things during the wet season.

Some houses even turn the open-deck area into a small garden. These are typical structures for riverine houses.

Readers of Thai classical literature “Khun Chang-Khun Paen” can imagine such a spacious deck and its beauty. This is an architectural design well adjusted to nature, enabling occupants to cope with heat and floods. It also helps householders to tackle natural changes and live a normal life all year round.

5. Height

The size and height of Thai traditional houses are related to the occupants’ physical traits. The different space between floor and open deck area is designed to make it fit for occupants to sit with their feet hanging down. The window panes are level with seated occupants, allowing them to look out of the house comfortably. The roof of enclosed *Ruen Palai* makes it comfortable for occupants to place baskets, which contain things to sun-dry. Thai houses are designed to allow occupants to complete all activities without the need to go down to the ground. Occupants can also pull up the stairs at night to prevent invaders from climbing up.

6. Treasure pillar

In the past, house owners hid their money and valuables in unconventional places, rather than cabinets and coffers. It was common that they discreetly holed one of the house’s large pillars, making it a secret chamber. Such treasure pillars are now extremely rare.

7. Raft house

Fig.7 Raft houses in the north of Thailand in the reign of King Rama 5
(Source : National Archive)

Thai houses in the central region were located on flood plains. Therefore, it was necessary that the houses were designed to enable occupants to continue a normal life in their houses during floods. Some groups of people like traders and fishermen, whose livelihood depended particularly on water preferred living on rafts, which allowed them to move from place to place and earn a living.

In the past, rivers and canals were the most convenient channels of transportation for people and goods. They are also an important source of water for farming. All ancient Thai cities were located near water sources and when cities were expanded inland, people dug up canals, mainly to get water for their farm and use them as transportation channels. Networks of canals in Ayutthaya and Bangkok in the early Rattanakosin period (18th century) attest to this fact.

Therefore, raft houses provided one of the two housing choices in this period. They were designed specifically for people to live on or to use in making a living. During the reign of King Rama V, the number of rafts along the canals and rivers was substantial. Now only a few remain in provinces like Uthai Thani. The number of rafts is dwindling since the maintenance cost is high. Besides, the increasing number of boat population makes living on the rafts no longer convenient.

8. Construction methods

Traditional Thai houses on the banks of the Chao Phraya River have long been developed to the point that form and size became fixed and people were able to purchase prefabricated parts for repair or for new construction. Memoirs of Krungkao residents dating from the period before the 1767 war with Burma mentioned a village, Nan Ian Chai, in the capital of Ayutthaya where prefabricated house parts were on sale.

Thai craftsmen adhered to conventional construction practices when building a house. They usually made all prefabricated parts, including the roof frame and walls, often tested them for fit, and when they were certain that there were no flaws, they would start the construction, assembling the parts on the prepared stilts at an auspicious time. The construction was normally quick.

It should be noted that traditional Thai houses did not vary much in size, especially those for medium-sized families. The similarity was as close as if they were made using blueprints. This traditional construction method conforms to geometric theory, an amazing observation given Thai craftsmen who never studied geometry were able to make precise or close calculations. This leads to the conclusion that there was a rationale behind the idealistic beauty, which perhaps can be rediscovered if we use the right methodology.

The construction of a raft house requires more knowledge and technical capacity than a house on land. A raft is like a boat as it moves on waves. Raft-house builders must know how and where to put the weight to keep the structure in balance and every joint

must be specially made to ensure it flexibly moves when hit by waves or the structure may be broken. Raft-house occupants brilliantly use water jars as weight and place it where needed.

Social Interaction

It is agreed that it needs more than one ethnic group to form a strong nation. It requires the unification of different ethnic groups to achieve peaceful co-existence.

Before the land known as Siamese Kingdom was established, this area was occupied by various ethnic groups with different cultural identities such as Mon, Lawa, Lao, Khmer, etc. Finally, the strongest group managed to get hold of power and established the kingdom by unifying different ethnic peoples and efficiently putting in place cultural assimilation. That is when people from different lands started to actively interacted with each other, exchange knowledge and learn about new cultures. Such a process therefore has an impact on their creations.

1. Dhevaraja, God-King and Thai architecture

Dhevaraja (the divine king) and god-king may have similarities but they came from different sources. God-king (Summuttidhev) or the reincarnation of god originates from Mahayana Buddhism while Dhevaraja is from Brahmanism.

The Mahayana school regards kings as Phrachao Jakkapat [as described in the Mahachompoo Bodi Sutra] and eventually the divine beings. In the Theravada school, the divinity of kings described as Dharmikarat or Phraya Jakkawatdiraj or Phraya Jak is mentioned in the Trai-Bhumi Praruang scripture.

The concept of the divine king can be traced back to the Buddhist culture of Mon people. During the Sukhothai period, kings were treated the same way as those in the Mon culture. These kings, who strictly followed the Phra Dhammasat text, were required to comply with the 10 royal virtues and uphold Buddha's principles of Sangahavatthu 4 and Brahmvihan 4 (these virtues believed to help bring social harmony to the country). Even though it seems kings in the modern time simply follow the royal court practice, but by uttering "I shall rule by righteousness," they are to observe dharma in Dharmasatra text.

Such royal practice automatically makes them a divine being and it becomes a tradition that Thai kings advocate Buddhism. The kings' divinity, either in the Mahayana school or the Theravada school, is often shown in their royal titles such as Phra Maha Dharmaraja and Phra Maha Jakkapat and Phrachao Songdharm.

Another way to recognise the kings' divine being is to compare them with the Lord Buddha. In Ayutthaya kingdom, there existed a tradition, which gave the title of ``Phra Buddhachao Luang," to the late kings. This was mentioned in the book,

Boromratchaphisek (Coronation) composed by Prince Krommuen Pittayalap Pruethiyakorn, which referred to ``Somdej Norbuddhangkoor'' as the son of the king, while Phra Buddhachaoyuhua as the kings.

Fig.8 Symbolic elements of Dhevaraja
(Source : Author)

Another idea of the divine king or Dhevaraja comes from Brahmanism, which regard the king's status as that of Indra God, a great god who resides in Daowadung-level heaven. Indra God, who is also mentioned in the Trai-bhumi Praruang scripture, is recognized for his great merits. During the Ayutthaya period, a new king must attend a coronation ceremony called “Indra-bhisek”. This tradition lasted until the early Rattanakosin period when King Rama I performed the Indra-bhisek ceremony for his coronation at the Indra-bhisek Throne Hall.

Other examples that indicate the importance of Indra God are the royal tonsure ceremony for young royal members, a ritual to open Krailas' gate and the ceremony on Mount Krailas (also known as Sumeru or Sineru Banpot Mount). The god’s names are also used in several structures in the palace, including Indra Vinijaya Throne Hall, Dusit Throne Hall, Chitralada and Paruskawan. Mythical animals like Singha and Garuda, which adorn the base of the throne, are believed to live in Mount Krailas.

The concept of a divine king is also extended to some Hindu gods, including Shiva, Brahma, Vishnu, and Sun god. This is evident in the royal titles of some kings. For example, the name ‘King Rama’, which is one of several names of God Vishnu, is used as a title of several kings of Ayodhya as well as kings of the current dynasty. This includes the use of his name for palaces and places [p 24] like Piman Chakri Throne Hall in the Phya Thai Palace, Phra Narai Ratchanives Palace in Lop Buri Province, Phrathi

Sommutidhevarak-ubat Throne Hall and Chakri Throne Hall in the Grand Palace, as well as the use of ‘Ayutthaya’ as the province's name.

Other royal titles of the kings, including Somdej Phra Narai the Great of Ayutthaya, Phra Ramindra, or the use of Ramathibodi at the end of the royal title during the Rattanakosin period, are also derived from the Dhevaraja concept.

The association between the Siam monarchy and God Vishnu can also be seen from the use of Vishnu’s image and his vehicle (a mythical animal called Garuda) as the royal symbol and also weapons, chakra (a spinning disk with very sharp edge) and a mace (Kaumodaki), as the dynasty's emblem.

Buddhism and Brahmanism endorse the concept of the divinity, which in fact contain different beliefs. Brahmanism has an important role in the royal ceremonies. It regards kings as the reincarnation of Vishnu while, under the Buddhist belief, kings are Norbuddangkoor and Phrachao Jakkapat with Sangahavatthu 4 and 10 royal virtues.

The acceptance of the kings' divinity and the architectural interpretation of heaven in Buddhism are the main reasons that inspired craftsmen to devote themselves faithfully to the job and go into great details to create an architectural masterpiece for the religion and the kings. Their good work will hopefully ensure great fortune and social hierarchy as well as a place in heaven.

It should be noted while craftsmen do their best to complete the job for the kings and the royal members, there are some construction rules and guidelines about the hierarchical status of Thai architecture.

Hierarchical status of Thai architecture

In the past, Thai houses were used to identify the social status and wealth of the owners. There were some feudal rules that governed the construction and the design of a house. This is known as the hierarchical status of Thai architecture.

This was evident in a court law dating back to the Ayutthaya period. In this system, a person with a social rank is granted certain types of possessions.

“A prince administers a town, rides on Phraya Numat horse, ...
Have male and female krom, a Buddha chamber and a hall.."

This means only a prince and princess in the rank of krom were allowed to have a Buddha chamber and a reception hall in their palaces. A prince and princess of lower ranks could not have such structures. The two structures were, thus, the indicator of their ranks and status.

Basically, there were two kinds of house for commoners and those in high positions. Houses of commoners were made of non-durable materials like bamboo, leaves of sugar palm trees, rattan and others in the same family. This kind of house was called *Ruen KRueng Pook* (pook literally means tying). It was given such a name because builders used a rattan or bamboo strip to tie the whole structure together.

On the other hand, houses of those in power were made of stronger materials, particularly timber from perennial trees like teak and some others in mixed deciduous plants. To build these houses, builders make pre-assembled planks and join them together. This kind of house was called *Ruen Krueng Sap* or sometimes called *Ruen Fa Kradan,* for its pre-fabricated wooden planks. Therefore, people were to comply with their social status and restricted to build a certain type of house, using a certain type of materials.

Furthermore, the house's hierarchical status was only one of the ways to display the owners' social status. It was a mechanism that indirectly informs its citizens of their duties and rights in the society. Such awareness helped society maintain normality to a certain extent.

However, the idea is obliterated in the modern Thai society because of the rapid influx of foreign cultures. It is also caused by socio-political changes as stipulated by the constitution, which endorses the right and freedom of people. House owners are now free to build a house in any style without an obligation to follow the hierarchical rules.

1. *Ruen Krueng Pook*

There are two types of Ruen Krueng Pook; namely *Rong Na* and *Krathom*.

Rong Na is built from bamboo sheets and poles with thatch roof. There is no floor or platform as the structure rises from the ground. Builders only level the ground before the construction. It has no furniture but one or two bamboo benches. Simple and cheap, this kind of house is a temporary place for farmers, labourers and slaves who look after the farm.

Krathom is built on an elevated platform made of bamboo. The wall is made either of *krachaeng* on or bamboo sheet. With palm thatch roof, it has a veranda and an open deck. This structure is stronger and more comfortable than Rong Na, implying a better economic position of the owners.This kind of house was also a home of high-ranking officials, including members of the royal family, who were stripped of their titles. Historical record mentioned an incident, which happened in the reign of King Prasartthong of Ayutthaya:

Fig.9 Ruen Krueng Pook in the rural village
(Source : National Achive)

"..... The king, accompanied by his consort and court ladies, went to Wat Sanphet to make merit before Phra Buddhapatimakorn during the Buddhist Lent. When proceeding to the temple's main Vihara, he saw Phra Atitayawong, son of the previous king, who sat on the jewelled wall with his feet hanging down and did not come down to pay respect. The king was angry at Phra Atitayawong's arrogance, stripping him of his royal rank and sending him to a two-room hut near Wat Tha Sai temple. The prince was allowed to have two helpers to do cooking and house chores. After giving his command, the king then returned to the palace."

Such punishment also occurred in 'Sang Thong', a well-known Thai literature composed by King Rama II in the early Rattanakosin period. The story depicts a king, who was angry with his daughter Rojana for choosing an unattractive man 'Chao Ngoh' as her suitor. She was then expelled from the palace and sent to live in a Krathom with him.

2. *Ruen Krueng Sap* or timber house

Fig.10 Ruen Krueng Sap
(Source : National Achive)

Using real timber, *Ruen Krueng Sap* is an upgraded form of a house. Only wealthy people can afford to live in this kind of house. However, the design of the house is subject to the owners' ranks and status.

In general, a house of a well-to-do family has three rooms in length, and a veranda and an open platform at the side. Next to the platform is a kitchen suit while stairs are on the opposite. The house can be extended without limit when the number of family members increases. For commoners the house must consist of a living unit and a kitchen.

Basically, there is little difference in the design of *Ruen Krueng Sap* of aristocrats and commoners. This is shown in the house's positioning and certain rooms that are used to reflect the owner' status. Normally, the aristocrat's house has twin units, with a *Chan* in between. The back end of the C*han* is a kitchen while the front end is stairs. Another room in Ruen Kreung Sap is a middle-sized hall called *ho ree* or *ho klang*. This hall is used for receiving guests and leisure activities as well as religious ceremonies. House owners tend to beautify this hall.

For senior aristocrats, their houses are bigger than ordinary Ruen Kreung Sap. These houses consist of more units, including an additional main unit next to *ho ree* on the middle *chan*. The *Chan's* back end features another unit for the house owner's grown-up children and their families. On the opposite *chan*, there is a *laplae* partition, which is the house owner's bathroom.

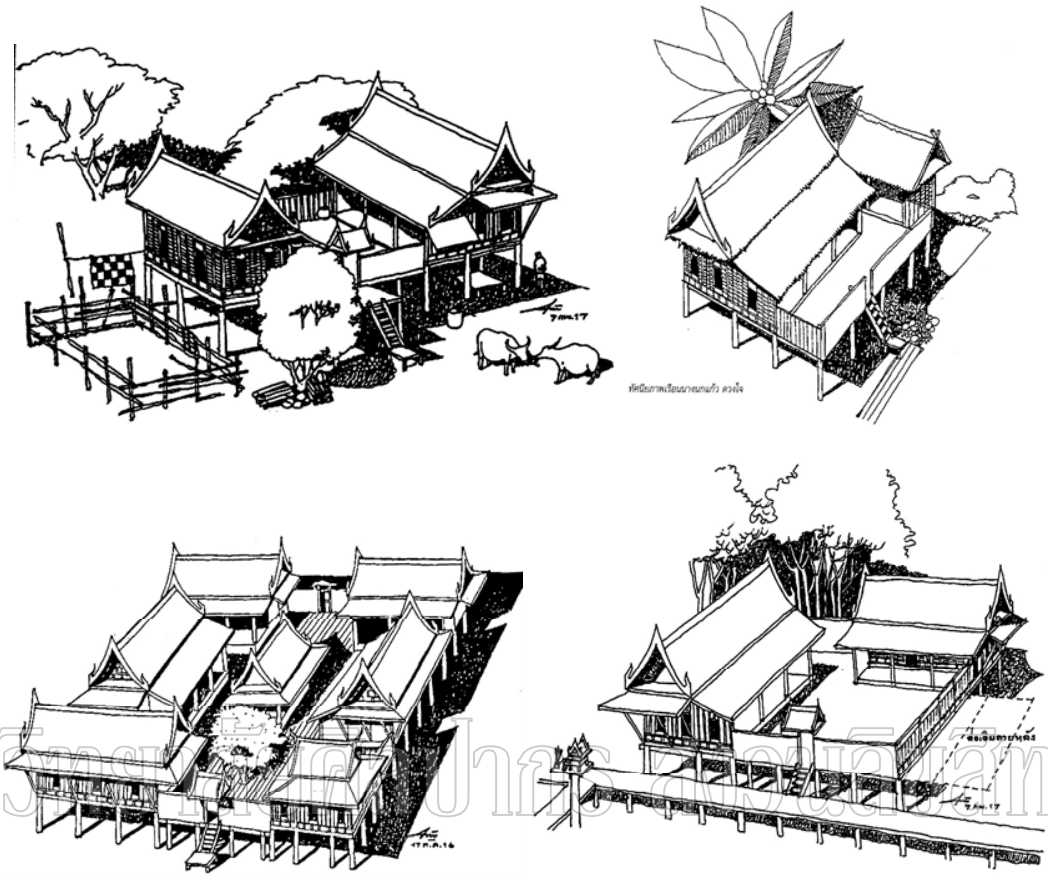


Fig. 11 Various style of Ruen Krueng Sap

It is a tradition for senior aristocrats to have a hall, *ho kwang* or *ho naa*, at the front of the main unit. The name is derived from its positioning, which cuts across the main unit. The hall, used as a reception chamber, is a distinctive part of the main unit and can sometimes have three-sided walls, while keeping open the side facing the middle *chan*. Some houses feature *mae mai* - a wall panel with square-shaped, grill-like holes in the middle. The holes are for ventilation and better lighting. It is not appropriate for commoners to build *ho kwang* or *ho naa* since it is reserved for the aristocrats.

Ho naa or *ho kwang* also serves as an office of non-*krom* princes or princesses who had a state position with a great number of officials under control. The hall is sometime used as a command office and, in some cases, a court. It is common that these high-ranking officials convert some rooms in the residences as the office because there were no office buildings in those days. Needless to say, the hall was the place that reflected the owners' social status.

In fact, *ho naa* functions as a throne hall or *thong phra rong* in the king's palace (The term throne hall was reserved only for the structure in the king's palace). Besides, owners of *Ruen Krueng Sap* were required to modestly decorate the pediments with bargeboards, or *panlom,* and *tua ngao* and the house remained unpainted.

Royal residence, known as *tamnak*, was the structure for senior royal family members with the minimum rank of 'Momchao'. The residence of those in lower royal ranks was called *Ruen*, like that of aristocrats and court officials. The size of the residence, *Ruen* or *tamnak*, also demonstrated the ranks of the owners. This ancient tradition lasted until the early Rattanakosin period.

3. The Residence of minor royal family members

The historical evidence in the early Rattanakosin period showed that the residence of royal family members of lower ranks had brick walls in *luad sai bua* pattern. The gate, which was made *chong kaad*, had no arch top. The residence, *Ruen* and *tamnak*, was made of wood with the wall decorated with red-earth *luk fak pakon*. The roof was made of earthenware tiles, with *panlom* and *tua ngao*. The frame of the pediment was painted red. The positioning of the residence of these lower-rank princes was similar to that of high-ranking aristocrats, except that the whole royal structure was painted red -- the colour that indicated the royal status.

4. The residence of senior royal family members or those at the rank of Phra Ong Chao

For royal family members of this level, the wall of their residence was made of brick and decorated with *bua lang jiad*. The corner of wall had a *sao-med song-man* design. The gate was made of hard wood and painted in red. The reception hall or *thong phra rong* was made of wood, with one-tiered roof of earthenware tiles, while the pediment was painted red and adorned with *chofah*, *bai raka* and *hanghong*.

However, *ruay raka* was made in Mon style, with *lamyong* hanging down below but not so low as that of *nak sadung* style, as that would exceed their rank. The pediment could not be gilded or decorated with coloured glass, again, for the reason of hierarchy.

Tamnak was made of hard wood and had three similar connected units, all painted in red. It was built with one end joined to an open platform behind *thong phra rong*. The roof was made of earthenware tiles while the pediment was decorated with *panlom* and *tua ngao*. Some *tamnak* had a *chan* at the end of the three-unit structure. This was also the architectural style that displayed the owners' status.

5. The residence of royal family members at the level of Chao Fa

The first structure that signified the rank of Chao Fah was the wall. Their residence's wall was made of brick and cement and topped with leaf-form sheets. However, they were not allowed to build a barbican, called *taitia*, at the wall. This was to ensure that the owners would not be too strong to commit treason. Prince Damrong explained the tradition of leaf-form sheets, which were used to differentiate this type of residence from those of royal family members of the lower ranks as follows:

> ``According to the old tradition, the king would pick grown-up, smart princes to govern outer cities called *muang luk luang* to alleviate his burden. Such tradition was known as *kin muang*. Normally, *muang luk luang* were the frontier cities where these princes had to protect against invaders. Each frontier city had a strong citadel, similar to that of the capital. This tradition was later annulled as the king preferred to have their sons with him in the capital, giving them important assignments. However, the king allowed the sons to build their residence much like that of *muang luk luang* with *sema* (leaf-form sheet) on the wall, except that they could not have *taitia* for guards. The gate used the same materials like that of the wall, with *ban thalaeng* arch attached to the so-called elephant-ear gate which was painted in red. The residence had wooded *thong phra rong* as the main building. It had *chala* and *atthachand* connected to the stairs. The building had enclosed walls while the main hall's roof, made of earthenware tiles, was multi-tiered and low at both ends. The pediment was decorated with brahma-faced *luk fak* without motifs. The pediment's frame had *cho fah, bai raka*, and *hanghong*. in red. The structure could not be gilded or decorated with coloured glass."

The multi-tiered roof was used to demonstrate the status of the structure's owners. A French priest, ชื่อเป็นภาษาฝรั่งเศส, who resided in Ayutthaya during the reign of King Narai recorded that the higher the number of tiers, the higher the rank of the owners. He wrote: ``In Siam, the nobility of people could be decided from the number of roof's tiers. The roof of the temple's ordination hall or *Bot* had five tiers, while the roof of the royal palace had seven tiers."

The appearance of *thong phra rong* hall and *tamnak* in Chao Fah's palace was much similar to that of Phra Ong Chao, except that the latter's hall was bigger. The hall's long side faced the palace's front with *chan laen* at the same length of *thong phra rong*. Next to *chan* were three identical *tamnak* buildings, with the middle one serving as *ho klang*. The other two were the palace owner's bedroom and a living area, called *ho nang*. These three structures were connected with *chan laen*, ... the palace owner' s wife and daughters resided in a separate unit at the end of *tamnak*. This was the basic plan for chao fah's palace. Some palaces may have smaller units for court officials depending on the rank of each palace owners.

6. Phra Boworn Ratchawang

Fig.12 Phra Boworn Ratchawang
(Source : Author)

This type of palace was for the king's younger brothers or sons who served as heirs or *Phra Maha Ouparat*. Their palace had a brick wall and leaf-shaped Sema sheets and without *taitia*. The gate and decorations came in two styles; one was a lintel with *krajang* and the other had a *mondhop* shape top with a royal crown (called 'phra kiew') and was made of red-painted wood.

Main architectural structure in the Rattanakosin-era palace, comprising of the reception hall or *thong phra rong*, a throne hall and the back hall, which followed that of the Ayutthaya peroid.

The status of the owner of Boworn Ratchawang is demonstrated in the palace plan and decoration. Each *thong phra rong* and *phra thinang* has a two-tiered roof made of earthenware tiles. The pediment may be crafted in various patterns but all must be painted in red without the use of gild or coloured glass. Roof decoration, *cho fa lamyong, bai raka, hanghong*, was also made of red-painted wood. Only the palace's worshipping hall, *ho phra*, could be gilded or decorated with coloured glasses.

The tradition, which prohibited the decoration of gild and coloured glasses, was mentioned by King Rama V in his letter to Prince Naris concerning the construction of a pavilion in the Dusit Palace as follows:

``That the whole structure was entirely gilded... because it was gilded and kept it in close-door area ..... the crafted item that was abandoned .... like in the royal throne hall....."

The tradition of using red-painted wood for the decoration of the structure in Phra Boworn Ratchawang was strictly observed in the early period of the Rattanakosin era. The prohibition also covered the decoration of the frames of doors and windows, which were not allowed to have an ornamental arch like that of the royal palace.

It should also be noted that there was no *maha prasat* in Phra Boworn Ratchawang because such tradition did not exist in the Ayutthaya period. This was mentioned in the Rama I chronicle as follows:

``When Krom Phra Ratchawang Boworn Maha Surasinghanat built his palace in the year of the tiger, 1144 Minor Era (2325 Buddhist Era), he originally wished to have *prasat* built on an islet in a pond like the Banyong Rattanat Throne Hall in the Ayutthaya palace and had all the construction materials prepared. However, there was an incident in the fifth month of the Year of the Rabbit when two invaders broke into his palace to attack the prince who happened to be in the royal palace at the time. Court officials spotted the invaders and, during a fight, killed them at the site designated for the *prasat* construction. The prince regarded the incident as a bad sign, believing that the *prasat* structure was not for a prince. He finally dropped the construction plan.” The abovementioned structure explained the tradition that used architectural structure to show a hierarchical status of a person.

The following involves the royal architectural structure of the king, especially the palace. The stately structure was to honour the king and reflect his supreme royal status. This was mentioned in a book, Art in the Reign of King Rama I" which described the construction of palace and royal structures in the King's honour: ``When establishing Bangkok as the capital, King Rama I aimed to create a city as prosperous, beautiful and elegant as that of the Ayutthaya kingdom. This was to demonstrate that the nation was united and independent. The news of the reconstruction and the nation’s unity should scare would-be invaders. Besides, since the art could imply the nation's prosperity, the king had a strong intention to build a grand royal structure in his honour."

Architectural features and decoration were used to demonstrate the king's status. The palace’s brick wall was decorated with *sema* sheets. The inside wall featured barbicans where palace guards were deployed to look after the structure. The gate, which was made of wood, had a decorative arch on top in the form of *mondhop* – the same style found in the royal structures in the Ayutthaya period.

7. *Phra Maha Prasat*

Fig.13 Dusit Maha Prasat
(Source : Author)

The royal palace had *phra maha prasat* as the symbol of the royal status. The architecture in this style was regarded as a residence for highly respected persons, including the Lord Buddha, monks, kings and deities. This statement can be found in *Senasonkhanthaka,* which referred to five categories of *senasana* or monk's residence, including *Vihara, atthayoke, prasat, hamniya*, and *kuha*. This kind of belief originates in the ancient Indian civilisation.

Therefore, building a *prasat* structure as a royal palace for a king is compared to building a residence for deities. Such structure was sometimes called *maha prasat*. This was mainly because Thais had the highest regard for their kings who were worshipped in three ways. Firstly, kings were regarded as *sommut putthawong* or bodhisattva (a reincarnation of Lord Buddha) and called *somdet phra putthachao yoohua* or *somdet nor putthangoor*. Secondly, kings were considered the reincarnation of God Vishnu who came down to ease sufferings, according to the Brahmanism. In this regard, they were called

Somdet Phra Borammarachathirat Ramathibodi or Somdet Phratripuwanetworanat Nayokdilokrat as a tradition in the *Isaravet* belief. Finally, the kings were the protectors who took good care of their subjects and practised the 10 royal virtues and *Sang Kahawathu 4*. It is often compared to fatherly love. For this, the kings were called Phrachao Yoohua. Since Thais held their kings in such high regard, a *prasat* building is reserved for the kings only.

As a royal tradition, *Prasat* structures had a spire or *kutakan* on the roof. Each side of the building sometimes had extended symmetric and asymmetric parts. *Phra Thinang* was built at the back of *prasat* building and connected by *muk krasan*. From *phra thinang*, there were two prapat and *Ruen chand* where the kings spent leisure time.

Other architectural structures that represent the king's status are as follows.

1. *Kampaeng kaew* (a jewelled wall) is a low wall encircling *phra maha prasat*. Traditionally, such wall was built for two architectural structures, *Ubosot* (an ordination hall) and *phra maha prasat*. *Ubosot* represented the dharma council in the *Sukhawadee* land, which had seven layers of a jewelled wall as described in the *Sukhawadee Sutra* and the *Amitapa Sutra*. Thus, the wall surrounding *phra maha prasat* was built on of the belief that the king was Sommut Budhdawong or Bodhisattva (a reincarnation of Lord Buddha) who came down to complete his mission on earth. Since *phra maha prasat* was considered a dharma sapha (council), the wall was built to signify his status.

2. God Narai on Garuda, a typical decorative image on the *phra maha prasat*'s pediment, symbolised the structure as the residence of God Narai or Vishnu who is reincarnated as the king. The image is similar to the Chinese tradition in which a written announcement was put in front of the palace gate and the shrine. However, an image is perhaps more aesthetic and easy to understand.

3. The decorative frames of the *phra maha prasat* building include *cho fa, bai raka, nak sadung hanghong*. All are gilded or decorated with yellow-coloured glasses. The craftsmanship was more delicate than other royal residences. *Nak Sadung* is specially designed with the head of naga turning to the front, facing onlookers. This design is called *nak buen,* which is used only in the *maha prasat* building.

4. The roof of the *Phra maha prasat* building normally has a minimum of three lower tiers at the back and on the sides. The roofing material was originally tin tiles but later changed to coloured enamel tiles during the Rattanakosin period. There used to be *paralee* at the roof's kernel. However, the design was obsolete. For instance, the *phra maha prasat* building in the Grand Palace, which was built in the Rattanakosin period, was made of plain cement.

5. The pyramid-shaped roof can be divided into three tiers. The lowest tier has the largest base and the upper tiers are smaller. Each layer had a replica pediment, called *ban thalaeng*, with *nak buen* installed at every angle of each layer. The middle part of the roof has a bell-shaped design with a square cover called *kor rakang*. The top of the roof has a *karp plee* (petal of banana flower) design, which is similar to *bua karp kanun*, a popular decorative pattern for the top of Prang (stupa). The building is topped with a spire.

Indeed, there are reasons behind the design of the roof structure. For example, the multi-tiered roof is developed from the original design of *prasat,* which has different floor levels. When Thai architects built *prasat*, they were not comfortable with building different levels of the floors because this would make people look like they were standing over each other's head, a respectful part of the body in Thai culture. Therefore, they built a single floor and compensate it with a multi-tiered roof.

The bell-shaped design represented stupa – a symbolic container of Lord Buddha's relics. The idea is related to a throne that epitomises the Lord Buddha when he was not represented in human form. Craftsmen tended to incorporate a throne-shaped form on the stupa in order "to let it be known that the stupa houses the Lord Buddha's relics."

The idea of building a *prasat* building that resembles a stupa is to demonstrate that kings are the Bodhisattva, an incarnation of the Lord Buddha according to the Mahayana belief.

Finally, the spire, with layers of petal-like decoration, is an attempt of Thai architects to harmoniously blend *prasat*, a wood structure, with the stone-made Prang. The term *prangpra(sat)* is used occasionally to refer to the prang structure.
This architectural combination helps accentuate the king as the head of the kingdom.

It can be said that the custom and beliefs about the hierarchical status had a significant role in teaching people about social hierarchy and maintaining social order.

Religious and Beliefs

1. Household spirit

Household spirit has played a significant part in Thai houses since ancient times. The belief in household spirit may stem from the belief in ancestors' spirits. However, this belief faded away when Thais started to pay respect to Thao Chatulokaban, a group of gods believed to protect the world. They adopted these gods as a household spirit that can affect their families both in good and bad ways.

Thais' worship of spirit is hierarchically complex. It starts with *Pii Ruen*, which are spirits of ancestors believed to provide protection to their children. These household

spirits, however, only support moral occupants. According to traditional beliefs, every house has *Pii Ruen* and the fear of this spirit discourages family members from bad conducts. At the same time, it helps prevent outsiders from trespassing on certain parts of the house, especially the inner area reserved for family members. Offending *Pii Ruen* is believed to lead to bad luck or ill health. Thus, this mechanism can contribute to collective morality protection and helps maintain social order.

Fig.14 Spirit house
(Source : Thai House)

Apart from household spirits, people set up a shrine for community ancestors' spirits. It came from an old tradition that ancient people established a shrine for their ancestors' spirits whenever they migrated to a new place. They believed the spirits would follow them wherever they are in order to provide protection. The shrine is called *san puta* or *laa thuad*, depending on local tradition. It serves as the household pillar.

It should be noted that people paid respect not only to ancestors' spirits but also local spirits like mountain or forest ghosts and others. They also built a shrine and regularly performed a ceremony to ask for their protection.

Buddhism mentions but rarely attaches the importance of household spirits. It merely classifies them as *Opatika,* which are creatures in the Sensuous Planes. Indeed, it is Hinduism that recognises these spirits and offers a method to invite these spirits to desired places. In certain areas where there is no ancestor spirit worship, people may recognise *Opatika* as household spirits. It is such belief that leads people to build *Sarn Phra Phumi* or spirit houses in their residences. Even though Buddhism does not recognise superstition, Thai Buddhists somehow seek protection from supernatural powers. The spirit house has also become a household item in addition to Buddha images respected by householders.

These superstitious beliefs can also be found in the western-educated Thais nowadays. For that, spirit houses still have their place in the society.

Thai Buddhists also seek help from supernatural powers in the hope of making career progress and having a happy life. For this, they look to ghosts or *Opatika*, for their protection and blessings. Some people believe that such belief cannot be scientifically proven but they can still co-exist with modern thinking.

It is said the belief in other worlds stems from Buddhism, which fosters to a certain extent supernatural beliefs. It points to the ideology of reincarnation. For example, good and bad deeds one does in the present life will affect his next life or determine the place to where he will be born.

Buddhism's holy text tells of four *Chatulokaban* gods in the *Chatumaharachik* heaven plane, namely *Tao Vatarata* (ghost or *khonthan* leader) of the East, *Tao Virunhok* (god leader) of the South, *Tao Virupak* (naga leader) of the West and *Tao Kuveru* (giant leader) of the North. The four gods protect the earth and assign lesser gods to protect the earth in their jurisdiction areas. Gods are also hierarchically classified depending on their duties, which come in various levels, national, provincial, district, and village.

The type of household deity or god in *Sarn Phra Phumi* depends on the type of structures such as palaces and commoners' houses. This results in various sizes of shrines, including city pillar shrines, community shrines, palace shrines and spirit houses. These shrines can also be found at public and private organisations, including institutions whose work deals with science and science-related subjects.

In addition, some *Chatumaharachik* gods reside in as well as protect natural settings such as mountains, rivers, trees and big anthills. Even some transport like boats and cars are believed to be protected by a female god called *mae ya naang*.

Ironically, some worshipers mistake superstitious rituals for Buddhist ceremonies. For instance, some people offer foods to Buddha statues -- the representation of the Lord Buddha -- despite the fact that this ritual does not exist in Buddhism. In fact, the offerings are for deities who protect the statues. Nowadays the belief about protector gods still remains, despite the rise in the number of western-educated population.

In ancient times, gods and humans shared some similar characteristics. While humans tried to make merits, hoping for a better life, gods have a desire to achieve higher realms. This is evident in a number of shrines of gods who are higher than those at the *Chatumaharachik* level. It is believed that these gods come down to the earth to ease human's suffering, to cure illnesses, or persuade humans to do good deeds. It is believed that a result from these good deeds will help these gods attain the higher realms.

Protector gods at the *Chatumaharachik* level have a duty to record good and bad deeds of humans in their jurisdiction areas. For this reason, most houses have a place called *Sarn Phra Puma* as their residence.

2. Buddhism

It is common that smaller ethnic groups are culturally influenced by dominant kingdoms. Many scholars believe that Indian civilisation has a significant amount of influence over art and culture in most of Southeast Asia or the Suvarnabhumi area for the following reasons.

Archaeological studies showed that Buddhist art was widely spread in the reign of King Ashoka the Great who became a devout Buddhist after he waged a fierce war with Kalingaraj in which hundreds of thousands of soldiers perished. The huge casualties greatly saddened the king who was determined to stop committing bad deeds after the war was over. He studied all religions and eventually adopted Buddhism because he believed Lord Buddha's teachings were aimed at achieving the true peace. The king commanded craftsmen to build a plain stupa, which was later called Sanchi stupa, in the shape of a faced-down round bowl, with a throne and a parasol-like object. The structure was the representation of the Lord Buddha because in those days he was not portrayed in human form.

Other Buddha's symbols include

- Footprints with lotus in between – a representation of his birth
- Bodhi trees and a throne – a representation of his enlightenment Dharmachakra
- Deer – a representation of his first preaching
- Stupa – a representation of his death and nirvana.

- Thai architecture might benefit from the war during the reign of King Ashoka the Great because it caused a big immigration of Indian craftsmen. It is believed that these craftsmen reached Suvarnabhumi, the area where Thailand, Burma and Cambodia are now situated, from Ceylon through Nakhon Si Thammarat in southern Thailand. They later created numerous works of art. Archaeological finds in the area include Indian-styled rice-grinding bowls, lamps, and Dharmachakra.

- When Alexander the Great invaded India, people fled the country by crossing the Sindhu River and later settled in Suvarnabhumi. Some archaeologists theorised that the Buddhist art found in this area might be brought by Indian monks who sought to promote the religion. Important finds excavated here include Kanthararath-styled Buddha statues, which are known for their unique Greek-faced features and the old Pathom Chedi, which resembles Indian Sanchi stupa.

3. Ancient Belief and Faith

At the beginning, craftsmen transformed old beliefs and faith into physical structures, which went through different periods of time. To understand the philosophy of Thai architecture, one has to know what and to what extent religious beliefs have the influence over it. Historical evidence showed that Thais had embraced different schools of Buddhism (Theravada, Mahayana and Mantarayanas), Brahmanism as well as spirits and ghosts.

Obviously, Thai architecture is influenced by Buddhism. Artistic artefacts such as carved stones and paintings were created to depict Buddhist history and stories. Monks play a vital role in spreading Buddha's teachings while craftsmen transformed the ideals of Buddhism into physical structures, buildings and artistic works. It is unfortunate that there are no written records of the knowledge about Thai traditional construction. The passage of knowledge was orally made from generations to generations.

Had there been learned craftsmen who had true understanding of architectural philosophy, Thai architecture would not have diminished significantly. Nowadays, Thai craftsmen are not able to answer or give proper explanation involved with architectural questions. Lack of textbooks or manuals for reference has also hindered new creations and this may result in flaws in architectural design and construction as craftsmen simply followed the old works without the real knowledge and rationale behind forms and components of art. This is a worrying trend for the country's art and culture since people might assume that Thai architecture is created without theoretical foundation and reference.

Theravada Buddhism was embraced by ethnic Mons, one of the first settlers in Suvarnabhumi who were known for their magnificent craftsmanship. The influence of Mon style art and architecture dated back to the 9th century and stretched over the central plains, the Northeast and some parts of the North and the South of the Siamese kingdom. In the 18th century, Thai artists adopted Ceylon architectural style, which remained so until the Rattanakosin period in the 14th century.

On the other hand, the influence of Mahayana Buddhism on art and culture began before the establishment of Sukhothai kingdom in the 12th century. Even when Thais later accepted Theravada Buddhism, they did not totally reject Mahayana beliefs and practices. There are some historical and religious artefacts that show the harmonious blend of the two Buddhist schools. Historical artefacts and structures influenced by the Mahayana school is spread in different parts of Thailand such as southern Thailand, the old Chiang Saen town in the North, pre-Ayutthaya sites in the central plains and the north eastern region.

To understand Thai architecture, one needs to study various aspects of religious beliefs behind those architectural forms since it will help see the other side of beauty, which is no less important.

Buddhist Ideology and the Philosophy of Thai Architecture

When discussing Buddhist ideology in Thai architecture, it is inevitable to focus on the Theravada Buddhism, which arrived in the Thai Kingdom around the 12th century and remained the most prominent Buddhist school in Thailand until now. Its long continuity should ensure the influence of Theravada's script and preaching over Thai art and architecture. In fact, the main Theravada idea about getting rid of unwholesomeness, as a way to end all sufferings at the level of lokiya and lokutara, is related to the unique features of Thai architecture -- peace, lightness and floating.

Artists and architects must be driven by passion [*lokiya*] to create artistic structures. To make such creations, they are required to have profound understanding of the Lord Buddha's teachings in order to transform the ideals into physical structures and that is not an easy task.

Studying the works of ancient craftsmen has resulted in some important clues that may be linked to certain forms and features of Thai architecture as follows:

1. Mindfulness through meditation is a basic practice of Buddhist disciples. The practice is aimed at getting rid of unwholesomeness to achieve inner peace and finally end the reincarnation. The architects' task is to find out what architectural features signify inner peace.

2. If the meditation helps free one's mind from unwholesomeness and also brings the feeling of lightness, what forms and features are required to signify such lightness?

3. The feeling of lightness or floating is usually compared when one is frees from all attachments. To abstain from unwholesome deeds and to commit only wholesome acts are believed to lead to nirvana. A sacred Buddhist text, *Trai-bhumi Praruang*, written by King Lithai of the Sukhothai Kingdom (12th century), describes the lightness (absence) of sins in each plane of heaven. What forms and features of architectural design can represent the different levels of lightness?

The thorough study of the Thai architectural design will help ones appreciate the great craftsmanship of ancient architects who excellently transformed concepts into physical structures.

Trai-Bhumi Praruang and Thai architecture

As mentioned earlier, Buddhism has a great influence on Thai craftsmen and builders. In particular, the Trai bhumi Praruang scripture is a great inspiration to those working in various fields of art.

This holy text describes three different planes of existence, namely *Rupabhumi* (the sensuous plane) *Arupabhumi* (the non-sensuous plane) *and Anantachakawan* (the universe). The universe has *Mount Sumeru* as its core and is surrounded by rings of seven *Sattaboripan Mount*s and a vast ocean called *Sithandorn*.

Fig.15 Buddhist Ideology and Trai-Bhumi Praruang in mural painting
(Source : Thai Characteristics)

The ocean is in turn surrounded by a circular mountain wall, which marks the horizontal limit of the world. In this ocean, there are four continents inhabited by humans and human-like beings, including

- *Utarakuru Continent* – the north of Mount Sumeru

- *Burapa Witheha Continent* – the east of Mount Sumera
- *Chompoo Thaweep Continent* – the south of Mount Sumeru
- *Amorn Koyan Continent* – the west of Mount Sumera

According to Trai bhumi Praruang, Chompoo Thaweep is the only place where human deeds committed in this and previous lives determine the type of reincarnation in the next life. There are six realms of rebirths within the system of traditional Buddhist cosmology. They include all the possibilities - advantageous and less advantageous - of lives. The six realms are divided into Deva Realm, Human Realm, Animal Realm, Asura Realm, Preta (a hungry ghost) Realm and Naraka (hell) Realm. All human beings live in the Human Realm, which is the result of Kusala (wholesome) acts in the past, while those who live in the Deva (blissful) Realm accumulate higher virtue than humans. On the other hand, anyone with Akusara (unwholesome) deeds will be reborn in one of the last four realms, which are together called Abaiyabhumi.

The topography of Mount Sumeru and its surroundings described in the Tri-bhumi scripture has a significant role in the design of many structures in Thailand, particularly temples. It becomes an architectural template of any building wishing to achieve the status of Mount Sumeru.

Mahayana Buddhism and Brahmanism in Thai Architecture

Mahayana Buddhism and Brahmanism have influenced Thai culture since the early period of the Siamese Kingdom. Originated in the 1st century in northern India, Mahayana followers respect Bodhisattva and certain gods in Brahmanism. However, both Brahmanism and Buddhism share similar belief about the centre of the universe; namely *Mount Krailas* in Brahmanism and *Mount Sumeru* in Mahayana Buddhism. This idea significantly shaped the form of Thai art and architecture.

It should also be noted that some Mahayana-influenced structures were built when the Theravada school was popular in Thailand. This means these two schools of Buddhism can co-exist. There are two Mahayana Sutras (scriptures) that play an important role in Thai art and culture; namely the *Mahachompoo Bodi Sutra* and the *Sukhawadee Sutra.* The former deals with non-religious art and culture. The latter concerns religious art and architecture.

The *Sukhawadee Sutra* depicts the residence of Phra Amitabha Buddha in *Sukhawadee Heaven* as an elegant structure whose roof is decorated with *Kradung* chimes that give blissful sounds when struck with the wind. The structure is surrounded with *Kampaeng Kaew* (the jewelled walls). Such features are part and parcel of *Bot* (an ordination hall) and *Vihara* (an assembly hall) and stupa in most temples in Thailand.

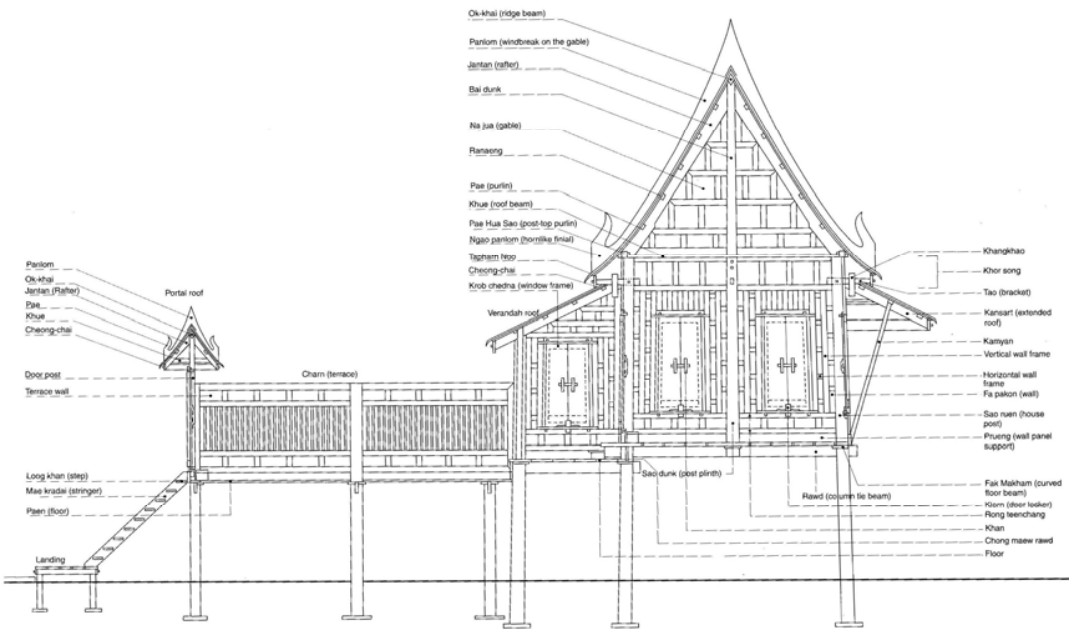
Ancient craftsmen put a lot of effort to imitate the abode of Phra Amitabha Buddha as described in the Sutra. For instance, the ceiling of *Vihara,* which is regarded as the

residence of the Lord Buddha, is meticulously adorned with glittering objects like gild and coloured glasses to make it look like stars. Sometimes, the star-like ornaments are made in silver colour to imitate the full moon or in gold colour like that of the clouds at dawn or dusk. The reflection of gold and candle light in this building makes gilded Buddha statues look luminous like they have a *chappan* aura. This exudes a serene, respectful atmosphere that easily draws people closer to the religion.

Another architectural feature that reflects the Mahayana belief is the concave curve of the base of the building, which resembles the bottom of the boat. This curving design was popular in the Ayutthaya and early Rattanakosin era. It is believed that the craftsmen use the shape of the vessel to symbolize Bodhisattva's determination to help as many living creatures as possible to cross the cycle of life before he eventually achieved nirvana.

Language of Symbolism in the architectural elements of Thai Houses

The elements of buildings ,especially architectural elements of religious buildings and palaces -- roofs, doors and windows, bases and so on -- have a greater importance in the Thai system of architecture than others. Temple and palace buildings are more readily perceived through their highly distinctive elements than as wholes. The elements call attention to themselves because they are stylized so far beyond their original functions. This stylization is partly for aesthetic purposes -- to create a more complex, dynamic and visually harmonious architectural whole. It usually has a symbolic intent as well, with reference to Buddhism and the cosmology. It can serve magical purposes, as in the case of carved roof finials that embody guardian figures meant to ward off evil influence.



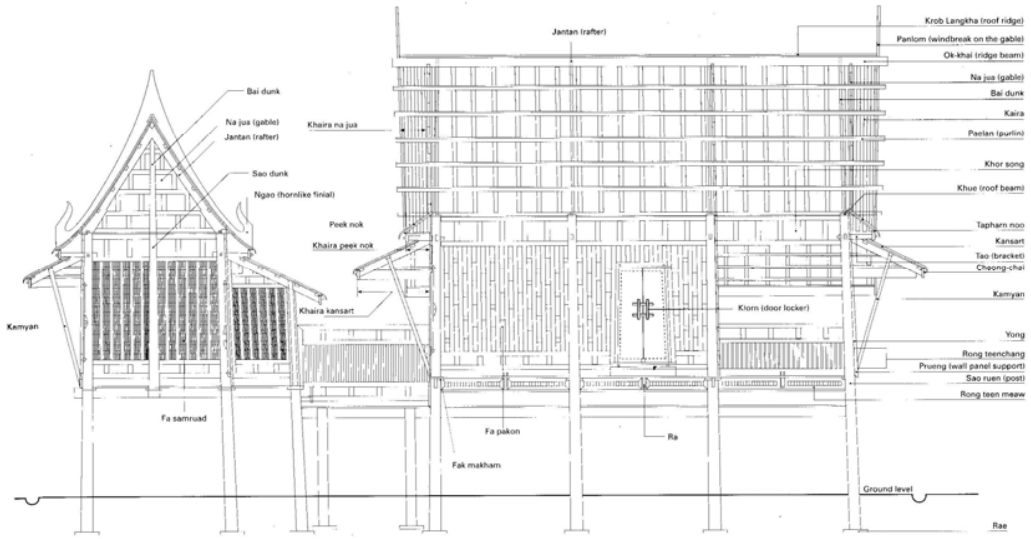


Fig.16 Language of Symbolism in the architectural elements of Thai Houses
(Source : Thai House)

The elements speak volumes about a building itself, revealing its vintage and regional identity. In contrast, the basic structures of religious architecture do not differ much no matter when and where they are built. For example, most temple halls have been built as rectangular boxes with gable roofs since the 11th century. Most present architectural elements have maintained the same characteristics since the Ayutthaya period, which became the foundation of the Rattanakosin architecture. Surviving examples of temple and palace elements typically date to the late 18th century and after. Earlier elements were lost to war, theft, decay and frequent renovations.

The style of recently built *wats* throughout the central region and beyond was influenced by the architecture of royally sponsored temples in Bangkok. These royal temples feature styles and elements similar to buildings in the Grand Palace and its royal temple. Indeed, many were built by the same architects and artisans. Central-style temples started to appear in other regions in the 19th century as part of the Crown's extension of political influence into places that had been under other countries' sovereignty such as Isaan and the south. In this way, the royal architectural style from the central region becomes the prototype of important buildings in Thailand.

Almost all of the elements are rich in symbolism. Guardian figures are embodied in roof finials, eave brackets and courtyard statuary. Buddhist cosmology is expressed in the courtyard layout and the odd-numbered tiers of bases, roof spires and finials on courtyard wall columns. The most sacred elements, to be certain, are Buddha statues.

1. Roof Forms

Roofs are the quintessential elements in Thai public architecture, shaping the character of the buildings with their elaborate structure and decoration. The ornamented multi-tier roofs are, however, reserved for temples and palaces as well as public buildings such as government offices, university halls and monuments. Commercial buildings that breach this tradition, as a few hotels have done, are frowned upon.

Fig.17 Roof Form
(Source : Thai House)

This is because, in their decoration, the tiers with multiple layers and height above the ground symbolise the prestige of the buildings, which extends from the paramount status of royalty, Buddhism and the Thai nation. The more ornate the roof is, the higher the status of the building or of the person who commissions it demonstrate. Two or three tiers are most often used, but some royal temples have four.

Multiple roof tiers basically provide weather protection but their rationale is more aesthetic than functional. Because temple and palace halls are large, their roof areas are massive. To lighten up the roof's appearance, the lowest tier is the largest, with a smaller middle layer and the smallest roof on top. Multiple breaks in each roof lighten it further -- a double-tiered roof might have two, three or even four breaks in each tier. The slope increases with each tier, from a gentle 45 degrees gradient on the lowest, to over 50 degrees on the highest. In central Thai architecture, the lower tiers telescope a short distance beyond the top roof at the gable ends. On northern temple halls, the tiers project further, often over a redented floor plan that starts narrow at the entrance and grows wider towards the altar.

Further dividing each tier's surface are coloured-ceramic tiles in concentric patterns, which help make a single tier look as if it has multiple sections. These configurations transform the roof's seeming scale, enlivening the aesthetics of the entire building. Instead of building a massive roof that visually weighs the building down, Thai

architects create a roof with a dynamic series of forms that appears to soar. In this way, aesthetics suit the intent of veneration.

2. Forms of Roof Spire

Roof spires designate buildings of the highest status, especially royal palace halls. Indeed, the term for a roof spire, *yod prasat*, means 'spire of a palace'. Since the mid-Ayutthaya period, the royal palace architecture has called for a cruciform floor plan topped by a roof spire. This shows Ayutthaya's embrace of the Khmer-Hindu concept of the divine king, or devaraja. The roof spires of royal structures and *chedis* (or prangs) symbolise Mount Meru, which is the residence of gods and the divine centre of the universe. The cruciform structure signifies the intersection of axes at this centre.

The main type of the *prasat* spire is a *mondop* style, which has multiple tiers of redented squares diminishing in size as they rise towards a thin conical tip. Each tier is decorated with rows of miniature gables. In palace buildings, these feature tiny finials such as *hang hong* and *bai raka*, which represent nagas and garudas respectively.

The *mondop* roof spires are featured on top of most spire halls in the Grand Palace. The Maha Prasat spires have seven-tiered bases over roof tiers decorated with garuda figures grasping nagas, an icon of Thai royalty. Other less prominent halls, prasat, have five-tiered spire bases.

Similar to the *mondop* style is the *mongkut* spire. Instead of having square tiers, the *mongkut* spire has round rings like a crown, which is called 'mongkut' in Thai. *Mongkut* spires often grace the buildings constructed during the reign of King Rama IV, whose name was King Mongkut. Some prasat roofs may be topped by a spire of a bullet-shaped prang, as seen on Prasat Phra Thepbidorn or the Royal Pantheon at the Temple of the Emerald Buddha and above the City Pillar Shrine in Bangkok.

The prasat spires are also often built on temple halls, *mondops*, crematoriums, gates and spirit houses.

3. Roof Finials

Every roof edge apex has stylized attachments that essentially transform the structure into a huge piece of sculpture while hinting at mystical concepts. Most of them are decorations fixed at the bargeboard on the edge of the roof at the gable ends. While the bargeboard protects the roof covering from the wind, its decorative roof finials called "*lamyong"* embodies guardian figures that protect against bad influences.

Usually covered in glass mosaic or gilding, the *lamyong* is sculpted in an undulating, serpentine nag sadung shape evoking the naga. Its lower finial is called *hang hong*, which means 'goose tail', referring to hongsa, the Thai name for Hamsa. Although

this name may suggest that the finial is shaped like a hamsa figure, it now usually takes the form of a naga's head turning up and facing away from the roof, like the *tua ngao* or house bargeboards. The finial of the naga head (*hang hong)* may be styled in flame-like kranok motifs and feature multiple naga heads. A roof with multiple breaks or tiers has identical *hang hong* finials at the bottom of each section. Some old temples in Lanna and Isaan have a Laotian-style metal finial in the form of a multi-tiered umbrella of state fixed at the centre of the roof ridge.

Another part of *lamyong* is the large curved finial called *cho fa* or 'sky tassel'. Perched at the peak of *lamyong*, *cho fa* resembles the beak of a bird, perhaps representing Garuda. This finial is often erected ceremonially to signify the structure's status.

The intriguingly indeterminate shape of the *cho fa,* which resembles both bird and reptile, has led to several assumptions about its symbolism. One theory suggests that it may represent Garuda in his mythical struggle with Naga. This could be explained by another element of the bargeboard called *bai raka.* Symbolising both the feathers of Garuda and Naga's fins, *bai raka* consists of a row of blade-like projections along the body of the bargeboard. They are probably created to depict the two mythical animals entwined in a battle. Another interpretation sees *cho fa* as a naga head, *lamyong* as its body, and *hang hong* as additional naga heads.

Another theory indicates that *cho fa* may represent the celestial goose Hamsa. For example, the *cho fa* of some temples, especially in the north, is explicitly carved as Hamsa. Other *cho fa* figures are a deva divinity or budding lotus.

Whatever the mythical animals they represent, the *lamyong* figures are all benevolent divinities, suggesting the protective powers of Buddhism and the temple's role in guarding the faith.

4. Pediments

The large triangular section at the end of a gable roof, the pediment is the most prominent exterior element of a Thai public building. Standing high over the entrance, it inevitably becomes the most decorated part of palace and temple buildings, where it is called *naa ban* (corresponding to the *naa chua* of a house). Its degree of embellishment corresponds closely to the building's status in terms of sponsorship and royal affiliation.

In the Ayutthaya and early Rattanakosin periods, *naa ban* was usually decorated in carved wooden relief that was lacquered and gilded, and sometimes featured glass tiles set into the grooves or applied to the surface. Plaster relief later became popular, usually painted or inlaid with glass tiles, or left bare in the case of modest rural temples. During the reign of King Rama III, plaster relief was often adorned with crockery mosaics made of Chinese ceramics.

Pediment reliefs show figurative designs and abstracted floral motifs of Thai, Chinese, Khmer and, sometimes, Western origin. These *lai thai* motifs serve as a background for pediment guardian figures and as foreground designs on the pediments of secondary structures such as sala and gates. The pediments of temples under royal patronage often centre on the figure of the god Narai sitting astride his vehicle Garuda. This figure is an emblem of the king, who is regarded as the embodiment of King Rama of the Ramakian epic, who is a reincarnation of Narai. Sometimes the royal emblem of an individual king is used on the pediments. Narrative scenes from the Ramakian epic are depicted on the pediments of some important temples in Bangkok. Other divinities selected for temple architecture include Indra on his mount, the three-headed elephant Erawan; Brahma on his goose, Hamsa; or Siva on his bull, Nandi. Guardian figures such as Rahu and Kala sometimes appear.

5. Eave Brackets

Eave brackets (*khan thuai*) are among the most inventively carved wooden elements in Thai temple architecture, and their design is a good index of a building's vintage and stylistic heritage. They did not seem to appear in the Sukhothai period when roof eaves were supported by peristyles.When these outer rows of columns began to be structural role of transferring the weight of the roof eaves to the columns or walls.

Late Ayutthaya temple halls were smaller than their predecessors. Thus their eaves did not need extra structural support. Nevertheless, brackets continued to be used, but as decorative and symbolic elements. They became slender and increasingly stylized. *Khan thuai* usually embodied guardian figures such as naga, hamsa or deva intertwined with floral and cloud motifs. Preferably carved on one piece of wood, they were often gilded, and sometimes decked with glass mosaic. From the 19th century onwards, cement or plaster began to be used in the carving of eave brackets.

Brackets enhanced the roof's appearance of soaring lightness. When massive outer pilasters and columns were eliminated, they were replaced by these slender limbs. They improve the temple hall's proportions and composition - echoing in reverse the diagonal lines of the sloping roof and amplifying the rhythm of the columns, windows and bargeboard finials.

Regional variations of *khan thuai* are especially interesting. Artisans in northern Thailand and parts of the northeast were probably pressed to be creative because each bracket was carved differently, unlike the identical set mandated in central region. Figures such as monkeys, demons and devas typically appear with arms and legs raised as if they are supporting the roof.

6. Doors and Windows

In palace and temple architecture, the heightened status of the interior space is suggested by the elaborate decoration of doors (pratoo), windows (naatang), air vents and eave brackets (khan thuai). These elements demonstrate some of the most beautiful ornaments in Thai architecture, including plaster or carved wood relief, painted designs, gold-and-lacquer work and glass mosaic. Doors and windows of temple and royal structures have a larger surface area for the embellishment, compared to that of houses. The embellishment also helps shed more light on the objects and the ceremonies that take place inside the buildings.

Fig.18 windows
(Source : Thai Characeriistic)

Traditionally considered as the passage between differing realms, doors and windows, especially in palaces and temples, are decorated with special motifs in order to ward off the entry of evil spirits. Panels are carved or painted with images of guardian demons (*thawara baan*) or other auspicious figures and designs. Statues of guardian demons, warriors or beasts are also placed outside the buildings for additional protection.

7. Bases

While roofs get special treatments in Thai architecture, bases or *thaan,* too, receive an aesthetic attention. Important buildings such as ordination halls, prang, chedi memorial towers and palace halls are exalted by bases that raise them off the ground, usually in multiple layers that add height, structural complexity and decoration.

Stylised mouldings make massive structures appear taller, lighter and more dynamic. The recesses at the corners create an impression of structural complexity without adding other structural elements or reducing structural strength. Using simple rectangular or square layers, bases take on a multi-faceted geometry. Instead of just four sides, bases can have as many as 32. Surface decoration -- glass mosaic, gold leaf, paint or patterned relief – also adds splendour. Guardian figures such as elephants, garudas or devas are

often applied. Bases are typically made of laterite blocks, stone, brick or cement. Stylised bases can be seen at religious shrines, door frames and other structures.

The stylization of bases, plinths and pedestals proliferated during the Ayutthaya period, especially in the design of *chedis* and prangs. Mouldings came in two special types, lotus and lion's throne - each with many variations. Lotus mouldings can represent upturned or downturn blossoms, elongated petals and other forms. Lion's throne mouldings - an influence from Persia, China or India - are a stylised representation of a lion's legs and torso. Signifying dignity and nobility, this moulding is generally reserved for sacred or royal structures.

Assembly and ordination halls built in the Ayutthaya period have a concave base that calls to mind a hull of a ship. Some experts explain that it is a metaphor in Buddhism for a vessel of enlightenment.

8. Columns

The massive, multi-tiered roofs of palace and temple buildings are supported by columns (sao) of timber or bricks. A large ordination or assembly hall can have as many as eight rows of columns supporting the roof: one or two double interior rows; rows of load-bearing pilasters within both lateral walls; and sometimes an external row of columns under the eaves of the roof on both lateral sides.

Columns can be round, or, if square, can have single, double or curved redentings. Decoration may come in a variety of lotus motifs -- upturned, downturn, elongated or clustered. (This Asian ornament parallels the classical Corinthian order, which use acanthus leaf designs instead of lotus.) Column bases may also have lotus or lion's throne mouldings similar to the base of *chedis* and shrines.

Courtyards may also feature free-standing lantern columns (sao khom duang prathip) that are used to hold up torches to illuminate the buildings during the night.

9. Interior Space

Entering a viharn or ubosot can be a dramatic transition. From the white-walled courtyard, broad and bright, one enters a dim, hushed enclosure. Tall, narrow windows receive enough light to illuminate ornaments such as gilded lacquer on columns, mother-of-pearl door panels and polychrome wall murals. At the front is the altar, with more gilded decoration, many candles or lamps, and sacred parasols, all under to gaze of the presiding Buddha image. Except for the lack of seating, its interior is quite similar to that of a Christian church: a long, narrow nave between columns, a soaring space under the roof. Chandeliers are hung from the high ceiling, which is painted red and decorated with the crystalline floral motifs that form a 'starry ceiling' or *dao phedan*. In all, it becomes a

kind of a palace building that enshrines the Buddha image -- an architectural expression of reverence. It is also a sanctuary, encouraging a state of contemplative tranquility.

The interior of a palace throne hall, too, is dramatic. The hall is dominated by a single, central element; an ornamented throne under a carved wooden canopy or royal parasols with an elevated seat up to 2 m above the ground. Other elements of the hall are few but stately such as decorated walls, chandeliers, ornate doorways and marble floors. The floor plan comes in square or cruciform, a layout designating a cosmological axis, signifying the kind's importance. Additionally, the traditional palace protocol heightened the sense of grandeur: the king entered and mounted the throne behind a curtain; the audience then entered and prostrated themselves as the veil was lifted to reveal the king seated above them in majesty.

10. Ceilings

Since the Sukhothai period, the ceilings of the temples' ordination halls and assembly halls have been decorated with lotus motifs. Done in paint, gold leaf or carved wood, and sometimes inlaid with glass mosaic, the lotus is usually rendered as a rather crystalline rosette. The motifs are arranged within rectangular or square ceiling panels that are defined by columns and beams. A typical pattern is a group of five, seven or nine flowers, the largest in the centre, with stylized 'bat' designs in the four corners, all against a red background. A chandelier may be hung from the central flower. Contrast to the twinkling designs of *dao phedam* overhead, the flower pattern symbolises the cosmological order brought about by dhamma or Buddhist law.

11. Mural Painting

Mural paintings enliven the walls of assembly and ordination halls not as decorations but as visual texts designed for spiritual instruction. When the majority of Thai population was illiterate before the 20th century, only Buddhist monks were able to read the ancient scriptural language of Pali. As a result, murals were used to illustrate the teachings of Buddha because they were easy to understand and remember.

The contents, set by convention but to stylistic innovation, range from iconic to narrative. The mural at the west end of the hall, behind the main Buddha statue, is the iconic depiction of the Thai Buddhist cosmology, the Traiphum: mountains and oceans symbolising different layers of the universe and time. Illustrated below is the Realm of Desire, with hellish imagery of errant souls being tortured by demons and beasts. Above, celestials inhabit the intermediate realms of earth.

Murals on the sides and entrance walls recount the life of the Lord Buddha. The entire east wall at the entrance end depicts the moment when the Lord Buddha, meditating under a Bodhi tree, is harassed by an army of demons led by Mara, lord of the Realm of Desires, who aims to interrupt his concentration. The Buddha touches the ground with his

right hand to call the earth to witness the merits he has made. (The same gesture is portrayed by most Thai Buddha statuary.)

Murals may also depict any of hundreds of stories in the jatakas, tales of the Buddha's previous incarnations, peopled by Bodhhisatvas, kings, queens, ascetics, Hindu divinities and ordinary folk tales and the Ramakian epic, grandly rendered in 178 panels at the Temple of the Emerald Buddha in the Grand Palace.Add text add text add text add text add text add text

12. Interior Statuary

One of the important roles of any wat is to enshrine Buddha images for veneration. Indeed, the ornate decoration of a viharn building is intended to create a palace-like setting appropriate for these statues. Thai Buddhists view them not as a work of art but as reminders of Buddhist doctrine or sacred objects for worship. The main statue stands on a pedestal or altar at the end flowers, often with many secondary Buddha figures. Cloisters, pavilions and shrines may also house these images.

While bronze Buddha images are prevalent, many were made of stone, terra cotta, wood and ivory. The monumental statuary of Sukhothai and Ayutthaya were made of bricks or laterite blocks covered with stucco. Enshrined at Wat Phra Kaew, Thailand's Palladium of State, the Emerald Buddha is probably made of green jasper.

Buddha images first appeared in Thailand during the Mon Dvaravati period from the 6th to the 11th centuries, and the Khmer Lopburi period from the 7th to the 14th centuries. However, the making of the statues might have reached the artistic peak during the Sukhothai era (12th – 14th centuries). Later, Ayutthaya artisans sculpted crowned, jeweled Buddha images, among other styles.

Most Buddha figures display gestures called mudra. The most prevalent in Thailand is the bhumisparsa mudra (earth-touching mudra), which shows the Buddha seated in meditation with one hand touching the ground. The mudra symbolises his enlightenment under the bodhi tree when he summoned the earth goddess to bear witness to his enlightenment. Another important mudra depicts the meditation posture, a figure seated cross-legged with hands on his lap. The 'dispelling fear' mudra demonstrates a standing figure with the right hand raised to shoulder height, the arm bent and the palm facing outward. Sukhothai sculptors created fluid statues of a walking Buddha.

13. Courtyards

Temple compounds are enclosed within walls that form layers of courtyards. These grounds assume a greater importance than do the grounds around Western churches. They are filled with a variety of key religious structures, statuary and ceremonial sites. The inner courtyard, formed by low walls surrounding the ubosot, is the centre. The

courtyards may comprise *chedis*, prangs, the pavilions of scriptures, shrines, pavilions for meditation and funerals and auspicious trees such as Bodhi. A wall is used to separate the ceremonial courtyard from the courtyard of the monk's quarters.

Circumambulation rites take place around the temple's most sacred structure, which could be a *chedi* or a prang that contains an important relic or a viharn that houses a revered Buddha image. Often this structure will be enclosed within cloisters. Worshippers gather before dusk and slowly walk around the structure three times clockwise, with lit candles, incense sticks and lotus buds in their hands. The three offerings and the triple circumambulation are reminders of the holy Three Gems of Buddhist doctrine: Lord Buddha, Dhamma (his teachings) and Sangha (the assembly of all beings possessing some high degree of realisation or nobility).

Courtyards of major monasteries are typically paved with bricks, terra cotta tiles, stones or terrazzo, which are often laid out in decorative patterns. The courtyards of ordinary temples are simply covered with earth, sand, pebbles or grass.

Courtyards at the Grand Palace are broad and stately to suit the celebrations of the kings' birthday and the receptions for dignitaries. Lending regal pomp are attractive ceremonial pavilions, elaborate gates and shrines housing royal insignia. Plazas and walkways are paved with decorative tiles.

14. Courtyard Walls and Gates in Temples

Different layers of walls around the temple compounds designate the grounds as sacred. The design often follows a floor plan that complies with the Hindu-Buddhist cosmological concept, with *ubosot* representing the centre of the compound. Gates, as thresholds between different spaces, are perceived to protect against the entry of evil spirits. When gates are built, rites are performed to invite guardian spirits to take abode and ward off bad influences.

Built of bricks and covered in plaster, outer walls are usually between 1 m and 3 m high and 30 cm and 80 cm thick. They are typically whitewashed and decorated with ceramic balustrades, a multi-tiered column capital (hua med) and mouldings around the base. Elite temples may have walls of glazed ceramic tiles.

Inner walls that demarcate the ceremonial zone and surround key structures such as ubosot, *chedi* or prang are called *kampaeng kaew*, meaning 'jewelled walls'. This is another cosmological reference to the god Indra who resides in a heaven surrounded by walls embedded with seven precious gems. The term thus designates the ubosot as a symbol of heaven. The inner walls are low structures about 0.8 m to 1.2 m tall, and can take the form of balustrades, with square, rectangular of cross-shaped openings. Some walls feature balusters, which are shaped like pilasters of turned wood. Some use Chinese glazed stoneware blocks with decorative fretwork.

Outer wall gateways generally take one of three forms according to the styles of their tops: gabled, spired or Western-influenced designs such as semi-circular arches. In recent decades, temple builders have tended to install larger gateways to accommodate visitors, especially those who travel by car.

15. Courtyard Walls and Gated in the Grand Palace

Walls and gates around buildings in the Grand Palace demarcate grounds of the highest status, from the fortified outer walls to the decorated walls around the Central Court and the Inner Court zones, where only the king and his children often have specific ceremonial designations in which many are individually named.

What are now the outer walls were once the city walls of Bangkok. These plastered brick walls are 3.5 m tall and 2.5 m thick. In addition to fortifications and passageways for soldiers, the walls have cannon towers at junctions. The largest outer gates stand at 4.5 m tall and 4 m wide with ornate roofs.

Courtyard walls in the Central Court and Inner Court are also called *kampaeng kaew*. They feature a variety of highly decorated gateways - many of them have spires. Walls around a primary palace building may have a triple-spired gateway featuring an elaborately ornate entrance for the king.

Low walls around ceremonial halls and pavilions have special adaptations for royal protocol. For example, a protruding platform called k*uey* is used to mount a carriage of state, borne by elephant or horse, or a hand-carried palanquin. Another platform called *kuey chai* is used by the king when presiding over ceremonies.

16. Courtyard Statuary

Most of the statues in temple courtyards are guardian figures of Hindu or Chinese origin. Rattanakosin-period temples, especially royal wats in the capital, are abundantly supplied with carved stone statues imported from China during and after the reign of King Rama III - they served as ballast in Siam-bound ships. Some were carved in Siam by immigrant Chinese artisans. They are typically figures of warriors, mandarins and animals, especially lions, which are considered by some schools of Buddhism as the guardians of Buddhist law and temples.

Another sculptural genre embodies a vast menagerie of creatures from the forest of Himaphan, a mythological Hindu-Buddhist paradise in the Himalayas. Many of these animals appear in the Ramakian epic, which can be seen in mural paintings as well. They include half-lion, half-human beasts such as *Norasingh*; half-maiden, half-goose creatures known as *kinnaree*; and dozens of others with eclectically mixed traits of elephants, deer,

monkeys, birds, fish, nagas and other animals. *Yaksas* are the Ramakian ogres depicted in huge statues at Wat Phra Kaew, Wat Pho and Wat Arun.

Figures of Hindu ascetics, or *rishis*, at Wat Pho demonstrate Yoga poses. Statues of Thai kings sometimes appear in some temples. Buddha statues, however, are less often placed in courtyards without a roof or enclosure of some sort; they are usually enshrined inside mondops, pavilions, chapels or cloisters. On the other hand, a courtyard in an ordination hall may feature the free-standing dhammachakra or 'Wheel of Law'. Usually carved from stone and mounted on a pedestal, the wheel is the symbol of the Buddhist doctrine set in motion when Buddha preached his first sermon.

17. Gardens

Courtyard landscaping shows a distinctively Thai amalgam of influences from Europe, Japan and China. If Chinese and Japanese gardens are a stylized version of nature, Thai temple and palace gardens seem to be a stylized version of these predecessors -- not a lush continuum of replica of nature, but something more constructed.

The gardening emphasizes the architecture, not the plants. The ground is paved with stones, ceramic tiles or gravel. Plantings are dew and formal, with hedges well trimmed, and trees pruned and trained. Most plants stand in ceramic or cement pots, and there are vat of lilies and lotus. The greenery stands free from the buildings and provides little shade. Coupled with their stone pavements and whitewashed walls, the courtyards are often hot and so bright during the day to the point that one has to squint.

The grounds are not a sweeping vista to be viewed all at once, but are a bit like a Chinese ink painting or the landscape in a Thai mural -- a maze of little vignettes: a flowering tree here, a shrine there, clusters of statuary and the Siamese rendition of bonsai called *mai dat*. Overt Chinese influence is seen in the rock gardens, or *khao more*. The courtyard's formality contrasts with the unplanned sprawl and clutter in the village or city beyond, heightening the sense that this space is sacred and governed by spiritual laws, rather than material ones or the accidents of nature.

Palace landscaping is even more formal than the temples, with more of the pomp and regality of the 18th and 19th century European style. Lawns with huge Thai bonsai enhance the grandeur of spired throne halls.

Quite informal, however, are the gardens in suburban or rural temples, which tend to feature a big open space (laan), usually used for religious events such as temple fairs. The gardens are usually unpaved and have large trees around the perimeter, often including a sacred Bodhi tree.

18. Thai Bonsai and Stone Mountains

Originated in China and perfected in Japan, the art of bonsai was reinvented in the Siamese kingdom. Arriving from China during the Sukhothai period and from Japan during the Ayutthaya era, bonsai was first taken up by monks for use in temple gardens. Whereas the Chinese and Japanese intent is to create a miniature replica of a mature tree, the Thais aimed for something pretty, rather like European topiary, emphasizing stylized, almost geometric shapes. Explicit artifice, rather than implicit nature, is the aim of Thai bonsai called *mai dat*, or 'tree bending'. The trunk and branches are drawn into diagrammatic lines, while bunches of leaves are trimmed into small globes. The little pompoms always occur in auspicious numbers of three, five, seven, nine or eleven, and usually on three levels. Larger trees, which can reach 3 m tall, are grown in the ground.

In addition, *mai dat* has had a strong aristocratic association since the time of King Rama I and II, who made it their favourite hobby, as did many nobles. Nowadays, *mai dat* is practiced widely beyond the temple and palace courtyards. It is common to see *mai dat* in suburban gardens and in front of commercial buildings, banks and gas stations.

Stone mountains or *khao more* are formed by piling or cementing rocks together to represent Mount Meru. They are often interspersed with a pool or small statues. Adopted from China, *khao more* were built in Wat Pho and other temples in Bangkok and palaces constructed during the 19th century.

Immigrants and Foreign-influenced Architecture

Foreign influence shaped Thai architecture from the beginning. The deepest foundation of Thai architecture of basic structures such as temple layouts, memorial towers and mondops were adopted during the Sukhothai period from Indian, Ceylonese, Mon, Khmer and Burmese antecedents. In the Ayutthaya and Rattanakosin periods, the main foreign influences were from Europe and China, which grew especially strong during the 19th century.

When the first Tai kingdoms emerged in Chiang Mai and Sukhothai in the 12th century and after, there had already been local settlements of Chinese Han traders, craftsmen and officials. Chinese potters helped Sukhothai to establish its famous ceramics kilns. When Thais displaced Khmer dominions in the region after the 12th century, China became an important cultural influence. There were extensive diplomatic exchanges with the Yuan and the early Ming dynasties between the 13th and the 15th centuries. From that period onwards, traders brought Chinese ceramics, textiles and other arts into the country, dominating the Siamese's repertoire of ornamental designs. Thai artisans adopted Chinese decorations such as lacquer paintings and mother-of-pearly inlay.

In addition to their influence on Thai architecture, Chinese immigrants also created their own religious and residential architecture. By far the most important example of this is the Chinese-style shop houses, which have become the architectural setting for Thailand's extraordinarily vibrant culture of small enterprise.

Much of the best Western-influenced Thai architecture was built under royal commission. King Rama IV and his successors had a key role in adapting European architecture, making it a part of Thailand's official style. It is evident in many royal mansions and palaces in and around Bangkok. These structures have been extensively photographed and published, thus shaping Thai tastes right up to the present.

Modern architecture is another foreign influence, one that has not often been successfully integrated into the Thai context. Since the 1990s, however, architects have made progress at deploying local forms to contemporary buildings, as illustrated in Chapter 9, Thai Architectural Forms Today.

1. Chinese Influence

Chinese art - through trades, diplomatic exchange and immigration - has had a strong and recurrent influence on Thai architecture since the beginning of the Siamese history. The best example of this influence can be seen in the ornaments of religious and royal architecture, including lacquer painting, mother-of-pearl inlay and decorative motifs. Other proofs are temple and palace roofs and courtyard elements such as Thai bonsai and stone mountains. Chinese-style imagery also appears in many Thai murals, and the red colour used in the temple interiors is probably a result of Chinese influence.

Chinese style reached its peak during the second, third and fourth reigns of the Chakri dynasty of the Rattanakosin period. Sinicisation was especially strong during the reign of King Rama III, when some 200,000 Chinese migrants, including many artisans and construction workers, came to Siam. Their works were visible in several royal palaces. About one in four of the 74 monasteries built or renovated during that reign (early 19th century) featured main buildings decorated in Chinese style. Chinese pagodas and guardian statues were imported for courtyard decoration. Additionally, many Chinese artisans were given ranks of honour during the reign of King Rama IV.

About 10 percent of Thailand's population can trace their ancestry to China - mostly immigrants who arrived over the past 200 years. These immigrants built a number of traditional Chinese structures throughout Thailand such as shop houses, courtyard houses, temples and shrines. However, the presence of Chinese architecture in Siam dates back to the Ayutthaya Kingdom. Ayutthaya, which relied heavily on Chinese shipbuilders, had three Chinese districts. A Chinese-style building built during this period includes Phra Kaew Pavilion, an octagonal wooden repository for the safe keeping of royal treasures. Palaces built by King Taksin, the half-Chinese founder of the Thonburi Kingdom, also borrowed Chinese architecture and decoration.

2. Chinese Shop Houses

The basic 'building block' of urban Thailand, the type of structure that gives cities and towns their layout and look, is the venerable Chinese shop house. This half commercial, half residential building is a hybrid of Eastern-Western form brought by immigrants mostly from the coastal provinces of southern China from the mid-19th to the mid-20th centuries. Thanks to its adaptability in terms of function, style and configuration, the Chinese-style shop house is one traditional genre that is still being built.

The classic shop house is built in a row of two-or three-storey masonry units with shared walls. The front wall on the ground floor is often made of louvred doors that open the interior to the street for use as a retail shop or a wholesale business. The upper level serves as a residence of the owner's family. A shop house can be converted into a warehouse, a restaurant, a barbershop and other businesses. It can also be used solely as a residence, turning the ground floor's front room into an open family room.

Laid out as a narrow rectangle, the street frontage of the building measures just 3 m to 5 m wide, but the house extends as far back as 20 m. An interior courtyard or air well provides ventilation since the shared, load-bearing side walls lack windows. The ground-floor shop is furnished with an ancestral altar along the back wall facing the entrance. Upstairs rooms can be subdivided with walls to provide rental units. Ceilings often feature exposed timber joists under wooden floorboards.

Decoration is focused on the front facade, especially on the upper storeys. This is a legacy of a taste in southern China during the 19th century for plaster foliate designs, pilasters, fanlights and other elements of European styles like neoclassical, Baroque and Italianate.

3. Sino-Portuguese Style

Many of Thailand's most distinctive shop houses and townhouses were built in the Sino-Portuguese style. This Chinese-European architecture emerged in the 16th century through Portuguese traders and colonial officials, who introduced the European row house structures to Melaka. It was then mixed with local Chinese art and spread throughout the Melaka Straits. Later, the Dutch and British succeeded the Portuguese as colonials in the Straits, adding their ingredients to the mix, particularly in places like Penang and Singapore. It later reached Siam in southern port towns, especially Phuket, which traded substantially with Penang.

A typical Sino-Portuguese townhouse features a ground-floor shop with a family's living space on the second floor, similar to the Chinese shop house. The building, however, has the overhanging upper floors that provide weather protection for pedestrians and function as a corridor for people to window shop. This so-called 'Five-Foot Way'

architecture dates back to the colonial government in Singapore when Sir Thomas Stamford Raffles included this in his Town Plan of 1822.

The floor plan is narrow and deep, with a width of perhaps just 5 m to 7 m fronting the street, but extending several times this distance behind. Chinese influence is seen in decorative details such as frescoes and carved wooden decoration, often in auspicious motifs including clouds, flowers and swastikas. The colourfully painted facade is further layered with European features-Greco-Roman columns and arches, or Victorian gingerbread wooden fretwork.

The Sino-Portuguese architecture is also embodied in some courtyard houses and other free-standing structures in Thailand. Perhaps the best example is the1878 mansion of the governor of Songkhla, which is notable for its Chinese-style central courtyard, red-painted timbers, concave roof and European sweeping exterior staircases.

4. Western Influence

European and colonial architectural influences have been filtering into Thailand since the Ayutthaya period. Western forms have occasionally been cross-bred with Siamese structures, but more often the mixture has been a graft; a Thai roof on a Western structure, European-style rooms within a Thai-style exterior. In other instances, Western architecture has been transplanted wholesale.

The aesthetic peak of Western architecture came in the late 19th and early 20th centuries during the reign of King Rama IV, V and VI, who commissioned the constructions of palaces, temples and public buildings in a variety of 19th -century European and colonial styles. This was a conscious effort to assert Siam's modernity and independence in the threat of Western colonial expansion in Asia. It also asserted the Chakri dynasty's status vis-à-vis European royalty.

Construction materials from Europe, which began to be used in the 19th century, included terrazzo, slabs of marble for floors and pavements, glass and stained glass from Belgium and France, and metal fittings for windows and doors. Vaulted ceilings and steel-reinforced concrete construction were also introduced. These new elements allowed buildings to be constructed on a larger scale.

Modernist architecture began to trickle into Thailand in the 1930s and 1940s. More came during the 1950s and 1960s. The most popular form was the Mid-Century modern architecture from the United States, a reflection of strong American cultural influence in Thailand during the Cold War and the fact that many Thai architects had graduated from the US.

Since the 1960s, architects have worked to fuse local tradition with Western modernism and post-modernism.

5. Western-Style Palaces and Mansions

Bangkok features a surprisingly broad collection of authentic 19th century European architecture. This is apparent in many of royal palaces (*wang*), princely residences (*tamnak*) and other mansions built from the mid-19th to the early 20th centuries. When these structures first appeared in Thailand during the reign of King Rama IV, Thai architects relied on prints and photographs of European structures. Later, King Rama V and his sons hired many European architects to work for the government, a tradition continued in the Sixth Reign. Members of the royal family who were architects also built Western-style structures.

Fig.19 Phyathai Mansion

Fig.20 Bang-pain Palace

Beyond the buildings constructed or renovated within the Grand Palace compound, each king built secondary palaces around Bangkok and in the provinces, mostly in Western styles. Even more extensive is the collection of royal residences built for the king's sons who attained the title of prince. Large with impressive designs, these structures serve as a place for the princes to live and perform their assigned duties as government officials.

After the end of absolute monarchy during the Seventh Reign, the tradition of building princely residences was discontinued, although new royal palaces have been established. In addition to houses of the aristocrats, many other Western-style mansions were built for wealthy local merchants and foreigners living in Siam.

Transforming philosophy into Architectural Works

Various architectural features of the late Ayutthaya period indicate the craftsmen's attempt to imitate heaven to create the sense of peace, lightness and floating in accordance with the Buddhist philosophy.

Peace is represented in the symmetry of the structures in the temples. This is visible in the square shape of *Mondhop, Chedi* and *Vihara Kod*, the rectangular structure of *Bot* or *Vihara* and the round shape of *Chedi*. These features, with the stress at the structure centre that rises toward the top of the structure, give a sense of firmness and stability. One can have this kind of feelings when looking at the facade of Benchamabopit Temple and the famous stupa at the Temple of Dawn (Wat Arun).

Lightness is represented in the form of the curve. This curving design appears in several parts of the structures in the temples such as the arched roof and the base of *Bot, Vihara* and *the round shaped Chedi* as well as the curve of the roof kernel' end. This design is aimed to create the feeling of lightness.

Another way to create the sense of lightness is to break up a big rectangular form into tiers while maintaining the whole structure. This method is typically employed for the roof of large structures like *Bot*, *Vihara* and multi-purpose buildings. Without the tiered roof, the structure would look stiff.

In addition to the curving design, craftsmen of the late Ayutthaya period make a lower layer at the front and back part of the roof. The lower layer from the main roof helps make the structure look light.

Apart from knowing how to create the sense of lightness, late-Ayutthaya craftsmen were able to make an object or structure of different sizes look as if they were floating in the air, imitating the movement of angels. Some features such as the sweeping multi-tiered

roof and the upward curve at the roof are good examples in this case. Moreover each roof tier is imbued with religious meanings. For the construction of *Bot* and *Vihara,* the craftsmen intentionally made the space between the tiers at the lower end closer to each other than the tiers at the upper part. As a result, the tiers at the lower end of the roof makes the structure look tense and heavy while the upper part of the roof looks more relaxing and liberating. The design is meant to represent the freedom from all attachments, which is the ultimate goal of Buddhist philosophy.

Such philosophy is even obvious in the design of *Mondhop*'s steep roof, which also feature dense multi tiered roofs. The top tier of the steep roof sweeping up into the sky represents the achievement of the supreme wisdom or nirvana. Basically, this is the symbol of peace, lightness, floating up high in Mahayana beliefs. Although the sweeping roof of the *Mondhop* is designed to represents the concept in the Trai-bhumi scripture of the Theravada school, the Mahayana school' s symbol of peace, lightness, and floating helps complement the structure beautifully.

The walls and pillars are also built to signify heaven. Thick at the base and thin at the top, walls and pillars lean toward the centre of the structure. It is a unique characteristic of Thai architectural design.

In addition, the Maha Chompoobodi Sutra in Mahayana school refers to the story of the Lord Buddha when he used supernatural power to appear as King Jakkapat in order to teach the arrogant Tao Mahachompoo, who, after listening to the teaching, became a Buddhist saint (Arahat monk). The story inspired the creation of elaborately adorned Buddha statues such as Phra Athibuddh, Phra Wairojana Buddh, and Phra Sakkayanmuni Buddh. Such beliefs are linked to the making of both elaborately ornamented Buddha statues and Bodhisattva, especially the ones made of raw clay that is widely popular in the south. This idea was also popular in the Theravada influenced Ayutthaya Kingdom and continues to dominate the making of Buddha statues today.

Chapter 3

Characteristics of Thai Architecture

Suggesting a shared cultural origin, the primary form of dwelling throughout Southeast Asia and some parts of East Asia is a gable-roofed structure built on posts or stilts. As depicted in ancient relics such as engraved bronze drums unearthed in Vietnam and Indonesia, this form dates back to the region's prehistoric period.

Fig. 21 Characteristics of Thai Architecture
(Source : Thai House)

In Thailand this style of house, which is often located near waterways, is built from bamboo or unpainted wood with pre-assembled walls hoisted into place on the posts, leaving a multi-purpose space below the cabin. The most refined local expression of such architecture evolved in central Thailand during the prosperous Ayutthaya period. A house of this type may consist of one large house or a group of individual small cabins joined together by a raised terrace, which functions as an outdoor family area. These classic Siamese dwellings stand as one of Asia's most appealing types of traditional house, combining gracefulness with marvelous adaptation to climate and lifestyle.

Similar structures are also found in other parts of Thailand. The northern version is somewhat boxy and big with walls sloping out towards the roof rather than in, as they do with houses in the central region. Houses in the northeastern region are comparatively rustic while the Malay-influenced southerners often decorate their houses with painted fretwork and blend local arts with colonial architecture.

Generally, Thai people in the countryside still live near their rice paddies, the nation's long leading agricultural export. Some farmers build rice barns not only for storing grain but also a temporary shelter when working in the fields away from the village. These structures are sometimes so important that they devote more attention to the barns' construction and their aesthetic value than to their own abode. Like houses, these barns are usually built on stilts with a gable roof.

A traditional Thai house typically features a rice barn and some small sheds for storage or livestock. Its vegetable garden consists of plants grown in pots or patches, which are used for cooking or auspiciousness rather than decoration. The merits of traditional houses nowadays inspire growing numbers of well-to-do Thais and expatriates to invest years of effort and large sums of money in conserving them. Others have new ones built at high costs.

Appearance of Thai Architecture

Residence

1. The Siamese Wooden House

The classic wooden house of central Thailand has a distinctive elegance. It has a concave roof, arching bargeboards with hooked lower finials, and trapezoidal walls. These slopes and curving lines keep it from looking boxy.

The house's adaptation to heavy rain and heat starts with the tall posts on which the structure is built. This is needed because central Thai villages are mostly built near rivers and canals, which are subject to flooding during the wet season that lasts from June to October. When the ground is dry, families use the sheltered area under the house, which is about 2 m to 2.5 m high, for making crafts, storing tools or raising poultry.

The curve of the steep roof is highlighted by a bowed plank called a bargeboard, or *panlom*, placed at the gable rims to protect the thatch roof tiles from wind. The lower ends of the bargeboards are carved in a horn-like shape called *ngao*.

Columns and walls are built leaning inwards, adding structural strength. Windows are tall and wide, for optimum ventilation; their shape mirrors the trapezoid of the cabin all panels. Skilled carpenters pre-assemble the wall panels in a standardized, modular system that allows them to be used interchangeably in any Thai house. The rooms open onto covered verandahs about 2 m wide, which step down onto a broad wooden terrace.

A small family might start with a single cabin and a terrace, using a small cabin to the side as a kitchen. As the family grows, they will add two cabins at a time to reach a total of three or five; an even number of living cabins is considered inauspicious.

2. The Northern House

The architecture of local houses in northern Thailand represents the distinctive culture of Lanna Kingdom, which flourished between the 13th and the 18th centuries. The largest and most refined type of Lanna residence is the classic timber *kalae* house, named for the V – or X-shaped wooden decoration extending from the gable end peaks, thought to represent the horns of water buffalo.

Fig.22 Forms of kalae

The *kalae* house, like its central Siamese cousin, is assembled from pre-carpentered wooden panels on a platform over wooden stilts with a multi-purpose space underneath. The house typically has twin cabins joined at the eaves along a rain gutter, with wooden - rather than earthenware - tiles on the roof. Walls on the lateral sides lean quite steeply outward towards the roof, not inward as in the central house. The roof is not as steep and curved as the central version, so the slopes form a triangular pediment. Windows are small and placed only on the lateral walls, to better retain heat during the cold season, when temperatures sometimes drop close to freezing.

Fig.23 The Kalae House

There are four types of *kalae* house, which vary in size and floor plans and include as many as four cabins as well as secondary terraces. Other types of northern houses are smaller and less luxurious than the *kalae* but share many of its basic features.

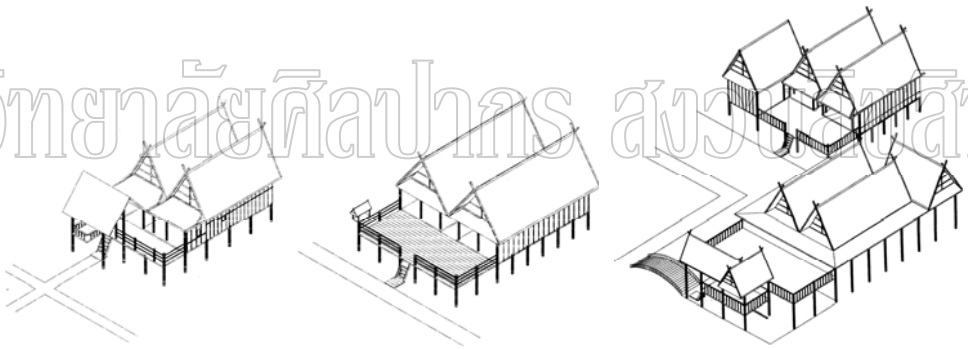


Fig.24 Northern houses

The northern house's most important part is the verandah or *toen*, which is usually built facing south for warmth and used for family activities, entertaining guests and, sometimes, sleeping. The main cabin has a single room that serves as a bedroom for the whole family.

3. The Northeastern House

Centuries of migration from nearby Laos have helped shape the architecture of Thailand's northeast, known as Isaan. Siam gained control of the region in the 18th century, and from the early 19th century promoted the resettlement of Lao immigrants there. Today the Tai Lao people outnumber the Khmer and other ethnic minorities in Isaan's 19 provinces, where a third of Thailand's population lives.

Fig.25 North-eastern House

Unfortunately, the region has chronically been hit by economic hardships resulting from drought, poor soil and a less developed education infrastructure in the rural areas. Thus, its architecture is simpler and less elaborate than elsewhere in Thailand.

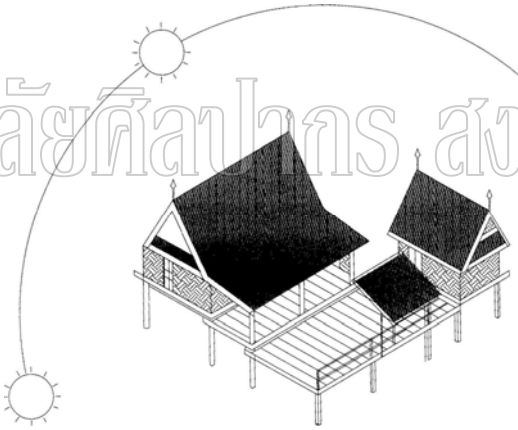


Fig.26 Positioning of north-eastern house

Northeastern-style houses are similar to central Thai houses. They are built of wood on stilts, but their roofs feature a gentler slope since there is less rain to cope with. Thatch and corrugated iron roofs are more common in Isaan than other regions. Walls are perpendicular, not slanted, and often made of simple wooden planks rather than the prefabricated panels used in other regions.

Homes are built in a compound structure, starting with a main cabin; a second cabin may be added as the family grows.

4. The Southern House

Of several styles of houses in the 14 provinces of Thailand's south, the most distinctive are the houses of Thai Muslim. Owing to their exotic Malay features, these

houses are especially common in the four deep-south provinces of Pattani, Satun, Yala and Narathiwat, where most of the populace are Muslims of Malay ethnicity.

Fig.27 Southern House

The roofs of these houses take one of three forms. Hipped roofs, known as *panya* or *lima*, are popular in the south. It is an influence from colonial Dutch and English architecture that spread from Indonesia or the Malay Peninsula. The same is true for the hipped-gable roof, which is called locally *blanor* roof. Gable roofs are also visible in this region.

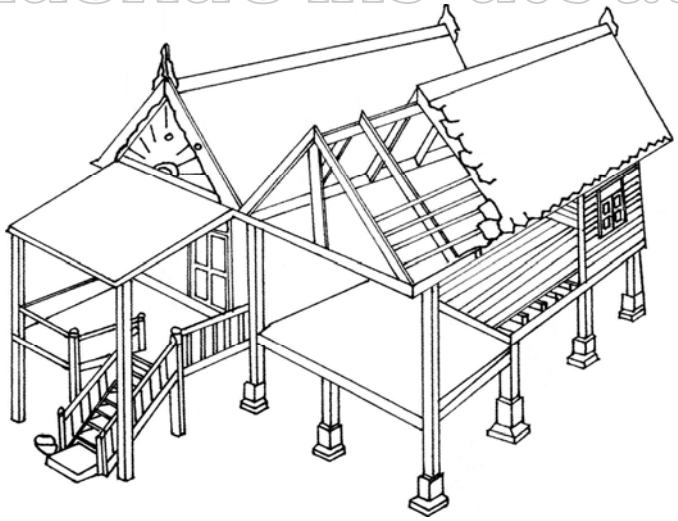


Fig.28 Structure of Southern house

Malay style, with its roots in Islamic art, is expressed in carved ornamental details: gable end panels, roof finials and the fretwork of ventilation grilles often painted in many colours.

The posts of southern houses of all sorts typically stand on column bases, or *teen sao*, made of stone or cement slabs. This protects the posts against termites and

moisture during the rainy season. This feature also allows the building to be relocated easily.

5. Houses on Water

From the vantage point of the traditional Thai lifestyle, with its heavy reliance on boat travel, fishing and frequent bathing, the only place better to live than next to a river is right on top of one, in a house on pontoons or stilts. These houses are comfortable and well suited to commerce, given the ease of water transport.

Fig. 29 Ruen Pae

A raft house, or *ruen pae*, can be built much like a house on land, with a gable roof, low eaves and wood-or bamboo-panelled walls. The cabin wall facing the water, usually made of woven bamboo or corrugated iron sheets, has hinges so it can be propped open, often to display goods for sale to passing boats. Bathing is done directly in the surrounding water, so no bathroom is needed. Below the cabin is the pontoon used to support the raft house. They are usually made of wood or bundles of bamboo. This feature also allows the house to be relocated.

Another type of houses on water is the stilt house. Built over a canal, river or lake and supported by tall posts, this traditional Thai house is called *baan rim naam*, literally meaning 'house by the water'. Sometimes, part of the house is built over land, but the entire house can easily be built over the water with a walkway leading to the river or canal bank. In either case, the main entrance will face the water, usually with a roofed verandah and stairs leading down into the water, in case of bathing and boat transfer.

6. Bamboo Houses

The structural characteristics of Thai bamboo house are very similar to the wooden ones: one-storey, raised on stilts, a gable roof and prefabricated walls. They tend to be smaller, however, with a single cabin, not clusters grouped around a big terrace as in the case of some wooden houses.

Fig.30 Bamboo House
(Source : National Archive)

Apart from being the primary form of the traditional Thai house for commoners, bamboo dwellings can be considered the original design of the wooden version that was developed later. The Thai system of pre-assembled wall panels, for example, probably evolved from the bamboo houses since woven wall mats needed to be completed before the house was erected, a technique that proves efficient when building with wood.

Nowadays, bamboo houses are still built among low-income families and also for temporary use; for example, as a 'starter' house for the newlyweds until they can afford to have a wooden house. Since the structure is simple, some homeowners build their bamboo houses themselves without professional help.

The house can be made almost entirely from bamboo, but other materials are commonly used as well. Posts and beams, for example, may be made of wood for greater strength, relegating bamboo to roofs, joists and floors. Walls are woven of split bamboo, palm leaves or, in the south, pandan leaves.

In central Thai parlance, the structure is called *ruen khrueng phook* (house assembled by binding), while in the north, it is known as *ruen mai bua*. Low-income levels in many districts in the northeast still prefer bamboo houses because they are not expensive.

In the south, bamboo houses are the most common among fishing communities. Those in Muslim districts are remarkable for the beautiful geometric woven patterns of their walls: herringbone, diamonds, stars and others.

7. Rice Barns

In rural areas, most houses have a rice barn or granary (yung khao), built to protect the produce from spoilage and vermin. The granary is virtually the family's cash box since rice is a major cash crop and needs to be stored for sale. The size of the rice barn is an indicator of the economic status of its owner. Those growing rice for sustenance may not have a rice barn but will keep their rice in the house instead.

Fig.31 Rice Barn

In most of Thailand, the granary is a rectangular cabin built on stilts, parallel to the main house but far away enough to maximize sunlight and ventilation in order to keep the grain dry. Gable roofs are common, and are usually made from corrugated iron or earthenware tiles nowadays, instead of traditional thatch. Sometimes the underside is built with wooden walls to form an enclosed space for storing tools.

In the north, the barn is called *long khao*, *yung khao* or *ye khao*. It has massive pillars and a balcony on all four sides, making the cabin appear to float in mid-air. The roof may be either gabled or in the hipped form called *panya*. Northeastern granaries usually resemble local houses, with metal gable roofs and small entrance terraces suitable for keeping tools.

In the South, soil conditions are less suitable for rice farming. Thus, villagers mainly grow rice in small fields only for family consumption, not trade. For this reason, most villagers tend to set aside a place in their house for rice storage instead of having a separate barn. There are some granaries, known locally as *ruen khao*, but the size is usually smaller than those in other regions.

8. Field Huts and Cottages

When farmers live several kilometers from their rice fields, they need to build huts and cottages (*hang na*) for shelter. Most sheds are simple, temporary shelters for daily rest or short visits. In hilly areas, however, rice fields are scattered further away

from the community, and cottages need to be built for longer, more comfortable stays of four to six months.

Fig.32 Field Hut

Such field cottages are found throughout the northern provinces, where they are known as *theng na*. These cottages are a bit like primary houses in the village, but are more quaint and charming.

Rice farming has increased substantially in some northeastern provinces thanks to improved irrigation system in recent decades. Field huts or *thiang na* have become numerous, and are constructed in a simple, folkish style. The gable roof is easily assembled and the house is only slightly elevated since flooding is infrequent in the region. In the central region, field cottages are less prevalent because rice fields are located close to the village. In the South, such cottages are smaller in number as rice is not the main economic crop for the region like other plants, including rubber.

9. Roadside Shops, Stalls and Pavilions

Until Bangkok's canals started to be filled to pave the way for roads in the 1950s, water transportation was the main travelling mode for people and traders who directly sold from boats. Traders normally set up riverside stalls and shop houses. When the transport shifted to land, rows of shops sprouted along the roads instead of the waterways. Today, roads throughout Thailand, even deep in the countryside, are lined with wooden stalls and shop houses selling local produce, handmade items and packaged goods.

Fig.33 Roadside Shop

The simplest type of roadside shop is a small shed called *ran kha rim thang.* It normally stands by the road at the edge of a field. The shop may have a simple thatch roof with a bamboo table to display products and a chair. There are also temporary stalls for selling seasonal fruits or vegetables. Interestingly, groups of stalls often spring up together at some busy junctions and eventually become extended rows of permanent shops.

More elaborate is the traditional Thai shop house, *ran ruen*, used for both trade and living. It is a wooden house built with a front verandah where goods are displayed. The verandah is sheltered from the sun and rain by an extended roof eave. Unlike its Chinese-style counterparts (see 8.2 Chinese shop houses), the Thai shop house is built on a single storey with a family unit at the back of the house. The reason for the single storey house is probably derived from the old custom that does not allow people to stand higher than a person's head, which is considered the most important part of the body.

Other huts and pavilions include roadside shelters for bus passengers and booths for outdoor restaurants.

Religious architecture

Thais observe Theravada Buddhism, the most conservative form of Buddhism. Even though it is a religion of cultivated dispassion, it has inspired people's passion to build a large number of elegant religious structures. This reflects in some 30,000 Buddhist temples throughout the country. They suggest visions of the celestials, with multiple layers of form and ornament that turn a temple hall into a glittering palace-like structure to enshrine Buddha images. In the national architectural hierarchy, temples

even stood higher than palaces. Until the Ayutthaya period, only temples were built with durable materials like stones, bricks and stucco while palaces were built of wood.

Before modern times, Siamese rulers built large temples in their cities not only to make merit, but also to strengthen their domains. A temple enshrining an important relic, for instance, would attract merit makers to its vicinity because they wished to be protected by its spiritual power. The bigger populace enabled the government to collect more taxes and gather more labour.

Temple architecture is governed by the influence of centuries of tradition and by official guidelines set by the Department of Religious Affairs. Yet architects and craftspeople can still make some innovations within these limits. Over the course of the last millennium, Thai temple architecture has absorbed influences from India, Ceylon, Burma, Cambodia, China, Persia and Europe. Regional variations within Thailand are symbols of the nation's own cultural diversity. Thai temples are opulent and regal in the central region; gracefully sinuous in the north; rustic and charming in the northeast; and in the south, sometimes quite eclectic.

Diversity is also apparent in Thailand’s 3,000 mosques, which can be seen in most large towns. They are centers of religious and social life for diverse Muslim communities of both Thai and immigrant origin. The coexistence between Islam and Buddhism reflects largely in the architecture of mosques that resemble Buddhist chapels, and Buddhist chapels that resemble mosques. Several mosques in Thailand's deep south, where Muslims are a majority, are among the most unique and architecturally significant examples of Islamic worship sites in Southeast Asia.

1. Temple compounds

A Thai Buddhist temple, or wat, is not a building but a place, a complex that serves as a community centre for religious rites, learning, social life, recreation and even festivals. The Wat is also a small community in itself, since almost every wat is also a monastery.

White courtyard walls and decorated gates signify the compound's holy status. Its layout, moreover, follows a sacred design -- a formal ground plan that contrasts with the impromptu sprawl of the village or city. Viewed from the sky, as a deity might view it, the ground plan outlines a sacred diagram, or *mandala*, a structure influenced by Khmer-Hindu temples. Buildings are arranged in a series of zones, with a succession of sacred, walled layers centering on the ordination hall, or *ubosot*, where the holiest rites take place. This is the heart of the wat’s ceremonial grounds, or phutthawat, which are enclosed within its own special courtyard walls called *kampaeng kaew*.

The complex is geographically aligned, starting from the ordination hall, whose entrance side faces east. Next to it are one or more assembly halls, or *viharn*, which house Buddha images and murals. There may be a memorial tower in the form of a bell-shaped stupa known as *chedi*, or a bell-shaped prang. The grounds may contain cloisters or roofed galleries open on one side to display Buddha statues.

Other structures include the scripture pavilion (*ho trai*), study hall (*sala kan parian*) and bell tower (*ho rakhang*). Monks' living compound or the sanghawat consists of cabins known as *kuti*, a dining hall, libraries and other facilities for monastic life.

a) Ordination Hall and Assembly Halls

Each wat has just one ordination hall, or *ubosot*, where monks are ordained. It is the most important building in the compound. Standing on sacred ground, which is outlined by eight consecrated boundary markers, this ordination hall is typically a symphony of forms, figures, finishes and colours, with decoration on almost every surface except its whitewashed outside walls.

A single storey building with a rectangular floor plan and a raised plinth, the *ubosot* has a high ceiling and a steep, multi-tiered gable roof with elegant finials at the ridge and eaves. Its doors can be covered in carved wood or plaster relief, gold leaf, glass mosaic, lacquer painting or mother-of-pearl inlay.

Tall windows line both lateral walls with timber doors at the narrow entrance end, facing east. Opposite the entrance door at the west end of the interior is the ubosot's largest Buddha statue, placed behind a multi-tiered altar. The altar's splendour is matched with painted murals on all four walls depicting Hindu divinities, the Buddha's life story and past lives of the Buddha.

Ubosot, colloquially shortened to *bot* in Thai, is derived from the Pali term *uposathagara*, which refers to a hall used for rituals on the upostha days -- the Buddhist Sabbath, which falls four times a month on the full moon, new moon and eighth day after each. On these days, monks gather to confess if they have broken any of the 227 precepts of monastic conduct.

The assembly hall, or *viharn*, is architecturally similar to the *bot* except that there are no boundary markers. It houses Buddha images and is used for sermons and ceremonies involving monks and lay people. In addition, there may be more than one *viharn* in the wat compound.

b) Boundary Markers

The construction of an ordination hall begins with the ceremonial burial of special stones called *luk nimit* in the surrounding courtyard at the four cardinal points of the compass and four points in between. A ninth stone is buried under the floor in the centre of the hall or under the main Buddha image, thus marking the geographic center of the whole temple compound.

Boundary markers can take many forms but usually have a tablet shape like the leaf of Bodhi tree. Typically made of stone or plaster, the markers are often enclosed in small shrines. Each shrine may contain one or two, or sometimes three, markers. This indicates the number of times the hall is consecrated - either because of a major

renovation or enjoying royal patronage. In a few temples, the markers are enclosed within the columns of the *ubosot* or its courtyard wall. The boundary markers of temples in rural areas may simply be boulders, or even living trees.

c) Pavilions and Sermon Halls

The courtyard of wat often has one or more free-standing roofed pavilions, or *sala*, built as places for visitors and monks to hold meetings, rest, meditate or have meals. Thais like to make merit by sponsoring the construction of *salas*, so such structure sexist in almost every wat. The layout of a *sala* usually follows the rectangular format of an assembly hall, using a gabled roof that is less elaborate. It tends to be built entirely or partly without walls. Indeed, *sala* might be viewed as the primordial form of the temple halls since, in the traditions of the old Sukhothai and Lanna kingdoms, assembly halls and ordination halls resemble the architectural form of *Sala.*. A few examples still stand.

The highest form of *sala* is the study hall, also known as the sermon hall, the preaching hall or *sala kan parian*. This pavilion is traditionally a place where monks give sermons, chant and perform ceremonies. *Sala kan parian* may be as large as, or sometimes larger than, an assembly hall. They can be partly or fully enclosed by walls.

Parian refers to a system of formal examination for monastic study; a degree system introduced in the 18th century by King Narai. Its highest level took nine years of study. Thus, the name of *sala kan parian* suggests a serious intent in learning Buddha's teachings, which also include listening to the sermons.

The elementary or secondary school facilities built on the grounds of many wats are not *sala kan parian*. They are better thought of as preaching halls than as secular classrooms.

d) Cloisters

At major temples, courtyards around ordination halls, assembly halls, *chedis* and prangs are often encompassed by cloisters. Called *phra rabiang khot,* or simply *rabiang khot*, the structure is a roofed walkway or gallery with one side open to the air. Its roof is supported by pillars. The inner wall of *phra rabiang khot* displays Buddha statues or murals. Despite its resemblance to the cloisters of Christian monasteries, this structure was indeed architecturally influenced by the fully enclosed stone cloisters built around Khmer sanctuaries of, for example, Prasat Phimai and Prasat Phnom Rung.

As part of the wat's cosmological ground plan, cloisters represent one of the layers of mountains or oceans around Mount Meru, which is symbolized by encircled buildings. In the Ayutthaya-era temple layouts, the *chedi* or prang was the main temple structure. During the Rattanakosin period, the ordination hall or the assembly hall became the prime structure surrounded by cloisters. In both periods, the importance of the building was determined by the significance of the relics or the Buddha image that were housed within the structure.

The cloistered area is typically where circumambulation rites take place, allowing worshippers to contemplate the Buddha images as they proceed. In many temples, cloisters also serve as open-air classroom where monks conduct classes.

Of all Thailand's cloisters, the most exceptional one can be found at the Grand Palace, where a vast length of galleries surround the entire complex of the Temple of the Emerald Buddha. Unlike most temples, the cloisters here do not display Buddha images, but 178 panels of murals illustrating the entire Ramakian epic -- the Thai version of the Hindu Ramayana epic that recounts the adventures of Rama, the earthly incarnation of the Hindu god Vishnu. The murals are intended to show respect to monarchs of the Chakri dynasty since they are regarded as incarnations of Rama.

e) The Prang Memorial Tower

The imposing structure of *prang*, often surrounded by open cloisters, is a form inherited from the pre-Thai era between the 6th and the 12th centuries when Khmer dominions extended into much of what is now central and northeastern Thailand. The Khmers first built their Brahman sanctuaries in the pyramidal form of Indian sikhara. Between the 11th and 12th centuries, however, the *sujgara* form evolved into the curving, bullet shape of *prang* at both Brahman and Mahayana Buddhist sites. Sukhothai-era Thais later adopted this architecture and built them for Theravada Buddhist relic chambers.

Both the sikhara and *prang* have 33 level-bases, tiers, mouldings and finial that represent the 33 levels of Mount Meru in the Hindu cosmology. In the Mahayana and later Theravada towers, these come to signify the 33 levels of perfection outlined by Buddhist doctrine.

The bullet-shaped top of *prangs* is formed underneath by tiers of receding cubes. This geometry is given its curve by the use of miniature gables and antefixes, or corner pieces that curve inward towards their tops. The rectangular body of the structure is visually integrated with the curving top by the use of tall gables above the entrance. Thais built these monuments in brick or laterite covered with stucco rather than the carved sandstone preferred by Khmer builders east of the Mekong.

The sacred relics enshrined in *prangs* (and stupas or *chedis*) are often cremation ashes, in a few cases believed to be from the Buddha or a disciple. In some case, ashes of a monarch or a revered monk are encased in *prangs.* A relic chamber may also hold Buddhist inscriptions or an image, such as the Buddha footprint.

f) The Chedi Memorial Tower

Temples may feature one or more *stupas*, or memorial towers, which are usually in the conical form called *chedi*. This name is based on the word 'chetiya' in the Pali language of Theravada scripture, which refers to a burial mound or pyre. From ancient times, Indians built mounds to commemorate deceased leaders; such stupas were built to enshrine relies of the Buddha.

Buddhist *stupas* first appeared in Thailand in the central region of the Chao Phraya River Basin in the 7th century or earlier, built by Theravada Mons. Some experts believe the early form of stupas, which resemble a hemispherical dome, was derived from Indian stupas. The later Mon chiefdom of Hariphunchai, in what is now Lamphun Province, built pyramid-shaped *stupas*. A few examples built during or before the 13th century survive.

Thailand's predominant *chedi* type is the bell-shaped form introduced during the Sukhothai era, which was influenced by Ceylonese models, perhaps via Burma or Nakhon Sri Thammarat. The Siamese version evolved towards an ever taller and more slender shape.

The *chedi* has three levels: a base, a middle section that contains the chamber holding relics, and typically built of laterite blocks or bricks, decorated with stucco, and stylized by redented geometry in the base, middle, top or throughout. A few were built on top of older *chedis* or *prangs*. Many Rattanakosin-era *chedis* are clad in gilding, copper or ceramic tiles. Both *prang* and *chedi* present a cosmological evocation of Mount Meru.

g) Monks Residential Units

In Thailand, the main function of temples is to serve as a monastery, a residence for more than 300,000 monks and novices. Almost all active Thai temples have resident monks, except the Temple of the Emerald Buddha in the Grand Palace, which is reserved for royal use.

The monks' private residential zone at the back or side of the temple compound contains cabins called *kuti*, usually small wooden or white plastered brick buildings. Each has a single room upstairs and a ground floor. *Kutis* are scattered around the zone and interconnected by walkways that lead to facilities such as bathrooms and a Pali language school. In some monasteries, the *kutis* are built as a cluster house on posts with a central terrace.

The monks have meals in a large building with a high ceiling, often constructed without walls for the sake of ventilation. Usually included in the residential zone is a pavilion, or *sala*, for the monks to gather to meditate or pray. In small temples, however, a single hall will serve dual functions as a place to eat and meditate.

h) Scripture Pavilions

A small, sacred repository or library called *ho trai* is located in the ceremonial zone within the monks' residential area. It is a place where copies of Buddhist scriptures called Tripitaka are enshrined. It serves as a library where monks study the scriptures. The Tripitaka is considered the foundation of the Theravada school of Buddhism practiced in Thailand.

The *ho trai* is usually built in either of two forms that show its sacred status. Often, it resembles an assembly hall in miniature, with a rectangular floor plan, verandah, multi-tiered roof and ornamented gables. In other instances, it assumes the square of cruciform structure of the *mondop.* Most temples have only one *ho trai* but large temples may have more.

Built of wood and set on tall posts; *ho trai* was traditionally situated at the middle of a small pond to protect against termites and folds. With just one or two windows and a single door, the only access to *ho trai* was via a tall ladder that could be removed to prevent theft.

However, space restraints led to the omission of the *ho trai* pond in temple, built in the last 50 years or 80. In such cases, the structure can be built on two levels instead, with a brick-and-mortar lower level that prevents termites from reaching the upper level of wood. Sometimes *ho trai* is simply built as a one-storey structure on the ground, with a high cement base.

i) Drum Towers and Bell Towers

Thai temple architecture includes a traditional form of public address system; a drum tower (*ho klong*) or a bell tower (*ho rakhang*). Used to announce the hour, the start of religious ceremonies and emergencies, these towers are typically constructed near the residences of the monks who are in charge of ringing or drumming.

This tower or belfry usually adopts a square shape and is built on two or three levels. It can have any of several types of roof, including the conventional gable roof or the cross-shaped, four-gable top called *chaturamuk*, which is used on a royal pavilion or a royal pire.

The towers of temples in the rural areas are usually made of wood, on four round pillars including verandahs with balustrade fretwork done in local style. Temples in Bangkok and those under royal patronage have enclosed towers of brick and cement with interior staircases and large window openings for better broadcast sound. They may be decorated with plaster relief or Chinese ceramic tiles, and often have windows and roof structures in Western styles.

The tower is the temple's tallest structure after the *chedi* or *prang*, ordination hall and assembly hall. Its height helps the sound of the bell or drum travel beyond the temple to the surrounding community. It is often be used as a public clock, announcing village meetings or a fire or emergency alarms. For monks, the signal conveys different meanings, such as the start of the fast at noon and the prayer time in the evening.

The drum used in such towers is of the long type, which rests horizontally on a stand or in a sling. Bells may be made of wood, stone or bronze.

j) The *Mondop*

Distinctively Siamese in its symmetry and stateliness, *mondop* is not a functional type, but a ceremonial structural form that can be applied to different kinds of temples and palace buildings. It is distinguished by its square or cruciform floor plan.

A *mondop* can house a scripture pavilion or a bell tower, enshrine sacred objects such as a Buddha footprint or boundary marker, serve as a crematory shrine, or stand as a ceremonial palace pavilion. The form is also abstracted in miniature as the decorative framework around the windows of palace buildings and royal temples.

The Thai form of the *mondop* was probably influenced by the Burmese *mondop*, which in turn was based on South Asian models. It differs from the mandapa of Khmer and Indian temple architecture, which are the entrance chambers on one or more of the four sides of the sanctuary of a sikhara or prang memorial tower. Whereas the Indian and Khmer *mondop* towers are essentially elements of a larger structure, the Thai *mondops* are a free-standing unit.

The present form of *mondop*, which originates in the Sukhothai period, has been applied extensively in royal temples in and around Bangkok since the inauguration of the capital.

Prime examples are the Phra Mondop scripture pavilions at Wat Pho and at the Temple of the Emerald Buddha in the Grand Palace, various *mondops* at the Temple of Dawn (Wat Arun) in Thonburi, and the grand *mondop* housing the Buddha footprint in Saraburi Province.

k) Crematoriums

A Buddhist funeral ceremony ends with the cremation, a ritual that takes place in a crematorium called *meru* – a shortened term for Mount Meru, the divine peak symbolizing the afterlife in the Buddhist-Hindu cosmology.

This reference is underscored by the building structure, which usually takes the form of a *mondop*, a square hall on a three-tiered base with a multi-tiered spire roof. In structural form, the *meru* for commoners is similar to the royal one which is called in Thai *phra merumas*, except that the ordinary version is less elaborately decorated and is of permanent use, usually built of masonry, while the royal structure is temporary and made of wood.

The *mondop* hall is used for the ceremonial display of the deceased in a decorated coffin while mourners pay their respects. An anterior room or verandah provides a space for monks to chant prayers. Adjoining the *mondop* is a second, rectangular structure that contains a cremation chamber with a furnace and a chimney. After the cremation, only a small pile of ashes is left. It is either kept in a memorial urn or scattered over the water.

The *meru* is usually built within the temple compound or at the village fringe. It should be noted that there are no *merus* in the temples in the inner part of the Rattanakosin area, which is the old quarter of Bangkok. King Rama I forbade the construction of *merus* in this royal district probably because, so soon after the fall of Ayutthaya, the smell of a burning corpse was considered inauspicious.

2. Northern Temples

Northern Thailand, where the first Thai chiefdoms emerged in the 12th century, retains a distinctive culture and architecture to these days. The most important dominion in the north was known as Lanna. Meaning the Land of a Million Rice Fields, it is a group of small kingdoms in Chiang Mai that flourished from the 13th to the 18th centuries. The region, which had cultural and political affiliations with principalities in Laos and southern China, was not annexed to Siam until the 19th century.

Fig.34 Northern Temple

Temple halls in the north are smaller and less elaborate than those in central Thailand. Wood ornament predominates while the structures are sometimes gilded or decorated with glass tiles. In general, the interior and the exterior of the northern temples are freer, gentler and less regimented. The roof area is larger, sweeping low towards the ground to cover more of the wall. Multi-tiered roofs have lower tiers that telescope much farther, over redented floor plans. Unique to temples in the north is *viharn*, which is built as an open pavilion. Burmese architecture has also had an influence -- a legacy of conquest, migration and trade. Indeed, much of Lanna was occupied by the Burmese for more than 200 years after1558. Temples in this region featured characteristic *pyatthat* roofs in three, five, seven or nine tiers of rectangular pyramids, recalling Chinese pagodas. Other Burmese decorative traits were brought in by craftsmen and traders of the Tai ethnic minorities known as the Shan, or *Tai Yai*. The Shan populace is spread in northern Burma but many groups have migrated and

settled along trade routes in northern Thailand over the past 1,000 years. Major resettlements are in Lampang, Phrae and Nan Provinces.

3. Northeastern Temples

The Buddhist architecture of Isaan - Thailand's populous, multicultural Northeast - has been shaped mostly by the ethnic Tai groups who migrated there in the 17th century, especially from Laos. Temple architecture reflects the Laotian styles that similarly influenced some parts of northern Thailand.

Fig.35 Northeastern Temples

The classic Isaan temple hall is small, simple and built on a high base. Its roof features one or more gabled upper tiers over a hipped lower tier. An ordination hall is locally called *sim*, a term derived from the word sema or sima, meaning sacred boundary (as in bai sema). The *sim*, which used to be built as a floating structure called a *sim nam,* is now nearly extinct. Since the sim was traditionally used only for monastic rites, it was built just large enough to accommodate 21 monks.

Sims built on land can be made of wood or plastered brick and partly enclosed by walls or fully open. A rustic *sim* may simply have gable coverings made from carpentered boards, like on a house, with a floor made of packed earth and a roof of corrugated iron. Temples with masonry walls feature murals painted on the exterior in a style distinctive to Isaan. Laotian-influenced *sim* may have eave brackets that are carved with a different design rather than the identical pattern seen in the central region. The Isaan wat usually also features a sermon hall called *ho chack*, and a sim-like *viharn*.

Since Bangkok gained control over the region in the 18th century, many temples in Isaan have been built in the same style as those in the central region.

4. Southern Temples

Wats in southern Thailand show a mix of local influences and central style. The region was increasingly integrated with central Siam during the early Rattanakosin years, and King Rama V made many visits to the south. *Ubosots*, *viharns* and other main temple structures built or renovated there during the 19th century often reflect a central influence, including Chinese decoration and motifs prevalent in the capital.

Fig.36 Southern Temple

More eclectic local style is seen in secondary buildings such as monks' quarters. Malay and Sino-Portuguese influence also appear in several features, including colourfully painted motifs, wooden fretwork and hipped roofs, even multi-tiered hipped roofs recalling vernacular timber mosques of Malaysia and Indonesia.

One grand example is the abbots' residence at Wat Choltara Singhae in Narathiwat, the Muslim-dominated province in the deep south of Thailand. This wat made history in 1909 when a central-style *viharn* was incorporated. When Siam was negotiating how much of the country's southern territory would be ceded to Britain, officials cited the *viharn* as proof of the districts of Thai identity. It then successfully kept its borders about 15 km further south than what Britain had demanded.

5. Mosques

Some 13% of Thailand's populace is Muslim. There are some 3,000 mosques in the country with the oldest ones dating to the Ayutthaya period. Yet there is little study of the Thai Islamic architecture. Local characteristics originating in the mosques of Ayutthaya period disappeared largely from the more recently built places, which accommodate Indian Moghul or Middle Eastern styles.

In Bangkok, Thonburi and Ayutthaya, for example, there are a number of important mosques, which were built in eclectic Rattanakosin style, combining Western, Moorish and Southeast Asian forms. Renovation works removed original exteriors from many of these mosques, but Siamese stylistics show on interior elements such as the minbar or pulpit and the mihrab, the decorated niche on the wall facing Mecca. Some of these mosques have long enjoyed royal patronage, a manifestation of centuries-old Thai traditions of religious tolerance and multiculturalism.

Up to 99% of all Thai Muslims are Sunni, and most of them are of ethnic Malay origin. Thailand's non-Malay Muslims are mostly descendants of traders from the Middle East, South Asia and Persia. The Ayutthaya kingdom had an important settlement of Shiites, which was founded in 1595 by the Persian Sheikh Ahmad il Khumi, who became a key advisor to King Song Tham. Dwellers of this community were ancestors of the Bunnag family and other important Thai clans.

Islamic architecture in the south, especially in the four deep southern provinces where Muslims are a majority, is highlighted by timber mosques with Malay characteristics such as hipped roofs. A renowned example is Narathiwat's Masjid Telok Manok, also known as Taloh Manoh Mosque or Wadi Al-Hussein Mosque, built in 1624.

6. Spirit Houses

Animism is as much a Thai religious practice as Buddhism, with its own sacred architecture -- miniature houses, temples and palaces built as shrines (*san*) for guardian spirits of the land (*phra phum*, a Sanskrit-derived term). Before modern times, these shrines were community structures built for communal benefit -- one per village. These days, however, many Thais individually build at least one spirit shrine to guard their houses and buildings. They are also prevalent in a variety of places such as forests, roadsides, rice fields, ponds and caves. By this count, spirit houses probably outnumber any other types of buildings in Thailand.

Called *san phra plum* in Thai, the spirit house is normally installed when a new building is constructed in order to placate the spirit displaced by the project. It must be located further away from the building in order that it stands outside the building's shadow and erected at a time recommended as propitious by a Brahmin priest or astrologer. A ceremony is then held to invite the spirit to move in and become the guardian of the place. The shrine is populated with figurines of humans, elephants and horses, which are to serve the spirit, represented by a small ceramic or plastic statue. Regular offerings of lit candles, incense sticks, flowers, food and drink ensure that the spirit will provide protection, not harming the occupants.

The architectural styles of these shrines vary according to the preferences of the owner, local customs and the type of spirit being venerated. They range from wooden models of the humblest Thai house to plaster temple halls and palace-like structures with multi-tiered roofs. Many offices in Bangkok are often matched with modernist

spirit houses, designed by architects who use materials like cement, stone metal or glass.

The Palace Architecture

In terms of both form and symbolism, Thai architecture's pinnacle is the Grand Palace, which is considered the centre of the Thai nation, the monarchy and the main religion of Buddhism. Its traditional function until the end of the absolute monarchy in 1932 was to act as the seat of government, the king's principal residence and the centre of royal ceremonies.

Its architecture is not just majestic but sacred. The great halls topped with five- or seven-tiered spires are evocations of Mount Meru, the heavenly abode ruled over by the god of Indra, to whose status the king's is thereby likened. Pediments, bases and other elements are decorated with emblems of Garuda, vehicle of Narai, the god believed to be re-incarnated as the king according to the Khmer-derived Hindu concept of the divine monarch or devaraja. The Grand Palace compound also includes a royal temple. It is another custom influenced by the Khmer concept of the monarch, that of the dhammaraja, or moral king, who rules according to the righteous precepts of Buddhism.

When King Rama I commissioned the construction of the Grand Palace in 1782, it simultaneously marked the beginning of the Rattanakosin period and the Chakri dynasty. The king built it in emulation of the Grand Palace of Ayutthaya --Siam's former capital destroyed by the Burmese just 15 years earlier -- aiming to restore the kingdom's morale and governance.

The Grand Palace is the definitive expression of Thai architectural style, combining Thai, Chinese and Western forms and materials. Indeed, it contains almost the only remaining archetypes of the classical Thai royal palace. While Ayutthaya's palaces were ruined, the palaces built in the Sukhothai kingdom were made of wood and had long fallen apart. In addition, most other royal palaces built during the Rattanakosin period were done in Western-style.

The renovations and constructions of new buildings have taken place in the Grand Palace since its establishment. Although it ceased to function as the king's main residence in the early 20th century when King Rama V moved to Dusit Palace, it remains the site of important royal rituals including coronations, funerals and receptions of diplomats.

1.The Palace Compound

King Rama I laid out the Rattanakosin's Grand Palace in a format similar to the vanquished capital in Ayutthaya. It faces the Chao Phraya River for ease of transportation by the royal barge; it contains a royal temple; and it stands within an island formed by the digging of a canal, for better defense. Today, the compound covers some 24 hectares or 152 rai, and is surrounded by fortified walls topped by six

octagonal and three square towers. The walls form an uneven trapezoid with sides ranging from 360 m to 630 m in length, for a circumference of nearly 2 km.

Of the compound's four sections, the most important is the Central Court, containing the royal residences, or *maha monthian*, and the spired throne halls, or *maha prasat*. The Central Court is where the king lived and presided over affairs of state and ceremonies. The heavily walled Inner Court, which includes part of the *maha monthian*, encompassed residences that were strictly reserved for the king's vast royal household, concubines and many attendants, guards and officials, all of them women. Mostly offices fill the Outer Court, formerly including the Royal Treasury and other civil and military branches of government.

Almost all of the classical Thai architecture in the Grand Palace was erected during the first four reigns of the Chakri dynasty. King Rama V added many western buildings as well as the vast Chakri Throne Hall, a Western-style palace topped by three Siamese spires.

a) Spired Throne Halls – Prasat and Maha Prasat

The most impressive structures in the Grand Palace are the six-spired throne halls, which are designed to glorify the king and to host the most majestic ceremonies. These halls are epitomized by Dusit Maha Prasat (Dusit Throne Hall) and Chakri Maha Prasat (Chakri Throne Hall).

Fig.37 Dusit Maha Prasat

Adhering to Ayutthaya tradition, the spired throne hall has a cruciform floor plan and roof. The multi-layered roof is topped by a spire with a multi-tiered base symbolizing Mount Meru. A *prasat* has a five-tiered spire, while a *maha prasat* spire has seven tiers, signifying its higher status. Situated inside each throne hall directly

under the spire is a ceremonial throne, below its own miniature prasat-style wooden canopy or a nine-tiered umbrella.

The spired throne hall shows Siamese ornament at its most lavish form: gilding, glazed ceramic tiles, glass mosaic, and doors and windows decorated with mondop-style surrounds. Bases are decorated with singha figures, a reference to the king's role as a protector of Buddhism, while royal guardian figures on roof pediments and elsewhere include Narai, Garuda and nagas.

As did their Ayutthaya predecessors, each of the Chakri kings through to the Fifth Reign, except King Rama II, built a *prasat* or *maha prasat*. In keeping with his modest tastes, King Rama IV built a small, open pavilion called the Aphornphimok Prasat, used for the rite of changing ceremonial robes before or after royal processions. Despite its modest size, it is regarded as a perfect expression of Thai architectural form and ornament. A replica was built at Bang Pa-In Palace and was on display at the 1985 World Fair in Brussels.

b) Royal Residences – *Maha Monthian*

The royal residence or *maha monthian* is a group of structures centred on three interconnected buildings containing bedchambers and throne halls, all encompassed by a courtyard wall. The ceremonial rooms are decorated with 'star ceilings', crystal chandeliers, murals, inlaid marble floors and gilded walls, columns and beams. Inner chambers, no shown here, are more plainly ornamented.

Fig.38 Maha Monthian

Amarin Winichai Throne Hall is the most ceremonial of the three, with a formal audience hall used for celebrations of the king's birthday, the Thai New Year and other holidays, and receiving foreign ambassadors. The interior houses two important wooden thrones built by King Rama I: the Busabok Mala Throne, shaped like a boat with a spired roof, and the other throne beneath a nine-tiered umbrella.

Chakraphat Phiman Throne Hall is the main building in this group, where kings Rama I, Rama II and Rama III resided. The building contains the central audience hall and, to one side, the royal bedchamber, with a merit-making hall on the other side. By tradition, all the kings since Rama III have spent at least one night in this throne hall upon coronation.

Phaisal Thaksin Throne Hall was used by King Rama I for dining and relaxation. Ever since his reign, the hall has hosted coronation ceremonies. It contains the throne in which the new sovereign is crowned, and an octagonal throne for the rite in which the king receives the people's invitation to rule. Also here is an altar of the guardian divinity of the nation, Phra Sayam.

Most of the buildings and courtyards in the *maha monthian* are not open to the public.

c) Temple of the Emerald Buddha (Wat Phra Kaew)

The royal temple in the Grand Palace is Thailand's most important religious site. It centres on the ordination hall that enshrines the Emerald Buddha -- the Palladium of State, an ancient 66-cm-high jasper Buddha figure named Pha Kaew Morakot. Discovered in 1434 when lightning struck a stucco chedi in Chiang Rai, the statue was later held in Lampang, Chiang Mai, Luang Prabang and Vientiane before King Rama I brought it to Thonburi, and finally, to the newly-established Rattanakosin. This exalted chapel, where only kings are ordained, features exterior walls covered in Chinese ceramic tiles and gold mosaic, and a base decorated with 112 gilded garuda figures.

Among the many structures surrounding the hall are eight ceramic-covered *prangs* standing in a row, each with different colours. Two golden *chedis* flank a cruciform prang-spired hall, the Royal Pantheon. There is also a scripture pavilion in the *mondop* form, a number of monuments in the busabok form, a crown-spired assembly hall, a royal mausoleum, a belfry and other structures.

Among the abundance of Chinese carved stone statues is one of the Mahayana Buddhist bodhisattva Guan Im, revered especially by Chinese worshippers. The largest statues are Siamese, however, done in stucco and ceramic mosaic -- the 12 guardian giants from the Ramakian epic that stand at the entrances of cloisters surrounding the entire temple compound. Inside are 178 panels of mural paintings illustrating the Ramakian epic.

Unlike other wats, there is no resident monk in this royal temple.

Royal Funeral Architecture

The funeral of a Thai king is a profoundly solemn and majestic ceremony spread over many months, culminating in the rites of the cremation day. For this occasion, the passing of a reign, a royal crematorium called *phra merumas* is erected.

Built of wood and ornamented with paper, fabric, dried flowers and carved wood, the crematorium resembles a throne hall with a multi-tiered, spired roof. Inside, it houses a functional crematorium of metal, in which the actual cremation takes place. *Phra merumas* is a temporary structure that will be taken apart after the ceremony and never be used again. Each structure is a unique design built for an individual cremation.

The pavilion is erected in front of the Grand Palace in the Royal Field (sanam luang), also known as the Royal Cremation Ground (thung phra men). Large space is required to accommodate *phra merumas* itself, and other ceremonial pavilions, as well as a long procession and huge throngs of mourners.

In both its name and spired structure, *phra merumas* symbolizes the king's divine status. The cremation represents the monarch's return to the realm of the gods, the sacred Mount Meru, represented by the spire. The momentousness of the rite is underscored by the pavilion's towering height, even when built for other members of the royal family. *Phra merumas* for the funeral of HRH the Princess Mother in 1996 was some 37 m tall, as high as a 10-storey building. *Phra merumas* for the funeral of King Rama II was 80 m tall, with eight secondary towers rising at 40 m. A royal crematorium built during the Ayutthaya period reached 102 m in height.

Temple and Palace Ornament

The final form of Thai architecture, its lavish ornamentation, is the layer that is the most unique to Thailand. Yet most Thai ornamental crafts and motifs were adopted from other cultures. What makes Thai ornament 'Thai' is its eclecticism, stylization and floridness. Wood is not just carved into decorative motifs and figures, but carved and lacquered and gilded and inlaid with glass mosaic. Floral designs are pushed to the edge of pure abstraction, typically rendered in myriad pattern of fine detail.

Ornament represents the last layer in Thai architecture in two different senses. In the construction process itself, it is the last step. And in the historical sense - in the evolution of Thai architecture - the forms that were added most recently were forms of ornament. Most of these forms were imported and adapted for local use during the Ayutthaya and early Rattanakosin periods. They included mother-of-pearl inlay, crockery mosaic and glass mosaic. The origin of many forms of Thai architectural ornament can be traced to China, a legacy of the frequent waves of Chinese influence on Thailand over the past 900 years.

The various types of architectural decoration were included among the ten classic crafts, or chang sip moo, which were practiced among guilds based on apprenticeship and inheritance. These guilds, which relied on royal patronage,

included drawing, engraving, carving, sculpting, lacquering, masonry and other crafts. Practitioners included members of royalty. King Rama II was a skilled woodcarver, as shown in the splendid door panels he helped to craft for Bangkok's Wat Suthat.

The royal guild system ensured a highly standardized style of architectural decoration within central Siam. Yet official parameters left some room for individual flourish. Greater stylistic variations can be seen in the decoration of regional architecture: the rustic murals of the northeast, the sprightly gold-and-red lacquer designs of the north, and the use of fretted wood ornament rather than carved in the south.

1. Motifs

The floridness of Thai architecture comes from a vast array of ornamental motifs-traditional designs and figures expressed in wood carving, plaster relief, lacquer painting, mother-of-pearl inlay, mosaic and other decorative arts.

The most prevalent are Thai motifs, a codified set of designs called *lai thai*, which appear to be stylized versions of natural forms such as flames, leaves and flowers. But at least one art historian, Piriya Krairiksh, suggests that Thai artisans created such patterns as the various flame-shaped *kranok* motifs not from nature but from Chinese designs that flooded into Siam in the form of imported ceramics, screens, textiles and other crafts from the 13th to the 15th centuries, a period of extensive bilateral exchange. From these beginnings, *kranok* motifs attained their on scripture cabinets and temple doors. Many *lai thai* designs adopted Khmer, Chinese or Western motifs.

Other motifs are drawn from important narratives: episodes in the life of Buddha and the Jataka tales, as well as the Thai-Hindu Ramakian epic. Figures of Hindu divinities such as Narai, Garuda and devas proliferate in temple and palace architecture as guardian figures. There are also local guardian figures such as chawet, bearing a sword and book. Thai artisans invented dozens of fantastic creatures to populate the mythical Himalayan forest of Himaphan, or adapted models from Chinese and other foreign sources.

Before *lai thai*, Thais used early Buddhist motifs, which dated back to the iconic (non-figures) period of the religion's first six centuries before the Buddha figure was made. Often used in northern temple decoration, these include beautiful symbols such as the dhammachakra wheel, the Buddha footprint, the Bodhi tree, the phurnaghata ever-flowering pot, chatra parasols and the sacred goose, Hamsa.

2. Carved Wood

As the most traditional and important form of ornament in temple and palace architecture, carved wood is used to embellish roof finials, bargeboards, pediments, eave brackets, windows and doors. Interiors feature carved wood decoration on ceilings as well as free-standing elements such as pulpits, altars and statuary. Thai royal regalia are mostly objects of carved wood: thrones, ceremonial barges, carriages

and palanquins as well as funeral pavilions and urns. Wood relief is often the foundation on which other decorations are applied: gilding, lacquer, glass mosaic, cinnabar and paint.

Fig.39 Carved Wood

The Ayutthaya period was probably the peak of this art form, as suggested by some antique examples of carved wood that survived the ravages of termites, rot, fire and Burmese invasion. Carved wood design remained on a high level into the early Rattanakosin era. Although Sukhothai-period architecture calls to mind ruins of stone, brick and plaster, there is on doubt that wood decoration was important then too. All that survive, however, are a few carved ceiling ornaments.

Woodcarvers each specialized in different forms of roof finials and ornaments such as cho fa and bai raka; Buddha images and barge prows; seals and emblems; and pattern work on doors and windows.

Before wood was carved, the figure was outlined by a pattern designer. The image was drawn on paper that was then perforated along the perimeter. By shaking a porous sack of chalk dust or charcoal ash over the stencil, the outline was traced onto the wood, which was then carved with any of dozens of types of metal tools.

Northern carved wood decoration is notable for its fluidity and use of animal imagery, while a more formal, stylized mode is seen in central architecture. Wooden fretwork, which is pierced rather than carved, characterizes ornament in the south.

3. Lacquer Painting

Lacquer, overlaid with gold leaf designs, is a striking architectural decoration: regally refined in the central region and rustically expressive in the north. In central architecture, royal craftsmen applied gold leaf on black lacquer to decorate the surfaces of door panels and windows. The same craft was used on decorative screens and the trapezoidal wooden cabinets used for storing Buddhist manuscripts. Classic lacquer designs of the Ayutthaya period depict animals cavorting in the celestial forests of Himaphan. By the early Rattanakosin period, the paintings had become as elaborate as murals and even more refined, usually showing scenes from the Ramakian epic and Buddhist tales. Chinese-style imagery often appeared.

Although lacquer is obtained from the sap of the sumac tree (Anacardiaceae), native to northern Thailand and neighbouring Burma, the technique of lacquer probably come to Siam from China.

The painstaking central Thai style of the craft, called *lai rot nam*, or ‘washed lacquer’, starts with four layers of black lacquer applied on a wooden surface such as a door panel, each layer polished with charcoal. The design is drawn on paper, which is then marked with fine perforations and placed on the lacquered surface. Ash or chalk dust is pressed through the holes to transfer the image outlines onto the lacquered panel. Areas to appear in black are brushed with water soluble paint, and gold leaf is then applied to the entire surface. The paint is moistened with water and peeled off to reveal the lacquer background, with foreground figures glittering in gold.

Northern Thai artisans, on the other hand, relied on simple stencils to transfer gold leaf designs onto surfaces that were first painted in red lacquer. They created beautifully expressive graphics of the Buddha, Bodhi trees, pumaghata ever-flowering pots and other imagery.

4. Mother-of-Pearl Inlay

Mother-of-pearl inlay (*khruang muk*) is an architectural decoration borrowed from China, but brought to lyrical refinement in Siamese hands during the late Ayutthaya and early Rattanakosin periods. Often used to cover temple door panels and frames, the Thai craft sets a luminescent rose-and-green shell called *muk fai*, or ‘shell of fire’, in a black-lacquer setting.

The technique and materials used in Thai inlay differ from the Chinese. The Chinese design is carved onto wood and the area is filled in with a shell cut to the same shape. The Thai version instead applied *muk fai* to a flat surface. The shell had to be sanded into slices just 1 mm thin, then cut to the design and glued to the wood. Gaps in the design were filled in with seven layers of lacquer, each taking a week to dry. The finished surface was then sanded and polished. Whereas Chinese mother-of-pearl was made from bivalve shell, the Siamese used a snail-shaped Turban mollusk found in the Gulf of Thailand, a harder material with a more delicate opalescence.

Among Bangkok's most celebrated mother-of-pearl designs are the door panels at Wat Pho, Wat Benchamabophit and Wat Phra Kaew, and the feet of the reclining Buddha at Wat Pho. Mother-of-pearl inlay was also used in crafting royal trays, betel-nut boxes, furniture and other luxury items.

5. Glass Mosaic

Temple and palace buildings get their sparkle from colourful mosaic of glass tiles that collect and amplify whatever light is available – the last rays of dusk, the glow of candles at an altar. In use since the Ayutthaya period, this ornament is believed to be of Indian origin. The squares are about 2 cm by 2 cm, with a reflective backing, and come in characteristically Thai colours that are bright and pure: gold, silver, red, blue, green, yellow and pink. The earliest types were made of very thin glass with a tin plating.

Glass mosaic can be used to cover the entire surface of elements such as roof finials, columns, pediments and courtyard statuary, or can be embedded in the grooves of carved wood as well as stucco reliefs. The tiles are glued in place with lacquer resin combined with banana leaf ash. Alternatively, an adhesive mixture of rubber oil, pitch and lime can be applied. By tradition, glass mosaic is not used in residential or commercial architecture.

6. Crockery Mosaic

Mosaic of glazed ceramic has been used as decoration in central Thai architecture since the late Ayutthaya period, and became especially popular during the reign of King Rama III. This form of ornament may have been borrowed from Persian or Arabic art, since Ayutthaya had many merchants and even government ministers of Middle Eastern origin.

Thai mosaic features porcelain and stoneware ceramics imported from China -- usually fragments of dishes and vases that had broken during shipment. During the third reign of the Rattanakosin era, however, mosaics began to feature fine intact ceramics, often Chinese-made elements, which were designed, kilned and exported specifically for Thai architectural use. The ceramic pieces were chiseled into the right size and shaped and set into wet stucco -- usually in floral designs -- on pediments, columns, bases, door and window surrounds, gates, *chedis* and *prangs*.

7. Plaster, Stucco and Cement

Plaster, shaped into ornamental mouldings and motifs, is the icing on the cake of many Thai buildings. It sometimes even contains cane sugar, an ingredient that gives traditional Thai plaster work its brilliant whiteness.

Thai artisans probably turned to plaster because they wanted to achieve the kind of facade details perfected in Khmer architecture, but unlike their predecessors in Angkor they lacked ample supplies of fine rock such as sandstone for carving. As a result, plaster relief was used instead to decorate various elements, including pediments and the frames of doors and windows. Plaster also helped to strengthen the underlying brick and laterite that were the building blocks of bases, walls and columns. Large statuary, such as the monumental Buddha images in Sukhothai and Ayutthaya, were often built of brick and covered with plaster.

Plaster ornament was sculpted by hand, or else formed in a mould. Thais made plaster by crushing limestone or shells, heating this material in a kiln, and mixing it with sand, oil from long tung wood and sugar cane juice, sometimes using plain fibres such as rice straw or reeds as a binder.

Plaster relief often replaced wood decoration during the reign of King Rama III, the better to render the crockery mosaic decoration, which was then in vogue. In the 20th century, the scarcity and high cost of quality wood led to the wider use of stucco and cement relief. Reinforced concrete construction, a Western technique, was introduced in the 19th century.

8. Ceramic Tiles

The colour of temple and palace roofs comes from ceramics-glazed earthenware tiles in orange, yellow, blue, green and red. Terra cotta tiles have been used since the Sukhothai period. During the Rattanakosin period in the reign of King Rama III, coloured glazes were added, borrowing from Chinese practice. Ceramics have also been used in floor tiles, roof finials and other elements.

Besides earthenware tiles, which are fired at low temperatures, the Siamese also made high-fired stoneware ceramics in the hundreds of kilns of Sukhothai and its satellite kingdom of Sri Satchanalai (or Sawankhalok) by the 13th century. Ceramacists from China are known to have come to Sukhothai, but some experts have suggested that stoneware production was developed independently in Thailand as early as the 10th century. By the 14th century, Sukhothai trailed only China as the world's largest exporter of stoneware plates. Also produced were architectural components for local use, including such roof finials as naga figures, done in a white glaze or white with a black underglaze.

Chinese glazed ceramic elements, such as ventilation grilles, have been used widely since the mid-19th century or earlier in temple and palace courtyard walls. Roof tiles with Chinese contours supplemented the variety of traditional Thai tile shapes, including squares, diamonds, 'fish scales' and others.

Porcelain, a glass-like ceramic fired at very high temperatures from fine clay, was never made in Thailand. However, some imported Chinese porcelain was used in crockery mosaic.

European influence brought tiles of Terrazzo into use in the 19th century, especially for floors and courtyard pavements in temples and palaces. These durable tiles were produced using cement, sand and crushed marble or other stones. They came into wider residential and commercial use in the 20th century, when mineral pigments were often added to give them brighter colours and enhance decorative patterns.

9. Colour

The use of colours in traditional Thai architecture is almost exclusive to religious and royal buildings. While unpainted wood houses blend into the landscape, temples glitter with colours. Whitewashed plaster walls set off a rainbow of hues on roofs, columns and pediments, all created by the use of gilding, mosaic, ceramics and paints.

Intermediate colours tend not to be used. Thai colour usually comes in seven pure, gem-like hues representing the days of the week: red for Sunday, yellow for Monday, pink for Tuesday, green for Wednesday, orange for Thursday, sky-blue for Friday and violet for Saturday. Glass mosaics in temples and palaces sometimes use all seven colours. (A house owner may paint the spirit house on his property in the colour corresponding to his own birthday.)

The largest field to colour on the temple's exterior is often the roof covering of glazed ceramic tiles, typically laid in a two-tone pattern with a large rectangular area in the centre, surrounded by a border in a contrasting colour. The most common pairings are navy blue bordered by orange, or green amid yellow. This design gives the roof's large plane a lighter and more dynamic configuration.

Interiors are filled with colours in decorative trim. Red is extensively used on ceilings, and often on columns and beams. Gold, associated with good fortune, appears in gold leaf or golden paint, which is especially distinctive when contrasted with black lacquer or cinnabar.

Traditional paint got its colour from such natural materials as ground red stone, wood oil for yellow, copper stain for green, seashell for white and soof for black. The use of colour intensified in the 19th century as growing trade brought foreign supplies of mineral pigments and other paint ingredients to Siam.

10. Stone and Bricks

Brick is the chief building material in temple and palace architecture – the backbone of walls, columns and bases. The Ayutthaya kingdom, with its large temple compounds centred on brick *chedis* and *prangs*, was the peak of Siamese brick construction, but the material has been used in Thailand since the Dvaravati era (6th –

11th century). The sizes of Thai brick have varied somewhat over the centuries, but mostly followed basic Roman Brick proportions. In Ayutthaya period, these bricks measured about 5 cm by 15cm by 30cm. They were usually covered with plaster sculpted into mouldings or decorative motifs.

The earliest bricks were made from rich clay dredged from rivers and mixed with rice husks and water. The materials were trampled on by foot for a few hours and poured into wooden moulds and left there for about seven hours until dry. They were removed and sun-dried on the ground for a few days, then baked in an open fire for a full day and night. Later, kilns were used; bricks were baked for about two weeks in a low-temperature fire fuelled by rice husks.

Stone has played a rather limited role in Thai architecture, its use being structural rather than decorative in most cases. The stone available for use in the Sukhothai- and Ayutthaya-period architecture was mainly laterite, a clay-like reddish soil formed from decomposed rock, which can be excavated and carved into blocks that harden when exposed to air. These blocks were used for foundations, bases, columns and walls, but were too crumbly to be finely carved. Decoration had to be applied using stucco.

Stone has long been used for elements such as boundary markers and statuary. Engraved slate panels once decorated Sukhothai temples. Booming trade during the 19th century brought Chinese granite and European marble to Thailand for use as courtyard pavement stones, columns, based and decorative coverings.

Characteristics of Thai architecture: residence category

Since a number of Thai modern buildings like houses, offices, hotels and resorts have been developed from traditional structures, using modern construction materials and techniques, this part of study will focus on theories concerning traditional characteristics of Thai architecture. It seeks to review past research and studies that explain the development of modern Thai architecture.

Concrete concept in Thai architecture

1. The grouping of buildings

Houses, offices, hotels and resorts can be of small- or large-scale. It is important to do the grouping as these buildings have standard utility areas known as "front of the house, back of the house" with rooms. Each section of the buildings' utility area is connected by long walkways. The grouping can be made as follows:

a) Detached buildings with open-air walkways

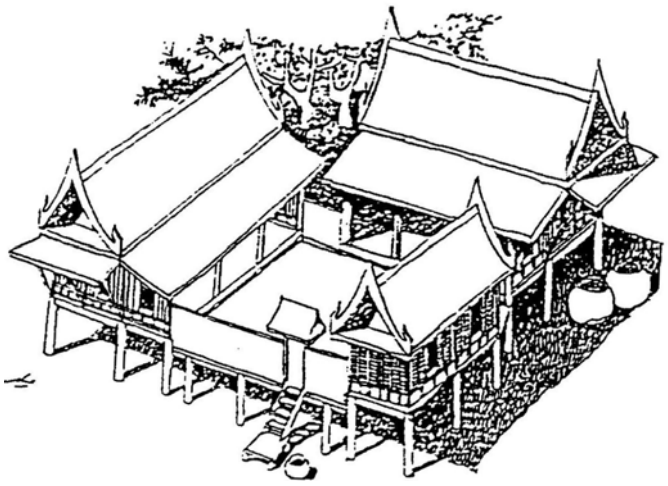


Fig.40 Detached buildings with open-air walkways

This type of detached buildings with open-air walkways conforms with traditional landscape. It was walkways that led to the house in the same villages or villages on the hills.

b) Walkways with roof

Roofed walkways provide protection from rain and sunlight. They can be seen at temples and palaces. MR Naengnoi Saksri (2537:140) defines *muk krasan* as a part of a building that connects with another. It serves as a walkway. The name is for the structure in the palace.

c) Connecting with terrace (*chaan*)

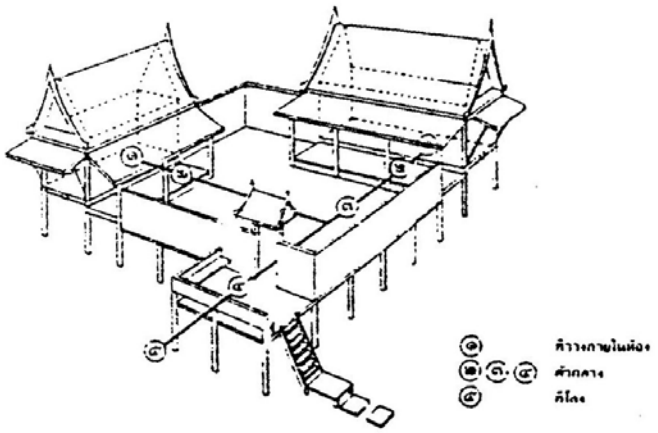


Fig.41 terrace is normally connected with a verandah

Terrace is a unique part in the grouping of buildings in traditional Thai architecture. Generally, terrace takes up about 40% of the whole area. Such vast space is necessary for houses in hot climate as it secures maximum ventilation. A place where family

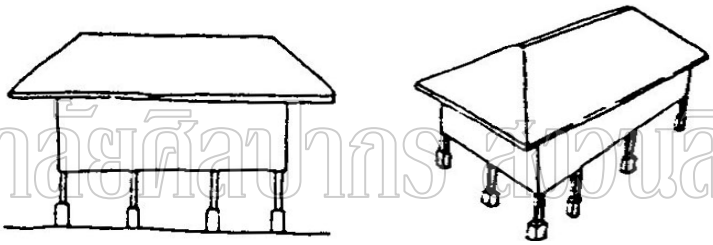
members gather for evening activities, terrace is normally connected with a verandah (rabiang or palai) and an interior area of the house.

The utility of terrace is as follows:

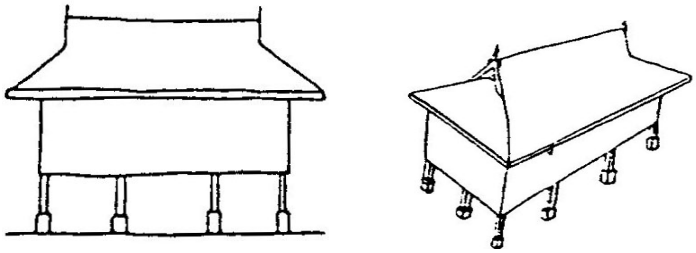
- It connects parts of the house.
- It serves as a recreational area like a verandah. Normally, it is a place for some religious events such as tonsure, merit making and wedding because it is the main reception area of the house that can receive a number of guests.
- Cluster of houses or monk's living quarters. Some house owners grow perennial shady plants like jampee (Michelia Longifolia), jackfruit, and mango trees, while others grow smaller decorative pot plants. Pet birds like dove, sarika and duwao are also common in many Thai houses.

2. Primary Elements

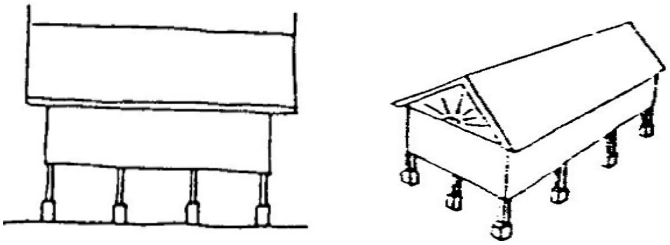
a) Roof form



western Panya hipped roof



Manila-style triangular gabled roof



double gabled roofs

Roof, with distinctive characteristics, is the most unique part of Thai architecture. It protects the structure from the sun and rain. There are numerous

roofing materials including earthenware tiles, teak wood chip, dried nipa palm leaves and dried grasses like vetiver.

- langkha song chua (double gabled roofs). It is also known in Thai as Manila style roof that places two separate gable roofs on top of the house.
- langkha song chua peek nok (double gabled roofs with bird wing-like extended part). The extended part from the roof provides better protection to the structure. Nor Na Paknam (2522: 246) pointed out that the extended concave part commonly seen at ubosot, viharn, or house helped prevent the rain from getting into the window or ventilation channel.
- langkha song chua manila (Manila-style triangular gabled roof). Known as blanor, this form of roof is influenced by Indonesian architecture and popular in the south of Thailand. The word "Blanor" is the term Muslim Thais used to refer to Dutch people. Some studies said the roof was of hipped panya type with added chua to better protect the structure, particularly both ends of the roof, from the rain. The blanor roof is a combination between Thai chua (gable) roof and western panya hipped roof. Muslim Thais call this combined architectural style "'portong blanor", which is shortened for blanor. Houses with this style of roof are also popular among Buddhist Thais, especially those living in the lower south. Therefore, gable, hipped and blanor roofs (very popular) are the main forms of roof in this region. However, roof details may vary, like the roof called takatan (grasshopper), depending on the creativity of constructors.
- langkha song chua manila with extended eaves. While this type of the roof can be found in any area, it is mostly found in the southern region. The construction of this roof is to suit the region's wet season, which lasts longer than other regions. Therefore, the added eaves are the unique characteristic of houses in this region.
- langkha song chua with double-deck eaves and kawsong. This is the type of roof for large building in Xishuangbanna in the south of China, which is called "khum Xishuangbanna." It serves as the residence of the Xishuangbanna ruler. In "Art Dictionary," Nor Na Paknam defined khum as "a house, mansion or residence of royal rulers in the north. A study of Tai architecture by Onsiri Panond (2539:39) refers to "tua haw chao muang," which means a small, wooden structure in Tai style built in the form of the shrine with gable roof, double kaw song and sam tab.

A study of Wanida Puengsunthorn (2533:29) indicates that houses of ethnic Tai Lue have a distinctive roof and an architectural form that differs in each city. They include:

- A house with straight, upright walls, or ruen faa trong, with one-layered roof. This style of house can be found in Ban Thin, Muang Chiang Lan and downtown Chiang Rung in the south of China.

- A house with straight, upright walls with double-layered roof. The raised part, or "kaw song," allows the house to have maximum ventilation and light. It also serves as an open duct for the house owner to look through around the house while the lower layer is very low, covering the upper part of the walls. This form of architecture is popular in Xishuangbanna including Jiangpom Village, Kwangluang Village, and Luantian Village.
- A house with walls leaning outward, ruen faa pai awk, with one-layered roof. This type of house is similar to the Lanna style house in the northern parts of Thailand, including Sonmon Village in Muang Hum.

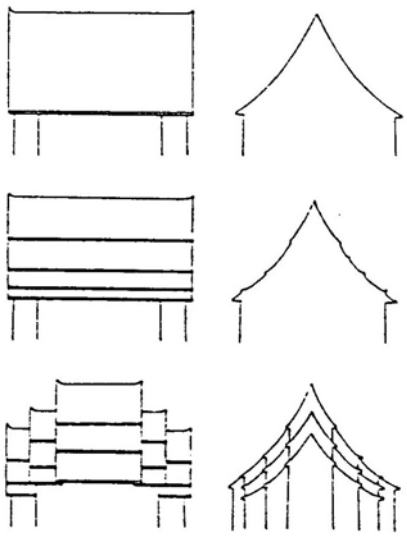
The double-layered kaw song roof is the unique style of Xishuangbanna house with an aim to maximise ventilation and light. Ruethai Chongchairak (2539:183), who studies Thai-style houses, points out that kaw song is the upper part on the wall. It is located about 1 sawk or 50 cm lower than the pillar's top or beam. It features square chong luk faks around the house.

In the Art Dictionary, Nor Na Paknam (2522:61) explains that kaw song is a wide and long wooden plank that is placed in the area connecting the roof layers. The preaching hall (sala kan parian) of some temples has murals, depicting jataka (the Lord Buddha's story) on kaw song.

- Chaturamuk-styled roof

Nor Na Paknam defines "chaturamuk" in Art Dictionary as a cross-shaped, four-gable top pavilion. Prasat Chaturamuk is a building with four "muks" or terraces.

B: Roof characteristics



The roof that has added or dented layers can be found mostly in religious buildings such as temple, bot, and viharn. This is a technique applied by craftsmen to create the sense of lightness and to reduce bulky look of the roof.

Chote Kalayanamit (2539:59) says the use of multi-tiered roof can create the lightness for large buildings. Without multi tiers, such large structure will look bulky and heavy.

The space between each layer is different. The roof tiers are closer to each other at the lower part of the roof and become wider and wider at the upper part toward the top. Apart from that, the end of the roof that rises toward the sky also creates the light feeling.

C: The extended part of the roof

- Fully extended part

Such feature, which is found in traditional architecture, is suitable for buildings during the wet season. Nukul Chompoonit (2530:81) says the fully extended part of the roof is a unique architectural style of the country in tropical climate.

- Slightly extended part

Slightly extended roof can be found mostly in religious buildings like bot and viharn in the Sukhothai period. With such feature, extra pillars or kun tuay or tuay hoo chang like that of the Lanna-style architecture is not necessary. Some temples in the early Ayutthaya period also shared this feature.

D: Roof materials

- Earthenware ceramic tiles

Ruethai Chaichongrak (2539:183) who studies houses in the central plains says earthenware ceramic tiles, made from baked mud, vary in designs and sizes. They are named after their features like *krabueng hangmon* (tiles with curved end), *krabueng hangtad* (tiles with sharply-cut end) and *krabueng khaw* (tiles with bended form). With male and female gender, most are measured 0.05-0.08 cm wide. Materials for the tiles are plentiful across the country.

Earthenware tiles called *mung dinkhaw* in northern dialect were used in the Ayutthaya period.

- Teak shingles or paen kled mai sak

Shingles or *paen kled* for roof is the main feature of houses in the north of Thailand.

Ruen kalae, a twin or a group of buildings attached together, is built from teak wood. It has high gable roofs with large eaves levelled with the windows. The roof tiles can be made either of earthenware or wood chips. Built on posts, the open space beneath the house is so tall that people can walk through the house without bending their backs. The house has one large hall-like room. It can be said that the use of earthenware or wood chip tiles is the characteristic that reflects Thainess.

E. Roof colour

The tile colours can come from the original colours of the material or their enamel. There are some typical tile colours as follows:

Red. It is a colour of earthenware that is made from red-colour mud. It can be found in traditional visual arts. The name is derived the materials like *see din daeng* or colour of red mud.

Brown. It is the colour of the roof of such structures like bot, viharn and sala karn parian. In Ayutthaya period, the roof had gender, male and female called *krabueng kabu*. Initially, the roof tiles were not enamelled until the reign of Phra Phetraja during the construction of Wat Borom Buddharam, with Muen Chandra doing the enamel work. Other temples with enamel tiles are Wat Dusit near Wat Raerai in Ayutthaya.

Green. It is the colour from the earthenware enamel.

F: Slope of roof

Some traditional Thai buildings have steep roofs of more than 45 degrees. The steep slope is said to be homegrown among local Thai artisans. The height takes about 4/5 of the pediment's base and the angle is between 45 and 60 degrees. Buildings with slight slope (less than 45 degrees) are influenced by Western architecture, which was developed from Greek and Roman. This roof style is called song chua baen or flat triangle pediment. The height of the roof is 1/4 of the pediment's base. This form of pediment can be seen from the famous Greek Pathenon.

G: High pillars or stilts

Regular rain-induced floods during the wet season and surging seawater in November and December make it necessary for people in the central plains to live on high stilts. Such feature is common for Thai houses.

- Round-shaped pillars

Reuthai Chaichongrak (2539:167) says the house pillars are made of large timber that comes in a long, round shape since timber was abundant in the past.

- Redented rectangular pillar

This spectacular form of pillars is developed from a type of chedi known as chedi liam yaw moommai in which smaller angles are made evenly at every main angle, giving a curved look. It is a distinctive characteristic of Thai architecture.

Chote Kalayanamit (2539:47) said such chedi, whether they are of 12 or 20 angles, would have its top decorated with bua thai motif. Its base comprises 3-layered chudansingha.

Nor Na Paknam (2522: 446) explained in Art Dictionary that the *sao yaw* moom means rectangular pillars with redented angles.

H: Open space that connects the exterior

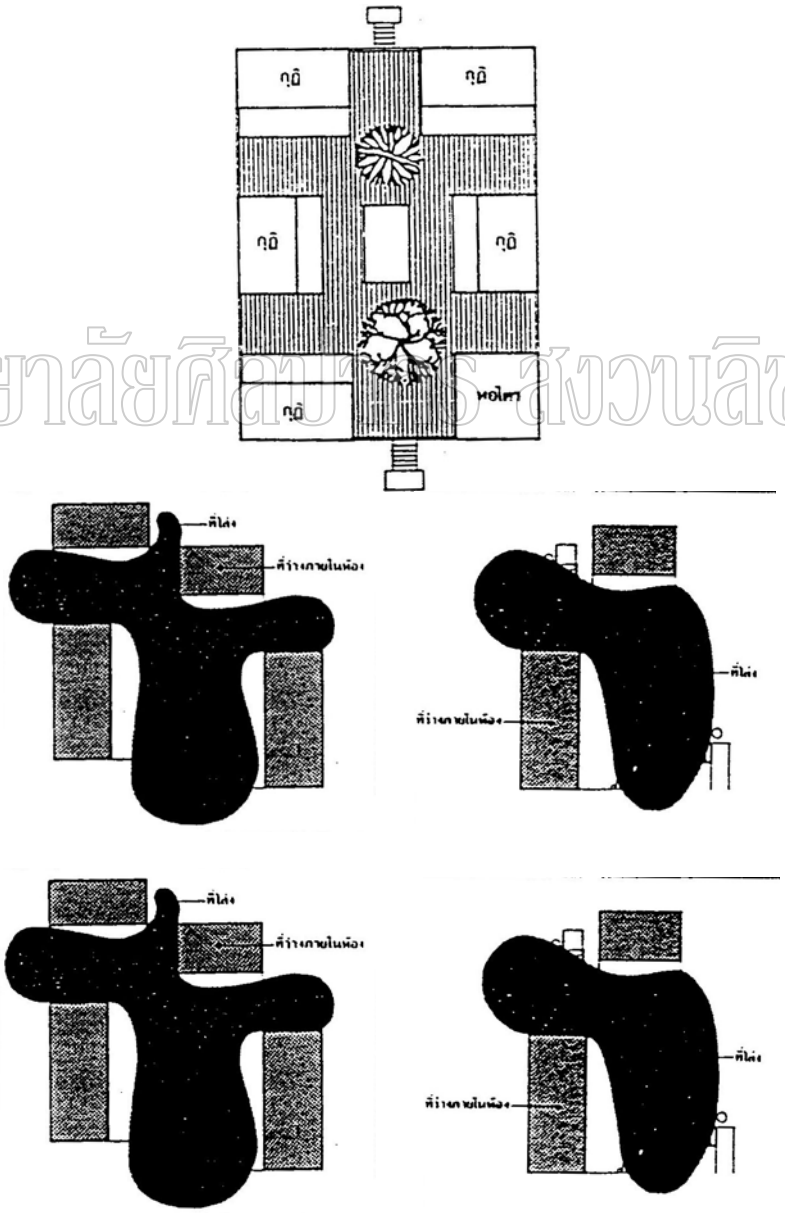


Fig.42 Open space that connects the exterior

The open deck like terrace, verandah (palai) and court connects the exterior of the building, creating a visual flow of the house. It is another characteristic of Thai architecture.

- chaan

Chaan or thi nawk chaan (terrace) is an open air elevated platform that links parts of buildings together. Nij Hincheeranan (2539:117) said *chaan* is an area that receives sunlight and moonlight. Since the ground of the house is normally damp or inundated, *chaan* becomes the family's main living area. Another important function of *chaan* is to connect surrounding buildings including the ones that are built to accommodate extended families.

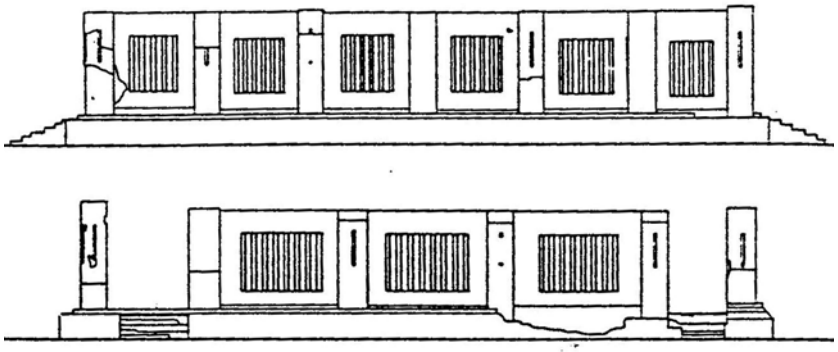
Chote Kalayanamit (2539:120) says this part of the house is necessary for Thai families because their houses normally have no fence and the ground is regularly flooded. The utility space provided by *chaan* during floods is even more practical for households who live near canals and riverbanks. It enables dwellers to sun-dry their things. Some house owners convert this area into a garden with a variety of decorative plants.

Chaan has a similar meaning to *chaan laen*. It is *chaan* that past cluster of buildings. Some *chaan* is so large that it extends to *ho klang*, a medium-seized multi purpose hall. Other *chaans* are decorated with pot plants like those at *kuti* (monks's residence). Moreover, some house owners allow a big tree to grow through the *chaan*, providing shade over the area like a Chinese court. (Nor Na Paknam, 2522:100)

- Verandah (rabiang/palai)

Nij Hincheeranan (2539:117) says verandah is a place where family members spend at leisure time. A sheltered area with natural light, it can also be used as a reception area in case there is no *ho kwang* in the house. Nor Na Paknam (2522:288) explains that *palai* is an extended part of the eaves supported by pillars. The area underneath is like a hall with no walls.

3.3.1.3 **Secondary Elements**



a) Walls or panang

In Thai architecture dictionary, Chote Kalayanamit (2539:183) defines *panang* as a partition that separates the interior from the exterior or divides the buildings. It can be made of stone or brick. MR Naengnoi Saksri (2534:137) observes that the wooden walls of the houses that belonged to middle-class owners in the reign of King Rama VI had the planks placed horizontally.

b) Windows and air vents

- Ban krathung

It is a type of glass window that is well conserved and still used in present days.

- Ban perd

The origin of *ban perd* window remains unclear but some believe that it was developed by Khmer artisans since the neighbouring kingdom had used *chang banchorn* (window makers) long before Thailand. The pattern and size of the window depends on the climate in each region. Windows of the houses in central region feature double casement windows that swing inward to open. In the south, the house's windows are almost as tall as doors, springing up from the floor and containing two panels.

- Ban Fiam

This form consists of a series of folded window panels used to divide the rooms. Most of them are made of teak wood. MR Naengnoi Saksri (2537:137) gives a definition of *ban fiam* as an adjustable wooden wall comprising many partitions that can be folded together.

C: Size and location of open-air vents

Steep, fixed glass or vents are small, each equal to the width of a brick, and vertically placed higher on the wall. This can be seen from windows and ducts in Christian churches and ancient *viharn*. The air vents serve as windows in classic Thai architecture. This style was popular during the Sukhothai, U-thong, and early Ayutthaya periods.

In Sukhothai, the walls in *viharn* buildings were holed to make a series of narrow vertical, rectangular windows. The light that shines through these windows makes the room look subtle. Compared to large windows, small narrow windows like this help add the feeling that the walls are intact.

D) Verandah grills

Verandah grills are called *luk tang in* due to their vertically placed position. It is a part of verandahs or stairs known as *Bang Khan*.

E) Floor motifs

The motif of the floor resembles a jagged angle on rectangular-shaped pillars like the12- or 20-angled pillars.

F) Floor materials

Terra cotta floor tile is called *krabueng na wua*. MR Naengnoi Saksri (2537:129) defines it as a large square-shaped floor tile, made of terra cotta.

Plank floors are commonly found in classic Thai wooden houses since timber was then still plentiful. Somjai Nimlek (2531:112) said there were two types of floor planks; the longer timber and the shorter timber. Old houses are mostly floored with the longer timber thanks to the abundance of wood.

3.3.1.4 **Miscellaneous Elements**

A) Kalae

Kalae is a decorative part commonly found in traditional Lanna style houses. Chaliew Piyachon (2538:62-66) says *kalae* house is the evolution of Lanna people.

It is V – or X-shaped wooden decoration extending from the gable end peaks (*panlom)*, thought to represent the horns of water buffalo. It is about 70-100 cm in length, with 2-3 inch breadth and 15-20 cm width.

Wiwat Temiyaphand (2539:55) says *kalae* is a type of *panlom* wood with the ends appearing in V-form. They come in delicate, subtle forms. Sirichai Naruemitrekakarn (2539:45) does not, however, consider *kalae* a distinctive characteristic of northern Thai houses.

Kalae can be divided into two main features as follows:

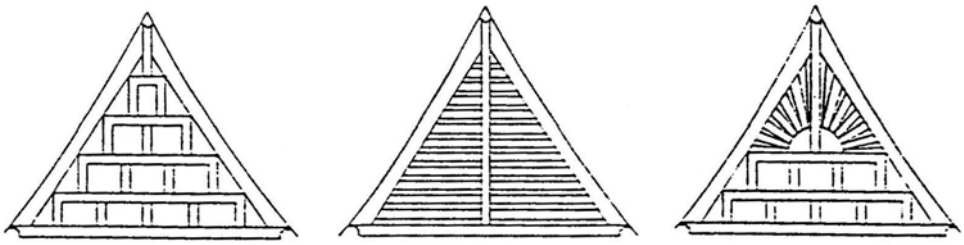
Pattern

- Straight pattern, which is a part of *panlom,* is the most popular type. The straight shape *kalae* has no curves, leading the eyes to the high roof.
- Curved, buffalo horn-like *kalae*. Like the straight type, this style of *kalae* is a part of *panlom*.
- X-shaped *kalae*. It is shorter than the first two types. The upper part is carved in the form of two naga heads facing each other. The lower end is finely crafted. This X-shaped *kalae* is normally attached to *panlom*.

Carved motifs

There are three styles of motif for *kalae*: namely *kanok sam tua* (three kanok), *thao mai* (vine) and *mek lai* (floating clouds).

B) Chua motif



Chua is a triangular-shaped pediment made of wood with the objective to protect the building from wind, sun and rain. There are several kinds of *chua* including:

- Chau luk fak
- Chua bai prue
- Chua roop phra arthit

C) Brackets or posts

Tropical climate requires Thai houses to have lower eaves for weather protection. The extended eaves need support from brackets or posts called *sao nang riang*, which are placed on the sides. Brackets for monks' kuti or viharn are called *khan thuai*.

3.3.1.5 Landscaping

A: The relations between water and buildings

Thai livelihood has depended on the water. Many families earn a living through fisheries and farming. In general, people build their houses near the canals and rivers.

- Settlement by the canals and rivers

Used in agriculture and transport, water has been a major part of the livelihood of Thai people for centuries. In the past, people tended to settle down near canals or rivers.

Santi Chansaeng, a leading Thai architect at Sarin, said in an interview on 14 May, 1996:

"We have to look back that we initially lived in an agrarian society, with people living a simple life. They settled down near the water, a major factor for farming. Their houses were close to the water and they had to raise the platform from the water. When the water receded, people were able to make use of the vast space underneath the cabins."

This shows that water has always been a part of people's livelihood. When deciding on the location of their settlement, people gave little consideration to the wind. They paid more attention to the water, whether the site was near a canal or a river.

Khaisaeng Sukhawattana (2535:135) said riverside settlement is now scarce. He said, “We turn to roads and forget about canals. When we take a boat in a city canal, we have to face with visual pollution."

He also noted that there are three types of riverine architecture including:

1. The settlement of ordinary people was mostly adjacent to the water because it was a very important channel of transportation. Besides, they had access to the water supply all year round. Living by the water was considered an advantage. Those who lived inland had to dig up a canal that connected with the river.
2. Temples, particular the major ones, were built facing the water. The best location for temples was the land on the bank of the canal or the river. When people donated land to the temple, they tended to choose the one near the waterways.
3. Palaces were always situated near the river because the land that was far away from it was considered inappropriate. Such practice came into place since the Ayutthaya period.

- High stilts in the water

High stilt are a distinctive element of traditional Thai house. Such design was a response to seasonal floods that normally inundated the areas for a month or more. Now a number of modern architects adopt such characteristics into their works with an aim to embrace Thainess.

- Lotus pond

Many architects and home owners nowadays still prefer to install a lotus pond in the compound as an interior or exterior decoration. It is a tradition that has been passed down for generations. A lotus is a significant part of offerings to Buddha images, apart from candles and incense sticks. Nit Hinchiranan (2537:75) says a lotus pond is a distinctive feature of houses in the central region. "People put decorative and fragrant plants on the terrace of their houses because it is hard to tend the garden during the floods. Some people decorate their lotus pond with mountain rocks, or angbua khao mo, and some ivies."

Reuthai Chaichongrak (2539:33) mentions the decorative lotus in his article: A corner on a terrace may have decorative plants like various leafy plants like bon and koson, waan, or lucky plants, as well as a vat of lotus, for example."

MR Naengnoi Saksri (2537:143) refers to *angkaew* as a man-made pond that stores water for distribution to palaces and royal temples. Sometimes, various kinds of fish are bred in the pond that also contain decorative lotus.

B: Sala or pavilion

There are several Thai names for different types of pavilions, depending on their utility and location. A pavilion sited a short distance from the main residence or located on the banks of canals or rivers is called *sala* while the one on a house's terrace is called *ho nang*. A pavilion in palaces is known as *Phra thi nang*, *timkot*, and *keng*. For example, the pavilion in the Bang Pa-in Palace is named *Phra Thi Nang Aisawan Thippaya-asna*.

Thai pavilion refers to a free-standing roofed structure. It can be used as a resting point for travellers. Another type of *sala* is called *salawat* or *salarai,* which is a row of pavilions mainly built in the temples for relaxation and pleasure.

C: Walkways connecting buildings

- Bridge without roof cover

Bridges without roof cover are built along the canals or rivers and connected with riverine traditional shop houses.

Khaisaeng Sukhawattana (2535:135) defines the architecture as a walkway bridge over a *klong* or canal. Historical record indicated that there were three types of bridges in the Ayutthaya period. Each has unique architectural style and different hierarchical orders.

1. Wooden bridge that can take certain weights.
2. Cement bridge
3. Brick bridge - the strongest type - was reserved for royal processions that involved horses and elephants. It is also located in the areas occupied by foreign diplomats and traders.

D: Building and trees

Wiwat Temiyapan (2539:46) says the settlement of Lanna people in the north of Thailand reflected harmonious coexistence between man and nature. House, front ground, backyard, garden and the environment altogether blend into cultural ecology.

- Trees on open ground

In the central region, the types of trees planted on the ground are similar to those grown on a terrace in clustered houses. As it is said: "There are big trees planted in the middle of a terrace of clustered houses or some kuti. The plants bring the buildings closer to nature and provide shade to the terrace. Popular trees include jampi, jackfruit and mango. Others may have decorative plants like bonsai and some leafy plants.These trees are also visible in monks' quarters.

Architect Julathat Kittibut adopted the concept in developing the Royal Gardens Resort in Hua Hin. He made some adjustments, replacing a terrace with an open ground and planted a number of trees. The architect, who is managing director of Chiang Mai Architect Collaborative, said in an interview on 7 June 1996: "The change from a terrace to an open ground makes it more suitable for the place like a resort that receives foreign guests. Most guests like to gather in the lobby or at the beach for sun bathing".

- Trees sited close to the buildings

Trees planted near the building will serve as a heat insulator and, sometimes, may provide shade and protect the house against the rain and wind. This is also a common characteristic of Thai architecture. In general, Thai houses are surrounded by various kinds of perennial trees that provide weather protection. Some are planted right in the centre of the terrace, keeping the temperature in the house down.

3.3.2 Abstract characteristics

3.3.2.1 Impression from characteristic Thai features

A: Lightness and Buoyancy

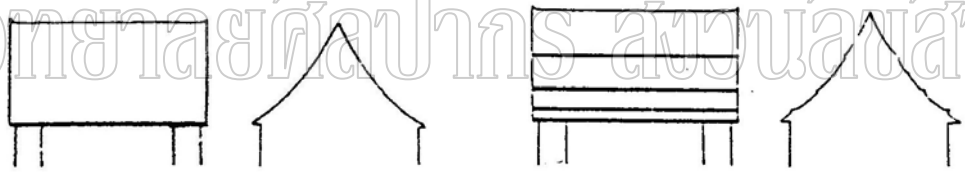


Fig.43 Lightness and floating through roof forms

- Breaking down the roof structure

Artisans successfully break down the roof structure, particular of religious buildings like *bot* and *viharn*, in order to create the feeling of lightness and floating and decrease the building's bulky appearance. Nij Hincheeranand (2537:38) said: "Breaking down the roof structure of *Bot* and *Viharn* into three major sections, with the prime, the biggest part at the centre, and the lower part at the front and back, is one of the methods invented to create the lightness of the building."

Chote Kalayanamit (2539:59) said: "In breaking down the roof, making the front and the back lower than the main part will help the structure appear light."

- Multi-tiered roof

The reduction of the roof mass can be achieved by a superimpose technique, making a multi-layered roof, as pointed out by Nij Hincheeranand: "The layers are closer at the base of the roof and gradually spread out onto the top."

Chote Kalayanamit (2539:59) gave an observation that: "Artisans are able to reduce the mass of the roof of a large building by applying the multi-layer technique to the roof's sides. If the structure has only one big roof, the roof will look bulky. They deliberately made the dense layers at the base, and bit-by-bit added the distance between the tiers at the upper part. The gap was the biggest at the section that covered the central part of *bot* and *viharn*.

B: Lightness and floating through the use of colonnade or posts

- Posts of sala

The use of *sala* posts allows one to see through the space underneath the raised cabin with nothing to block the view and creates the sense of lightness and floating. It makes the building 'float' before one's eyes. Such light and floating feelings are in regard with the Buddhist beliefs concerning meditation (calmness), lightness and floating.

- Posts with the use of an open space between the walls

Architect Anucha Tangsiriwiriyakul of 4-S Co said in an interview, “The tradition of leaving a gap between the wall and the object is to ensure that there is a sufficient space between them. For instance, when placing Buddha images inside *bot* or *viharn*, one has to be careful not to put the statues too close to the wall, leaving the gap of 2 - 4 sawk (a traditional Thai measurement) between them. This also applies to some furniture like tang, a traditional bench, which is placed in the middle of the room to ensure that the surrounding space is free.

C: Lightness and floating in relation to water and buildings

- Building surrounded by water

Architect Santi Chansaeng, managing director of Sarin Architect Co, said in an interview on 14 May 1996 that because “we lived in an agrarian society, the most appropriate site for settlement must be the area near the source of water. This is because water is very important for farming. Thus, buildings were established adjacent to the waterways. Dwellers had to live on a raised cabin to avoid the floods during the wet season. After the water eventually receded, they were able to use an ample space underneath the cabin.” His statement indicates that people and the water have been closely related since the ancient time. Thais paid less attention to the wind direction than the water when they choose the site of their residence.

3.3.2.2 Airiness
Openness in cluster buildings

Space between cabins of a Thai cluster house facilitates good ventilation and ensures enough sunlight. This is a characteristic of *chaan* or terrace, which is the area that receives the most sunlight and pure air, with optimum ventilation.

Each house has an open space called in Lanna dialect as "kwuang baan." It is a vast, levelled ground used for various activities such as a playground, the ground for sun-drying farm produce and a walkway to the buildings.

- Openness in the space between sala posts

The *sala* posts, with a raised cabin above people's heads, enable people to look across to the other side of the structure and create the feeling of lightness and floating as well as openness. The free-standing look effectively makes the building appear light.

- Openness from the space of chaan or terrace

Chaan or terrace facilitates the flow of space between the cabins and in turn creates the sense of openness. Ruethai Chaichongrak (2518:242) said since *chaan* connects the cabins in the house, it supports the flow of space from the inside to the outside of the house --from cabins, verandah to the terrace.

3.3.2.3 Cool & Pleasant Atmosphere

Shade from trees

- Trees on the ground are similar to those planted on the terrace of the house and kuti. They bring nature to the structure and provide shade. In addition, some house owners grow fruit trees at the rim of their compounds.

- Trees sited next to the buildings

Home owners carefully select tree species to grow near their houses to ensure auspiciousness. It is believed that certain types of trees are designated for each eight point of compass as guided by their forefathers to attain good luck and prosperity.

3.4 The development of new Thainess Characteristics

The study of the development of new Thai architecture for houses, buildings, hotels and resorts can be divided into 5 areas as follows:

- The use of traditional Thai characteristics in design
- New utilities
- The environment and climate
- Construction materials and technology
- Innovations

3.4.1 The Use of Traditional Thai characteristics in Contemporary Building Design

a: The use of abstract characteristics in design

Wimolsit Horayangoor (2539: 53) suggested that the revival of traditional architecture with some adjustments may focus on forms, like roof and posts. The revivals can be made in several ways as follows:

- Straight revival, with little adjustment in details.
- Renaissance, blending the tradition to new works to develop new designs
- Mannerism, with extensive changes of architectural tradition.
- The specific application of traditional Thai architecture

b: Adaptation of specific characteristics

Wimolsit Horayangoor (2539: 53) explained that the adaptation was an attempt to make new innovations that maintain the core of architectural concept like openness, lightness, and floating as well as shading. The sight of such structure creates the sense of lightness, floating and openness for those who see it. For example, the sight of space between the posts can make people feel that the structure is floating and the sight of trees near the building can make people feel cool.

c: The use of specific characteristics of traditional architecture

This specific application is aimed at using certain characteristics of traditional architecture in modern buildings. It is an attempt to search for new unique designs. For instance, applying traditional design to the arch over the entrance of a hotel is regarded as specific application.

d: The use of local architectural styles to stress regional uniqueness

This is to apply local architecture from different regions, including Lanna, Isaan, and the Thaksin Thai southern styles. For instance, the Lanna's *kalae* may be used over the peak of the pediment even though *kalae* is not indigenous item in the north. As well, Dan Kwian-style ceramic may be used in Isaan architecture.

3.4.2 New Use

Applying traditional Thai architecture to new buildings is to respond appropriately to new social needs with a new Thai identity regardless of the old forms. Wimolsit Horayangoor said, "Modern buildings must be built in accordance with the architectural style of the ninth reign. They should be of new designs, using new materials and construction technology, disregarding the old styles.

3.4.3 The environment and the climate

Modern architecture can accommodate certain elements like extended eaves, which can do a good job in sun and rain protection. Pusadee Thippatat, who studied the architectural design concerning the climate and tropical architecture between 1983 and 1984, said that architects with conscience would apply the concept in their works, housing estates or public buildings. As a result, the design will give due consideration to the climate, with extended eaves to provide protection against the sun."

Pusadee Thippatat (2539:96) noted that a number of buildings -- houses, hotels, resorts, and religious structures -- reflected an attempt to incorporate traditional architectural elements into new works that suit the environment and the climate.

3.4.4 Construction materials and technology

a: The application of traditional Thai characteristics in new works, using modern construction materials and technology

Sanchai Maiman (2521:45) suggested that "Modern buildings should be developed from making appropriate adjustments of some familiar architectural elements such as naa chua, naa bun and panlom.'

Saeng-arun Ratkasikorn (2521:45) said: "Thainess in architecture does not mean only panlom, tua ngao, and fa pakon. With new materials and technology as well as the architects' versatility, people can have a Thai building without panlom or fa pakon."

b: The design with energy-saving materials and technology

Sunthorn Bunyathikan and Thanit Jindawit (2536:35), who studies the "convenienceness" and the environment, finds that traditional Thai architecture possesses factors attributing to the "convenienceness." That amounts to the Thai uniqueness in the area of technology.

Truengjai Buranasomphob (2533:19-20) said, "The most important element in Thai architecture lies in the way it responds to the topography and the climate like sunlight, wind, rain and humidity, considering there was no electricity and air conditioner in the past. Even though we now have technology, we should not forget the environment and build a structure that suits the surroundings. In doing so, we not only create the structure with unique characters but also save the energy and reduce the pollution. Air-conditioner and electricity should be limited to necessary areas like meeting rooms. We may use natural sunlight and air vents in certain areas like stairways, walkway, toilet, and others."

3.4.5 Architectural innovation

a: Modern architecture and cultural conservation

Nowadays the influx of foreign cultures caused by globalisation has brought new ideas to architectural works but at the same time threatened to wipe out local cultures. Some experts think there is a need to resist this trend. Wimolsit Horayangoor (2539:52) said "Thai society has changed due to globalisation that becomes a new force that disregards wisdom roots. The force, if intensified, is a threat to local wisdom and culture. Each locality needs to safeguard its culture.

Wiwat Temiyapan (2539:43-52) suggested that buildings in each local area need to have unique characteristics. The uniqueness results not only from geographical setting, but also people's livelihood, historical background and local culture. These are key factors that help shape local architecture.

b: Design for hotels and resorts with consideration to hierarchical status

Wimolsit Horayangoor (2539:56) noted that in the past, traditional Thai architecture was limited to certain types of buildings. There should be more study about the traditional belief with regard to hierarchical status in order that the application of traditional architecture to new buildings will be appropriate, ensuring that the structure contains aesthetic value and suitability.

3.5 The acceptance of Characteristic Thai Features

The acceptance of new Thainess in architectural structures -- houses, buildings, hotels and resorts -- varies between the architects and the general public due to different experiences. Such differences are not unusual since, unlike the general public, architects' thoughts and viewpoints are shaped by their study and work experience.

3.6 Architectural Elements of Thai House

The beauty of traditional Thai house is achieved with almost no decoration. Its aesthetics is embodied in its form and structure: the shapes of the elements and the lines and proportions of the building as a whole. Its colours and surface textures are of raw and natural unpainted wood and unglazed clay roof tiles. Pure ornaments are simple, with the carved wooden panels, or *yong*, that decorate the exterior base of the windows in well-appointed houses and the geometric grid of classic wall panels. In the north, roofs are adorned with wooden horns called *kalae*. Elaborate ornaments are reserved for palace and temple architecture.

Despite the curves and trapezoidal shape of the structure, neatness is achieved because the house is essentially built from a kit. A master carpenter and his assistants construct most of the house elements, including the wall panels, windows and roof structure, before the house is erected. Since joinery is used rather than nails when assembling a house, each piece has to be fashioned with great care to ensure its precision.

The house’s exterior is rather important because occupants spend most of the time for family activities on the verandah and terrace, below the house or in the yard. The interior is dimly illuminated and minimally furnished.

Because good quality timbers are now scarce and carpentry work is expensive, building a traditional house today is often.

3.6.1 Gable Roofs

The gable roof is obviously Thailand's traditional roof form. It is built with a steep concave shape in the central region, where total rainfall during the wettest month, September, exceeds 30 cm - most of which comes in a daily torrent lasting an hour or less. The concave shape helps the house cope well with this heavy rain, sluicing down and shooting it out past the walls to prevent it from seeping through the roof covering.

Additional rain and sun protection is provided by a short eave below the main roof on two or all four sides extending about 40 cm from the wall. One or more sides of the house may also, or instead, feature longer *kansaad* eaves supported by brackets. Typical roofing materials are terra cotta tiles, teak shingles, corrugated iron or palm leaf thatch.

The height of the roof not only protects against the rain but helps keeping the interior cool. Since the house has no ceiling, the large roof cavity allows hot air to rise up through the eaves.

Regional designs vary according to different weather conditions and cultures. Cooler weather in the north requires the roof to dip lower to the same level of the windows and the roof is not concave. Roofs of homes in the south, where the monsoon season is long, are large and steep in order to cope with heavy rains and winds. The aridity of the northeast causes the roofs have relatively gentle slope.

3.6.2 Hipped and Hipped-Gable Roofs

Although gable roofs are prevalent, hipped and hipped-gable roofs can also be found in Thailand, reflecting the Malay, colonial and Western influences.

The hipped roof, which is known for better drainage, is called *panya* in Thai. It is visible at some Thai Muslim houses in the south, where the roof is a lima roof - a Malay term derived from the Arabic word for five, referring to the roof's five ridges. Some experts believe that this roof form was introduced by British and Dutch colonials who lived in the Malay Archipelago from the 17th century onwards. Hipped roofs also appear on some houses and buildings built in the Sino-Portuguese style by Straits Chinese immigrants.

Hipped roofs were used in many royal residences, government buildings and mansions built in different European styles during the reigns of King Rama IV, V and VI (see 8.5 Western-Style Palaces and Mansions). These buildings display strong influence by Western architecture, which differ from the Sino-Portuguese style in the south. They have helped to popularize the hipped roof form throughout Thailand over the past 100 years.

The hipped-gable roof and gambrel or Manila roof commonly seen at Thai Muslim homes in the south combine the hipped form with gables midway up the slope on two or more sides. It helps to improve the ventilation of the house, in addition to the

drainage advantage of the hipped roof. It is known in Thailand as a *blanor* roof. The word is derived from an Indonesian word referring to the Dutch, thus reflecting the colonial origin. This roof form has started to appear atop several palaces and mansions in Bangkok during the late 19th and early 20th centuries and become popular ever since.

c) Roof Finials

The main decorative feature of the house roof in central Siamese is the bargeboard, or *panlom*, which is a long, thin board attached along the projecting edge of a roof in front of a gable. Practically, it protects the exposed end of the roof tiles at the gable from the wind. At the same time, it is a decorative part of the roof with its ornately carving design that accentuates the roof height, steepness and shape.

In a timber house, *panlom* is made of a wooden board about 3 cm thick. It is cut at an acute angle on the top end, where it joins its pair at the gable's peak. At its lower end, the bargeboard may be carved into a curved figure called *tua ngao*. The most common figure is "ngao", a stylized naga head that looks like a hook or a fin pointing up towards the top of the gable. Alternatively, panlom can come in a form of a fish tail, called "hang pla". This figure is more popular in the central and southern regions.

In northern Thailand, a fine house can be distinguished by crossed boards placed at the peak of panlom called "*kalae*". They can be made simply by extending the *panlom* boards or attaching two separate pieces of wood. The origin and the meaning of *kalae* have been widely debated. Some observers believe it resembles water buffalo's horns, a symbol indicating that the household can or would like to afford plenty of livestock.

Southern people also decorate their houses with bargeboards with additional decorative wooden fretworks below the gable eaves as well as gable-peak finials of metal, stucco, or turned or fretted wood. In northeastern houses, *panlom* is usually a plain board without a lower finial.

d) Pediments

The pediments of common houses are called *na chua*. They cover the gable ends of the roof to protect the interior from the sun, wind and rain. Usually made of wood, *na chua* can be built in any one of several styles common to the central region and elsewhere.

The most popular style is the rectangular frame pattern called *chua luk fak pakon*, which is the same style as the wall panel called *fa pakon*. On the pediment, the panels create a kind of pyramid design: a row of rectangles at the base narrow to just one at the top. A pediment design often used in a kitchen is called *chua bai prue*, which is made of horizontal slats with openings for ventilation. The style is similar to louver doors. Another popular style of the pediment in the kitchen is *chua phra athit* or a sunray design. It comprises *chua luk fak* motif at the bottom end and a set of wooden

slats cut and placed with gaps in between on the top part in a semi-elliptical form, imitating the sun and its ray.

e) Walls

One of the ingenuities of the Thai house is its fast and sturdy construction using modular wooden wall panels. Pre-assembled by carpenters, they are brought to the construction site and simply hoisted into place on the posts. This way, the house can be erected in a single day. Wooden *fa* wall panel forms are named according to the pattern formed by the boards called "*fa pakon"* – a pattern of a grid of tall rectangles commonly found in central Thailand.

The panels dismantle easily, allowing the house to be moved and reassembled elsewhere quickly. They can also be reused to build another house. The panels are attached to the posts and beams using joinery rather than nails. This technique makes a structure sturdy and flexible, particularly when the wood expands or contracts in response to the moisture or changes in temperature.

The modules are made in different shapes for different parts of the house. In a central Siamese house, with walls and posts leaning towards the roof, panels on the narrow ends of the house have a tall trapezoid shape with a wide base and narrow top. However, the panels of northern houses taper in the opposite direction. Walls stand straight in the northeasterners' houses because builders favour rectangular-shaped walls (square is considered inauspicious). There, the walls are generally not pre-assembled but simply nailed onto the posts horizontally in a pattern called *fa kradan reab* (panel of flat/smooth planks).

Bamboo houses have pre-woven wall panels, which are believed to be the form that precedes and inspires the pre-fabricated panels of the wooden house. The interior walls of bamboo houses and some wooden houses are made of woven panels called *fa samruad*, featuring long, thin bamboo strips laced into a grid pattern.

f) Doors

Doors (*pratoo*) are usually just plain wooden panels. Some wealthy home owners may have their doors carved, painted or gilded. In the central region, the door's trapezoidal shape enhances the visual composition of the whole structure because it mirrors the wall and window shapes, narrowing from the base to the top. Each room has a single door of two tall panels.

To bring good luck to the occupants, home owners believe house doors should be the width of three lengths of their foot, or four lengths for the gable-topped gate at the terrace entrance above the main stairs. Northern Thais believe a guardian spirit resides within the frame of the door, so they avoid stepping on the threshold, which is painted red for auspiciousness.

A central-style house door has four main components: frame, panels, mullion and twin bolt. The door frame is called a *thoranee*, formed by the horizontal parts.

They correspond to a lintel and doorsill-wooden boards at the top and bottom that hold the dowels on which the vertical door panels swing. The *thoranee* is mounted on a high threshold to block the entry of animals and water. One has to step over the *thoranee* when entering or going out of the room. The door panels are called *baan*, usually made from teak to withstand the heat, the humidity and the attack of termites.

One of the *baan* panels has a mullion, or *ok lao*, a narrow lip of wood fixed on the outside vertical edge to cover the gap when closed. Midway up the *ok lao* is a handle formed by a diamond-shaped block of wood, which, in refined homes, may have carved or painted designs. A wooden twin bolt called *dan khuu* is mounted on the inside.

g) Windows

The design of windows (*naatang*) in central Thailand is similar to doors in terms of both structure and mechanism. One window is built into each standard-size section of the wall panel between the columns, except along the verandah, where one or two doors are installed. A house with nine windows and doors is considered inauspicious because it corresponds to the nine openings of the human body.

The window usually has a single-bolt lock, or *darn diao*, and a wooden bolt at the base called *kob* that slots into the sill. The base of the window on the outside usually has a fixed panel of carved wood called *yong*. Though often purely ornamental, *yong*s are sometimes artistically perforated to provide ventilation.

Regional houses in the north, northeast and south often have other window types such as single-panel or balustrade windows that, when closing, use a hinged or sliding board on the inside. Windows in the north and northeast tend to be smaller and fewer.

h) Interiors

The virtue of the interior of a traditional timber house is its simplicity: the beauty of unpainted wood, and the versatility of open, uncluttered space. Rooms are mainly used for slumber, so loose furniture is limited to cupboards and boxes for storage, and perhaps a small low table and cushions.

Since the house normally has no ceiling, it helps reduce the weight on the posts and make the underside of the roof easy for repair. The space under the roof is sometimes used for storage by placing bamboo poles across the pillars.

The cabin may be partitioned into rooms by wooden or woven walls. The floor plan is simple, either a single room or one room bisected, not structured with hallways. In a cabin with two rooms, the larger one might be used as a sleeping area, while the smaller one is filled with Buddha images placed on altars. The family's unmarried daughters always take the innermost room.

Bedding is aligned parallel to the narrow end of the cabin rather than along the length, which is associated with the alignment of a body in a coffin. The alignment must also allow occupants to sleep with their heads pointing north, south or east, but not west. This direction is reserved for the dead whose body is always placed with its head facing west before cremation.

One cabin, or part of one, may be turned into a three-walled sitting room open on the verandah side. The kitchen or *ho khrua* is situated on the terrace in a separate cabin somewhat behind the main house, and is just two posts wide. It features walls and a floor with a ventilation grille at the pediment. Traditionally, Thai houses have no en suite bathrooms. Bathing was done right on the terrace using a vat of water and a ladle. Toilet facilities may be a chamber pot or a nearby field or canal.

i) Terraces

Perhaps, the most important part of the house in central Thailand is its broad elevated wooden terrace or *chaan.* Connecting all the cabins, it is the largest part of the house, taking up about 40% of the floor plan or 60% if the verandahs in front of the cabins are included.

Chaan is built about 40 cm lower than a verandah - a comfortable height for sitting. The gap between *chaan* and the verandah is often left open, which accounts for its Thai name of *chong maew rod*, meaning “a hole for cats”. Indeed the gap serves as a ventilator that allows air beneath the house to come in.

Shaded by walls and roofs of the surrounding cabins, and ventilated by wooden balustrades, *chaan* becomes a comfortable multi-purpose space for dining, guest reception, handicraft making and other activities. Some house owners build a *chaan* around a big tall tree.

Comparing to the minimal decoration of the house interior and the yard, the terrace is adorned with ceramic vats of ornamental fish and water lilies as well as potted plants. Birds may be kept in cages or, sometimes, a special pavilion called *ho nok*. A big house with three or five cabins can have a broad terrace and an open pavilion in the middle of the house called *ho klang*, which is used as a living room.

j) Steps and Balustrades

Certainly, stairs are an essential part of a stilt house. It helps prevent against theft and wild animals. A house with a large terrace may have fixed dogleg stairs at the entrance topped by a gable-roofed gate. A smaller, secondary stairway may be built at the rear of the terrace. Stairs and ladders are always built with an uneven number of steps - not including the landing - because even-numbered stairways are believed to be steps for ghosts.

Timber balustrades mark the border of the terrace, creating a sense of enclosure and serving as a ventilator. In addition to using elements that are sawn, turned or sometimes cut into fretwork designs, there are usually vertical load-bearing supports

placed every 1 m or 2 m along the line. Terrace balustrades in central Siamese houses often function as a wall. They are tall, with narrow rectangular wooden panels in the fa pakon style at the top, bottom and sometimes sides of the balustrade section. Balustrades and railings are seen at their most decorative in Lanna and Shan houses of the north, and Thai Muslim houses in the south.

k) Yards

The traditional yard is a scrappy affair; the ground around the stilts is often just clay, packed hard by foot traffic. There might be a few bushes, chosen not for their beauty but their resistance to drought and floods. Some households keep potted plants, selected for their auspiciousness or fragrance rather than decorative qualities. Trees may stand around the yard, but their branches should not hang over the house, which is considered unlucky. There is an exception, though, for a shady tree, which is allowed to grow through an opening of the centre of the terrace.

Other plants are grown in patch cooking. The kitchen garden (*suan krua*) consists of herbs and spices such as lemon grass, chili, galangal and garlic. Some houses have a section reserved for a medicinal herb garden (*suan sa-mun-prai*). Fragrant flowers and plants found in the garden include *ma-li* (night blooming jasmine) and *jam-pee* or white chempaka (*Michelia alba*), which is used to decorate ceremonial wreaths. The fast growing tree like banana is also the favourite in many Thai houses.

Plants with auspicious names are also popular. Some Thais grow *ma yom* or gooseberry trees in the garden, hoping to be well liked by people. The tree's name '*ma yom*' sounds similar to ni yom, which means 'popular' in Thai. If one wishes to show their authoritativeness, he will plant tamarind or *ma kham* since *kham* means 'authoritative'. A jack fruit tree (*ka noon*) is often grown at the back of the house for spiritual support. Its name '*noon*' means 'support'.

Certain trees are considered lucky when grown at the right points of the compass around the house, serving as a natural fence. Yards in the south and northeast are often not enclosed by a fence or wall since relatives tend to inhabit next door. Thus the residence, which is about 200 – 400 on average, often turns into an extended family compound.

As important as the yard itself is the space under the house, which is sheltered from the sun and rain. The area is used for resting, storage, family activities, a handicraft making unit, and even a small livestock farm.

l) Wood

The sophistication of *ruen khrueng sap* or timber house reflects the abundance of many of the world's best types of wood in Thailand. The government's Forestry Organization has classified some 500 local species of trees for their commercial value. Until the mid 20th century, 80% of the country was covered in forests, making timber

the easiest choice when building permanent structures. However, these resources became so heavily exploited that logging was banned in 1989. During that time, Thailand lost more than 60% of its forests.

The most important wood is teak (tectona grandis) or locally known as *mai sak.* Perhaps the strongest wood in the world, it is noted for its capacity to withstand changes in the weather and season. Teak tree grows tall and straight, so it can be milled into a maximum amount of quality timber. The teak tree resin typically has an oil in its Galih (Cambium/heartwood) that is highly water resistant. This content alone can protect the teak from decay, insects, and bacteria. Teak houses can last up to 200 years. Thus it becomes an excellent choice for house builders

Another versatile wood is narra or *pradu* (pterocarpus macroarpus). It is a hard, medium-weight timber with yellow coloration. Moderate in cost, it is used for structural elements, interior finish, paneling and furniture.

Several varieties of rosewood (dalbergia) are used in Thai architecture too. Siamese rosewood, or *payung* (d. cochiclinensis), is used in making Chinese style furniture, as is timeline, or *ching chan* (d' dougnaiensis), known as the 'king of wood'.

Monkey pod tree, or *maka mong* (afzelia xylocarpa), is a strong, heavy wood used to make floors, stairs, furniture, beams, window and door frames, paneling and veneer.

Malabar ironwood, or *thakien thong* (hopea odorata), is a large evergreen tree used widely in construction.

Gurjan, of *yang na* (dipterocarpus alatus), is commonly used in structural elements, interiors, frames, furniture and plywood.

m) Bamboo and Thatch

The primordial construction materials used in Thai houses in the past are thatch for the roof covering and bamboo for other elements. Bamboo is nature's gift to builders. It is fast growing, easily harvested, lightweight, strong and flexible. It is so versatile that one can build a house, or *ruen khrueng phook*, almost entirely from the bamboo alone. Some laymen build a bamboo house themselves without help from the craftsmen. Each part can be interlocked using joinery or bound together with fibers made from vines, palm leaves, rattan or crushed young bamboo stems. Bamboo can also be used in combination with wood, which will be reassigned to structural elements like posts and beams.

Of the world's 1,200 species of bamboo, about 60 types flourish in Thailand. Supplies of wild bamboo have been reduced by deforestation and mismanaged harvesting. Therefore, it is increasingly being cultivated. Harvested after two or three years, the stems are treated with heat, water or chemicals to protect against insects and fungus. To make furniture and parts of the house, builders can either use the whole

bamboo stems or cut them in half, quartered, or as fine as a string. Cut in half and flattened, bamboo strips can be bound together to make a bench or a floor.

Among grasses and tree leaves used as roof thatch, mangrove palm or nipa palm, locally called *chak* (Nypa fruticans) is the most popular. These palms grow along canals and riverbanks. Vetiver grass or *ya-faek* (Vetiveria zizanioides) also makes a good roofing material thanks to its waxy, water-resistant surface, pleasant aroma and resistance to insects. An architectural emblem of northern Thailand is the beautifully rustic thatch made from the huge leaves of a tree called *long tung*, a species of dipterocarpus related to yang, or gurjan. Other thatch materials include banana leaves, sago palm leaves (Metroxylon saug), sugar palm bark (Arenga saccarifera) and elephant grass (Pennisetum purpjreum).

n) Construction

It requires two types of specialists to build a wooden Thai house; a master carpenter and a Brahmin priest or astrologer. The former is in charge of the construction while the latter help determine an auspicious construction time and the house location.

Construction starts at the builder's shop, where the components are prepared before they are transported to the site. Once an auspicious position for the house is selected, holes are dug for the posts and fitted with wooden bases to prevent it from sinking. A ceremony is then held when raising the first post to mark the beginning of the construction. It involves the monks chanting, the blessing of the post with lustral water and the placement of pieces of nine auspicious types of wood in the post hole. The remaining posts are raised one by one, going in a clockwise direction. Next comes the construction of the roof elements, then walls and finally the floor. In the past, each element was traditionally joined by wooden pegs. Now metal bolts and nails are now often used. About a dozen workers are needed for the construction. They could be volunteers from the neighborhood who will be supervised by the head carpenter. Nowadays it is usually done by paid workers.

Ritual aspects are as important and complex as the technical methods of the construction itself. A post, for example, must not be oozing sap, and careful consideration is made to avoid certain types or positions of knots. Even the position in which the post is laid in the ground before being raised must follow guidelines determined by the month. Additional rules govern the size, proportions and materials of other components as well as the planting of trees in the yard.

Chapter 4

Analysis of Thai Characteristics in Contemporary Buildings

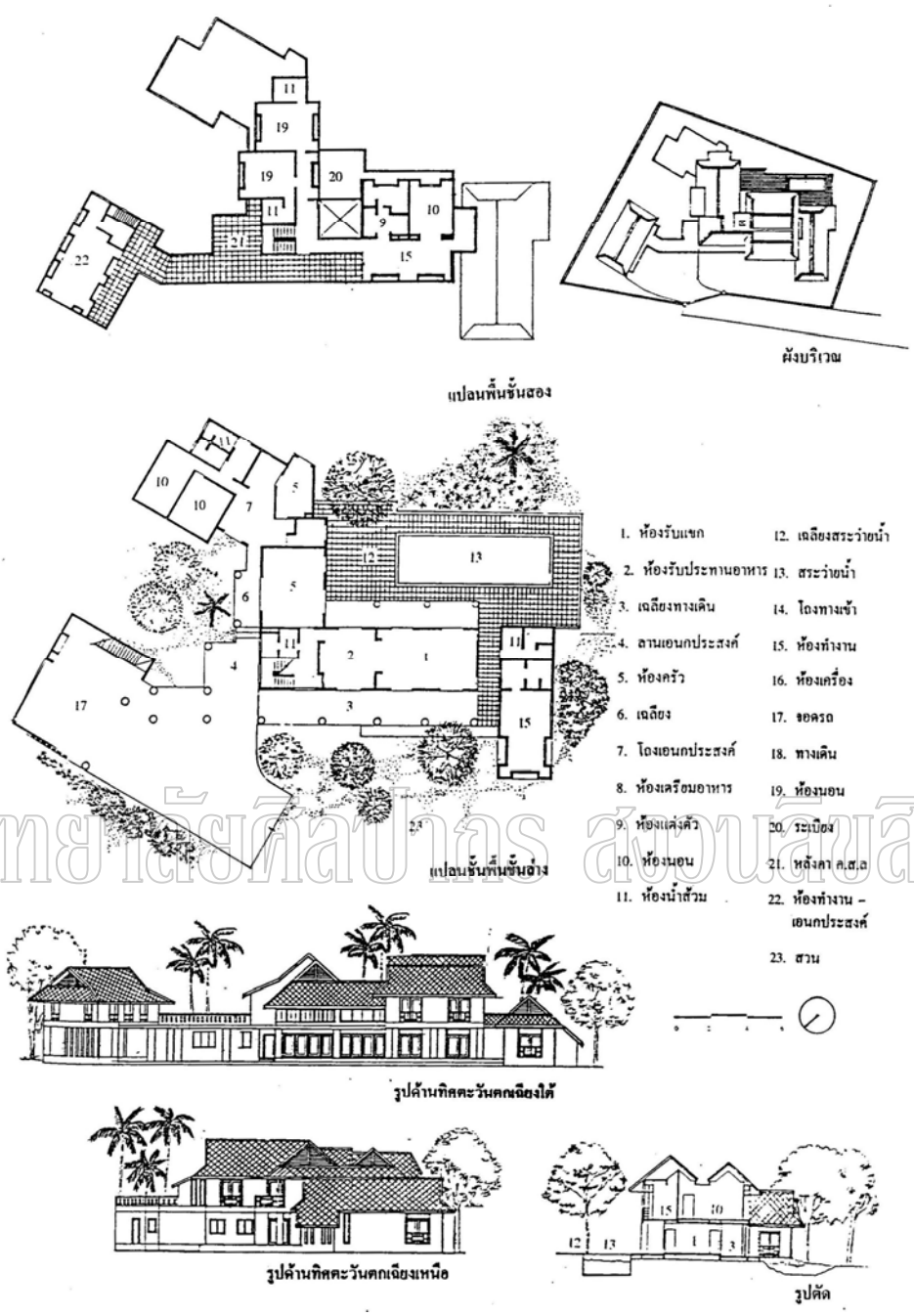
The data shown in the chapter were collected by photographing and documenting various types of selected buildings, including residential buildings, public buildings, commercial buildings, hotels and resorts. They were used in the survey and the analysis of the architecture of the buildings that possess modern Thai characteristics. The results of the analysis are shown below.

Residential Buildings

Nichada Park

Location Nichada Park
Soi Samakkee, Tiwanon Road, Nonthaburi
Owner Mr. Albert t Chandler
Architect Chartwichai Prommathatwethi, Aspect Company Limited
Significance Awarded Consolation Prize from ASA Architectural Design Awards in 1994

The Analysis of Thai characteristics of the Building



Physical Appearance of Thai Characteristics

- **Primary Elements**

a) Roof Type – The house has a hipped gable roof, generally known as Manila or Blanor. The gable wall has a louvre style pattern or 'Bai Prue', made to facilitate air circulation. The roofing materials are unglazed clay shingles. The house consists of a group of two-storey buildings with separate roofs (each level of the roof is connected). For example, there are bedrooms above the garage and the living room.

The roofed work room and the storage room have one storey. The rest of the house has a flat roof.

b) Roof Eave – Since it is a two-storey building, the roof eave can only protect from the rain and the sun for the upstairs. On the ground floor, the walls are set back and detached from the pillars in order to provide weather protection.

c) Free-standing pillars – These circular pillars can be seen in the living room downstairs next to the pool and at the entrance in front of the building. They are placed along the indented exterior walls and form a covered walkway that give shelter to the openings downstairs.

d) Empty Space that links the outside

The Grounds – They may not look exactly like the grounds in a traditional Thai house but it bears some similarity. They are visible at the rear of the house around the pool, and connected with the back garden and spacious enough for recreational activities.

The Terrace – Like the grounds, the house's terrace shares some characteristics with the terrace in a traditional Thai house. This is evident at the covered walk way along the indented wall next to the pool. Similar to a verandah, it functions as a passage that connects the house's interior with the exterior.

- **Secondary Elements**

a) The room opening – Rooms are classified by their functions such as the living room, the workroom, the dining room and the bedroom. The first three rooms are divided by a sliding door flanked by glass openings fitted to the floor. The bedroom has double sliding doors. The kitchen displays glass jalousie windows while double awning windows are installed in the bathroom.

b) Shapes and the type of the room opening – It can be classified by types of doors and windows. The sliding door sided by fixed glass openings, the glass jalousie windows and the double awning windows are rectangular. The glass jalousie windows are placed about 0.90 centimetres from the floor while the double awning windows are 1.80 metres above the floor.

c) Flooring – Earthenware tiles are used in the pool's floor, walkways

and the downstairs floors.

d) Walls – All the brick walls are plastered and painted white, except the beams that are painted gray. The walls of the bedroom on the second floor have recessed windows where the indented area serves as a shelf.

- **Miscellaneous Elements**

The pediment has a louvre design called Bai Prue. It is made from small wooden slats fitted horizontally on top of each other with the space in between for vents. They are held together by vertically fitted pieces of wood.

- **Landscaping**

a) The water is set near the building. It is shown at the spacious grounds at the rear of the house around the pool, which is used for recreational activities in the evening since they are shaded by the building. The garden nearby is an extension of the garden at the pool and the walkway (terrace) respectively, leading into the inside of the building.

b) The relation between the trees and the building. Trees planted near the building are young bushes and shrubs such as bonsai and Izora flowers. There are only a few betel nut trees.

2. The Impression of Thai Characteristics

- **Lightness and Buoyancy**

a) The feeling of lightness and buoyancy from a long roof eave.
The long roof eaves make the building look as if it does not entirely bear the weight of the roof but drift in the air.

b) The feeling of lightness and buoyancy from a row of free-standing pillars along the indented walls. Due to the gap between the load bearing pillars and the glass-opening wall, the ground floor looks less dense. The gap creates a passage between the pillars and the opening.

c) The feeling of lightness and buoyancy from the proximity to the water. When looking at the building from the outside through the rear pool, the shadow cast from the building over the slight ripple of the water in the pool not only beautifies the building but also brings out the feeling of lightness and buoyancy to the place.

- **The Cool and Pleasant Atmosphere**

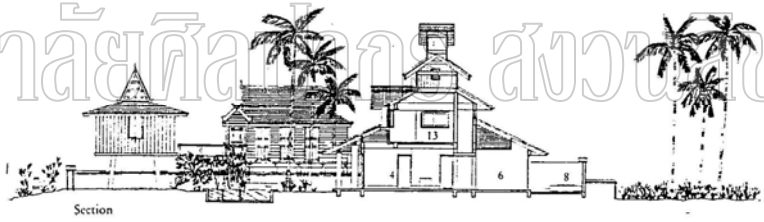
a) The cool and pleasant atmosphere from a long eave. The cool and pleasant atmosphere on the second floor is created by the shade from a long roof eave while the first floor benefits from the shelter made by the space between the pillars and the exterior walls.

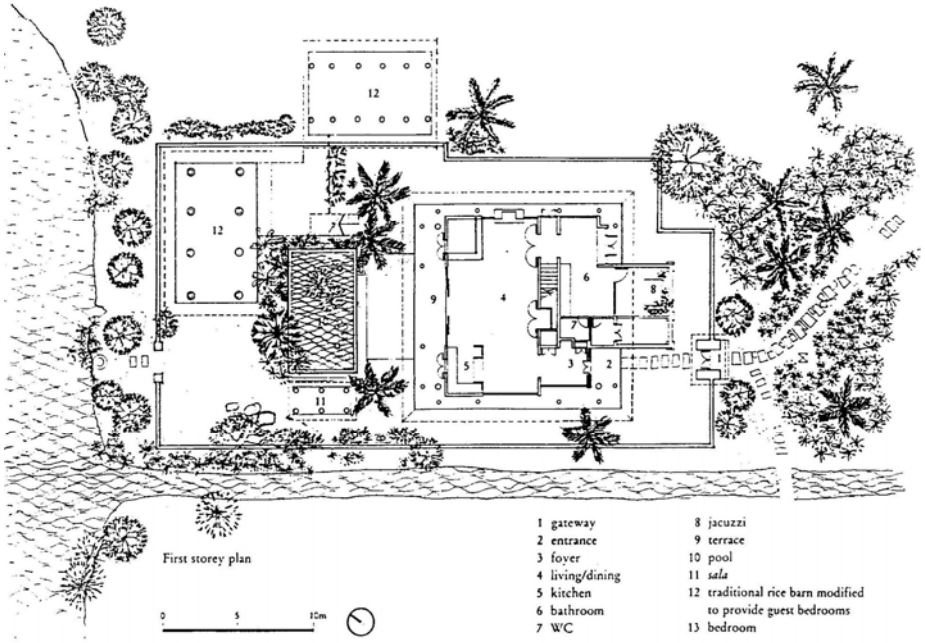
b) The cool and pleasant atmosphere from the trees. The tall trees, like coconut trees provide shelter to the second floor of the building while the shrubs protect the first floor against the sun.

Baan Jang Nak

Location	Rimtai Saitharn Project Sukapiban Mae Rim, Mae Rim District Chiang Mai
Owner	Suchet Suwanmongkol
Architect	Nithi Sathapitanon, Architect 49 Limited
Significance	Awarded First Prize for Best Architecture from ASA Architectural Design Awards in 1994.The presentation of local architectural design

The Analysis of Thai characteristics of the Building





1. Physical Appearance of Thai Characteristics

- **Building Layout**

This resort consists of a group of buildings, including the main buildings (residential building) and a rice barn. They are set along and across the main building and surrounding the ground filled with a fish pond, a pavilion and a garden. Next to this area is a lake, which can be seen from the building. The building's access is similar to those at the resorts in which the entrance is on the other side of the residential area and does not block the views.

- **Primary Elements**

a) Roof Type - The square building has a four-tier roof in the 'Chaturamuk' style of four cross gables facing four directions. The bottom roof that covers the first floor is a hipped roof similar to Panya. The bedroom that occupies the entire second floor is sheltered by another hipped roof (there is only one bedroom in this building.) It is topped by the gable roofs on the third and the fourth tiers. All roof tiers start from the biggest one at the bottom until the smallest one at the top.

b) Free-standing pillars - These roof supporting pillars, which are detached from the walls, surround all sides of the building except the side where the Jacuzzi is located. It should be noted that the house features both concrete and wood pillars. This clearly shows a structural design that uses pillars to bear the stress from the weight of the roof.

c) Roof Eave – The building has long roof eaves because of the indented walls. This results in the construction of the free-standing pillars to support the roof. The gap between the pillars and the eave is 1 metre. Thus, the total distance between the eaves and the walls is longer than usual.

d) The Gateway – The gateway is part of the fence that marks the boundary of the house. It is topped by a gable roof with long eaves supported by brackets. The roof and the brackets are fixed with the load-bearing wall. This is similar to the gate at a traditional Thai house. In addition, the gateway is equipped with doors like those at the building's entrance.

- **Secondary Elements**

a) Horizontally and vertically fitted wood slat walls – These are visible at the exterior walls of the structure except the wall facing the Jacuzzi area.

Surrounding the building on the elevated platform, the wooden wall is about 0.90 centimetres above the ground and made of horizontally fitted wooden slats.

b) Shapes and the types of the room opening. The big opening is seen at the entrance of the living and recreational room. It is in a rectangular shape fixed with big glass sliding doors, which connect the rooms in the building with the outside area. Additionally, there are double windows installed about 0.90 centimetres above the floor. The kitchen and the bedroom have sliding doors.

- **Miscellaneous Elements**

Eave brackets – They can be seen supporting the eaves of the gateway at the fence.

- **Landscaping**

a) The pool – A water lilly pool is used to connect the building with the lake. The continuity between these two areas becomes clear when looking at the lake from the living room.

b) The relation between the trees and the building. Plants grown within the building boundary are mostly shrubs or bushes and randomly placed, giving the impression that they grow naturally.

2. The Impression of Thai Characteristics

- **Lightness and Buoyancy**

a) The feeling of lightness and buoyancy from the free-standing

pillars. The free-standing pillars built as a result of indented walls help bear the weight of the roof, making the roof look lighter than buildings without such pillars.

b) The feeling of lightness and buoyancy from a multi-tier roof. The 4 tier roofs, whose sizes descend from the bottom to the top, help to reduce the hefty look of the roof.

c) The feeling of lightness and buoyancy from the proximity to the water. The shadow cast from the building over the fish and the water lilly pool at the rear of the building evokes the feeling of lightness. The structure also benefits from its proximity to the lake. When it is viewed from the other side of the lake, the sense of lightness arises.

Baan Suan Thorung

Location	Baan Suan Thorung Project Baan Noanmuang, Tambon Sila, Muang District, Khon Kean Province
Owner	Dr. Thada Suthitham
Architect	Dr. Thada Suthitham
Significance	The presentation of Northeastern (I-Sarn) style architecture

The Analysis of Thai characteristics in the Buildings

1. Physical Appearance of Thai Characteristics

- **Primary Elements**

a) Roof Type – The hipped gable roof (known as Manila or Blanor) and the gabled roof are connected at horizontal and vertical roof valleys. The building has a brown Spanish tile roof.

b) Roof Eaves – The short roof eaves cover only the second floor. The canopies on the balcony and over the doors and the windows on the first floor also provide some weather protection.

c) Free-standing pillars – Two circular pillars with lotus bases and capitals appear at the front of the house. They are used to indicate the entrance. In addition, there are square pillars that support the roof of a car-parking pavilion, which is separated from the house.

- **Secondary Elements**

a) The room opening – The rooms are classified by their functions. They includes the living room, the dining room and the bedroom. They feature a casement door fixed with double windows about 0.90 centimetres from the floor. The kitchen has glass jalousie windows and the bathroom has double awning windows.

b) Shapes and the room opening – These can be classified by types of doors and windows. They comprise rectangular casement doors flanked by openings fixed to the floor, double casement windows and jalousie windows about 0.90 centimetres above the floor. The last type of opening is a double awning window made in a small rectangular shape and 1.80 metres from the floor.

c) Balustrades - The balustrades consist of pieces of perforated flat wooden balusters in floral motifs. Each baluster is about ½ inch thick and 4 inches wide and fitted with a wooden handrail and a base of ½ inch thick and 3 inches wide. The perforated parts face the outside of the building. The balustrade is not many transparent because the balusters are not made in the form of typical round balusters.

d) Walls – The exterior walls are plastered and painted white. The joint between the floor and the wall surface is covered by a decorative base moulding painted in grey in order to emphasize the base of the building.

e) Flooring – The porch floor is marble while the floor of the terrace at the back is covered in ceramic tiles.

- **Miscellaneous Elements**

a) Pediment motif – The roof pediment of the porch has the sun ray motif usually seen in northeastern Thailand. At the top of the gables is a traditional roof finial called Mai Krung or Kian Pun Lom.

b) Eave brackets – Overhanging the wall supporting the balcony, the eave brackets are made up of steel-rod reinforced concrete that is decoratively moulded.

2. The Impression of Thai Characteristics

- **Lightness and Buoyancy**

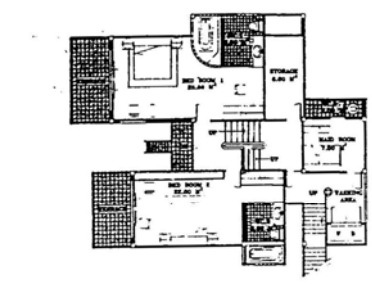
The feeling of lightness and buoyancy from the free-standing pillars can only be seen at the garage, which resembles an open space under a traditional stilt house. However, the whole building looks rather hefty because there is less airy space on the ground floor.

Vanich Bayfront Ville

Location	Moo 8, Sakrach Road (Makham Bay – Panwa Cape), Phuket
Owner	Angkana Vanich
Architect	Somkieat Setaphan, O – Art Company Limited
Significance	The presentation of Southern style architecture

The Analysis of Thai characteristics of the Building

1. Physical Appearance of Thai Characteristics



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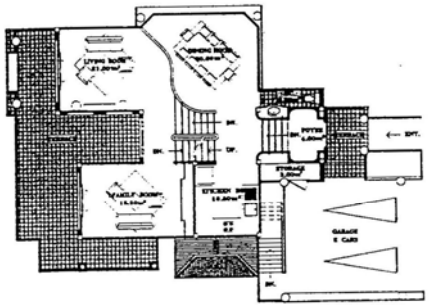

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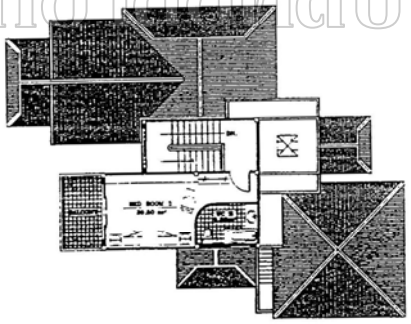

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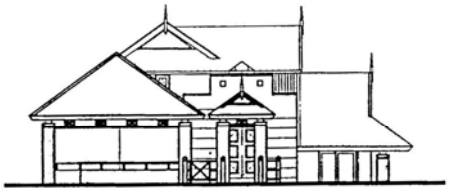
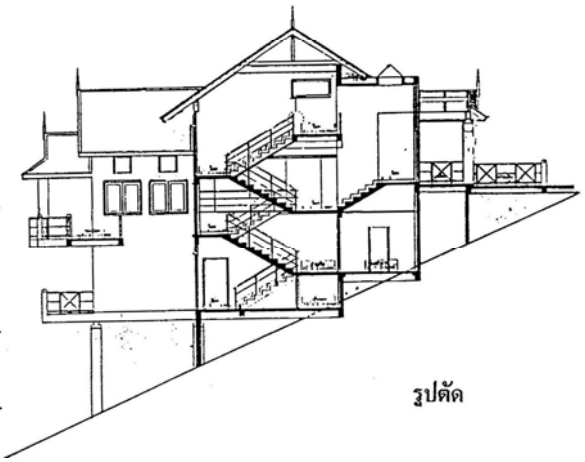


รูปด้านทิศตะวันตกเฉียงเหนือ

รูปด้านทิศตะวันออกเฉียงใต้



รูปตัด

- **Primary Elements**

a) Roof Type - The hipped gable roof (Blanor) and the hipped roof (Panya) are connected. The top end of the bargeboard is decked with a piece of decoratively perforated thin wooden sheet usually seen at the houses in the southern region. Some parts of the house have flat roofs, particularly in the area that covers the entrance hall and the bathroom on upstairs bathroom. The roofing material is black C-PAC Monier tiles.

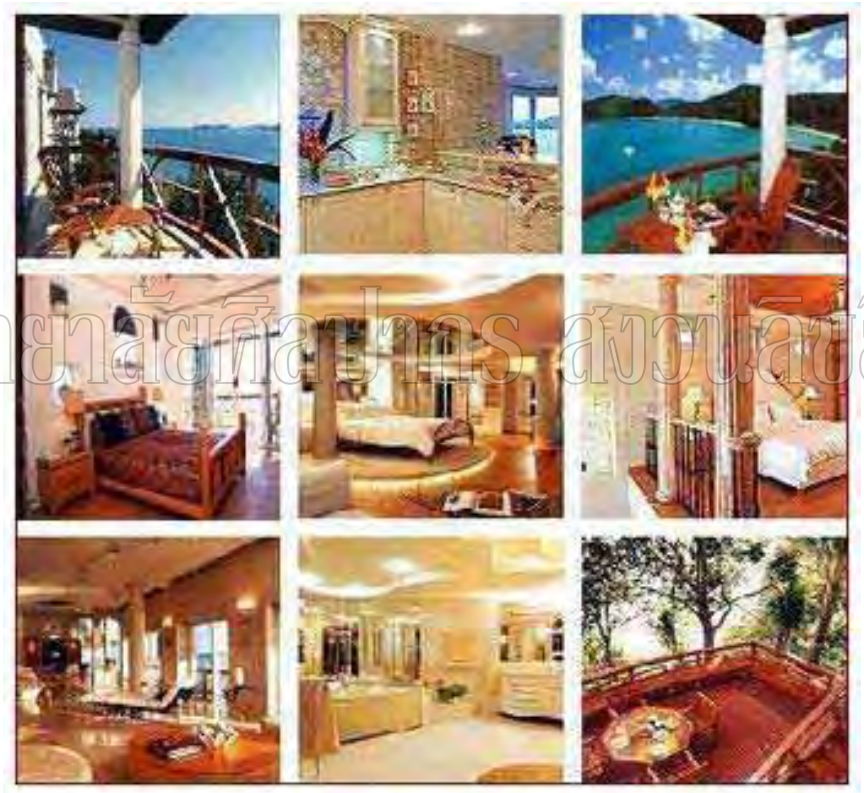
b) Roof eaves – Located on the island, the building has long roof eaves that give weather protection to the third and the second floor only. Even though the ground floor is not roofed, it is sheltered by an extended part of the balcony of the second floor.

c) Free-standing pillars – These type of pillars are visible at the front terrace and the parking space at the back of the building. They are built in a circular shape with decorative capitals.

- **Secondary Elements**

a) The room opening. The rooms are classified by their functions. They include the living room and the dining room, which have sliding doors flanked by openings fixed to the floor. The bedroom also features the sliding doors bordered by openings that appear only at the sea facing side. The kitchen has glass jalousie windows and the bathroom has double awning windows.

b) Shapes and the type of the room opening. They can be classified by types of doors and windows. They comprise rectangular sliding doors sided by fixed rectangular openings, rectangular double casement windows and jalousie windows placed 0.90 centimetres above the floor. The last type of opening is a double awning window made in a small rectangular shape and 1.80 metres high from the floor.



c) The balustrade – The balustrades feature a series of crossed wooden balusters (1 ½ x 3 inches) sided by vertical balusters that are attached with another horizontal baluster. The balconies' posts are made of concrete with exposed aggregate finish and placed 2 metres away from one another.

d) Flooring - The material used for exterior floors of the terrace and the porch is ceramic tiles.

e) Walls – All exterior walls are plastered and painted white, except the walls downstairs, which are made of mountain rocks.

- **Miscellaneous Elements**

a) Pediment motif - The top end of the bargeboard is attached with a piece of decoratively perforated thin wooden sheet and a roof finial usually seen in houses in the southern region.

b) The relation between the trees and the buildings. There are not many big trees around the house. Most of them are shrubs and bushes planted closely to the building. Overall, the building stands exposed to view.


2. The Impression of Thai Characteristics

- **Lightness and Buoyancy**

a) The feeling of lightness and buoyancy from a long roof eave. A long roof eave makes it look like the weight of the roof is not directly pressed on the building. The roof looks light and drifting in the air.

b) The feeling of lightness and buoyancy from the free-standing pillars. These pillars, which are detached from the exterior walls, can be seen on the upstairs at the porch adjacent to the car parking area. Another area is the terrace in front of the living room that faces the sea. They are built in the same style as the pillars that support the roof of Sala.

- **The Cool and Pleasant Atmosphere**

The long eaves provide shade for the rooms on the second floor. The first floor is sheltered by an extended balcony from the upstairs.

Institutional Buildings

Building for Study and Preservation of Sangkalok Kilns, Si Satchanalai District, Sukhothai Province

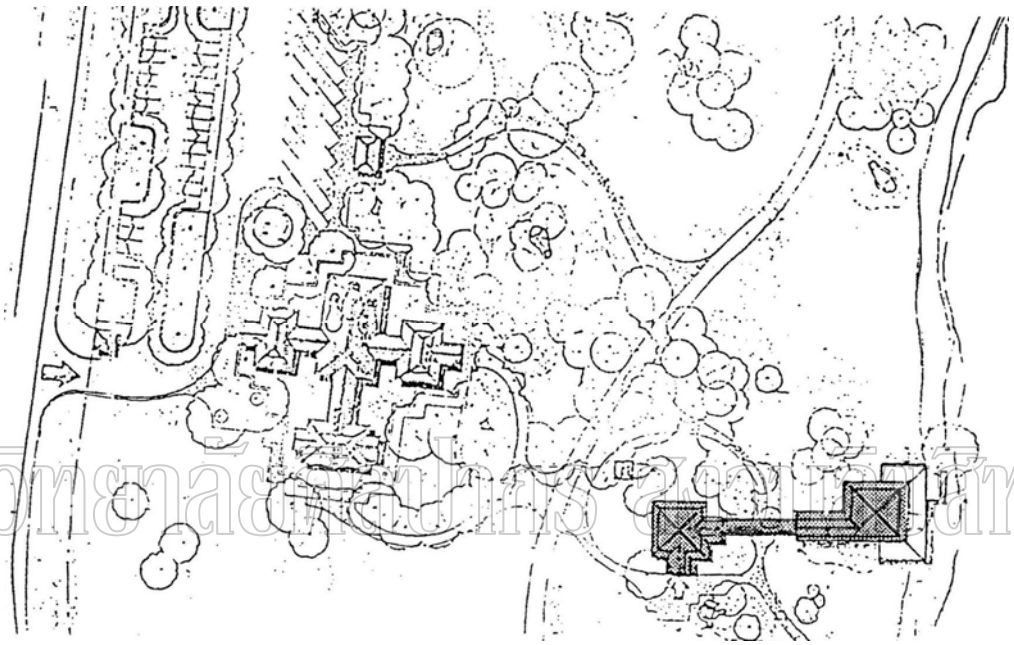
Location	Si Satchanalai Historical Park, Si Satchanalai District, Sukhothai
Owner	Office of Archeology, the Fine Arts Department
Architect	Ronnarit Thanakoses, the architect of the Archeological Site Conservation Subdivision, the Division of Archeology
Significance	Awarded First Prize for Outstanding Modern Thai Architecture from Mom Chao Vodhyakara Varavarn Foundation and ASA Architectural Design Awards in 1990

The Analysis of Thai characteristics of the Building

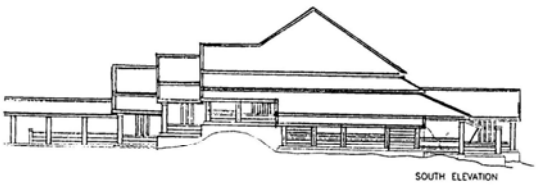
1. Physical Appearance of Thai Characteristics

- **Building Layout**

The Building for Study and Preservation of Sangkalok Kilns consists of two buildings covering the site where the kilns (Tao Turiang) are excavated. The first building, which is located on the flat land, houses Tao Turiang number 123. The second building is built over Tao Turiang number 42, which sits on a mound about 1 – 2.5 metres high. Both buildings are connected by a roofed walkway. Thus, They are classified as the buildings with covered connecting walkway.

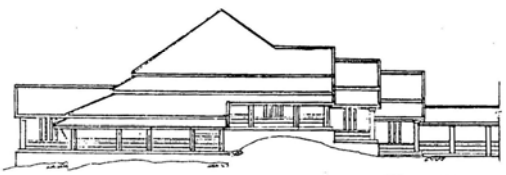


WEST ELEVATION

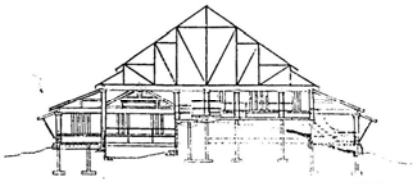


SOUTH ELEVATION

EAST ELEVATION



NORTH ELEVATION



SECTION B

SECTION A

- **Primary Elements**

a) Roof Type – Covering big kilns, the roof of the Building for Study and Preservation of Sangkalok Kilns is extensive. It is in the form of the hipped roof. Additionally, there is a gable roof that covers a walkway that links the buildings.

b) Roof Characteristics – The building has multi tier roofs built to match the height of Tao Turiang No 42 that sits on the mound. The roof eaves of the buildings are long while the eaves of the covered walkway are short. Roofing materials are white Spanish roof tiles.

c) Free-standing pillars – The free-standing pillars are used throughout all of the buildings, including the connecting walkway. Some parts of the buildings have pillars that are built as a result of the indented walls.

d) The space that links the outside – The space at the terrace at the back of the buildings serves as a waiting area that links the outside with the walkway inside the building.

- **Secondary Elements**

a) Shapes and the Opening – Several high narrow openings close to one another.

b) Walls – The exterior walls are brick masonry.

c) Flooring Materials – The floors inside the building and at the walkway are covered by ceramic tiles. The terrace at the back of the buildings has a wooden floor.

d) Railing – The railings inside the buildings are made of vertical and horizontal round steel bars.

e) Stair Railings – The stair railings in the building are made of concrete and undulating like the body of Naga.

- **Miscellaneous Elements**

a) Roof support – The free-standing pillars that support the roofs are Built from the base of the buildings. They help bear the weight of the extended eaves.

b) Base moulding – Typical base moulding (commonly made to resemble a lotus petal shape)

- **Landscaping**

The relation between the trees and the building.

There are trees grown along both sides of the connecting walkway. The area close to the building is planted with bushes and shrubs while big trees can be seen further away.

2. The Impression of Thai Characteristics

- **Lightness and Buoyancy**

a) The feeling of lightness and buoyancy from the roof

- The cascading roofs help reduce the size of the roof and give the building the impression of being light and drifting in the air.

- The long eaves from different tiers also support the feeling of lightness and buoyancy.

b) **The feeling of Lightness and Buoyancy from the pillars**

The indented walls around the building give rise to the free-standing pillars, which exude a sense of lightness and buoyancy.

- **The airiness.** The empty space at the terrace at the back of the building makes the building airy.

- **The Cool and Pleasant Atmosphere**

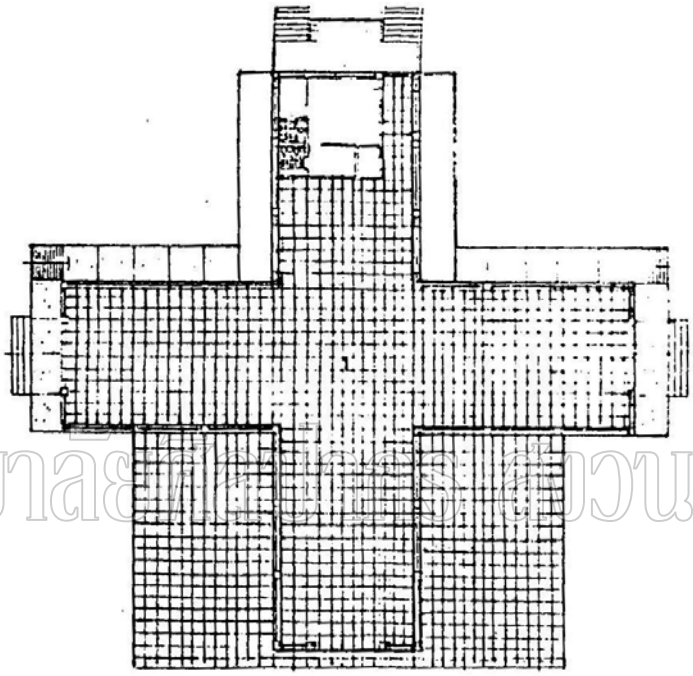
a) The cool and pleasant atmosphere caused by the relation between the trees and the building. Different types of trees can be seen at the walkway and around the buildings. Big trees are also in the vicinity, helping to create the cool and pleasant atmosphere to the place.

b) The cool and pleasant atmosphere from long eaves. All the roofs that cover the building, particularly the hipped roof over all sides of the buildings make the overall area look cool and pleasant.

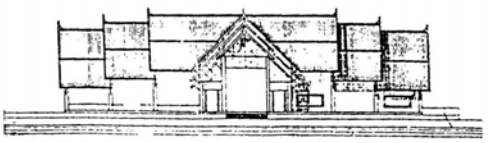
The Golden Jubilee Convention Hall

Location	the University of Khon Kaen, Muang District, Khon Kaen
Owner	the University of Khon Kaen
Architect	Sunthon Tulsuk
Significance	The building is deemed to have architectural values and well recognised by Thai architects.

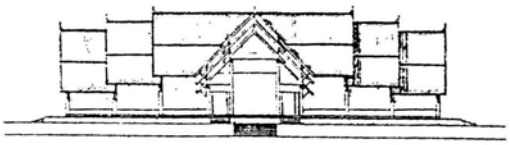
The Analysis of Thai characteristics of the Building



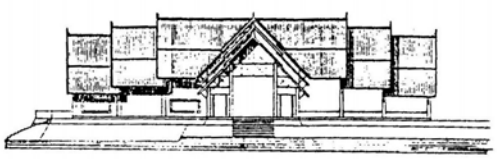
GROUND FLOOR PLAN



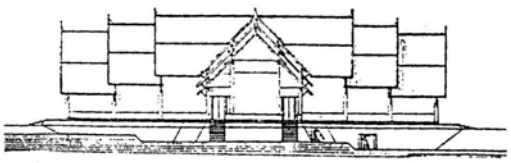
NORTH ELEVATION



EAST ELEVATION



SOUTH ELEVATION



WEST ELEVATION

1. Physical Appearance of Thai Characteristics

- **Building Layout –** Single building
- **Primary Elements**

a) Roof Type – Gable roof
b) Roof Characteristics – multi roofs with cascading tiers. The roof eaves are long. The roofing materials are light green C-PAC Monier tiles.
c) Free-standing pillars - Square pillars

- **Secondary Elements**

a) Shapes and the opening – The building's rectangular openings incorporate barred windows in traditional Ma Huad design.

b) Walls – Inside the building is one big hall. Only the exterior wall at the back of the building is painted white.

c) Flooring materials – The interior floor is marble.

- **Landscaping**

Some trees are growing along the building. There are many big trees in the area.

2. Impression of Thai Characteristics

- **Lightness and Buoyancy**

a) The feeling of lightness and buoyancy from the roof.

- Cascading roofs help reduce the size of the roof and give the building the impression of being light and drifting in the breeze.

- The long eaves from different tiers also add the feeling of lightness and buoyancy.

b) The feeling of Lightness and Buoyancy from the free-standing Pillars.The pillars resemble the free-standing pillars of traditional Thai (Sala) pavilion. They too support a sense of lightness and buoyancy.

- **The airiness from the space**

Since the structural design of this former 25th Anniversary Building is similar to a traditional Thai pavilion, its elevated platform helps make the structure look airy.

- **The Cool and Pleasant Atmosphere**

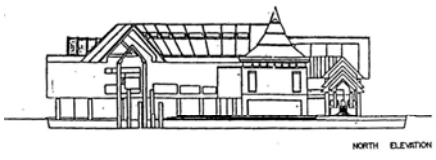
a) The cool and pleasant atmosphere caused by the relation between the trees and the building. A number of trees near the building generate the cool and pleasant atmosphere.

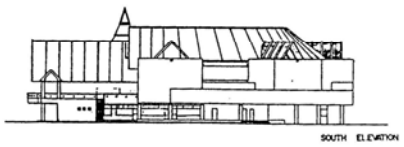
b) The cool and pleasant atmosphere from long eaves. The long eaves that cover every side of the building create the cool and pleasant atmosphere.

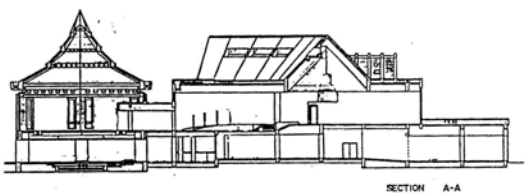
Ayutthaya Historical Center Building

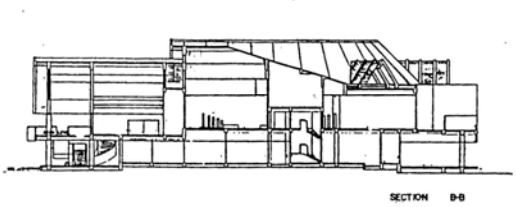
Location	Rojana Road, Ayutthaya Province
Owner	The Ministry of Finance
Architect	Dr. Apichat Wongkaew, Thai Group Company Limited
Significance	Awarded Best Modern Thai Architecture from Mom Chao Vodhyakara Varavarn Foundation and ASA Architectural Design Awards in 1992

The Analysis of Thai characteristics of the Building









1. Physical Appearance of Thai Characteristics

- **Building Layout**
  A group of buildings connected by roofed walkways

- **Primary Elements**

a) Roof Types – The building is mostly covered by gabled roof, except the front building that has a pyramid (Mondop) hipped roof.

b) Roof Characteristics – The front building presents a pyramid roof of multi tiers while the roofs over the walkway entrance are placed on top of one another in succession. The eaves are slightly extended from the pillars and walls. Roofing materials are concrete covered by green ceramic tiles.

c) Free-standing pillars – A number of circular pillars can be seen supporting some parts of the elevated ground floor of the building. The same kind of pillars is also used at the walkway entrance.

d) Space – The space at the terrace in front of the exhibition hall on the second floor is a hall that links with the outside.

- **Secondary Elements**

a) Shapes and the opening. A series of small ventilation holes are in square shape. They can be seen around the front building under the pyramid (Mondop) roof.

b) Walls – The exterior walls are painted white.

c) Railings – The railing system at the walkway entrance and the second-floor terrace consist of a handrail fitted on a low painted concrete wall. The design of the wall incorporates a series of small square openings, each at an equal distance apart.

- **Miscellaneous Elements**

The gables of the roofs over the entrance are made of concrete.

- **Landscaping – the relation between the building and the water**

The building overlooks a pool. The bases of the pillars of some structures such as the main building and the walkway entrance are underneath the water.

2. The Impression of Thai Characteristics

- **Lightness and Buoyancy**

a) Roof characteristics – multi roofs with cascading tiers

The pyramid roof consists of roof tiers placed on top of one another from the largest one at the bottom to the smallest one at the top. Over the building's long walkway entrance are cascading gabled roofs of three tiers, reducing the lengthy look of the roof and creating the feeling of lightness and buoyancy.

b) An elevated platform

The building stands on a raised platform, which supports a sense of lightness and buoyancy.

c) Free-standing pillars

The pillars supporting the raised platform, which is created by an indented wall, make the building look light and floating in the air.

d) The proximity of water – The building appears to stand on a big pool, which adds the feeling of lightness and buoyancy.

- **Airiness**

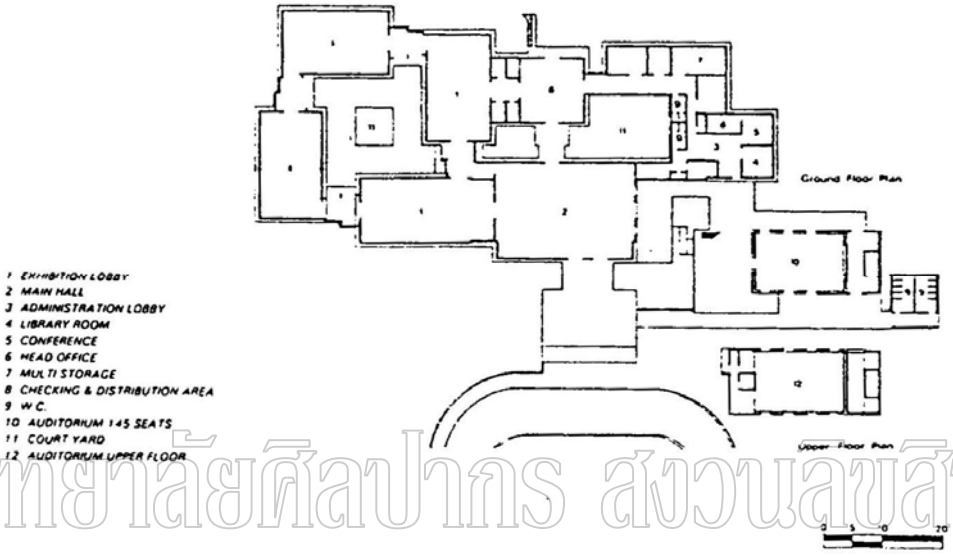
a) Elevated platform – The highly elevated platform imbues the building with a sense of airiness.

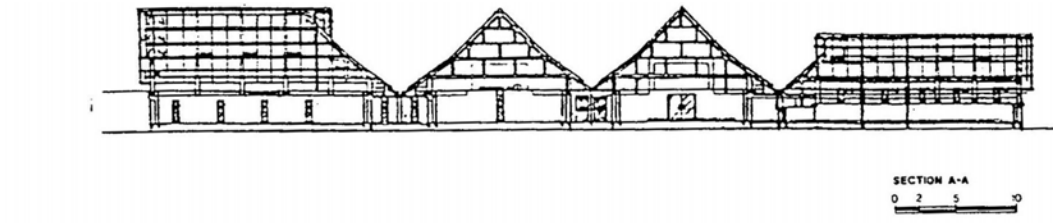
b) The space – The space at the terrace on the second floor makes the building appear airy.

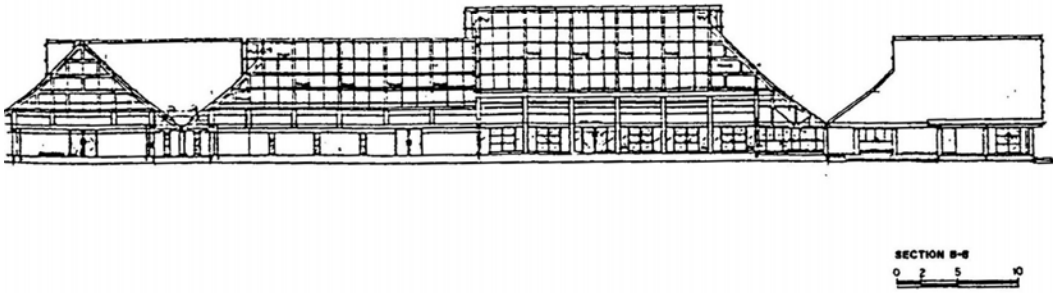
Talang National Museum Building, Phuket

Location	Sri Soonthon Sub district, Ta-Lhang District, Phuket
Owner	Phuket Province and the Fine Arts Department
Architect	Udom Sakulphanich, architect of the Fine Arts Department
Significance	Awarded Best Prize for Outstanding Architecture from ASA Architectural Design Awards in 1987

The Analysis of Thai characteristics of the Building



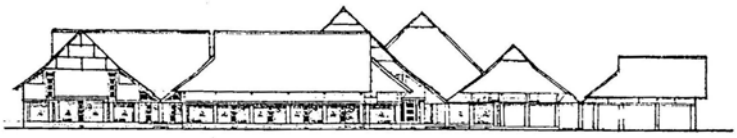




Physical Appearance of Thai Characteristics

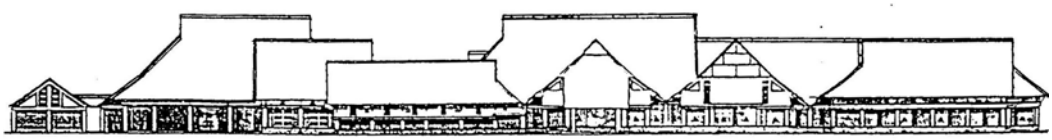
- **Building Layout**
  A group of connected buildings encircling an empty space

ELEVATION 1



ELEVATION 2

ELEVATION 3



ELEVATION 4

- **Primary Elements**

a) Roof Types – Some parts of the buildings have gabled roofs while the others have hipped gable roof (Blanor).

b) Roof Characteristics - The structures have long sloping eaves and are covered with blue tiles similar to C-PAC Monier tiles.

c) Free-standing pillars – There are a number of circular pillars under the elevated platform and along the indented walls.

- **Secondary Elements**

a) Shapes and the opening – A series of high narrow openings can be seen around the museum building.

b) Window – Awning windows

c) Walls – The exterior walls are plastered with a lattice like pattern (Lai Khat Tae). Some parts are simply painted white.

d) Flooring material – The floors at the entrance and the building's base are covered with slate tiles.

- **Miscellaneous Elements**

Pediment motif – brick-like pattern

- **Landscaping –** The relation between the trees and the building

There are some small trees growing near the museum buildings. However, the whole area is surrounded by big trees. These trees blend well with structures.

2. The Impression of Thai Characteristics

- **Lightness and Buoyancy**

a) Roof type - Some parts of the roofs have long eaves, which encourage the feeling of lightness and buoyancy.

b) Elevated Platform – The walkway entrance in front of the museum stands on a raised platform that gives the impression of lightness and buoyancy.

c) Free-standing pillars - The pillars supporting the covered entrance are similar to those of traditional Thai pavilion (Sala). Some pillars are built along the indented walls. These pillars add to the building a sense of lightness and buoyancy.

- **Airiness**

Trees grown around the museum and other tall trees in the area make the place look airy.

- **The Cool and Pleasant Atmosphere**

a) The relation between the trees and the building. Tall trees may be seen around the museum area but they are not as close to the building as bushes and shrubs. However, they help create the cool and pleasant atmosphere.

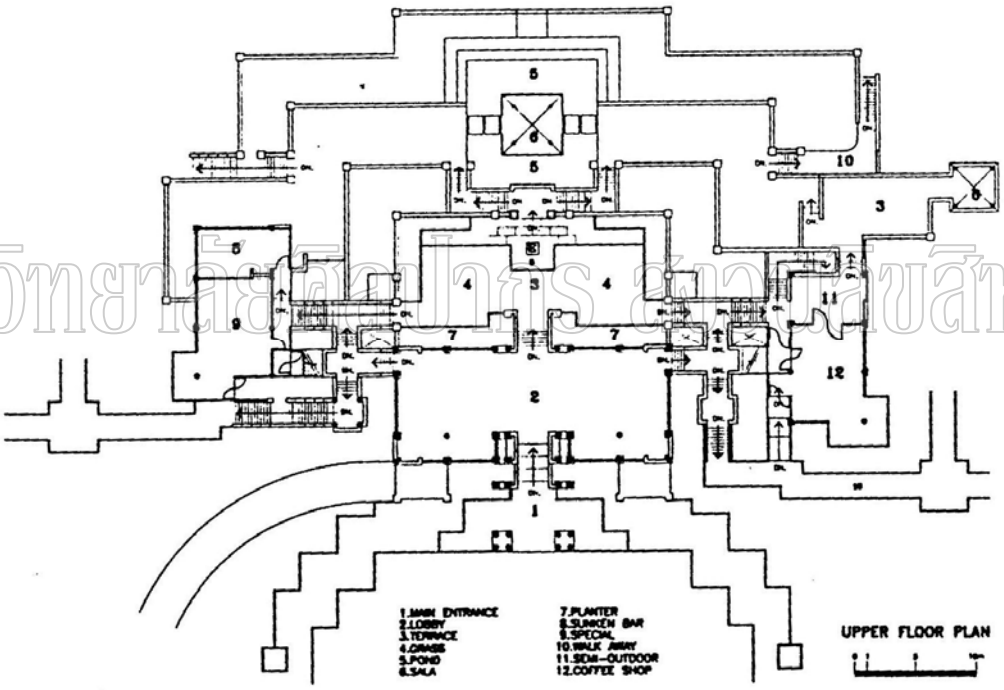
b) Long roof eaves. Each of the museum buildings is covered by one big roof with long eaves. This attribute supplements the cool and pleasant atmosphere.

Hotel and Resort Buildings

Four Seasons Resort, Chiang Mai

Location	Mae Rim district, Chiang Mai
Owner	Mae Rim Terrace Company Limited
Architect	Chulatas Kitibut
Size	6000 square metre, 66 Rai (or about 26 acres)
Significance	Awarded Outstanding Prize for preserving Thai Heritage in 1996 from the Fine Arts Department

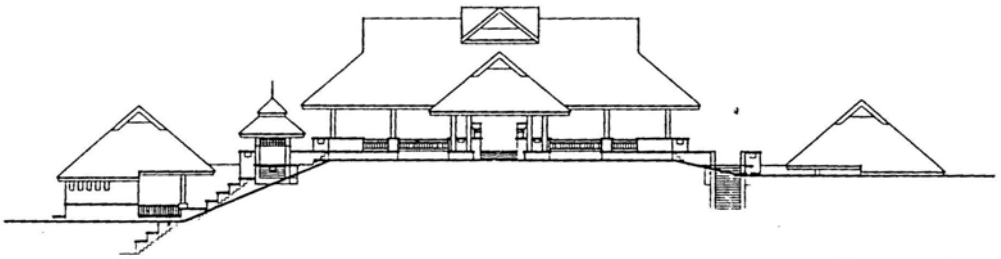
The Analysis of Thai characteristics of the Building



1. Physical Appearance of Thai Characteristics

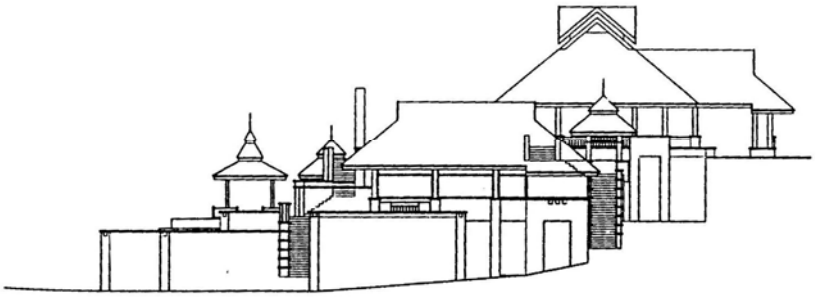
- **Building Layout**

The hotel comprises groups of buildings overlooking a space filled with a swimming pool and terraced rice fields. Each group of the buildings is connected by a walkway.



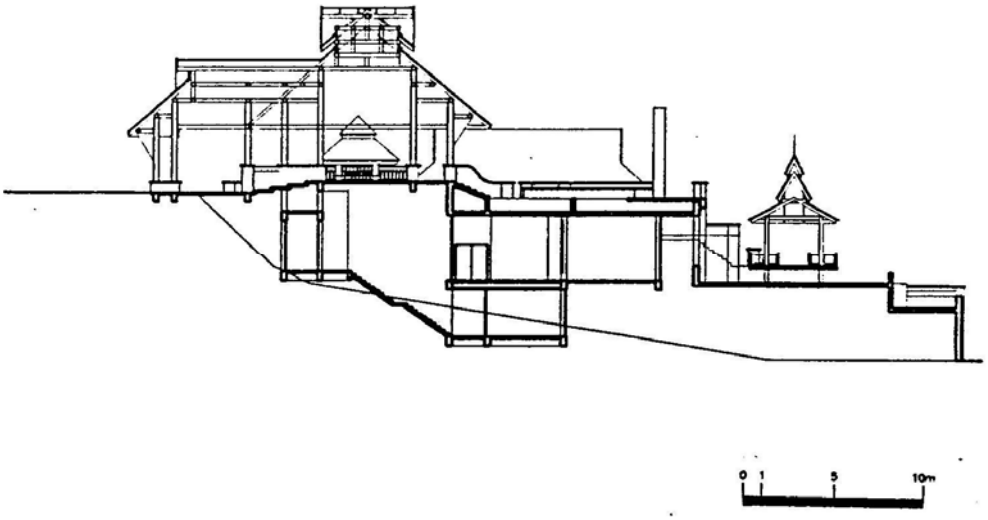
FRONT ELEVATION

0 1 5 10m



SIDE ELEVATION

0 1 5 10m



- **Primary Elements**

a) Roof Type – The buildings are covered by Manila roofs that are decorated by Kalae finials at the top of the gables. Covered by teak shingles, the roofs are steep and long. The pavilion located on the walkway to the swimming pool is topped by 'Chaturamuk' roof (4 cross gabled roof facing 4 directions).

b) Free-standing pillars – Circular pillars are used at the reception hall while the guestroom buildings feature square pillars.

c) The space linking the outside – The uncovered walkways are used to link the reception hall with the groups of guestroom buildings that scatter the hotel area.

- **Secondary Elements**

a) Walls - The exterior walls on the lower part of the buildings are plastered and painted. The walls on the upper part of the buildings are made of horizontally fixed wooden slats.

b) Openings - Casement Windows and trapezoid windows

c) Balustrades and Balusters – The airy balustrades are mounted with vertical balusters.

d) Flooring – The reception hall and the guestrooms have wooden floors while the dining rooms terrace and some parts of the walkway have sandstone floors.

- **Miscellaneous Elements**

a) Kalae – The Kalae finials are well carved.

b) Pediment motif – wooden pediment with louvre style pattern

c) Eave brackets – Eave brackets are used to support long roof eaves.

- **Landscaping**

a) The relation between the building and the water – The buildings are not situated close to the swimming pool.

b) Lotus Pond – A lotus pond near the reception hall is located on the pathway to a restaurant and a gift shop. Traditional lotus bowls are also visible along the walkway.

c) The relation between the trees and the building – Various species of trees are grown around the resort.

2. The Impression of Thai Characteristics

- **Lightness and Buoyancy**

a) The feelings of lightness and buoyancy from the roofs – The long roof eaves of the reception hall make the structure look light and buoyant.

b) The feelings of lightness and buoyancy from the free-standing pillars - The Sala style reception hall hosts a number of free-standing pillars, adding the feeling of lightness and buoyancy.

- **Airiness**

a) The airiness from space – The buildings are spread nicely throughout the resort area. Each group of the buildings is connected by uncovered walkways, which allow unobstructed views of the place and support the feeling of airiness.

b) The airiness from the free-standing pillars – The use of free-standing pillars in the Sala style reception hall, which is not enclosed by walls, generates a sense of airiness.

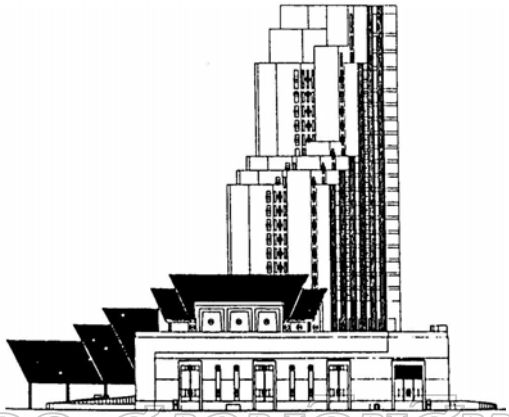
- **The cool and pleasant atmosphere**

Various species of trees are grown around the resort area, giving a refreshing feel to the place.

Sofitel Racha Orchid

Location	Prachasamran Road, Muang District, Khon Kaen
Owner	Hotel Racha Orchid Company Limited
Architect	Interdesign Company Limited
Size	3.2 acres (8 Rai), 25 floors, 300 guestrooms
Significance	The building is published in Art and Idea Magazine

The Analysis of Thai characteristics of the Building



1. Physical Appearance of Thai Characteristics

- **Building Layout**

This is a large property where the land is fully utilised. All the guestrooms occupy the tall building. The common area and the reception are located on the ground floor. Cascading roofs are visible at the walkway to accent the entrance.

- **Primary Elements**

a) Roof Type – Multi tier roofs are used at the walkway entrance and the banquet hall, which is built in Sala style.

b) The space that links the outside. The space in front of the hotel is used as a car park for visitors.

The free-standing pillars that not success because it's looked heavy.

- **Secondary Elements**

a) Walls - Plaster walls with spray paint in granite colour and colour filtered glass walls

b) Opening – awning windows and fixed glass trapezoid windows

c) Balustrades and Balusters – The airy balustrades are mounted with vertical balusters.

d) Flooring - Granite is a flooring material used at the hotel lobby.

- **Landscaping**

a) The relation between the building and the water - There is a Thai style pavilion near the swimming pool.

b) The relation between the trees and the building – There are not trees around the hotel building.

2. The Impression of Thai Characteristics

- **Lightness and Buoyancy**

The walkway to the hotel building and the entrance of the function room are covered by cascading roofs, which give the impression of being light and drifting in the air.

- **The airiness from the space**

According to the survey, there is a big space in front of the hotel building.

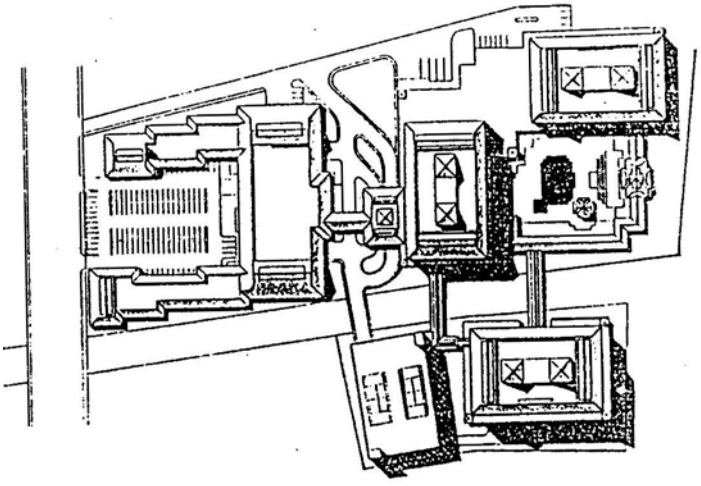
- **The cool and pleasant atmosphere**

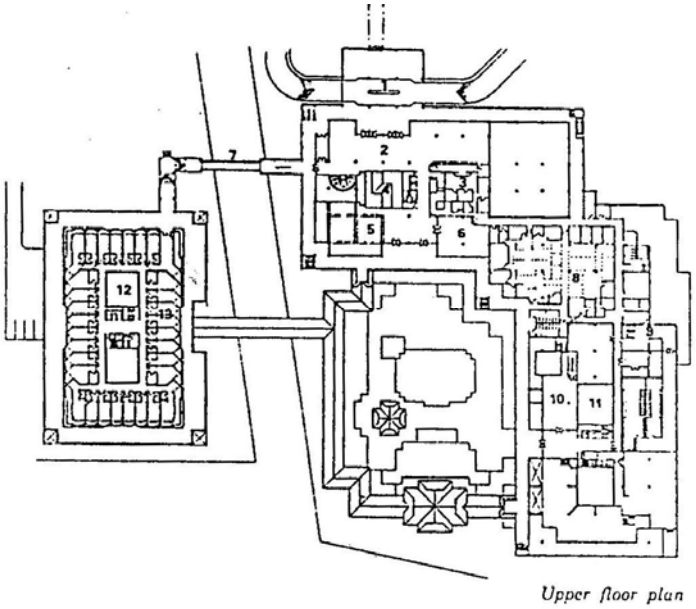
The hotel does not generate much of the cool and pleasant atmosphere because it has limited space and the trees in the area are not fully grown,

Bangkok Marriott Resort and Spa

Location	Charoen Nakorn Road, Klongsarn District, Bangkok
Owner	Marriott Royal Garden Riverside
Architect	Robert G Boughey & Associates Company Limited
Significance	Awarded Consolation Prize for Outstanding Modern Thai Architecture from Mom Chao Vodhyakara Varavarn Foundation and from ASA Architectural Design Awards in 1992

The Analysis of Thai characteristics of the Building



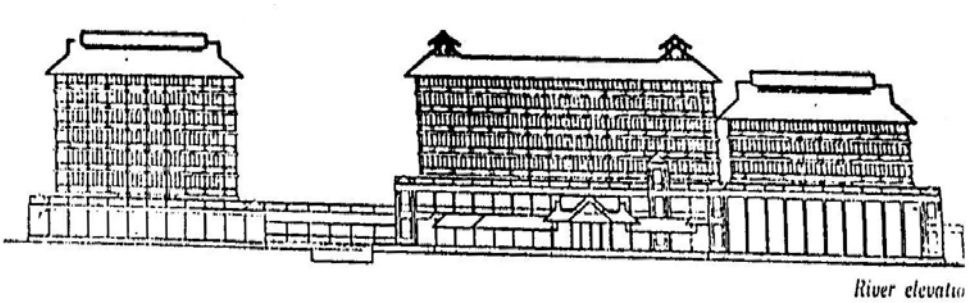


Upper floor plan

1. Physical Appearance of Thai Characteristics

- **Building Layout**

Located on the riverbank of the Chao Phraya River, the hotel is divided into 2 sections; the plaza and the hotel. The plaza area is situated at the entrance of the hotel along the road. The hotel area, which consists of 3 buildings and an outdoor swimming pool, is set facing the river. Each building is linked by a covered walkway.



River elevatio

- **Primary Elements**

a) Roof Type – The 7-storey hotel buildings are topped with hipped gable roofs (Blanor) with long eaves. Roofing materials are red clay tiles. The roof is at the slope of 35 degree. The Thai pavilion at the swimming pool is covered by 'Chaturamuk' roofs of four cross gables facing four directions. Cascading gable roofs are also visible at the outdoor restaurant.

b) Free-standing pillars – The use of the free-standing pillars can be seen throughout the hotel. Many of them are built in a unique Thai style called "Yor Mum Mai Sip Song," in which each sharp corner of the square pillar is replaced by 3 vertical indentations or groves, making a total of twelve indentations. This is evident at the pillars of the covered walkway that links the hotel buildings.

c) The space that links the outside – The space around the first and the second floor is the verandahs (Palai) that lead to the outside. Another big space is located by the river.

- **Secondary Elements**

a) Walls – The brick wall is plastered and painted.

b) Balustrade and balusters – The balusters are made of pieces of decoratively perforated thin wooden slats.

c) Flooring – Polished stone floors are generally used throughout the hotel. Gravel and sandstone floors can be found at the swimming pool while the floor of the empty space by the river features wooden planks and sandstone.

- **Miscellaneous Elements**

Pediment motif – Louvre pattern

- **Landscaping**

a) The relation between the building and the water - The hotel is located on the riverbank of the Chao Phraya River with a canal flowing alongside the buildings.

b) Lotus ponds – Lotus ponds are placed in some areas like the swimming pool in order to create the pleasant atmosphere.

c) Thai pavilion – The hotel takes advantage of its riverside location by building a Thai wooden pavilion (Sala) at the pier to receive visitors who travel to the hotel by boat.

d) Walkways – The buildings are connected by covered walkways and roofed bridges.

e) The relation between the trees and the building – Many trees are grown throughout the hotel, adding the cool and pleasant atmosphere to the place.

2. The Impression of Thai Characteristics

- **Lightness and Buoyancy**

The long roof eaves of the covered walkways and the free-standing pillars along indented walls give a sense of lightness and buoyancy to the buildings.

- **The airiness from building layout**

The layout of a horseshoe shape, where all 3 buildings face a swimming pool and an empty space by the river, makes the place look airy.

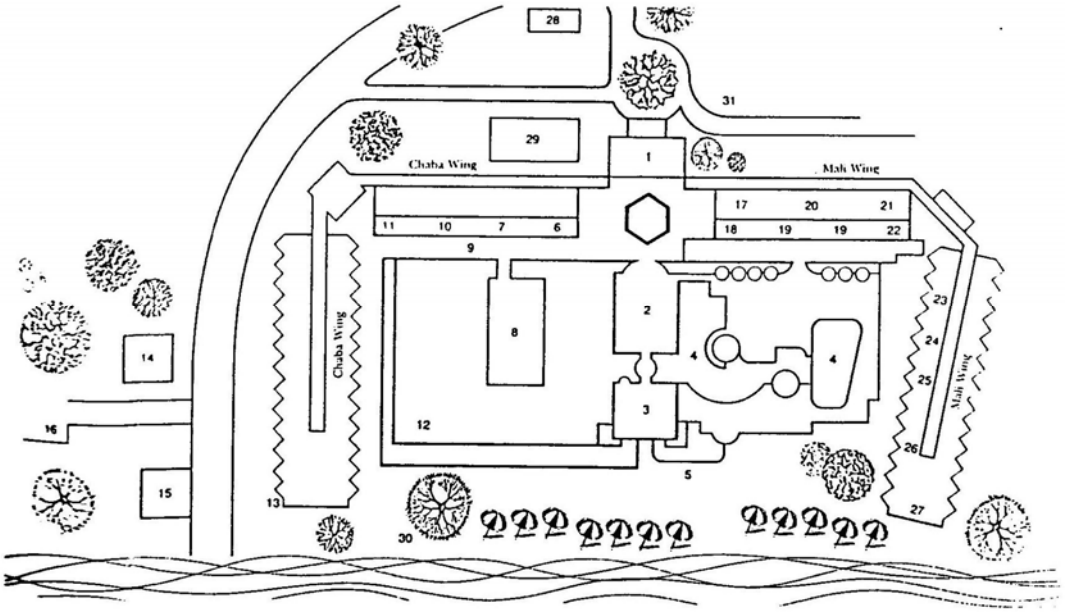
- **The cool and pleasant atmosphere**

A large number of trees, which are visible almost everywhere, make the hotel look cool and pleasant.

Le Meridian Phuket Beach Resort

Location	Karon Noi Beach, Muang District, Phuket
Owner	Le Meridian Phuket Beach Resort
Architect	Moblex Company Limited
Size	464 guestrooms, a meeting room accommodating 700 – 800 people, fresh water and salt water swimming pools
Significance	Awarded Consolation Prize from ASA Architectural Design Awards in 1989

The Analysis of Thai characteristics of the Building



1. Physical Appearance of Thai Characteristics

- **Building Layout**

The hotel buildings are arranged in a U-shape and face the sea. The entrance is situated at the centre of the building. There is a terrace in front of the building that serves as a walkway to a conference room.

- **Primary Elements**

a) Roof Type – The building's entrance is covered by gabled roofs of cascading tiers. One of the buildings next to the swimming pool is covered by a gabled roof, which is topped by a "Chaturamuk" roof (four cross gables facing four directions) and a stupa style pinnacle. Generally, the roofs have a high pitch and long eaves. Roofing materials are green C- PAC Monier tiles.

b) Free-standing pillars – Circular pillars are used at the lobby and along the indented walls of the verandahs.

c) The space that links the outside – Each guestroom opens onto the verandah (Palai). The terrace serves as a link between the conference room and the lobby.

- **Secondary Elements**

a) Walls – White plastered wall

b) Openings – Casement and awning windows are installed in many parts of the hotel buildings. Other parts of the walls have a series of narrow fixed windows arranged at an equal distance from one another.

c) Balustrade and balusters – The airy balustrades are made up of horizontal balusters.

d) Flooring – The interior floor is covered by polished stone in wave like motif. Wash gravels are the flooring material for the walkway.

- **Miscellaneous Elements**

Pediment motif – glass pediment in checked pattern set diagonally at the same degree as the roof

- **Landscaping**

a) The relation between the building and the water – The rear building is in the vicinity of the water while some buildings are projected into the swimming pool.

b) Pool side pavilion and pool pavilion – The restaurants are built in a Thai pavilion style and situated at the middle of the swimming pool.

c) The relation between the trees and the building – The resort is nestled in a sheltered bay and has a backdrop of forested hills.

2. The Impression of Thai Characteristics

- **Lightness and Buoyancy**

a) The feelings of lightness and buoyancy from the roofs. The reception hall is sheltered by multi roofs of cascading tiers and long eaves.

b) The feeling of lightness and buoyancy from the free-standing

pillars. The use of the free-standing pillars in the Sala style reception hall, which is not enclosed by walls, makes the structure look light. The pillars are also visible along the indented walls of the walkway.

c) The feeling of lightness and buoyancy from the proximity to the water. Most of the buildings in the resort are close to the water. Some Sala style structures even stand on the swimming pool. These make the buildings look as if they are floating in the water.

- **Airiness**

a) The airiness from the empty space. The building layout includes an empty space at the swimming pool and the beach area.

b) The airiness from the free-standing pillars. The reception hall, which has no walls and contains free-standing pillars, shows good ventilation.

- **The cool and pleasant atmosphere**

a) Planted trees – The trees around the buildings and the existing trees in the hotel area encourage the pleasant atmosphere.

b) Existing trees – Since the hotel is surrounded by forested hills, it displays the cool and pleasant atmosphere.

Chapter 5

Analysis of the Interviews

The study about characteristic Thai features of Thai architecture is conducted through an interview with two groups of people, which are laymen (users or residents of the buildings) and prominent architects. In this study, three types of buildings are selected; namely residential buildings, buildings of organisations and commercial buildings – particularly hotels and resorts. The information obtained from the interviews will be used as a guide for the study about the acceptance characteristic Thai features between the two groups and for the guidelines for the development of characteristic Thai features.

The summary and the analysis of the opinions given by architects and laymen are given below.

Analysis of the Opinions of the interviewees

1. The analysis of characteristic Thai features from physical architectural characteristics of the surveyed buildings and opinions of the interviewees
2. The summary of characteristic Thai features from physical architectural characteristics of the surveyed buildings and opinions of the interviewees
3. The analysis of the opinions of interviewees about the guidelines for the development of characteristic Thai features of residential buildings, buildings of organisations and commercial buildings - hotels and resorts
4. The summary of the opinions of the interviewees about the guidelines for the development of characteristic Thai features of residential buildings, buildings of organisations and commercial buildings - hotels and resorts

Analysis of Opinions from the interviews

Opinions obtained from interviewing the architects who design the surveyed buildings

Table 5.1 – Opinions received from interviewing users of the surveyed buildings

Questions	Analysis of Opinions
1. Is there any characteristic Thai feature available in your building? If yes, what are they?	Characteristic Thai features observed by every user of the surveyed buildings are shown below: - The roofs of the buildings reflect regional characteristics. - Using modern construction materials

	with Thai style buildings creates an overall image of characteristic Thai features.
2. Are the overall characteristic Thai features mentioned earlier appropriate?	The users of buildings think that the overall characteristic Thai features are appropriate due to the following reasons: - It is practical for the buildings. -The physical appearance of the buildings reflects indigenous characteristic Thai features in respective regions. -The design of the building is suitable to the surroundings and climate of the region
3. What are outstanding components that reflect characteristic Thai features of the buildings?	The users of the surveyed buildings give the following components that reflect characteristic Thai features of the buildings as follows: 1. The layout of the buildings - A single building - A group of buildings surrounding a garden - A group of buildings connected by a walkway 2. Primary elements - Roof - Free-standing pillars - space connecting with the outer area of the building(e.g.verandah or *Palai*) 3. Secondary elements - Shapes and openings - Walls - Flooring materials - Balustrades and railings of the terrace 4. Miscellaneous elements - A gable roofed gateway built to indicate the entrance - Space with gable gateway - Eave brackets - Imitation of the assembly of woodwork - Skirting boards 5. Landscaping - The relationship between the building and the water - Shapes of ponds - Flooring materials - The relationship between the trees and the building

4. What is the ambiance or the impression brought about by characteristic Thai features in the surveyed buildings?	The users of the surveyed buildings describe the ambiance or impression they receive from characteristic Thai features as follows: 1. Lightness and buoyancy emanating from; - Additional porches, tiered roofs and long eaves - Free-standing pillars in Thai pavilions (*Sala*) and a series of free-standing pillars along the walls that have been set back. - The water is next to the building 2. A sense of airiness brought about by - An elevated platform - Open ground or space surrounded by buildings and space in the verandah 3. A cool and pleasant atmosphere created by: - The relationship between the trees and the building - Long eaves
5. What does a characteristic Thai feature mean in your opinion?	The users of the surveyed buildings generally describe a characteristic Thai feature as an application of modern materials – whether it be from foreign countries or within the country - in Thai style buildings, and which are also practical for the buildings.
6. Is it appropriate to incorporate characteristic Thai features in this type of the building?	Users of the surveyed buildings mostly agree that it is appropriate to build the surveyed buildings that reflect characteristic Thai features because it represents Thai identity and shows local style. Some users of the buildings comment that the design for the buildings with characteristic Thai features should be in agreement with the purpose of the buildings. – The buildings that suit the climate of the country

Opinions Obtained from interviewing the prominent architects

There are 10 buildings selected for the study of characteristic Thai features in residential buildings, buildings of organisations and hotels and resorts. The study includes an interview with 10 prominent architects, who have one of the following qualifications.

- Be a judge of the Association of Siamese Architects for Best Architecture Awards for the surveyed buildings
- Have written articles about Thai architecture in academic journals
- Have designed the buildings

Each architect is asked the same questions. An analysis of their response is given in the table below.

Table 5.2 – Opinions received from interviewing the prominent architects

Questions	Analysis of Opinions
1. Are there characteristic Thai features available in the surveyed buildings? If yes, what are they?	- Characteristic Thai features in the surveyed buildings observed by most prominent architects are shown below: - Regional characteristic Thai features shown in roofs, size and proportion appropriate to the buildings - Overall atmosphere or impression created by characteristic Thai features such as a sense of lightness caused by tiered roofs, a sense of airiness created by space connecting to the outer area of the buildings. - These characteristics are adapted from the traditional forms of residential and religious buildings and created by the use of modern materials and technology suitable for the style of modern buildings. - Some prominent architects comment that some buildings have too many traditional characteristics. However, they agree that the buildings overall represent characteristic Thai features, which are created by the use of modern materials.
2. Are the overall characteristic Thai features mentioned earlier appropriate?	- The prominent architects agree that the overall image of characteristic Thai features is appropriate due to the following reasons: - The designs of the buildings reflect regional Thai architecture. - The buildings are in harmony with the natural surroundings and climate. - The design is practical to the use of the buildings.

3. What are outstanding components that reflect characteristic Thai features of the buildings?	- The prominent architects give the following components that reflect characteristic Thai features of the buildings as follows: 1. The layout of the buildings - A single building - A group of buildings surrounding a garden - A group of buildings connected by a walkway 2. Primary elements - Roof - Free-standing pillars - space connecting with the outer area of the building (e.g. verandah or *Palai*) 3. Secondary elements - Shapes and openings - Walls - Flooring materials - Balustrades and railings of the terrace 4. Miscellaneous elements - A gable roofed gateway built to indicate the entrance - Space with gable gateway - Eave brackets - Imitation of the assembly of woodwork - Skirting boards - Concrete work to imitate the assembly of woodwork 5. Landscaping - The relationship between the building and the water - Shapes of ponds - The relationship between the trees and the building
4. What is the ambiance or the impression brought about by characteristic Thai features in the surveyed buildings?	- The prominent architects describe the ambiance or impression they receive from characteristic Thai features as follows: 1. Lightness and buoyancy emanating from - Additional porches, tired roofs and long eaves - Free-standing pillars in Thai pavilions (*Sala*) and a series of free-standing pillars along the walls that have been set back. - The water is next to the building 2. A sense of airiness brought about by

	- An elevated platform - Open ground or space surrounded by buildings and space in the verandah 3. A cool and pleasant atmosphere created by: - The relationship between the trees and the building - Long eaves
5. What does a characteristic Thai feature mean in your opinion?	- Most architects give similar description about characteristic Thai features. They refer to it as an adaptation or a simplification of traditional Thai architectural forms in the buildings. It can be a reproduction of the overall ambiance or impression of Thai architecture by using appropriate materials and technology in order to: - be practical to the use of the buildings and in harmony with current lifestyle of people. - suit the climate and the surroundings of each region of Thailand - save energy consumption and be easy to maintain. - blend in with local culture and customs of each region
6. Since you were a judge of the Association of Siamese Architects for Best Architecture Awards, do you think the building is awarded because of their overall appearances or some valuable architectural characteristics, including the impression created by characteristic Thai features?	- Some prominent architects comment that characteristic Thai features are influenced by the investments, the economic situation of the country and the financial situation of the projects. - Prominent architects, who were a judge, stated that the award winning buildings are judged by the following criteria: - The appropriate layout of the buildings and interior space management in the buildings - The harmonious appearance of the buildings, the surroundings and climate - The presentation of characteristic Thai features created by architects who design the buildings - The prominent architects state that the award winning buildings display characteristic Thai features, which are regional architectural characteristics such as roofs, size and appropriate shapes of the

	buildings.
7. Is it appropriate to incorporate characteristic Thai features in this type of the building?	- The prominent architects identify physical characteristic Thai features of the award winning buildings as follows: - Roofs - Long eaves - Free-standing pillars - Openings - Open space that serves as a verandah - Railings with vertical bars - Prominent architects identify the impression created by characteristic Thai features of the award winning buildings as follows: - A sense of airiness emanating from space management (e.g. verandahs, corridors and the open space on the ground floor of the buildings) - A cool and pleasant atmosphere brought about by the relationship between the trees and the buildings (e.g. trees planted near the buildings) - The prominent architects mostly agree that it is appropriate to build the surveyed buildings that reflect characteristic Thai features because: - It supports the development of traditional architectural forms and reflects local culture of each region. - It creates new designs, which can be further developed in future. - It makes architects realise the value of Thai architecture, rather than mainly coping foreign architectural styles Some prominent architects state that the decision to incorporate characteristic Thai features in the buildings should be judged by: - the types of traditional architectural forms, which should correspond with the type and status of the place - cost effectiveness
8. Have you ever writing an article about characteristic Thai features of modern buildings?	- Most prominent architects have never written an article about characteristic Thai features of modern buildings.
9. What are the guidelines for the development of characteristic Thai	- The guidelines for the development of characteristic Thai features given by most

features for this type of buildings?	prominent architects are shown below: - Adapt or simplify indigenous architectural features in the design of buildings in the respective regions. Try to create the Thai ambiance by using space connecting to the outer area of the buildings. - Use modern materials and technology that are suitable to the design of the buildings. Simple materials with fine surface are recommended (e.g. traditional Thai roofs) - Use modern materials and technology for energy efficiency in the buildings. - Design the buildings that are in harmony with the climate. For example, the buildings should facilitate air flow and have long eaves and a wide verandah for weather protection. - Explore traditional architectural characteristics of each region more deeply in order to apply those characteristics or the ambiance in the design appropriately. - Some prominent architects comment that the development of characteristic Thai features should be practical to the type of the buildings and support current life style of people. - Some prominent architects give guidelines for the development of characteristic Thai features as follows: - Use symbols of characteristic Thai features in the design, in stead of imitating the old features - Apply interior design to create the Thai ambiance (e.g. Thai motif) - Thai architects should appreciate the value of Thai architecture and try not to imitate foreign architecture. - Some prominent architects comment that the types and the size of buildings are important factors for the development of characteristic Thai features such as openings, indented corners and the reduction of the size of the roof - Some prominent architects think that there is no fixed rule about the development of Characteristic Thai features. It depends on: - Knowledge and experience of architects - Purpose of the building

Summary of the Opinions of the Interviewees Based on the Same Questions

Table 5.3 shows the summary of the agreements and the differences of opinions between users of the buildings and prominent architects – based on the same set of questions

The next chapter will discuss the questions about physical architectural characteristics and the impression of characteristic Thai features and the guidelines for the development of characteristic Thai features.

Table 5.3 - Summary of the Opinions of Interviewees

Questions	Analysis of Opinions
- Are there characteristic Thai features available in the surveyed buildings? If yes, what are they?	- Both groups of interviewees agree that the surveyed buildings demonstrate characteristic Thai features of regional architecture, particularly the style of the roofs. - The architects comment that regional architectural characteristics can also be shown by proportionate shapes and sizes of the buildings. - The users of the buildings and the prominent architects agree that construction materials and technology, when used properly, can enhance the characteristic Thai features. - The prominent architects further comment that the overall characteristics of the buildings can be derived from the ambiance or the impression towards the buildings such as a sense of lightness brought about by tiers of roofs. - The prominent architects add that some of the surveyed buildings may bear too much resemblance to the old architecture. However, modern materials used in other sections of the buildings help to maintain characteristic Thai features.
- Are the overall characteristic Thai features mentioned earlier appropriate?	- Both groups of interviewees agree that the overall image of characteristic Thai features is appropriate due to the following reasons: - The designs of the buildings reflect regional Thai architecture. - The buildings are in harmony with the natural surroundings and climate. - The design is practical to the use of the buildings.

- What does a characteristic Thai feature mean in your opinion?	- Both groups of interviewees agree that characteristic Thai features mean an adaptation or a simplification of traditional Thai architectural forms in the buildings. It can be a reproduction of the overall ambiance or impression of Thai architecture, which is in line with: - modern materials and technology - the use of the buildings and current lifestyle of people
- Is it appropriate to incorporate characteristic Thai features in the design of the building?	- The prominent architects also comment that characteristic Thai features should correspond with local art and culture - The prominent architects add that characteristic Thai features should support energy saving practice and be easy to maintain. - Both groups of interviewees agree with the idea of incorporating characteristic Thai features in the design of the buildings is appropriate. It is because buildings that house organisations represent social and cultural identities of the country. Therefore, it is necessary for these buildings to showcase Thai architectural characteristics and local culture in respective regions. - The prominent architects and the users of the buildings agree that the use of the buildings, size and proportions of the buildings and the climate are important factors in the design of characteristic Thai features. - The prominent architects further comment that architects should be careful and sensitive about the status the nature of traditional architectural forms that will be used or adapted in the design of the buildings housing organisations. - The prominent architects add that the design of the buildings with appropriate characteristic Thai features will support the creation of new architectural forms for further development.

Analysis of the Interviews for Use in the Quesionnaire

Analysis of Characteristic Thai Features from the Study of Physical Architectural features of the Surveyed Buildings and the Opinions of Interviewees

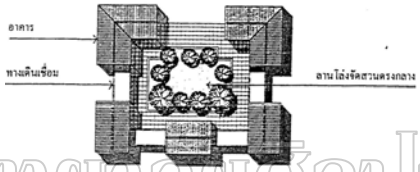
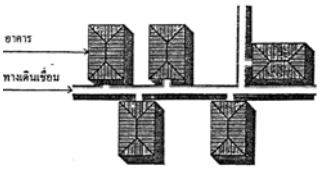
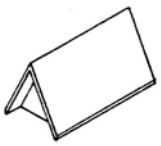
The study of the opinions about characteristic Thai features of the surveyed buildings involves the interviews of two groups of people; namely the users of the buildings and the prominent architects. Each group consists of ten people. The characteristic Thai features included in the questionnaire are based on the opinions of the prominent architects. This is because the prominent architects can identify characteristic Thai features in every surveyed building while the users of the buildings can identify Thai features only in the buildings that they use or reside.

The analysis of characteristic Thai features from physical architectural features of the surveyed buildings and the opinions of interviewees, thus, corresponds with the study of physical architectural characteristics of the surveyed buildings and the opinions of the prominent architects. The study includes traditional architectural features that are mentioned by at least five prominent architects. These features will be used in the questionnaire, aimed at studying the opinions of architects and laymen about the characteristic Thai features. The detail of the study is discussed below.

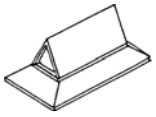
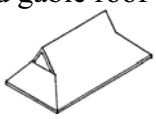
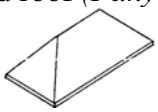
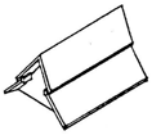
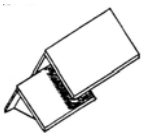
Physical Appearances of Characteristic Thai features

The study of physical characteristics of Thai architecture in the surveyed buildings and the data from the interviews provides a collection of physical characteristic Thai features, which will be used in creating the questionnaire.

Table 5.4 shows physical characteristic Thai features in the surveyed buildings and mentioned by interviewees

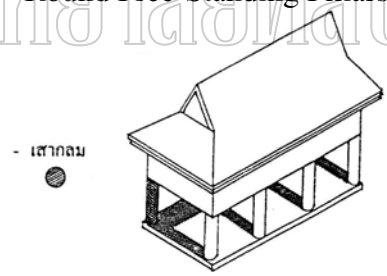
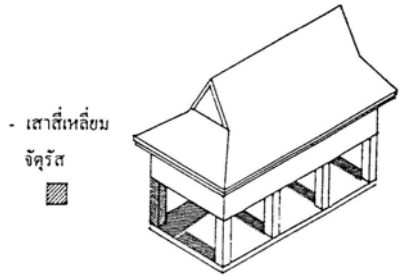
Physical Characteristic Thai features in the surveyed buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
1. Layout of Buildings 1.1 A single building 	2	3
1.2 A group of buildings surrounding a garden  	2	(7)
1.3 A group of buildings connected by a roofed walkway  	2	(7)
2. Primary Elements *2.1 Shapes of roofs* - Gabled roof 	7	(7)

( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Physical Characteristic Thai features in the surveyed buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
- Gabled roof with kicked eave (*Chua Peek Nok Roof*) 	1	(7)
- Hipped gable roof *(Blanor)* 	5	(7)
- Hipped roof *(Panya)* 	1	(6)
- Conical spired roof *(Mondop)* 	1	(6)
2.2 Characteristics of Thai Style Roofs		
- Tiered roofs 	4	(8)
- A reduction of the size of the roof 	3	(8)
- Long roof eaves 	7	(8)
- Short roof eaves 	2	(6)

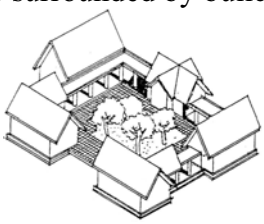
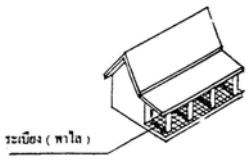
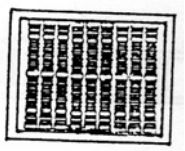
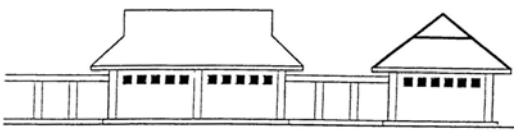
( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Table 5.4 shows physical characteristic Thai features in the surveyed buildings and mentioned by interviewees (continued)

Physical Characteristic Thai features in the surveyed buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
2.3 Roofing materials		
- Earthenware tiles	2	(6)
- Double barrel tiles	1	(6)
- CPAC Monier tiles	2	(7)
- Concrete roof with ceramic tiles	-	(6)
2.4 Roof colours		
- Red	1	(7)
- Orange	3	(7)
- White	-	(6)
- Blue	-	(6)
- Brown	1	(7)
- Light green	-	(6)
2.5 Free-Standing Pillars		
- Round Free-Standing Pillars 	7	(7)
- Indented Square Free-Standing Pillars 	3	(6)

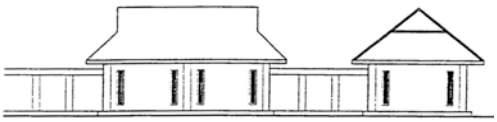
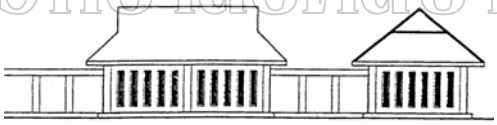
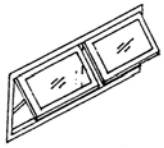
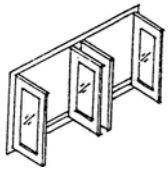
( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Table 5.4 shows physical characteristic Thai features in the surveyed buildings and mentioned by interviewees (continued)

Physical Characteristic Thai features in the surveyed buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
2.6 Space connecting with the outer area of the building - Space surrounded by buildings 	3	(7)
- Verandah or *Palai*  	3	(7)
- CPAC Monier tiles	2	(7)
- Concrete roof with ceramic tiles	-	(6)
3. Secondary Elements *3.1 Shapes and Openings* - Rectangular window with bars (*Look Mahuad)* 	1	2
- A Series of Small Square Ventilation Holes 	1	(7)

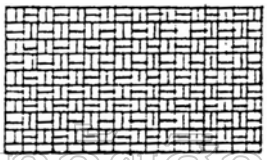
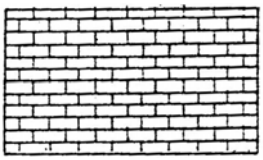
( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Table 5.4 shows physical characteristic Thai features in the surveyed buildings and mentioned by interviewees (continued)

Physical Characteristic Thai features in the surveyed buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
- A Series of Single High Narrow 	2	(7)
- A Series of Twin High Narrow Openings 	2	(7)
- High Narrow Openings, close together 	3	(7)
3.2 Types of Window (how the window is opened)		
- Awning Window *(Ban Krathung)* 	2	(6)
- Casement Window *(Ban Perd)* 	2	(6)

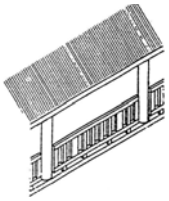
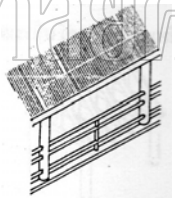
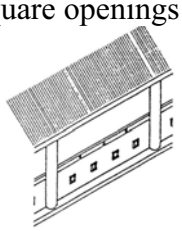
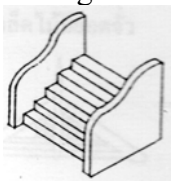
( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Table 5.4 shows physical characteristic Thai features in the surveyed buildings and mentioned by interviewees (continued)

Physical Characteristic Thai features in the surveyed buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
3.3 Wall		
- White plaster walls 	2	(7)
- Plastered walls with a lattice-like pattern 	1	(6)
- Masonry walls 	2	(6)
3.4 Flooring Materials		
- Wood flooring	1	(6)
- Earthenware Tiles	3	(7)
- Polished Stone	1	(6)
- Slate Tiles	1	2
- Marble Tiles	2	3

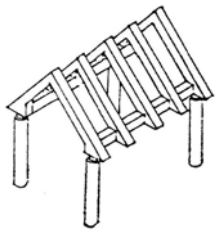
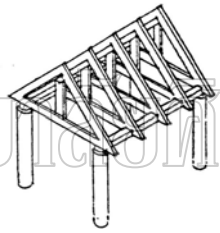
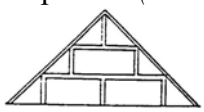
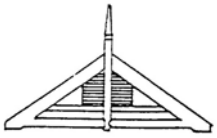
( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Table 5.4 shows physical characteristic Thai features in the surveyed buildings and mentioned by interviewees (continued)

Physical Characteristic Thai features in the surveyed buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
3.5 Balustrades and Railings of a terrace		
- A railing with vertical wooden bars 	1	4
- A railing with vertical concrete bars 	3	(6)
- A railing with horizontal iron bars 	-	4
- A low railing wall with a series of Small square openings 	1	(6)
3.6 Balustrades and Railings of stairs		
- Circular concrete railings resembling the body of Naga 	1	3

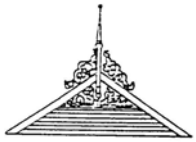
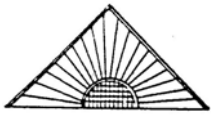
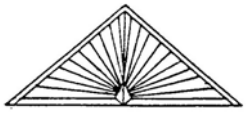
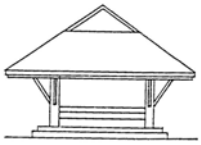
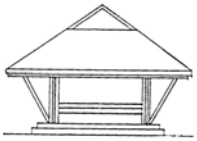
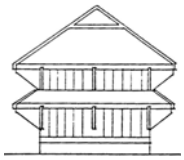
( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Table 5.4 shows physical characteristic Thai features in the surveyed buildings and mentioned by interviewees (continued)

Physical Characteristic Thai features in the surveyed buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
4. Miscellaneous Elements		
4.1 Building a gable roofed gateway to indicate the entrance to the building		
- Concrete gable roofed gateway 	2	(7)
- Wooden gable roofed gateway 	2	(7)
4.2 Pediment Motif		
- Brickwork pattern *(Lai Luk Fak)* 	1	(6)
- Louvre style motif *(Lai Tee Kred Mai)* 	2	(6)
- Louvre style motif with gable top *(Lai Tee Kred Mai Mee Yod Chua)* 	1	(6)

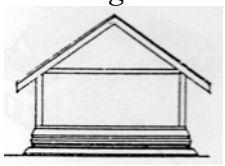
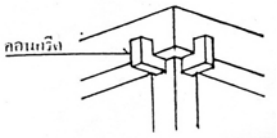
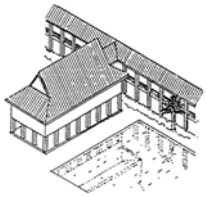
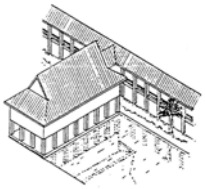
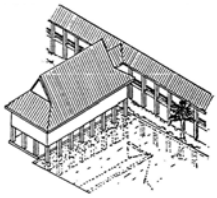
( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Table 5.4 shows physical characteristic Thai features in the surveyed buildings and mentioned by interviewees (continued)

Physical Characteristic Thai features in the surveyed buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
- Perforated wood with gable top *(Lai Kae Mai Chalu Mee Yod Chua)* 	1	(7)
- Sunray motif 	1	(6)
- *Lai Ta Wane* 	1	(6)
4.3 Eave Brackets		
- Wooden Eave Brackets with one side against the middle of the pillar 	2	(7)
- Wooden Eave Brackets with one side against the base of the pillar 	1	(6)
- Eave Brackets made from concrete that has been reinforced with steel rods 	1	(6)

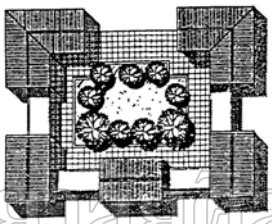
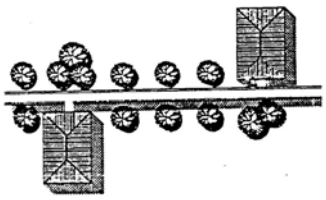
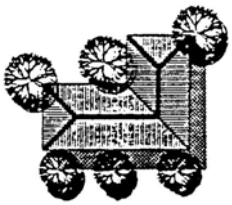
( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Table 5.4 shows physical characteristic Thai features in the surveyed buildings and mentioned by interviewees (continued)

Physical Characteristic Thai features in the surveyed buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
4.4 Wall's skirting boards 	2	3
4.5 Using concrete to imitate the assembly of woodwork 	1	4
5. Landscaping		
5.1 The relationship between the building and the water		
- Water near the building 	2	(6)
- Water next to the building 	2	(8)
- Pillars of building partly submerged in water 	2	(6)

( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Table 5.4 shows physical characteristic Thai features in the surveyed buildings and mentioned by interviewees (continued)

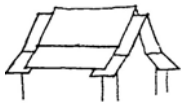
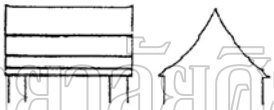
Physical Characteristic Thai features in the surveyed buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
5.2 Pool's shapes		
- Square shape pool with indented corners	1	4
- Rectangular shape pool	1	-
5.3 The relationship between the tress and the building		
- Trees located on open ground surrounded by the building	2	(7)
		
- Trees flanking both sides of the walkway of the building	1	(7)
		
- Trees located near the building	1	(6)
		

( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Impression Created by Characteristics of Thai Architecture

The study of physical characteristics of Thai architecture in the surveyed buildings and the data from the interviews provides a list of the impression created by characteristic Thai features, which will be used in creating the questionnaire.

Table 5.5 shows the impression created by Characteristics of Thai Architecture in the Surveyed Buildings and mentioned by interviewees

Impression Created by Characteristics of Thai Architecture in Surveyed Buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
1. Lightness and buoyancy		
1.1 A Sense of Lightness and Buoyancy emanating from the Roof		
- A reduction of the size of the roof 	3	(7)
- Tiered roof 	3	(7)
- Long roof eaves 	5	(7)
1.2 A Sense of Lightness and Buoyancy emanating from		
- An elevated platform	4	(7)
- Free-Standing Pillars found in Thai Pavilions (*Sala)*	5	(7)
- Free-Standing Pillars Along the Walls that Have Been Set Back	4	(7)
1.3 A Sense of Lightness and Buoyancy emanating from		
- Water next to the building	2	(7)
- Water near the building	1	(7)

( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Table 5.5 shows the impression created by Characteristics of Thai Architecture in the Surveyed Buildings and mentioned by interviewees (continued)

Impression Created by Characteristics of Thai Architecture in Surveyed Buildings	Number of People Who Mentioned Characteristics Thai Features of the Surveyed Buildings	
	Users of Buildings	Prominent Architects
2. Airiness		
2.1 A Sense of Airiness brought about by an Elevated Platform	4	(7)
2.2 Airiness brought about by Space		
- Open ground surrounded by a group of buildings	2	(7)
- The effect of a verandah or *Palai*	6	(7)
3. A Cool And Pleasant Atmosphere		
3.1 A cool and pleasant atmosphere arising from the relationship between the trees and the building		
- Big trees planted on open ground surrounded by buildings	1	(7)
- Trees planted near the building	4	(7)
- Trees planted far from the Buildings	2	(6)
3.2 A Cool And Pleasant Atmosphere from long eaves	6	(8)

( ) - Characteristic Thai features that are mentioned by at least five prominent architects will be included in the questionnaire.

Summary of an Analysis of Characteristic Thai features found in the surveyed buildings and from Opinions of Interviewees

According to the study of surveyed buildings and opinions of interviewees, a summary of characteristic Thai features based on their physical appearance and impression is shown below. This information will be used in the questionnaire for target groups; namely, architects and laymen.

1. *Physical Appearance of Characteristic Thai Features*

The Layouts of the Building that will be featured in the questionnaire are

- A group of buildings surrounding a garden
- A group of buildings connected by a roofed walkway

2. *Primary Elements that will be used in the questionnaire are*

- *Shapes of Roofs*
  - Roof type: Gabled roof, Gabled roof with kicked eave (*Chua Peek Nok Roof*), Hipped gable roof *(Blanor),* Hipped roof *(Panya)* and Conical spired roof *(Mondop)*
  - Characteristics of Roof: tiered roofs, a reduction of the size of the roof, long roof eaves and short roof eaves.
  - Roofing materials: Earthenware tiles, Double barrel tiles, CPAC Monier tiles and Concrete roof with ceramic tiles
  - Roof colours: red, orange, white, blue, brown and light green
- *Free-Standing Pillars:* round free-standing pillars and square free-standing pillars
- *Space connecting with the outer area of the building:* space surrounded by buildings and Verandah or *Pala*

3. *Secondary Elements*

Secondary elements that will be featured in the questionnaire are

- *Shapes and Openings:* a series of small square ventilation holes, a series of single high narrow openings, a series of twin high narrow openings and High Narrow Openings that are close together.
- *Types of Window (how the window is opened):* awning window *(Ban Krathung) and* casement window *(Ban Perd)*
- *Walls:* white plaster walls, plastered walls with a lattice-like pattern and masonry walls
- *Flooring Materials:* wood flooring, earthenware tiles and polished stone floors
- *Balustrades and Railings of a terrace:* a railing with vertical concrete bars and a low railing wall with a series of small square openings

4. Miscellaneous Elements

Miscellaneous elements that will be featured in the questionnaire are

- *A gable roofed gateway to indicate the entrance to the building*: a concrete gable roofed gateway and a wooden gable roofed gateway
- *Pediment Motif:* brickwork pattern *(Lai Luk Fak),* louvre style motif *(Lai Tee Kred Mai),* louvre style motif with gable top *(Lai Tee Kred Mai Mee Yod Chua)*, sunray motif and Ta Wane motif (*Lai Ta Wane)*
- *Eave Brackets:* wooden eave brackets with one side against the middle of the pillar, wooden eave brackets with one side against the base of the pillar and eave brackets made from concrete that has been reinforced with steel rods

5. Landscaping

Landscaping elements that will be featured in the questionnaire are

- *The relationship between the building and the water*: water near the building, water next to the building and pillars of building partly submerged in water
- *The relationship between the tress and the building:* trees located on open ground surrounded by the building, trees flanking both sides of the walkway of the building, trees located near the building and trees located far from the building

Impression created by characteristic of Thai architecture

- Lightness and buoyancy

Lightness and buoyancy elements that will be featured in the questionnaire are

a) A Sense of Lightness and Buoyancy emanating from the Roof
   - Tiered roofs
   - A reduction of the size of the roof
   - Long roof eaves

b) Lightness and buoyancy emanate from
   - An elevated platform
   - Free-standing pillars found in Thai Pavilions (*Sala)*
   - Free-standing pillars along the walls that have been set back

c) Lightness and buoyancy emanate from
   - having water next to the building
   - having water near the building

- Airiness

  Airiness elements that will be featured in the questionnaire are
  a) A sense of airiness brought about by an elevated platform
  b) A sense of airiness brought about by space
     - Open ground surrounded by a group of buildings
     - The effect of a verandah or *Palai*

- A Cool and Pleasant Atmosphere

  Elements of a cool and pleasant atmosphere that will be featured in the questionnaire are
  a) A Cool and Pleasant Atmosphere Arising from the relationship between the trees and the building
     - Big trees planted on open ground surrounded by buildings
     - Trees planted near the buildings
     - Trees planted far from the buildings
  b) A Cool and Pleasant Atmosphere from long eaves

Analysis of the Opinions of Interviewees about the Guidelines for the Development of Characteristic Thai Features of Contemporary Architecture in Future

The tables below show the guidelines for the development of characteristic Thai features of contemporary architecture in future. The guidelines are from the analysis of the opinions of prominent architects who participate in an interview.

Table 5.6 Opinions of Interviewees about the Guidelines for the Development of Characteristic Thai Features of Future Architecture of Buildings Housing Organisations

Guidelines for the Development of Characteristic Thai Features of Future Architecture of Buildings Housing Organisations	Opinions of Interviewees	
	Architects of the Building	Prominent Architects
1. Application of Thai Architectural Characteristics in the Design		
1.1 Incorporate physical elements of traditional Thai architecture in the design to create new Thai characteristics		
- Incorporate traditional architectural features in the design by using modern materials and construction technology	●	●
- Incorporate architectural elements of religious structures in the design such as the use of openings and indented corners	●	●
- Adapt characteristics of residential structures in the design such as the use of the layout of traditional Thai houses	●	●
- Use symbols of characteristic Thai features in the design, in stead of imitating the old features	●	●
1.2 Apply the impression created by Thai architectural characteristics in the design	●	●

● = Opinion is given. O = No opinion

Table 5.6 Opinions of Interviewees about the Guidelines for the Development of Characteristic Thai Features of Future Architecture of Buildings Housing Organisations (continued)

Guidelines for the Development of Characteristic Thai Features of Future Architecture of Buildings Housing Organisations	Opinions of Interviewees	
	Architects of the Building	Prominent Architects
2. Create New Use - Adapt traditional architectural features practical to lifestyle of Thais	●	●
3. Climate - Design a building that suits the climate by, for example, making good ventilation system and adding long roof eaves	●	●
4. Use Modern Materials and Construction Technology for Energy Efficiency	●	●
5. Apply Interior Design to create the Thai ambiance	●	●

● = Opinion is given. O = No opinion

Summary of the Opinions of Interviewees about the Guidelines for the Development of Characteristic Thai Features for Architecture in future

Table 5.6 shows opinions, given by architects who design the surveyed buildings and other prominent architects, about the guidelines for the future development of characteristic Thai features of contemporary architecture of buildings that houses organisations. They can be summarised into four suggestions.

1. Apply Thai Architectural Characteristics in the Design
2. Create New Use
3. Design Buildings that suits the Climate
4. Use Modern Materials and Construction Technology for Energy Efficiency

These suggestions, based on a result of the questionnaires from architects and laymen, will lead to the study about the way Thai architectural features should be developed in future.

Analysis of Opinions of Interviewees

The questionnaire is based on the data from the study of physical architectural features of surveyed buildings and the results of interviews. It aims to study opinions of a target group of people. There are three types of variables in this study.

A. Controlled Variables: social background of respondents (gender, age, education, occupation, position and number of years in occupation)
B. Independent Variable:
   - Occupation of respondents
C. Dependent Variables: opinions of respondents regarding specific Thai architectural characteristics of surveyed buildings that house organisations

To obtain opinions about characteristic Thai features, two groups of people are selected for the questionnaire.

- Architects
- Laymen

Covering different social backgrounds of respondents, 30 samples are selected from each group. This is to prevent statistical differences of variables and to minimise the effect of social differences. After the test on the social background of respondents, in terms of gender, age, education, occupation, position and a number of years in occupation, it can be concluded that there is no difference in social background of respondents. Therefore, this research can control social variables.

To collect the data of architects and laymen about their opinions towards characteristic Thai features of architecture of surveyed buildings housing organisations, the questionnaire is divided into three subjects.

- Characteristic Thai features of different types of contemporary Thai architecture
- The guidelines for the development of characteristic Thai features of different types of contemporary Thai architecture
- Social backgrounds of respondents.

This supports a hypothesis that characteristic Thai features found in different types of the surveyed buildings are developed from traditional architectural features, both in terms of their physical appearances and their impression. Apparently, architectural forms that have noticeable Thai features and show traditional characters are well accepted by architects and laymen. However, the acceptance of characteristic Thai features differs between architects and laymen. This is because architects have more direct experiences with architecture than laymen.

Analysis of the Data from Questionnaires

The study of the opinions of architects and laymen is presented in this order.

1. A Comparative Analysis of the Opinions of Architects and Laymen about the Acceptance of Characteristic Thai Features of Different Types of the Surveyed Buildings

A. Physical Appearances of Characteristic Thai Features
   1) The layout of the Buildings
   2) Primary Elements
   3) Secondary Elements
   4) The layout of the Buildings
   5) Miscellaneous Elements
   6) Landscaping Design

B. Impression Created by Characteristic Thai Features
   1) Lightness and Buoyancy
   2) A Sense of Airiness
   3) A Cool and Pleasant Atmosphere
   4) Summary of an Analysis of Impression Created by Characteristic Thai Features

2. A Comparative Analysis of the Opinions of Architects and Laymen about the Guidelines for the Development of Characteristic Thai Features of Different Types of Contemporary Architecture

A. Apply Thai Architectural Characteristics in the Design
B. Create New Use
C. Design Buildings that suits the Climate
D. Use Modern Materials and Construction Technology for Energy Efficiency
E. Summary of analysis of the way Thai architectural features should be developed

3. A Comparative Analysis of the Opinions of Architects and Laymen about the Acceptance of Characteristic Thai Features of Surveyed Buildings Housing Organisations

A statistic test is used in the comparative analysis of the opinions of architects and laymen about the acceptance of characteristic Thai features of different types of surveyed buildings. The test is explained in the degree of their agreement, mean average (X), which comes from opinions of each group of respondents about characteristic Thai features. Thai features. The degrees of characteristic Thai features, which start from 1 – 5, mean

1 = Lowest degree of characteristic Thai features
2 = Low degree of characteristic Thai features
3 = Moderate degree of characteristic Thai features
4 = High degree of characteristic Thai features
5 = Highest degree of characteristic Thai features

The t – test is used to find out whether opinions of the two groups are different. The result of the test is shown below.

A. Physical Appearances of Characteristic Thai Features

1. The Layout of the Buildings

1.1 Analysis of the Layout of the Buildings

There are two types of the layout of the buildings (a group of buildings that surround a garden and a group of buildings connected by a roofed walkway) in the surveyed buildings.

Table 5.7 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of the layout of buildings

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- A group of buildings surrounding a garden	4.11	0.77	1	3.33	1.22	1	5.38 *
- A group of buildings connected by a roofed walkway	2.42	0.85	2	2.86	1.01	2	- 3.32 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.7, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of the layout of the buildings.

Based on the mean average (X), it shows that these two groups of people share the same opinions. From this study, the layout of buildings that demonstrates the highest degree of Thai architectural characteristic is a group of buildings that surround a garden. It is followed by a group of buildings that are connected by a roofed walkway. Indeed, the layout that sees a group of buildings surrounding a garden evolves from the layout of traditional Thai houses of rich or big families (called Reun Moo or Reun Kahabodee) in central Thailand. It consists of a group of cabins arranged crosswise and connected by a terrace. A big tree is usually planted at the middle of the terrace.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of the layout of the buildings

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion. It shows that there are more architects than laymen who consider the layout of a group of buildings surrounding a garden to represent a higher degree of a characteristic Thai feature than a group of buildings connected by a roofed walkway. On the contrary, there are more laymen than architects who see a group of buildings connected by a roofed walkway as displaying a higher degree of a characteristic Thai feature than a group of buildings surrounding a garden.

1.2 Summary of an Analysis of the Layout of Buildings

Based on the analysis of the opinions about characteristic Thai features in terms of the layout of the buildings, it reveals that both architects and laymen agree that modern architecture of a group of building should have a characteristic of a group of buildings surrounding a garden. This is because it represents a distinguishing characteristic of Thai architecture and corresponds with the layout of traditional Thai houses of the central region of Thailand. Therefore, this feature should be considered in the design of a group of buildings in future.

However, the result of comparative analysis shows that architects and laymen have different opinions concerning the acceptance of Thai architectural features. Therefore, architects should be aware that the public has a different view about Thai architectural forms. That means architects should take into account a public perception about Thai architecture when designing the buildings.

2. Primary Elements

2.1 Analysis of Primary Elements

2.1.1 Shapes of Roofs

There are five types of Thai-style roofs (gabled roof, gabled roof with kicked eave (*Chua Peek Nok roof*), hipped gable roof *(Blanor),* hipped roof *(Panya)* and conical spired roof *(Mondop))* in the surveyed buildings.

Table 5.8 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of the shapes of roofs

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Gabled roof	3.33	1.03	3	3.10	1.19	2	1.46
- Gabled roof with kicked eave(*Chua Peek Nok Roof*)	3.57	1.13	1	3.22	1.29	1	2.04 *
- Hipped gable roof *(Blanor)*	3.40	0.96	2	2.92	1.07	3	3.33 *
- Hipped roof *(Panya)*	2.74	1.17	5	2.82	1.19	4	- 0.48
- Conical spired roof *(Mondop)*	3.01	1.41	4	2.53	1.41	5	2.41 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.7, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of the shapes of the roofs.

Based on the mean average (X), it shows that architects believe a gabled roof with kicked eave or *Chua Peek Nok roof* to represent the most distinguishing characteristic of Thai style roofs. It is followed by a hipped gable roof, a conical spired roof and a hipped roof respectively. For laymen, *Chua Peek Nok roof* is considered to show the most noticeable feature of Thai style roofs. Then, it is followed by a gabled roof, a hipped gable roof *(Blanor),* a hipped roof *(Panya)* and a conical spired roof *(Mondop) respectively.*

Obviously, both groups consider that a gabled roof with kicked eave is the best representation of Thai style roof. This is because Chua Peek Nok, which is typically seen at traditional Thai houses and an ordination hall and an assembly hall of a temple, has a long roof eave that protects the buildings from rain and wind.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of the shapes of the roofs

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion. For Chua Peek Nok, Blanor and Mondop roofs, both architects and laymen have different opinions in terms of statistics at the significance level of 0.05 ($t \geq = 1.96$). It shows that there are a larger number of architects than laymen, who think that a gabled roof with kicked eave, a hipped gable roof and a conical spired roof have higher degree of characteristic Thai features.

2.1.2 Characteristics of Roofs

There are two types of Thai style roofs (tiered roofs and a reduction of the size of the roof) in the surveyed buildings.

Table 5.9 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of characteristics of roofs

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Tiered roofs	3.46	1.11	1	3.30	1.20	2	0.98
- A reduction of the size of the roof	3.44	1.21	2	3.32	1.03	1	0.75 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.9, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of the characteristics of roofs.

Based on the mean average (X), it shows that architects consider tiered roofs to represent a characteristic Thai feature better than a reduction of the size of the roof. On the contrary, laymen believe that a reduction of the size of the roof is a better representation of Thai style roof than tiered roofs. However, both architects and laymen agree that both characteristics present characteristic Thai features at similar degree. It is because these two features are typically used to lessen the hefty appearance of big structures such as an ordination hall and an assembly hall. For example, the front and the back of some large Sukhothai style assembly halls may feature different layers of roofs. Sometimes, the architects might reduce the size of the halls and attach porches to the front and the back of the buildings.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of the characteristics of Thai style roofs

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion.

2.1.3 Roof Eaves

There are two types of Thai roof eaves (long roof eaves and short roof eaves) in the surveyed buildings.

Table 5.10 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of roof eaves

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Long roof eaves	3.79	1.02	1	3.46	1.11	1	2.19 *
- Short roof eaves	2.13	1.09	2	2.92	1.07	2	- 5.18 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.10, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of roof eaves.

Based on the mean average (X), it shows that both groups consider long roof eaves to show characteristic Thai feature better than short roof eaves. It is because long roof eaves have long been included in traditional Thai houses of the central region and served as weather protection for the buildings.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of roof eaves

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion. It reveals that there are more architects than laymen who associate long roof eaves as a representation of characteristic Thai features. On the contrary, there are laymen than architects who believe that short roof eaves show more of Thai architectural features than long roof eaves.

2.1.4 Roofing Materials

There are four types of roofing materials (earthenware tiles, double barrel tiles, CPAC Monier tiles and concrete roof with ceramic tiles) in the surveyed buildings.

Table 5.11 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of roofing materials

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Earthenware tiles	3.92	1.17	1	2.61	1.40	4	7.18 *
- Double barrel tiles	2.46	0.96	4	2.83	1.02	3	- 2.64 *
- CPAC Monier tiles	2.90	1.02	3	3.73	1.02	1	- 5.41 *
- Concrete roof with ceramic Tiles	2.94	1.29	2	3.35	1.14	1	- 2.30 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.11, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of roofing materials.

Based on the mean average (X), it shows that earthenware tiles present the most noticeable quality of Thai architectural features. Then it is followed by concrete roof with ceramic tiles, CPAC Monier tiles and double barrel tiles respectively. Laymen also agree that earthenware tiles are the most typical roofing material in traditional Thai architecture. This type of tiles has been a staple roofing material of traditional Thai houses since the Ayutthaya period. In addition, laymen think of CPAC Moniear tiles, which are modern roofing materials, as a typical form of roofing materials in modern Thai architecture.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of roofing materials

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion. It shows that there are more architects than laymen who consider CPAC Monier tiles, double barrel tiles and concrete roof with ceramic tiles to represent a characteristic of modern Thai architecture.

2.1.5 Roof Colours

here are six roof colours (red, orange, white, blue, brown and light green) in the surveyed buildings.

Table 5.12 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of roof colours

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Red	3.42	1.09	3	3.78	1.24	1	- 2.17 *
- Terra Cotta	3.50	1.10	2	2.97	1.27	5	3.16 *
- White	2.83	1.29	4	2.44	1.26	6	2.10 *
- Blue	2.82	1.15	5	3.32	1.29	3	- 2.90 *
- Brown	3.71	1.05	1	3.57	1.04	2	0.95
- Light green	2.75	1.18	6	3.14	1.20	4	-2.32 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.12, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of roof colours.

Based on the mean average (X), it shows that brown is chosen by architects as a colour that typifies characteristic Thai features the most. It is followed by orange, red, white, blue and light green respectively. For laymen, red is the colour that shows a characteristic of roof colour of Thai architecture the most. It is then followed by brown, blue, light green, orange and white respectively.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of roof colours

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about the brown colour. However, both architects and laymen have different opinions about the rest of the roof colours in terms of statistics at the significance level of 0.05 ($t \geq = 1.96$). It explains that there are more architects than laymen who consider red, blue and light green to show more of modern Thai architectural features than other colours.

2.1.6 Free-Standing Pillars

There are two types of free-standing pillars (round pillars and square pillars) in the surveyed buildings.

Table 5.13 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of free-standing pillars

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Round pillars	4.11	0.89	1	3.59	1.16	1	3.35 *
- Square pillars	3.20	1.04	2	3.12	0.97	2	0.56

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.13, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of free-standing pillars.

Based on the mean average (X), it shows that both architects and laymen consider round free-standing pillars to be a better representation of architectural characteristic of Thai style free-standing pillars than square free-standing pillars. Apparently, round free-standing pillars are commonly visible below an elevated platform of traditional Thai houses. They are usually made of long timbers and used as a main structural component of the house.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of roof colours

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about the square pillars. Also at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion about the round free-standing pillars. It shows that there are more architects than laymen who think the round free-standing pillars present more quality of characteristic Thai feature.

2.1.7 Space connecting with the outer area of the building

In the study of the surveyed buildings, there are two types of space connecting with the outer area of the building; namely, space surrounded by buildings and the verandah or *Palai*.

Table 5.14 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of space connecting with the outer area of the building

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Space surrounded by buildings	4.20		1	3.59	1.13	1	4.29 *
- Verandah or *Palai*	3.66		2	3.15	1.03	2	3.67 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.14, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of space connecting with the outer area of the building.

Based on the mean average (X), it shows that both groups agree that space surrounded by buildings possesses a characteristic Thai feature more than the verandah. This is commonly seen in the use of a terrace to loosely link different sections of a group of traditional Thai houses or monk's cabins, creating a smooth flow of space.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of space connecting with the outer area of the building

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion. Also at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion about the round free-standing pillars. It shows that there are more architects than laymen who think that space surrounded by buildings and the verandah or *Palai* represent a Thai architectural feature.

2.2 Summary of an Analysis of Primary Elements

It can be concluded that both architects and laymen believe that *primary elements representing characteristic Thai features are*

- Gabled roof with kicked eave (Chua Peek Nok roof), tiered roofs
- A reduction of the size of the roof
- Long roof eaves
- Round free-standing pillars and space surrounded by buildings.

In addition, architects see earthenware tiles as the most noticeable feature of roofing materials of Thai buildings while laymen have the same opinion for CPAC Moniear tiles. For roof colours, architects think that brown typifies modern Thai characteristic.

For the summary of the comparative analysis of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of primary elements, it shows that both architects and laymen generally have different opinions. Architects should be aware that the public may have different perceptions and understandings about Thai architecture. Therefore, it is necessary for architects to take into account public views about Thai architecture when designing the buildings.

3 Secondary Elements

3.1 Analysis of Secondary Elements

3.1.1 Shapes and Openings

There are four types of shapes and openings (a series of small square ventilation holes, a series of single high narrow openings, a series of twin high narrow openings and high narrow openings, close together) in the surveyed buildings.

Table 5.15 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of shapes and openings

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- A series of small square ventilation holes	2.85	1.07	4	2.95	1.14	2	- 0.64
- A series of single high narrow openings	3.24	1.04	2	2.92	0.99	3	2.23 *
- A series of twin high narrow openings	3.17	1.22	3	2.88	1.36	4	1.59
- High narrow openings, close together	3.47	0.98	1	3.23	0.99	1	1.71

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.15, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of shapes and openings.

Based on the mean average (X), it shows that architects consider a series of high narrow openings (close together) to be the best representation of characteristic Thai features among other shapes and openings. The second best representation is a series of single high narrow openings, followed by a series of twin high narrow openings and a series of small square ventilation holes respectively. At the same time, laymen also think of a series of high narrow openings (close together) as a prominent Thai architectural feature for shapes and openings. A series of small square ventilation holes, a series of single high narrow openings and a series of twin high narrow openings are ranked second, third and fourth respectively. It is clear that both groups agree that a series of high narrow openings (close together) is the most typical form of openings of old Thai architecture in various kingdoms, including Sukhothai, U-Thong and the early period of Ayutthaya (น. ณ Paknam, 1979: 456). For example, each section of the walls of an assembly hall built during the Sukhothai period generally features a series of vertical square openings on all sides of the halls.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of shapes and openings

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about a series of small square ventilation holes, a series of twin high narrow openings and high narrow openings, close together. Also at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion about a series of single high narrow openings. It explains that there are architects than laymen who see a series of single high narrow openings as an outstanding characteristic Thai feature.

3.1.2 Types of Window (how the window is opened)

There are two types of windows (awning window *(Ban Krathung)* and casement window *(Ban Perd)*) in the surveyed buildings.

Table 5.16 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of types of windows

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Awning window *(Ban Krathung)*	2.97	1.03	2	2.96	1.18	2	0.06
- Casement window *(Ban Perd)*	3.33	1.03	1	3.63	1.15	1	- 1.94

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.16, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of types of windows.

Based on the mean average (X), it shows that both groups consider casement windows *(Ban Perd)* to present characteristic Thai feature more clearly than awning windows. It is common to find casement windows in the architecture of old buildings in Thailand. For example, traditional Thai houses in central Thailand generally have double casement windows.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of types of windows

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion.

3.1.3 Walls

There are three types of walls (white plaster walls, plastered walls with a lattice-like pattern and masonry walls) in the surveyed buildings.

Table 5.17 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of walls

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- White plaster walls	3.44	1.01	1	3.11	1.35	3	0.06
- Plastered walls with a lattice-like pattern	2.72	1.04	3	3.17	1.19	2	0.06
- Masonry walls	3.13	0.88	2	3.30	1.06	1	- 1.94

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.17, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of walls.

Based on the mean average (X), it shows that architects give highest scores to white plaster walls in terms of Thai architectural characteristics. Masonry walls and plastered walls with a lattice-like pattern are ranked second and third respectively. For laymen, it is the masonry walls that are given highest scores for representing characteristic Thai features. The second and third places are plastered walls with a lattice-like pattern and white plaster walls respectively. It is obvious that the opinions of architects and laymen differ in this case. Indeed, white plaster walls are a common architectural characteristic of religious structures in Thailand such as an ordination hall and an assembly hall in the temple. At the same time, masonry walls can also be seen in many religious buildings in different periods. For example, the walls of religious buildings built during the Dvaravati period were created from big bricks joined together by resin and laid in a Flemish bond. Similar size of bricks (30 x 15 x cm) were used in the walls of structures built in U-Thong, Sukhothai, Ayuttaya and Supannabhum periods (1600 - 1900 BC). Laid in English bond, each brick is bound together by a mixture of resin and earth.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of walls

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion about white plaster walls and masonry walls. It explains that there are more laymen than architects who think that plastered walls with a lattice-like pattern represent characteristic Thai features.

3.1.4 Flooring Materials

There are four types of flooring materials (wood flooring, earthenware tiles, polished stones and slate tiles) in the surveyed buildings.

Table 5.18 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of flooring materials

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Wood flooring	3.84	1.23	2	3.68	1.26	1	0.94
- Earthenware tiles	3.87	0.99	1	3.10	1.13	2	5.12 *
- polished stones	3.07	0.90	3	2.85	0.94	4	1.69
- slate tiles	2.92	1.00	4	3.00	1.10	3	- 0.54

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.18, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of walls.

Based on the mean average (X), it shows that architects think that a flooring material that shows Thai architectural characteristics the most is earthenware tiles. It is followed by wood flooring, polished stones and slate tiles respectively. At the same time, a majority of laymen consider wood flooring to showcase the best quality of characteristic Thai features among other types of flooring materials. Earthenware tiles, slate tiles and polished stones are ranked second, third and fourth respectively. Apparently, architects and laymen have different opinions about flooring materials. According to Reuthai Jaijongrak (1996 : 107), wood flooring is commonly seen in Thai houses. She stated that traditional Thai houses usually feature wide wooden slats as a floor. These slats are also used in different parts of the structure of the house such as floor flaming (called 'Rod' in Thai) and the base of the floor (called 'Tong' in Thai).

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of flooring materials

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about wood flooring, polished stones and slate tiles. Also at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion about earthenware tiles. It shows that there are architects than laymen who perceive earthenware tiles to best represent characteristic Thai features.

3.1.5 Balustrades and Railings of a terrace

There are two types of balustrades and railings of a terrace (a railing with vertical concrete bars and a low railing wall with a series of small square openings) in the surveyed buildings.

Table 5.19 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of balustrades and railings of a terrace

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- A railing with vertical concrete bars	3.70	0.96	1	3.43	1.18	1	1.77
- A low railing wall with a series of small square openings	3.00	1.07	2	2.88	1.16	2	0.76

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.19, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of balustrades and railings of a terrace.

Based on the mean average (X), it shows that architects both groups consider a railing with vertical concrete bars to display characteristic Thai features better than a low railing wall with a series of small square openings. It is due to the fact that a railing with vertical wooden bars (called 'Look Tung') is generally used in old Thai buildings.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of balustrades and railings of a terrace

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion.

Summary of an Analysis of Secondary Elements

It can be concluded that both architects and laymen agree that secondary elements representing characteristic Thai features are a series of twin high narrow openings and high narrow openings, close together, casement windows and a railing with vertical concrete bars. In the case of walls, Thai architects choose masonry walls as a manifestation of Thai style walls as laymen think that white plaster walls

display more quality of Thai architecture than other types of walls. In addition, architects believe that earthenware tiles and wood flooring are typical features of Thai buildings while laymen think that only wood flooring stands out as a common characteristic Thai feature of Thai style floors.

For the summary of the comparative analysis of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of secondary elements, it shows that both architects and laymen generally have the same opinions. It means that both groups have similar understandings about secondary elements of Thai architecture. Therefore, architects can use secondary elements mentioned above in the design of buildings of organisations in future.

4. Miscellaneous Elements

4.1 Analysis of Miscellaneous Elements

4.1.1 A gable roofed gateway that indicates the entrance to the building

In the study of the surveyed buildings, there are two types of a gable-roofed gateway used to indicate the entrance of the building; namely, a concrete gable roofed gateway and a wooden gable roofed gateway.

Table 5.20 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of a gable roofed gateway used to indicate the entrance of the building

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- A concrete gable roofed gateway	3.43	1.13	1	3.51	1.07	1	- 0.51
- A wooden gable roofed gateway	3.14	1.02	2	3.23	1.14	2	- 0.59

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.20, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of a gable roofed gateway used to indicate the entrance of the building.

Based on the mean average (X), it shows that both groups consider a concrete gable roofed gateway to exhibit a typical characteristic of Thai architecture. That

means a concrete gable roofed gateway in front of a building is perceived as a Thai architectural feature.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of a gable roofed gateway used to indicate the entrance of the building

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion.

4.1.2 Pediment Motif

There are six styles of pediment motif (brickwork pattern *(Lai Luk Fak),* louvre style motif *(Lai Tee Kred Mai),* louvre style motif with gable top *(Lai Tee Kred Mai Mee Yod Chua),* perforated wood with gable top *(Lai Kae Mai Chalu Mee Yod Chua),* sunray motif and *Lai Ta Wane*) in the surveyed buildings.

Table 5.21 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of pediment motif

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Brickwork pattern *(Lai Luk Fak)*	3.22	1.28	1	2.87	1.08	2	2.09 *
- Louvre style motif *(Lai Tee Kred Mai)*	3.03	1.09	2	3.33	0.96	1	- 2.06 *
- Louvre style motif with gable top *(Lai Tee Kred Mai Mee Yod Chua)*	2.90	1.14	5	2.84	1.18	3	0.37
- Perforated wood with gable top *(Lai Kae Mai Chalu Mee Yod Chua)*	2.64	1.23	6	2.83	1.37	4	- 1.03
- Sunray motif	2.94	1.20	3	2.67	1.30	6	1.53
- *Lai Ta Wane*	2.91	1.19	4	2.74	1.31	5	0.96

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.21, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of pediment motif.

Based on the mean average (X), it shows that architects think that a pediment with brickwork pattern *(Lai Luk Fak)* represents the most distinguishing characteristic of Thai pediment motif. It is followed by louvre style motif *(Lai Tee Kred Mai),*

sunray motif, *Lai Ta Wane*, louvre style motif with gable top *(Lai Tee Kred Mai Mee Yod Chua)* and perforated wood with gable top *(Lai Kae Mai Chalu Mee Yod Chua)* respectively. For laymen, *Lai Tee Kred Mai* is perceived to display typical characteristic Thai features of pediment motif. It is followed by *Lai Luk Fak, Lai Tee Kred Mai Mee Yod Chua, Lai Kae Mai Chalu Mee Yod Chua, Lai Ta Lane* and sunray motif respectively. Apparently, architects and laymen have different opinions about Thai style pediment motif. In fact, *Lai Luk Fak* was commonly seen in the pediment of Thai houses and ordination halls and assembly halls in the temple compound. Reuthai Jaijongrak (1996 : 179) stated that *Lai Luk Fak,* also known as *Chua Phromma Phak*, *that appears on the pediments of Thai houses in central Thailand resembles a Thai wooden wall motif called Fa Pakon. The Lai Luk Fak pediment is created by slats laid out to form multiple courses of squares similar to brickwork.* It is also found that the wooden louvres used to cover the pediments of some houses in the central region resemble the *Chua Bai Preu* pattern. A pediment in this style consists of a set of parallel slats arranged horizontally and overlapping each other. It is often available in bedroom cabins. It is also installed in kitchens with its top part open to facilitate air flow.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of pediment motif

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about louvre style motif with gable top *(Lai Tee Kred Mai Mee Yod Chua),* perforated wood with gable top *(Lai Kae Mai Chalu Mee Yod Chua),* sunray motif and *Lai Ta Lane.* Also at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about the brickwork pattern *(Lai Luk Fak)* and the louvre style motif *(Lai Tee Kred Mai).* It shows that there are more architects than laymen who think that *Lai Luk Fak* exhibits Thai architectural features better than *Lai Tee Kred Mai*. It also shows that there are more laymen than architects who believe that *Lai Tee Kred Mai* present Thai architectural features better than *Lai Luk Fak*.

4.1.3 Eave Brackets

There are three types of eave brackets (wooden eave brackets with one side against the middle of the pillar, wooden eave brackets with one side against the base of the pillar and eave brackets made from concrete that has been reinforced with steel rods) in the surveyed buildings.

Table 5.22 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of eave brackets

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Wooden eave brackets with one side against the middle of the pillar	3.78	0.97	1	3.46	1.17	1	2.11 *
- Wooden eave brackets with one side against the base of the pillar	2.72	0.98	2	2.74	1.00	2	- 0.14 *
- Eave brackets made from concrete that has been reinforced with steel rods	2.14	1.15	3	2.72	1.30	3	- 3.35 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.22, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of eave brackets.

Based on the mean average (X), it shows that both groups consider a wooden eave bracket, which has one side under the projecting surface and the other against the middle of the pillar, to be the most typical from of Thai eave brackets. It is followed by wooden eave brackets with one side against the base of the pillar and eave brackets made from concrete that has been reinforced with steel rods. Generally, eave brackets are a common architectural element of traditional Thai houses, monk's cabins and ordination halls and assembly halls in the temples. Usually made of wood, they overhang an external wall to support eaves. When used with ordination halls and assembly halls, it is called *Kuhn Thai*.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of eave brackets

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about wooden eave brackets with one side against the base of the pillar. Also

at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion about wooden eave brackets with one side against the middle of the pillar and eave brackets made from concrete that has been reinforced with steel rods. The result shows that there are more architects than laymen who think wooden eave brackets with one side against the middle of the pillar have more characteristics of Thai architecture than eave brackets made from concrete that has been reinforced with steel rods. On the other hand, there are more laymen than architects who believe that eave brackets made from concrete that has been reinforced with steel rods show characteristic Thai features better than wooden eave brackets with one side against the middle of the pillar.

4.2 Summary of an analysis of Miscellaneous Elements

It can be concluded that both architects and laymen agree that miscellaneous elements representing characteristic Thai features are a concrete gable roofed gateway and wooden eave brackets with one side against the middle of the pillar. In the case of pediment motif, Thai architects choose brickwork pattern (Lai Luk Fak) as the most basic style of pediment motif while laymen pick louvre style motif with gable top (Lai Tee Kred Mai Mee Yod Chua) for the same reason.

For the summary of the comparative analysis of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of miscellaneous elements, it shows that both groups generally have the same opinions. It means that both groups have similar understandings about miscellaneous elements of Thai architecture. Therefore, architects can use miscellaneous elements mentioned above in the design of buildings of organisations in future.

5. Landscaping

5.1 Analysis of Landscaping

5.1.1 The relationship between the building and the water

In the study of the surveyed buildings, there are three types of relationship between the building and the water; namely, water near the building, water next to the building and pillars of building partly submerged in water.

Table 5.23 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of the relationship between the building and the water

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Water near the building	3.31	0.93	3	3.63	1.07	1	- 2.26 *
- Water next to the building	3.67	0.95	2	3.25	0.91	2	3.18
- Pillars of building partly submerged in water	3.98	0.98	1	2.82	1.37	3	6.86 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.23, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of the relationship between the building and the water.

Based on the mean average (X), it shows that architects see pillars of building partly submerged in water as displaying the most typical characteristic of Thai architecture. It is followed by the water next to the building and the water near the building respectively. For laymen, the water near the building ranks as the best representation of characteristic Thai features. It is followed by the water next to the building and pillars of building partly submerged in water respectively. Pillars of building partly submerged in water, in fact, reflect the architectural style of Thai houses, which can be located in land and along the riverbank. It is a result of people's attempt to adapt their dwellings to different climate, locations and occupations. These factors influence the design of Thai houses. A good example in this case is an elevated platform – a common character of Thai houses almost throughout the country. Most Thai houses in the central region have highly elevated platforms to tackle flooding, which can last for months. A building that has the water nearby indicates the old settlement of Thai people. In the past, Thai communities chose to settle along or near the river or canal in order to have access to the water, which is used as an important channel of transportation and essential for their farms and livestock.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of the relationship between the building and the water

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion. The result reveals that there are more architects than laymen who consider the water next to the building and pillars of building partly submerged in water to represent a basic form of Thai architectural features. On the contrary, there are more

laymen than architects who believe that the water near the building displays basic Thai architectural features better than the other types.

There are four types of relationship between the tress and the building (trees located on open ground surrounded by the building, trees flanking both sides of the walkway of the building, trees located near the building and trees located far from the building) in the surveyed buildings.

5.1.2 The relationship between the tress and the building

In the study of the surveyed buildings, there are four types of relationship between the tress and the building; namely, trees located on open ground surrounded by the building, trees flanking both sides of the walkway of the building, trees located near the building and trees located far from the building.

Table 5.24 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of the relationship between the tress and the building

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Trees located on open ground surrounded by the building	4.42	0.88	1	3.60	1.14	2	3.62 *
- Trees flanking both sides of the walkway of the building	3.00	0.92	3	3.63	0.82	1	- 5.10 *
- Trees located near the building	3.37	0.98	2	3.33	1.16	3	0.26
- Trees located far from the building	2.33	1.00	4	2.70	1.12	4	- 2.46 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.24, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of the relationship between the trees and the building.

Based on the mean average (X), it shows that architects consider trees located on open ground surrounded by the building to present the most outstanding characteristic of Thai architecture. It is followed by trees located near the building, trees flanking both sides of the walkway of the building and trees located far from the building respectively. It also shows that laymen see trees flanking both sides of the walkway of

the building as the most basic characteristic of Thai architecture. This is followed by trees located on open ground surrounded by the building, trees located near the building and trees located far from the building respectively. Obviously, both groups have different opinions about the relationship between the trees and the building.

Generally, a group of traditional houses and monk's cabins in central Thailand feature trees planted at the middle of the terrace. Reuthai Jaijongrak (1996 : 22) stated that trees planted at the middle of the terrace help to bring nature closer to the dwellings and create a pleasant atmosphere. Diospyros decandra, white champaka, jackfruits and mangos are trees commonly planted in Thai houses. In addition, some corners of the terrace may have decorative plants such as species of caladiums and herbs, garden crotons and water lilies in garden clay bowls.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of the relationship between the trees and the building

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about trees located near the building. Also at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion about the other three types of relationship between the trees and the building. The result indicates that there are more architects than laymen who consider trees located on open ground surrounded by the building to display a typical characteristic of Thai architecture. It also shows that there are more laymen and architects who see trees flanking both sides of the walkway of the building and trees located far from the building as the best representation of characteristic Thai features.

Summary of an Analysis of Landscaping

Based on the analysis of the opinions about characteristic Thai features in terms of landscaping, it reveals that architects consider pillars of building partly submerged in water to represent a typical Thai characteristic of the relationship between the water and the building. It also shows that laymen refer to the water near the building as a common characteristic of the relationship between the water and the building.

In case of the relationship between the trees and the building, architects consider trees located on open ground surrounded by the building to present the most outstanding characteristic of Thai architecture while laymen see trees flanking both sides of the walkway of the building as the most basic characteristic of Thai architecture.

For the summary of the comparative analysis of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of landscaping, it shows that there is a difference of opinion between both groups. Therefore, architects should be aware that the public has a different view about Thai architectural forms. That means architects should take into account a public perception about Thai architecture when designing the buildings.

Summary of an Analysis of Physical Thai Characteristic Features

Based on the summary of an analysis of physical Thai characteristic features, it can be concluded that most Thai architectural characteristics in the surveyed buildings are developed from traditional architectural elements and accepted by architects and the public as characteristic Thai features in modern architecture. For example, the layout that has a garden located at the middle of a group of buildings is derived from the layout of a group of traditional houses in central Thailand (called Reun Moo or Reun Kahabodee). Gabled roof with kicked eave (Chua Peek Nok Roof) and eave brackets are common architectural elements of houses, ordination halls and assembly halls in the temples. Space surrounded by buildings resembles the terrace in a group of Thai houses and monk's cabins. In addition, a series of high narrow openings is a typical form of openings of assembly halls and ordination halls in the temples.

These support a hypothesis that physical characteristic Thai features in different types of modern architecture of the surveyed buildings are developed from distinctive, old Thai architectural features - both in terms of physical appearances and the impression - and accepted by architects and the public.

For the summary of the comparative analysis of the opinions ofarchitects and laymen about physical characteristic Thai features, it shows that there is a difference of opinion between both groups. This is evident in the opinions about landscaping and primary elements, particularly the layout of the buildings. They share the same opinions about secondary and miscellaneous elements. Therefore, it can be concluded that their opinions about physical characteristic Thai features differ from each other. It means that their opinions about the acceptance of characteristic Thai features in modern architecture are different. This is because architects have more direct experiences with architecture than laymen. It supports a theory that past experiences of people who understand the surroundings are crucial to the ongoing learning process. Different perceptions and knowledge among people are a result of different past experiences.

B. Impression Created by Characteristics of Thai Architecture

1. Lightness and Buoyancy

1.1 Analysis of Lightness and Buoyancy in Thai Architecture

1.1.1 A sense of lightness and buoyancy emanating from the roof

In the study of the surveyed buildings, there are three types of lightness and buoyancy emanating from the roof; namely, a reduction of the size of the roof, tiered roofs and long roof eaves.

Table 5.25 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of a sense of lightness and buoyancy emanating from the roof

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- A reduction of the size of the roof	3.56	0.97	1	3.39	0.98	1	1.23
- Tiered roofs	3.43	1.03	2	3.39	0.90	1	0.29
- Long roof eaves	3.31	1.07	3	3.30	1.17	2	0.06

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.25, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of a sense of lightness and buoyancy emanating from the roof.

Based on the mean average (X), it shows that architects a reduction of the size of the roof presents the most typical quality of Thai architectural characteristics. It is followed by tiered roofs and long roof eaves respectively. On the other hand, laymen think that a reduction of the size of the roof and tiered roofs have equal quality of characteristic Thai features. It is followed by long roof eaves. It is clear that both architects and laymen agree that a reduction of the size of the roof and tiered roofs to make buildings look light and buoy. This is evident in the architecture of ordination halls and assembly halls. Choti Kanlayanamitr (1996 : 59) mentioned the way Thai architects created a sense of lightness by breaking the heftiness of the building into small volumes. It can be done by adding a roofed porch at the front and/or the back of assembly halls and ordination halls. The roof of the porch is always lower and smaller than the roof of the halls. It helps lessen a bulky appearance of the buildings. He also referred to the use of multiple tiered roofs to create a sense of lightness for ordination halls and assembly halls. These big structures will look bulky if they are covered by a roof.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of sense of lightness and buoyancy emanating from the roof

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about a reduction of the size of the roof and long roof eaves.

1.1.2 A sense of lightness and buoyancy emanating from an elevated platform and free-standing pillars

In the study of the surveyed buildings, there are three types of lightness and buoyancy emanating from an elevated platform and free-standing pillars; namely, an elevated platform, free-standing pillars found in Thai Pavilions (*Sala)* and free-standing pillars along the walls that have been set back.

Table 5.26 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of a sense of lightness and buoyancy emanating from an elevated platform and free-standing pillars

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- An elevated platform	3.70	1.03	2	3.32	1.26	1	2.33 *
- Free-standing pillars found in Thai Pavilions (*Sala)*	3.72	0.90	1	3.00	0.99	3	5.37 *
- Free-standing pillars along the walls that have been set back	3.68	0.94	3	3.10	1.03	2	4.16 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.26, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of a sense of lightness and buoyancy emanating from an elevated platform and free-standing pillars.

Based on the mean average (X), it shows architects think that free-standing pillars found in Thai Pavilions (*Sala)* typifies characteristic Thai features the most. It is followed by an elevated platform and free-standing pillars along the walls that have been set back. For laymen, an elevated platform is perceived as the most basic form of characteristic Thai features. Free-standing pillars along the walls that have been set back and free-standing pillars found in Thai Pavilions (*Sala)* are ranked second and third respectively. Reuthai Jaijongrak (1996 : 242) stated that a platform of a house is raised above a person's so that *he can see the fence on the other side without any obstruction. Additionally, it creates a sense of lightness for the building.*

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of a sense of lightness and buoyancy emanating from an elevated platform and free-standing pillars

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion. It explains that there are more architects and laymen who think that a sense of lightness and buoyancy emanating from an elevated platform, free-standing pillars found in Thai Pavilions (*Sala)* and free-standing pillars along the walls that have been set back represent characteristic Thai features.

1.1.3 A sense of lightness and buoyancy emanating from the distance between the building and the water

In the study of the surveyed buildings, there are two types of lightness and buoyancy emanating from the distance between the building and the water; namely, water next to the building and water near the building.

Table 5.27 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of a sense of lightness and buoyancy emanating from the distance between the building and the water

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Water next to the building	3.90	0.88	1	3.28	1.14	2	4.31 *
- Water near to the building	3.19	0.94	2	3.54	0.83	1	- 2.79 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.27, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of a sense of lightness and buoyancy emanating from the distance between the building and the water.

Based on the mean average (X), it shows architects think that buildings located next to the water present Thai architectural characteristics better than buildings located near to the water. Laymen have an opposite opinion in this case.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of a sense of lightness and buoyancy emanating from the distance between the building and the water

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion. It explains that there are more architects than laymen who consider buildings located next to the water to display the most outstanding quality of Thai architectural characteristics. It also shows that there are more laymen than architects who think that buildings located near the water represent typical characteristic Thai features.

1.2 Summary of an Analysis of Lightness and Buoyancy in Thai Architecture

Based on the analysis of the opinions about characteristic Thai features in terms of lightness and buoyancy, it reveals that architects and laymen agree that tiered roofs and adding porches to the back and the front of a building make the structure look light and present typical feature of Thai architecture. A difference of opinions, however, occurs when it comes to an elevated platform and free-standing pillars. While architects favour an elevated platform and free-standing pillars found in Thai pavilions exhibit common Thai architectural features, laymen choose only an elevated platform as a manifestation of Thai architectural features. In addition, architects think that buildings located next to the water present Thai architectural characteristics better than buildings located near to the water. Laymen have an opposite opinion.

For the summary of the comparative analysis of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of lightness and buoyancy, it shows that there is a difference of opinion between both groups. Therefore, architects should be aware that the public has a different view about Thai architectural forms. That means they should take into account a public perception about Thai architecture when designing the buildings.

2. Airiness

2.1 Analysis of Airiness in Thai Architecture

2.1.1 A sense of airiness brought about by an elevated platform

In the study of the surveyed buildings, a sense of airiness can be brought about by an elevated platform.

Table 5.28 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of a sense of airiness brought about by an elevated platform

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- A sense of airiness brought about by an elevated platform	3.94	0.97	-	3.49	-	-	2.89 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.28, an analysis of the opinions of architects and laymen is given below.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of a sense of airiness brought about by an elevated platform

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion. The result indicates that there are more architects than laymen who think that an elevated platform represents a typical Thai architectural characteristic.

2.1.2 A sense of airiness brought about by space

There are two types of airiness brought about by space (open ground surrounded by a group of buildings and the effect of a verandah or *Palai*) in the surveyed buildings.

Table 5.29 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of a sense of airiness brought about space

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Open ground surrounded by a group of buildings	4.10	0.94	1	3.79	1.03	1	2.23 *
- The effect of a verandah or *Palai*	3.34	0.91	2	2.97	1.02	2	2.70 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.29, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of a sense of airiness brought about by space.

Based on the mean average (X), it shows that both groups agree that an open ground surrounded by a group of buildings is a basic characteristic of Thai architecture. It can be said that the layout that includes a group of buildings surrounding a garden demonstrates a typical characteristic Thai feature. This type of layout corresponds with the layout of an extensive terrace in traditional Thai houses in central Thailand. Reuthai Jaijongrak (1996: 30) referred to the characteristics of *the Thai terrace that it is open to sunlight and fresh air and facilitates air flow.* A group of buildings that has open space in the middle allows air to enter easily, creating the same effect like the terrace.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of a sense of airiness brought about by space

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion. It indicates that there are more architects than laymen who think that an open ground surrounded by a group of buildings and the effect of a verandah or *Palai* display an outstanding characteristic Thai feature.

2.2 Summary of an Analysis of Airiness in Thai Architecture

Based on the analysis of the opinions about the impression created by characteristic Thai features in terms of airiness, it reveals that architects and laymen agree an elevated platform and an open ground surrounded by a group of buildings clearly demonstrate Thai architectural characteristics.

For the summary of the comparative analysis of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of airiness, it shows that there is a difference of opinion between both groups. The architects, therefore, should be aware that the public has a different view about Thai architectural forms. That means they should take into account a public perception about Thai architecture when designing the buildings.

3. A Cool and Pleasant Atmosphere

3.1 Analysis of a Cool and Pleasant Atmosphere

3.1.1 A cool and pleasant atmosphere arising from the relationship between the trees and the building

In the study of the surveyed buildings, there are three types of a cool and pleasant atmosphere arising from the relationship between the trees and the building; namely, big trees planted on open ground surrounded by buildings, trees planted near the building and trees planted far from the buildings.

Table 5.30 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of a cool and pleasant atmosphere arising from the relationship between the trees and the building

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Big trees planted on open ground surrounded by buildings	4.06	0.95	1	3.57	1.06	1	3.45 *
- Trees planted near the building	3.75	0.82	2	3.55	0.98	2	1.57
- Trees planted far from the buildings	2.41	0.95	3	2.94	1.09	3	- 3.66 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.30, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about characteristic Thai features in terms of a cool and pleasant atmosphere arising from the relationship between the trees and the building.

Based on the mean average (X), it shows that both groups agree that a cool and pleasant atmosphere in a group of buildings with big trees in the middle demonstrates a most typical characteristic of Thai architecture. It is followed by the buildings that are near trees and the buildings that are far away from trees respectively. This is because a cool and pleasant atmosphere from big trees in the middle of a group of buildings resembles the ambiance of a group of traditional Thai houses that have big trees in the middle of the terrace. Reuthai Jaijongrak (1996 : 33) stated that trees planted in the terrace help to bring houses in harmony with nature and create a cool and pleasant atmosphere to the place.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of a cool and pleasant atmosphere arising from the relationship between the trees and the building

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about trees planted near the building. Also at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion about a cool and pleasant atmosphere from big trees surrounded by a group of buildings and trees planted far away from the buildings. It indicates that there are more architects than laymen who consider big trees surrounded by a group of buildings to show characteristic Thai features better than trees planted far away from the building. It also shows that there are more laymen than architects who think that trees planted far away from the building display characteristic Thai features more clearly than big trees surrounded by a group of buildings.

3.1.2 A Cool And Pleasant Atmosphere from long eaves

In the study of the surveyed buildings, a cool and pleasant atmosphere can be created by long eaves.

Table 5.31 shows a comparison of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of long eaves creating a cool and pleasant atmosphere

A. Physical Characteristic Thai Features	Architects			Laymen			T calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Long eaves creating a cool and pleasant	3.77	1.04	-	3.55	1.00	-	1.52

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.31, an analysis of the opinions of architects and laymen is given below.

A comparative analysis of the opinions of architects and laymen about characteristic Thai features in terms of by long eaves creating a cool and pleasant atmosphere

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion.

3.2 Summary of an Analysis of a Cool and Pleasant Atmosphere

Based on the analysis of the opinions about the impression created by characteristic Thai features in terms of a cool and pleasant atmosphere, it shows that architects and laymen agree that big trees planted on open ground surrounded by buildings, trees planted near the building and long eaves are representative of characteristic Thai features.

For the summary of the comparative analysis of the opinions of architects and laymen about the acceptance of characteristic Thai features in terms of a cool and pleasant atmosphere, it shows that there is a difference of opinion between both groups. The architects, therefore, should be aware that the public has a different view about Thai architectural forms. That means they should take into account a public perception about Thai architecture when designing the buildings.

Summary of an Analysis of Impression Created by Characteristic Thai Features

Based on the summary of an analysis of impression created by Thai characteristic features, it can be concluded that most Thai architectural characteristics in the surveyed buildings are developed from traditional architectural elements and accepted by architects and the public as modern characteristic Thai features. For example, tiered roofs and a reduction of the size of the roof make a structure look less hefty – a type of architecture commonly found in ordination halls and assembly halls of the temples. A sense of lightness and buoyancy can also be created by raising a platform of a building higher than a person's head. This architectural characteristic is visible in most traditional Thai houses. The airiness found in a place where a group of buildings surround an open ground resembles the terrace in traditional houses in the central region of Thailand. In addition, a cool and pleasant atmosphere brought about by big trees located in the middle of a group of buildings corresponds with the atmosphere of traditional Thai houses or monk's cabins that have trees at the middle of their terraces.

This supports a hypothesis that characteristic Thai features found in different types of the surveyed buildings are developed from traditional architectural features, both in terms of their physical appearances and their impression. Apparently, architectural

forms that have noticeable Thai features and reflect traditional characters are well accepted by architects and laymen.

For the comparison of the opinions of architects and laymen about impression created by characteristic Thai features, it shows that there is a difference of opinion between both groups. It supports a hypothesis that the acceptance of characteristic Thai features differs between architects and laymen. This is because architects generally have more direct experiences with architecture than laymen. It is consistent with a theory that past experiences of people who understand the surroundings are crucial to the ongoing learning process. Different perceptions and knowledge among people are a result of different past experiences.

Comparative Analysis of the Opinions of Architects and Laymen about the Guidelines for the Development of Characteristic Thai Features for Architecture of Buildings Housing Organisations

As part of the study of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features for architecture of buildings housing organisations, the research includes the study of the opinions architects who design the surveyed buildings and a group of prominent architects. The study is summarised into four points.

A. Apply Thai Architectural Characteristics in the Design
B. New use
C. Climate
D. Modern Materials and Construction Technology

A statistic test is used in the comparative analysis of the opinions of architects and laymen about the guidelines for the development of characteristics Thai features for different types of modern Thai architecture. The test is explained in the degree of their agreement, mean average (X), which comes from opinions of each group of respondents about the guidelines. The degrees of agreement, which start from 1 – 5, mean

1 = Lowest degree of agreement
2 = Low degree of agreement
3 = Moderate degree of agreement
4 = High degree of agreement
5 = Highest degree of agreement

The t – test is used to find out whether opinions of the two groups are different. The result of the test is shown below.

A. Application of Thai Architectural Characteristics in the Design of Different Types of Modern Thai Architecture

A comparative analysis of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features for different types of modern architecture - in terms of an application of Thai architectural characteristics in the design - is shown below.

Table 5.32 shows a comparison of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features: An application of Thai architectural characteristics in the design for different types of modern architecture

Guidelines for the development of characteristic Thai features in architecture	Architects			Laymen			t calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
1. Incorporate physical elements of traditional Thai architecture in the design to create new Thai characteristics							
- Incorporate traditional architectural features in the design by using modern materials and construction technology	3.44	1.09	4	3.77	1.02	3	- 2.20 *
- Adapt or simplify architectural elements of religious structures in the design	3.25	1.07	6	3.16	1.05	6	0.60
- Adapt or simplify characteristics of residential structures in the design	3.83	0.87	3	3.58	1.03	5	1.86
- Adapt or simplify indigenous architectural features in the design of buildings in the respective regions, to preserve local culture	4.11	1.00	2	3.84	0.96	1	1.94

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Table 5.33 shows a comparison of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features: An application of Thai architectural characteristics in the design for different types of modern architecture (continued)

Guidelines for the development of characteristic Thai features in architecture	Architects			Laymen			t calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Use symbols of characteristic Thai features in the design, in stead of imitating the old features such as building a gable roofed gateway to indicate the entrance to the building	3.43	1.13	5	3.61	0.98	4	- 1.20 *
1. Create similar atmospheres or the Thai ambiance by applying the impression created by Thai architectural characteristics in the design	4.13	0.98	1	3.82	1.00	2	2.21 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.32, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features.

Based on the mean average (X), it shows that both architects and laymen agree with the application of Thai architectural features in the design. A list of guidelines, arranged in order of their preference, is given below.

A list of guidelines by architects

1. Create similar atmospheres or the Thai ambiance by applying the impression created by Thai architectural characteristics in the design
2. Adapt or simplify indigenous architectural features in the design of buildings in the respective regions, to preserve local culture
3. Adapt or simplify characteristics of residential structures in the design
4. Incorporate traditional architectural features in the design by using modern materials and construction technology
5. Use symbols of characteristic Thai features in the design, in stead of imitating the old features
6. Adapt or simplify architectural elements of religious structures in the design

A list of guidelines by laymen

1. Adapt or simplify indigenous architectural features in the design of buildings in the respective regions, to preserve local culture
2. Apply the impression created by Thai architectural characteristics in the design by trying to create similar atmospheres or the Thai ambiance
3. Incorporate traditional architectural features in the design by using modern materials and construction technology
4. Use symbols of characteristic Thai features in the design, in stead of imitating the old features
5. Adapt or simplify characteristics of residential structures in the design
6. Adapt or simplify architectural elements of religious structures in the design

It shows that architects and laymen favour the ideas of creating the Thai ambiance for the buildings by applying the impression created by Thai architectural characteristics and adapting indigenous architectural features in the design of buildings in the respective regions. It can be said that an attempt to create the Thai ambiance for the buildings by applying the impression created by Thai architectural characteristics is a practical option for modern architecture (or so-called 'King Rama IX architecture'). It corresponds with a comment of Trungjai Buranasomphop (1994: 52) who stated "*modern Thai architecture…involves the incorporation of the impression and the spirits of Thailand"*

In addition, an adaptation of indigenous architectural features in the design of buildings in the respective regions is an option suitable for buildings that house organisations. It is due to the fact that this type of buildings has an important role in supporting an understanding and an appreciation of the value of local culture. The design is also compatible with the natural surroundings of the region. Therefore, architectural works that reflect the era and the culture should represent their time and unique characteristics of each region. It is evident in significant buildings in different regions such as museums, school and university buildings. These buildings are often influenced by local architecture in order to represent their culture.

A comparative analysis of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about a simplification of architectural elements of religious structures, an adaptation of characteristics of residential structures, an application of indigenous architectural features in the design of buildings in the respective regions and the use of symbols of characteristic Thai features in the design. Also at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion about an incorporation of traditional architectural features in the design by using modern materials and construction technology and a creation of the Thai ambiance for the buildings by applying the impression created by Thai architectural characteristics. The result indicates that there are more architects than laymen who prefer the creation of the Thai ambiance for the buildings by applying the impression created by Thai architectural characteristics. It also shows that there are more laymen than architects who prefer the incorporation of

traditional architectural features in the design by using modern materials and construction technology.

B. New Use

A comparative analysis of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features for different types of modern architecture - in terms of new use – is shown below.

Table 5.34 shows a comparison of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features: New use

Guidelines for the development of characteristic Thai features in architecture	Architects			Laymen			t calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Adopt new designs that are practical for current patterns and current lifestyles, and which do not involve referring back to old architectural forms	3.22	1.24	1	3.43	0.99	2	- 1.32
- Create an open area or open space on the ground floor of the building, particularly for buildings of organisations. It may take up a lot of space but it is one of the basic Thai architectural characteristics	3.16	1.07	2	3.83	1.03	1	-4.52 *

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.33, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features. Based on the mean average (X), it shows that both architects and laymen agree with a creation of new use. A list of guidelines, arranged in order of their preference, is given below.

A list of guidelines by architects

1. Adopt new designs that are in harmony with current patterns and current lifestyles, and which do not involve referring back to old architectural forms
2. Create an open area or open space on the ground floor of the building, particularly for buildings of organisations. It may take up a lot of space but it is one of the basic Thai architectural characteristics
3.

A list of guidelines by laymen

1. Create an open area or open space on the ground floor of the building, particularly for buildings of organisations. It may take up a lot of space but it is one of the basic Thai architectural characteristics
2. Adopt new designs that are in harmony with current patterns and current lifestyles, and which do not involve referring back to old architectural forms

It shows that the architects strongly support an idea of adopting new designs that are in harmony with current patterns and current lifestyles - without referring back to old architectural forms. They tend to pay more attention to creating a new design that supports the current lifestyle of people. At the same time, they reject traditional forms that do not benefit the way of life of people.

A comparative analysis of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about an adoption of new designs that are in harmony with current patterns and current lifestyles, and which do not involve referring back to old architectural forms. Also at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion about creating an open area or open space on the ground floor of the building. It shows that there are more architects than laymen who think that this option offers a way to develop Thai architectural features better than the other.

C. Climate

A comparative analysis of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features for buildings of organisations - in terms of climate – is shown below.

Table 5.35 shows a comparison of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features: Climate

Guidelines for the development of characteristic Thai features in architecture	Architects			Laymen			t calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Design a building that suits the climate. (e.g. design a building that facilitates air flow, build long eaves for weather protection)	4.48	0.69	1	4.13	1.06	1	2.77 *
- Design a building that suits the climate and complements characteristic Thai features (even though the buildings have air-conditioning systems)	4.06	0.86	2	3.75	0.87	2	2.53 *
- Design a building that suits the climate and complements characteristic Thai features (even though it shares the same architectural forms with other tropical countries)	3.68	0.91	3	3.60	0.91	3	0.62

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.34, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features.

Based on the mean average (X), it shows that both architects and laymen agree with an architectural design that suits the climate of the country. A list of guidelines, arranged in order of their preference, is given below.

A list of guidelines by architects and laymen

1. Design a building that suits the climate. (e.g. design a building that facilitates air flow, build long eaves for weather protection)
2. Design a building that suits the climate and complements characteristic Thai features even though the buildings have air-conditioning systems
3. Design a building that suits the climate and complements characteristic Thai features even though it shares the same architectural forms with other tropical countries

It shows that both architects and laymen strongly favour the idea of designing a building that is suitable for the climate. It can be done, for example, by building long eaves for weather protection and designing a building to support smooth air flow. The idea can also be applied to a building that already has air conditioning systems. Indeed, most architects in previous generations have always taken into account the climate conditions when designing a building. Pusadee Thippatas (1996: 224), who studied architectural concepts of some architects who investigated weather conditions and the architecture in tropical countries between 1983 and 1994, stated;

"Architects who are aware of this issue will take into account weather conditions when designing residential and public buildings. The position of the buildings will correspond with directions. Roof eaves will be extended from the walls to protect against the rain and the verandah will provide shelter from the sun for windows."

It is clear that the architectural design that suits the climate is a way for the development of characteristic Thai feature that mirrors traditional Thai architecture.

In the case of buildings with air-conditioning systems, Pusadee Thippatas (1996: 223) stated

"The concept about the arrangement of interior space to correspond with directions is still visible in government buildings, schools and universities that may not entirely be equipped with air conditioning systems. It is evident, for example, in a building whose hallways are sided by rooms. The rooms in the south are often not installed with air conditioning systems because they can rely on the southern wind. On the other hand, the rooms in the north usually feature air conditioning systems because of the unfavourable conditions of the northern wind"

The concept mentioned above supports the development of characteristic Thai features and corresponds with the guidelines suggested by Trungjai Buranasomphop (1990: 119-121).

"The most important things that create Thai architecture are the surroundings and the climate, whether it be sunlight,temperature,wind, rain and humidity. These are factors that support living conditions. There was no air conditioner and electricity in the past. Even though life is more convenient because of advance technology, we should not forget about buildings that are in harmony with the surroundings. This way, we will not only create unique architecture but also help to conserve energy and reduce air pollution. So air conditioners and electricity should be installed in appropriate places such as meeting rooms. Other places such as halls, stairs, restrooms and walkways should just be designed to be open to sunlight and wind."

A comparative analysis of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about the design of a building that suits the climate, complements characteristic Thai features and shares the same architectural forms with other tropical

countries. Also at the significance level of 0.05 ($t \geq = 1.96$), there is a difference of opinion about the design of a building that facilitates air flow and includes long eaves and the design of the air-conditioned building that suits the climate and complements characteristic Thai features. It indicates that there are more architects than laymen who think the two design options above are the guidelines for the development of characteristic Thai features.

D. Modern Materials and Construction Technology for Energy Efficiency

A comparative analysis of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features for buildings of organisations - in terms of modern materials and construction technology for energy efficiency – is shown below.

Table 5.36 shows a comparison of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features: Modern materials and construction technology for energy efficiency

Guidelines for the development of characteristic Thai features in architecture	Architects			Laymen			t calculation
	X_1	SD_1	Order	X_2	SD_2	Order	
- Use modern materials and construction technology that supports energy efficiency for buildings (e.g. building insulation)	4.43	0.74	-	4.40	0.83	-	0.27

* shows a score of statistical difference at the significance level (P-value) of 0.05 ($t \geq = 1.96$)

Referring to the result in Table 5.35, an analysis of the opinions of architects and laymen is given below.

An analysis of the opinions of architects and laymen about the guidelines for the development of characteristic Thai features

shows that, at the significance level of 0.05 ($t \geq = 1.96$), there is no difference of opinion about modern materials and construction technology for energy efficiency.

It shows that architects strongly agree with the idea of using modern materials and construction technology that supports energy efficiency for buildings. It is necessary to think about energy saving when designing a building in a tropical country like Thailand. In addition to long eaves, modern materials and construction technology such as building insulation can help save energy for the buildings. Technology that encourages comfortable atmospheres can be useful as well.

Summary of an Analysis of the Guidelines for the Development of Characteristic Thai Features for Buildings of Organisations

An analysis of the guidelines for the development of characteristic Thai features for different types of modern architecture is given below.

1. Opinions of architects and laymen about the guidelines for the development of characteristic Thai features for different types of modern architecture

It can be concluded that both architects and laymen strongly agree with the ideas of using the impression from characteristic Thai features to create the Thai ambiance for buildings and adapting indigenous architectural features in the design of buildings in the respective regions. Both groups also favour the ideas of applying modern materials and construction technology with traditional architectural features, using symbols of characteristic Thai features in the design and adapting characteristics of residential structures in the design. However, they are taken as secondary options.

However, architects and laymen do not seem to support an attempt to adapt architectural elements of religious structures in the design. It is because religious structures are highly regarded in Thailand. *Some architectural features are reserved for the king and religious structures only. Therefore, there are limitations in applying these features with other types of buildings.*

A. New Use

It can be concluded that architects prefer an idea of adopting new designs that are in harmony with current patterns and current lifestyles, and which do not involve referring back to old architectural forms. It is because architects tend to focus on designing a building whose space can be utilised, and which serves current lifestyle of users. At the same time, laymen favour an idea of creating an open area or open space on the ground floor of the building in order to accommodate building visitors and users. Besides, this design will help to promote characteristic Thai features. The architects, therefore, should bear this option in mind when designing a building.

B. Climate

Both architects and laymen endorse the design that suits the climate. This can be done, for example, by building long eaves and designing a building that facilitates air flow. It goes to show that this idea is developed from traditional architectural features that correspond with the climate in Thailand. This idea can even be applied with buildings, which have air conditioning systems, to help to save electricity consumption and showcase characteristic Thai features.

However, both groups do not seem to support the idea of using Thai architectural features that are shared by other tropical countries. It is, therefore, suggested that architects add other characteristic Thai features (e.g. a cool and pleasant atmosphere and a sense of lightness, buoyancy and airiness) into the design to create a unique style of Thai architecture. However, in order to create the impression brought

C. Modern Materials and Construction Technology

Using modern materials and construction technology that makes buildings more energy efficient is strongly supported by architects and laymen - particularly when comparing with other options. This idea can be applied with all the options mentioned above.

2. Comparison of the Opinions of Architects and Laymen about the Guidelines for the Development of Characteristic Thai Features for Buildings of Organisations

Referring to the research's finding, it can be said that most architects and laymen share the same opinion about the guidelines for the development of characteristic Thai features for buildings of organisations. This is because of information technology, which makes the information about architectural design, technology and construction materials more accessible to people. It helps architects and laymen to understand various factors related to the architectural design, including climate, new use and even the latest construction technology for energy efficiency. As a result, both groups tend to have the same level of understanding about the development of characteristic Thai features. Based on the summary of the guidelines mentioned above, architects can use these options as a guide for the design of characteristic Thai features for different types of buildings.

Chapter 6

Summary and Suggestions

Today, architectural design in Thailand is aimed at serving the changing lifestyles of Thai people and is influenced by economic and social factors, and technology. However, the need to incorporate traditional characteristics of Thai architecture into modern buildings is also important. This need results from a new attitude of building owners who wish to present traditional architectural styles, and various social and cultural aspects of the country, to the public. This study is an attempt to investigate characteristic Thai features in three forms of modern architecture, namely residential buildings, buildings for organisations and commercial buildings, particularly hotels and resorts. These types of buildings are easily recognised by architects and the public. The study also gives attention to guidelines for incorporating characteristic Thai features, adapted where necessary, into architectural designs of the future. The results of this research are described in the summary below.

Research Summary

Characteristic Thai features, found in surveyed buildings that should be applied in the design of all three types of buildings.

From the opinions of architects and laypeople the conclusion can be drawn that many characteristic Thai features have been carried over into modern buildings, both as regards physical appearance and ambience. The detail of these characteristics is explained below.

1. Physical Appearance of Characteristic Thai Features

- ***The Layout of Buildings***

Buildings with a U-shape, or built in parallel sections with a connecting terrace, reflect characteristic Thai features which should be incorporated in the design of residential buildings. In particular, the connecting terrace is a distinguishing feature of traditional Thai houses.

Having said this, however, people in general do not consider that parallel buildings with a connecting terrace reveal a traditional Thai influence in the architectural design of houses.

Buildings that house organizations or institutes should be built around an open piece of ground, with a garden in the middle.

This reflects a time-honoured Thai tradition, relating to the layout of Thai houses in the central region. Such houses comprise a collection of connected cabins.

For hotels and resorts, the traditional layout of a group of buildings with a connecting terrace should be used to accentuate this long-established feature of Thai architecture. The design should also include roofed walkways to link buildings – the roof helping to protect against sun and rain, both of which are the norm in tropical countries like Thailand.

However, people in general do not relate a terrace connecting a group of buildings to any specific traditional Thai influence. They see roofless connecting walkways purely as a good example of a modern Thai architectural feature.

- ***Main Elements***

The main elements of modern Thai characteristics that should be considered when building houses is the gable roof. Houses may have a gable roof, a gabled roof with kicked eaves (*Chua Peek Nok*) or a hipped roof (*Panya)* with overlapping tiers. Roof eaves should be extended and roofing materials should be either shingles or earthenware tiles. Some suggest the use of CPAC Monier tiles. Brown, orange and black are recommended colours for the roofs. Another recommendation includes a terrace with an opening in the middle for a stairway or for a pool. The outer area of the buildings should be linked by a terrace or a verandah (*Palai*). Square and circular free-standing pillars are preferred while there should be an outside entry point or gateway to the premises, with or without a door.

Nevertheless, people think that short roof eaves and orange and black roofs on residential buildings are not a modern-day reflection of traditional Thai architecture.

In the case of buildings housing the organizations mentioned above, a gable roof, a gable roof with kicked eaves, or a hipped gable roof (Manila roof) with tiers, may be used to cover a large building in order to soften its hefty appearance. The roof eaves should also be extended while earthenware tiles are recommended for the roofing. The colours of the roof can be red, orange and brown. Free-standing circular pillars are preferable. An open piece of ground, surrounded by the buildings, should help consolidate the different aspects. However, people are of the opinion that a Manila roof, earthenware tiles and orange roof tiles do not necessarily point to a direct link with traditional Thai architecture. Some people suggest that the roofing material should be CPAC Monier tiles, and that the roof colour should be blue; others that the concrete roof is covered with ceramic tiles.

For commercial buildings such as hotels and resorts, it is proposed that a gable roof, a gable roof with kicked eaves or a hipped gable roof (Blanor) should be considered. Roof tiers will also help reduce the bulky appearance of the buildings while long eaves will provide shade and weather protection from the elements. Traditional elements can be used, such as a pitch roof, clay tiles, a red- or brown-

coloured roof, free-standing circular pillars, low roof pitch and a terrace and verandah (*Palai*) as a link between buildings.

However, people believe that earthenware tiles, a steep roof pitch and a verandah (Palai) do not constitute evidence of a direct link to traditional Thai architecture. Instead, a cross gabled roof (*Chaturamuk*), shingles, a low roof pitch, and an open piece of ground linking the surrounding buildings and the outside elements, are seen to be a modern representation of typical Thai architectural features.

- ***Secondary Elements***

Secondary elements of characteristic Thai features found in modern architecture, and which should also be included in the design of houses, are the different styles of openings such as folded door panels, casement windows and high vertical openings.

Some people suggest square openings, decoratively perforated panel railings, cross-shaped balusters, and railings with horizontal bars. Some suggest the use of railings with vertical and horizontal bars. Wooden floors and clay tiles are preferred as flooring material while exterior walls should consist of either bare brickwork or horizontally laid planks.

However, people in general do not consider that casement windows, awning windows, and washed sandstone floors, are obvious Thai characteristics which would warrant incorporation into the design of modern houses.

Among the recommended traditional Thai features that could be used in buildings which house the organisations, are high narrow openings set in a row. These openings could take the form of high single openings or high twin openings with casement windows. Other elements could include bare brick walls, whitewashed walls, earthenware floor tiles, wooden floors, railing bars and vertical concrete balusters. However, people think that a series of high single openings and high twin openings and earthenware tiles are not a modern representation of traditional Thai features. Others favour plaster walls with a lattice-like pattern (*Lai Khat Tae*).

Desirable Thai features for hotels and resorts would include plank walls (with the planks laid either horizontally, or both vertically and horizontally), painted plaster walls, casement windows and folded door/window panels. Other desirable features include fixed, narrow and tall glass openings, tall, narrow glass windows (whether or not fixed), vertical balusters, and railings with vertical and horizontal bars. Floors may have a lotus motif or a corner pattern (*Lai Yo Muum*). Earthenware tiles and planks would be a good choice for flooring. However, people think that walls made from horizontally laid planks; tall, fixed and narrow glass openings; vertical balusters; trapezoid windows with skirting frames; and decoratively perforated panel railings show the most noticeable traditional Thai characteristics in modern architecture.

- ***Miscellaneous Elements***

Other aspects of traditional Thai architecture found in modern buildings, and which would be suitable for houses, are concrete eave brackets and wooden eave brackets. The pediments may have a louvre-style pattern (*Chua Bai Prue*), or have a sunray motif, or just take the form of a gable wall. This includes the use of concrete to imitate the assembly of woodwork – a feature normally found in traditional houses in the central plains of Thailand. This said, laypeople do not regard wooden eave brackets and *Chua Bai Preu* as being such distinguishing features of Thai architecture that they would justify their inclusion in modern designs for residential buildings.

Under this heading, recommended elements for buildings that house the above-mentioned organisations and institutes include gateways surmounted by concrete gables to indicate the entrance to the premises. Wooden gables with a brick-like pattern (*Lai Lok Fuk*) or with a shingle motif (*Lai Tee Kred Mai*) would be an acceptable alternative. Other elements include eave brackets with one side attached to the middle of the supporting pillar.

However, people do not regard the brick-like pattern as representing a traditional Thai characteristic in a modern form.

For commercial buildings such as hotels and resorts, plain *Kalae* finials, louvre style and *Chua Bai Preu* pediments and eave brackets should be part of the architectural design. Nevertheless, people think that plain *Kalae* finials and the absence of eave brackets do not reflect traditional Thai features in a modern setting.However, *elaborate Kalae* finials and the absence of eave brackets do in fact show a more modern form of traditional Thai architecture.

- ***Landscaping***

A modern Thai feature in landscaping that should be applied to residences, is the relationship between water and structure. This involves such matters as the distance between the pools and the buildings, and the desirability of a wooden bridge linking the buildings. Additionally, trees should preferably not be too close to the buildings.

The relationship between water and structure should also be considered when planning and designing the environment around the buildings that house the above-mentioned organisations and institutes. For example, it may be preferable for the supporting pillars of a building to be partly submerged in the water of a pool, or to be adjacent or close to the pool.

At the same time, the relationship between trees and the buildings is also important. For instance, the buildings may be grouped around a piece of ground containing trees, or trees may be located close to the buildings.

However, people do not perceive pillars that are partly submerged in water as being a traditional Thai feature in a modern setting. They also think that the walkway should be flanked by trees on both sides.

The relationship between water and the buildings can be incorporated in the design of resorts and hotels. For instance, the base of the supporting pillars of a building may, by design, be partly under the water. For purposes of creating a Thai ambiance, a pool or a lotus pond could be built near the building or along a walkway. Other features include a Thai pavilion near or in a pool, and roofed bridges between buildings. Trees could be planted on an open piece of ground, or randomly around the buildings.

This said, the submerging in water of the base of the supporting pillars of buildings, and the planting of trees on an open piece of ground, are in fact clear indications of a modern application of traditional Thai features.

2. The Impression Created by Characteristic Thai Features

- ***Lightness and Buoyancy***

Lightness and buoyancy is one of the characteristics of Thai architecture. To add a sense of lightness and buoyancy to houses, architects may take advantage of different features of roofs, such as long roof eaves and roof tiers. Free-standing pillars can be built along indented walls, and they can also imitate the style found in Thai pavilions (Sala). Being close to water can add a feeling of lightness and buoyancy to houses as well.

However, laypeople do not regard the feeling of lightness from *Sala*-style free-standing pillars or the long distance between the water and the building, as distinguishing features in Thai architecture that should be applied in the design of houses.

As regards buildings that house the above-mentioned organisations, various aspects can contribute to a sense of buoyancy. These include roof tiers, different layers of roofs and extended roof eaves. However, other elements such as an elevated platform, Sala-style free-standing pillars, and pillars along indented walls can also create the impression of lightness. Close proximity to water can add the feeling of buoyancy. The research shows that the respondents think that the pool should be built near the building, to create the impression that the building is drifting in the air.

Hotel and resort buildings can show a sense of buoyancy through their roof tiers, different layers of roofs, long roof eaves, Sala-style free-standing pillars and their proximity to the pool. However, people in general think that an impression of lightness and buoyancy created by roof tiers is not a characteristic Thai feature in modern buildings.

- ***The Airiness***

Airiness is a common characteristic of traditional Thai houses. To **en**sure good ventilation, a house should have an open space or a terrace serving as a link to different rooms and sections of the house.

As regards buildings for the organisations referred to earlier, an elevated platform and an open piece of ground surrounded by a group of buildings can give a sense of airiness and provide appropriate ventilation.

A sense of airiness in hotels and resorts can be created by having a big terrace, Sala-style free-standing pillars and an open piece of ground amongst a group of buildings. These features allow fresh air to enter and move freely about an enclosed space.

- ***A Cool and Pleasant Atmosphere***

A cool and pleasant atmosphere in a house can be a result of long roof eaves and trees planted nearby.

A group of buildings occupied by the organisations can have a cool and pleasant atmosphere if they are positioned around a piece of ground filled with trees. Alternatively, long roof eaves and surrounding trees can also provide a cool and pleasant atmosphere.

Trees can have a significant impact on the atmosphere of hotels and resorts. Obviously, hotels that have their outside areas filled with trees, or their buildings shaded by trees, will enjoy a cool and pleasant atmosphere. Other trees planted around hotel buildings will provide the same effect.

Guidelines for the Development of Characteristic Thai Features for the Architectural Design of Buildings That House Organisations

Based on an analysis of the opinions of architects and laypeople, a summary has been compiled of the guidelines for the way in which characteristic Thai features should, in future, be *developed and* incorporated in architectural designs relating to buildings that house the above-mentioned organisations and institutes.

1. Incorporation of Thai characteristics in architectural designs of buildings that house the organisations

One of the suggestions made was that traditional Thai features should be made to conform to modern materials and technology, and then be worked into the design of houses. For example, free-standing pillars and Thai roof style can be constructed from modern materials and technology.

Another suggestion relates to incorporating the feeling and ambience (rather than the physical features) of traditional Thai architecture into modern designs. The methods involved in the two scenarios are apparently different. Particularly, laypeople

do not seem to have clear opinions about replicating the atmosphere and ambience of Thai architecture, without also incorporating the old architectural features into modern architectural designs for residential buildings.

It has also been suggested that the ambience of traditional Thai architecture should be considered when designing institutional and commercial buildings. This can be seen, for example, in the architectural work of Thai architects Non and Trungchai Buranasomphop, who designed the Thai embassy in Riyadh, Saudi Arabia. The embassy features several open areas that are conducive to good ventilation, giving rise to a sense of airiness.

Another method is to incorporate indigenous architectural design features, adapted as necessary, when designing buildings in the respective regions, to preserve local culture.

Thus, in developing guidelines for developing and incorporating characteristic Thai features into architectural design, consideration first has to be given to matters such as making traditional Thai features conform to modern materials and technology, making symbolic use of Thai architectural features, incorporating the ambience and feeling of traditional Thai architecture into modern designs, and making use of indigenous architectural design features, including the two scenario mentioned above.

Aspects such as airiness, a sense of lightness and a cool and pleasant atmosphere can also be applied in the design of hotels and holiday resorts. At the same time, physical features, such as Thai roofs and free-standing pillars, can appropriately reflect traditional Thai architecture. In addition, regional architecture can be incorporated into the hotel context in order to accentuate local characteristics and help restore indigenous culture. However, there was in the past a limit to which these features could be applied in tall buildings because there were no examples of such buildings in the history of Thailand, until comparatively recently. Therefore, only specific elements such as gable top gateways could be used to showcase traditional Thai architectural features.

2. *New Use of Thai Architectural Characteristics*

There are certain approaches that can be followed in revitalizing Thai architectural characteristics relating to residential structures. The first one concerns adapting traditional architectural features to suit the contemporary lifestyle of Thais. It incorporates established characteristics into new architectural designs. For example, a common feature of traditional Thai houses is a terrace, and this should be included in modern Thai houses even though people tend to spend most of their time indoors to avoid the hot sun. This way not only will traditional Thai architectural features be restored, but a new design feature will also be created.

The second approach is to adopt new designs that are in harmony with current patterns and current lifestyles, and which do not involve referring back to old architectural forms.

However, people seem to favour having an open area, or leaving the first floor empty even though it wastes a lot of space. These two approaches can be applied to different types of property, depending on how the land is to be used, the construction budget, the requirements of the land owner and the purpose of the building.

For resort and hotel buildings, the guidelines for developing and incorporating characteristic Thai features into architectural design should include some unique Thai architectural elements. These would have new uses in keeping with new lifestyles and would also help maintain Thai identity.

3. Climate

The guidelines for developing and incorporating characteristic Thai features into the design of houses also relate to the physical surroundings of the project. The house will blend in well with its surroundings when local architectural features are integrated into the building. Some distinguishing features such as *Kalae* finials and a gable roof with kicked eaves (*Chua Peek Nok*) may have to be redesigned to blend in with modern houses. This process can help indigenous architecture endure indefinitely.

Climate should also be taken into consideration when designing institutional or commercial buildings. Architectural elements such as long roof eaves can help protect the buildings from the elements. Even buildings that already have air conditioning systems can benefit from long roof eaves and good ventilation like that found in traditional Thai houses. Besides, a well-ventilated building is more energy efficient and obviously also reflects Thai architectural characteristics.

Even though a sense of airiness and long roof eaves are typical architectural features in tropical countries, Thai buildings have other distinct characteristics such as a sense of lightness and buoyancy and a cool and pleasant atmosphere. These can be incorporated into the design of new buildings. Therefore, architects should have a deep understanding of the physical characteristics and the spirit of Thai architecture in order to create unique structures unlike other buildings in the same region.

For resorts and hotels, the use of long roof eaves helps the property withstand sun and rain. At the same time, because long eaves are a distinguishing feature in Thai architecture, they add a distinct Thai quality to the building. Additionally, architects may use both modern materials (e.g. low-iron glass and stainless steel) and natural materials, to create a modern Thai ambience that blends in with the natural surroundings.

4. Materials and Construction Technology for Energy Efficiency

Blending modern materials and materials that resemble natural products can give a house a contemporary Thai look and feel, and bring nature closer to home. Another quality of modern Thai architecture is that it showcases the structure of the building.

Indeed, energy efficiency, comfort and a harmonious architectural response to Thailand's tropical climate should be essential elements in the design of every type of building.

5. Architectural Creation

The conclusion can be drawn that a design policy that supports the continuation of a traditional architectural custom provides a favourable basis for incorporating characteristic Thai features into modern architectural designs. Even though such action may lead to an increase in construction costs, it is in the best interests of Thai architecture. At the same time, architects should be wary about the social and cultural aspects of religious and royal structures. For instance, architectural features relating to temples and palaces should be avoided in hotels and resorts.

According to the research summary, traditional Thai architectural features can, when placed in a modern context, be arranged under two headings, namely "Physical Appearance" and "Impression Created by Characteristic Thai Features". The data collection focuses on the function of each type of buildings with some attention to architectural forms. The study also shows that architects and laypeople have different opinions about the acceptance of traditional Thai features that have been adapted to suit a modern context. While many Thai architects are still concerned with the relationship between form and function, based on the fundamental philosophy of Thai architecture, laypeople tend to see Thai characteristics of contemporary buildings in terms of architectural forms.

Architects should consider both form and function when designing a building. They should, for example, be able to explain to house owners the significance and benefits of modern Thai characteristics so that Thai architectural wisdom and philosophy can be preserved and developed properly.

Additionally, the impression created by Thai architectural characteristics should be incorporated into contemporary architecture. This would involve, amongst other things, adapting local design for buildings in respective regions of Thailand, to accommodate climate, local beliefs, construction materials and technology and energy efficiency measures.

Suggestions for Future Research

This research investigates modern adaptations of traditional Thai architectural features in selected residential buildings in different regions throughout the country. For further research, the researcher suggests an in-depth investigation of modern Thai characteristics for houses in the following aspects.

1. ***Characteristic Thai Features of Residential Dwellings in the Different Regions of Thailand***

A house is an expression of national and cultural identity. Each region has its own unique architectural characteristics. It would be interesting, therefore, to explore

these characteristics. Such a study would result in the guidelines for the design of houses that showcase modern Thai characteristics of each region.

2. Characteristic Thai Features of Condominiums

Bangkok is a densely populated city. This has resulted in drastic change in the design of residential buildings. Since land has become increasingly scarce and more expensive, the city has expanded vertically, rather than horizontally, in order to optimize land use and cost-effectiveness. The question is how to transfer characteristic Thai features of home living to condominiums, which differ from houses as regards, for example, size and the height of condominium buildings, construction materials and technology and the system of building

3. The Influence of Construction Materials and Technology on Characteristic Institutional or commercial Building Thai Features

According to the research, the acceptance of modern adaptation of traditional Thai architectural characteristics tends to depend on how the traditional qualities have been affected by modern construction materials and technology. It is, necessary, therefore, to study and compare the acceptance of modern adaptations of traditional Thai architectural features. Two approaches can be used in doing this:

The first one is to retain the traditional Thai architectural forms with the use of modern materials. The second one is to adapt the traditional Thai architectural forms with modern materials. The study will seek to find out to what extent architects and laypeople accept the two approaches, so that appropriate guidelines for the design of residential buildings can be developed.

Suggestions for Future Research

This research investigates modern adaptation of traditional Thai architectural characteristics in three types of buildings in different regions throughout the country; namely, the following:

- Residential buildings
- Institutional and commercial buildings
- Hotels and resorts

It involves a broad study of the traditional Thai architectural characteristics of such buildings, rather than focusing on the unique architectural features of each region. Each type of building can be classified further for future research. The following guidelines are therefore proposed for the further study of modern adaptations of traditional Thai architectural features in institutional or commercial buildings.

1. From the study, all three types of buildings can serve to encourage an understanding and appreciation of local culture. Therefore, future research should include the study of modern adaptations of traditional Thai features in regional architecture.

2. According to the study, modern construction materials and technology can affect traditional Thai architectural characteristics. Thus, it would be of interest to find out to what extent these architectural features are undergoing change, given the choice of materials and technology.

3. The design of hotels and resorts should be in line with their status and characteristics.

4. The research shows that residential buildings, institutional or commercial buildings and hotels and resorts differ in different sizes, shape, appearance, method of construction, etc. These are factors that can affect traditional Thai architectural characteristics. More research, therefore, should be done to find out how the further adaptation of traditional Thai architectural features in such buildings should proceed.

5. Shop houses in each region of Thailand have no local Thai character. Therefore, future research should include the study of modern adaptations of traditional Thai features for the shop houses.

6. Adjusting the appearance of Traditional Thai Architecture to use appropriately as decorating in the contemporary building is supportable. Because this is not only seeing the actual Thai appearance but also conserving Thai craftsmanship as well. So it is so suitable to study how to adjust the appearance of Traditional Thai Architecture to use appropriately.

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Appendix

Social Analysis of Respondents

There are two groups of respondents in this analysis; architects and laypeople. They are classified by gender, age, educational level, occupation, position held and number of years in employment. The Z-test is used as a tool to test hypotheses about the differences and similarities between the two sample groups, in regard to their social backgrounds.

1. Gender

Table 1 Frequency Distribution of Gender: Comparison between architects and laypeople

Respondents	Gender					
	Male		Female		Total	
	Number	Percentage %	Number	Percentage %	Number	Percentage %
Architects	77	77	23	23	100	100
Laypeople	65	65	35	35	100	100
Total	142	71	58	29	200	100

Table 1 shows that the gender ratio for the two groups of respondents, namely architects and laypeople, is similar. The results of the Z-Test also show that the gender ratio is not different. (The Z-scores of male and female respondents are 1.87 and -1.87 respectively. The significant level (p-value) of 0.05 is ± 1.96)

2. **Age**

Table 2 Frequency Distribution of Age : Comparison between architects and laypeople

Respondents	Age							
	< 26 years		26 – 35 years		36 – 45 years		> 45 years	
	Number	%	Number	%	Number	%	Number	%
Architects	35	35	46	46	12	12	7	7
Laypeople	31	31	58	58	8	8	3	3
Total	66	33	104	52	20	10	10	5

Table 2 shows that the age ratio for the two groups of respondents, namely architects and laypeople is similar. The results of the Z-Test also show that the age ratio is not different. (The Z-scores of respondents younger than 26 years old, between 26 and 35 years old and between 36 and 45 years old are 0.60, -1.71 and 0.95 respectively. The significant level (p-value) of 0.05 is ± 1.96)

3. **Educational Level**

Table 3 Frequency Distribution of Education: Architects and laypeople

Respondents	Education Level					
	Bachelor's degree		Postgraduate degree		Total	
	Number	Percentage %	Number	Percentage %	Number	Percentage %
Architects	78	78	22	22	100	100
Laypeople	82	82	18	18	100	100
Total	160	80	40	20	200	100

Table 3 shows that the educational-level ratio for the two groups of respondents, namely architects and laypeople, is similar. The results of the Z-Test also show that the education-level ratio is not different. The Z-scores of respondents with a Bachelor's degree and respondents with a postgraduate degree are -0.70 and 0.70 respectively. The significant level (p-value) of 0.05 is ± 1.96

4. **Occupation**

As of September 1996, there were 5,347 members of The Association of Siamese Architects (ASA). Of these, 4,706 members (88%) were working in the private sector and 641 (12%) were working for government agencies. The number of respondents in each category was accordingly based on this ratio.

Table 4 Frequency Distribution of Employment: Comparison between architects and laypeople

Respondents	Employment							
	Government		Private Sector		Self-employed		Other Agencies	
	Number	%	Number	%	Number	%	Number	%
Architects	12	12	84	84	4	4	-	-
Laypeople	17	17	77	77	4	3	**3**	**3**
Total	29	14.5	161	80.5	7	3.5	3	1.5

Table 4 shows that the occupation ratio for the two groups of respondents, namely architects and laypeople, is similar. The results from the Z-Test also show that the occupation is not different. (The Z- scores of respondents in government agencies, the private sector, self-employment and "other" (i.e. in other situations or circumstances) are -1.00, 1.25, 0.38 and -1.76 respectively. The significant level (p-value) of 0.05 is ± 1.96)

5. **Position**

Table 5 Frequency Distribution of Position: Comparison between architects and laypeople

Respondents	Position (Job level)							
	Employee		Management Levels		Other		Total	
	Number	%	Number	%	Number	%	Number	%
Architects	86	86	12	12	2	2	100	100
Laypeople	82	82	11	11	7	7	100	100
Total	168	84	23	11.5	9	4.5	200	100

Table 5 shows that the position (job level) ratio for the two groups of respondents, namely architects and laypeople, is similar. The results of the Z-Test also show that the position/job level is not different. (The Z scores of respondents at general employees, management level and other levels are 0.77, 0.22 and 1.66 respectively. The significant level (p-value) of 0.05 is ± 1.96)

6. **Number of Years in Occupation**

Table 6 Frequency Distribution of Number of Years in Occupation: Comparison between architects and laypeople

Respondents	Number of Years in Occupation							
	1 – 2 years		3 – 10 years		11 – 20 years		> 20 years	
	Number	%	Number	%	Number	%	Number	%
Architects	35	35	48	48	13	13	7	7
Laypeople	24	24	59	59	11	11	3	3
Total	59	29.5	107	53.5	24	12	10	5

Table 6 shows that the years-in-occupation ratio for the two groups of respondents, namely architects and laypeople, is similar. The results of the Z-Test also show that the years-in-occupation ratio is not different. (The Z- scores for the four categories, namely between 1 and 2 years, 3 and 10 years, 11 and 20 years, and more-than-20 years are 1.72, -1.57, 0.43 and 1.33 respectively. The significant level (p-value) of 0.05 is ± 1.96)

7. Summary of Social Analysis of Respondents

The investigation showed no difference in the social background of the respondents, namely architects and laypeople, in terms of gender, age, educational level, nature of employment, position (job level) and number-of-years-in-occupation. Therefore, the conclusion may be drawn that this research was able to control such variable social factors.

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