Institut für Architekturgeschichte
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ARCHITECTURAL ASPECTS OF TEMPLES IN MYANMAR

AN APPRECIATION OF SPATIAL COMPOSITION

Thaw Tar Aung

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TABLE OF CONTENTS

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ABSTRACT

Many countries in the Asian region which are now experiencing a high economic growth encounter in the built environment. A lot of buildings are being constructed in the region with a total disregard to our cultural landmark and traditional social life- style. Our traditional own heritage needs to be effectively understood and integrated into our evolving value system. Traditional values can either provide strength and identity or be obstructive to the development process and the acceptance of today's more enlightened value. Today, in Southeast Asian countries, architects caught in the theories of rapid transformation and learning how to cope with the modernization that modern building techniques appear to produce. And they try to reuse that traditional architecture in modern present buildings from the architecture of the history and development through the periods.

The forerunners of architectural historians and the pioneer scholars in Myanmar were interested in the art and architecture of the remains of the great historical traditions, such as the Burmese, Pyu, Mon and Rakhine. Starting from the beginning of 20th century, specialists of many disciplines dedicate their works to the study of architecture in Bagan and Mrauk-U from various aspects and now over one hundred years have been passed and yet many controversies and disagreements still exist, showing that research works are still needed about facts on this region.

These two cities, Bagan and Mrauk-U explain that the traditional buildings are monumental memorials in space and form and provide the traditional architecture as the symbol of national character and cultural heritage. The styles of the buildings reflect the situation of each period and the mind of builders at that time politically, socially, culturally and economically. It has to consider emphatically how it is delicate to approach in accordance with time, place and condition as well as harmonization to architectural technology of past and present for the solving of the cooperation and integration of Myanmar architecture.

Using traditional architectural identity to create a new contemporary architecture in the built environment is not only conserving the traditional architectural identity but also fulfilling the needs of the users as they have lived intimately in those buildings. By investigating that history of architecture in Pyu, Bagan and Mrauk-U and depending on the classification of the temples there, the reflection of the historic architecture of Myanmar can be compared and recommended with the present temples in Yangon.

This study tries to observe the ancient monuments in architectural aspects based on historical background, geographical, social, economic, religious and climatic influences and seek the existing values in the temples in Pyu, Bagan and Mrauk-U in terms of architecture in order to understand how they became the identity of and built image in such a built environment. The research is also aimed to get a better understanding of the various influences and evolutions within the historic setting and tries to rediscover the historical architectural aspects in their form and spatial composition. Finally, this research will try to provide some recommendations and suggestions for developing conservation strategies, which can be implemented all in the selected case study cities. These forces are creating tension in such areas and thus are among other current important tasks of the architecture of the temples today.

Keywords: Pyu, Bagan, Mrauk-U, Spatial Composition, Conservation, Evolution.

KURZZUSAMMENFASSUNG

Das hohe Wirtschaftswachstum vieler asiatischer Länder findet seine Entsprechung in der gebauten Umwelt. Allerdings werden viele Gebäude in diesen Ländern unter Missachtung der kulturellen Wahrzeichen und des traditionellem Soziallebens gebaut. Das eigene traditionelle Erbe sollte besser verstanden und integriert werden in die sich entwickelten Wertesysteme. Traditionelle Werte können dabei einen festen Halt bieten und Identität stiften oder den Entwicklungsprozess und die Akzeptanz der damit verbundenen Werte behindern. Heutzutage sind südostasiatische Architekten dahingehend gefangen, zurechtzukommen mit dem raschen Wandel, die die Modernisierung der Gebäude mit sich bringt. Dabei versuchen sie, die Geschichte und Entwicklung traditionelle Architektur in den modernen heutigen Gebäuden wiederzuverwenden.

Die Vorgänger der Architekturhistoriker und die Gelehrten in Myanmar hatten Interesse an den historischen Kunst- und Architekturhinterlassenschaften wie die der Burmesen, Pyu, Mo und Rakhine. Von Beginn des 20. Jahrhunderts an haben Spezialisten aus verschiedenen Disziplinen Ihre Arbeit dem Studium der Architektur in Bagan und Mrauk-U gewidmet. Hundert Jahre später existieren immer noch viele Kontroversen und Meinungsverschiedenheiten um dieses Thema. Das zeigt, dass diese Region weiterhin erforscht werden muss.

Die beiden Städte, Bagan und Mrauk-U zeigen, dass die traditionellen Gebäude monumentale Gedenkstätten in Raum und Form sind. Sie deklarieren traditionelle Architektur als Symbol des nationalen Charakters und des kulturellen Erbes. Die Stile der Gebäude spiegeln die Situationen des jeweiligen Zeitraums wider sowie den Geist der Bauherren, der zu jener Zeit beherrschend war in politischer, sozialer, kultureller und auch wirtschaftlicher Form. Es gilt zu überlegen, wie ein Ansatz aussehen könnte, um das heikle Unterfangen der Harmonisierung von Architekturtechnologien der Vergangenheit und Gegenwart in Einklang mit Zeit, Ort und Gegebenheiten zu bringen. Um eine Lösung für die Kooperation und Integration der Architektur in Myanmar zu finden.

Die Verwendung der traditionellen Architektonischen Identität um eine neue moderne Architektur in der bebauten Umwelt zu schaffen, dient nicht nur dem Erhalt einer Traditionellen Identität sondern auch der Erfüllung der Bedürfnisse der Nutzer. Sind sie es doch die eng mit diesen Gebäuden verbunden sind. Durch die Untersuchung der Geschichte der Architektur in Pyu, Bagan und Mrauk-U und der Klassifikation der Tempel kann die

Geschichte der Architektur von Myanmar verglichen werden besonders unter Einbeziehung der gegenwärtigen Tempel in Yangon.

Diese Studie versucht, die alten Denkmäler hinsichtlich ihrer architektonischen Gesichtspunkte in Bezug auf geschichtliche, geografischen, soziale, wirtschaftliche, religiösen und klimatische Einflüsse zu untersuchen und die vorhandenen Werte in den Tempeln in Pyu, Bagan und Mrauk-U in Bezug zur Architektur zu setzten. Dies mit dem Ziel, zu verstehen wie sie die Identität eines gebauten Bildes in dieser gebauten Umwelt vermitteln konnten. Die Forschung hat auch das Ziel, ein besseres Verständnis der verschiedenen Einflüsse und Entwicklungen innerhalb der historischen Umgebung zu liefern. Des Weiteren versucht die Studie die Wiederentdeckung der Raumkomposition und Form der historischen Architektur. Zudem versucht die Studie einige Vorschläge und Empfehlungen zur Entwicklung von Konservierungsstrategien zu geben. Diese können leicht in den Städten, die mir als Fallstudien gedient haben, umgesetzt werden. Die Ergebnisse dieser Studie sind deshalb von grosser Bedeutung für die heutige Tempelarchitektur in Myanmar.

LIST OF FIGURES

CHAPTER III

CHAPTER IV

CHAPTER V

CHAPTER VI

CHAPTER VII

LIST OF TABLES

CHAPTER V

CHAPTER VI

LIST OF MAPS

LIST OF APPENDIX

CHAPTER I

Introduction

CHAPTER I

1. INTRODUCTION

This work is an introduction to the spatial composition of the temples in Myanmar. It is perhaps the first 'history of architecture' of three periods in Myanmar history – the Pyu, Bagan and Mrauk-U - into which the architecture of those dynasties may be divided, according to transitions in style and conception. It is hoped that it will explain about the city and its many monuments; its origin, art and architecture, evolutions, something of the monuments' functions and the conceptions underlying the construction. About the history of architecture in Myanmar, there have been many books written and much research done upon a century of those religious studies but even today, numerous monuments have escaped study. Much work remains to be done at those ancient areas, not just in restoration and conservation, but in study. In the past, historical research there has mainly involved the translation and study of contemporary epigraphy, and is indeed, a valid and elucidating source for understanding contemporary events, society and religious life.[1]

Among the religious monuments in Myanmar, stupas are famous for their shape and form, temples are famous for their spatial composition and monasteries are famous for their features. The monastery is the building where Buddhist monks live and practice their religious activities, and where the Buddhist teachings of the *"Dhamma"* was propagated and where the monks resided and where young novices and those new monks who entered into the order were trained in the way of Buddha, recitation of prayers and taught the teaching of Buddha.[2]

The stupa is not merely a protective structure built about certain sacred objects. It is a symbol of Buddha and his *Dhamma*, or sacred teachings – to a Buddhist the ultimate architectural structure.[3] Stupas are the solid structures erected as a monumental place to commemorate the Buddha or the memorable deeds he had performed. And it housed the relics of Buddha

[1] The literature is based on the version of this group of scholars;
- Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.1
- Luce, G.H., 'A century of progress in Burmese art and archaeology', P.79-94

[2] Sun Oo, 'The Architectural Aspects of the Monasteries of Bagan', Ph.D. Preliminary Research Report, Yangon, 2001, P.11

[3] Paul Strachan, 1989, P.14

himself after his death and stood as sacred monument of Buddha. Stupas assumed many different contours but a bell-shape was most common for the larger stupas. Many of the later temples are capped with stupa-like superstructures, or towers, thus blurring the rigid distinctions made today in studies on Buddhist architecture. Relics placed inside the stupas generally include unspecified bone relics of the Buddha, together with numerous precious objects, such as gold and silver Buddhas and images made of various costly woods.[4]

The temple, in Burmese, is also called the *'Gu'*, or 'cave', and must be thought of as artificial caves[5] - the word is derived from *'templum'*, the Latin word for a sacred, ceremonial space. The temple is a place of worship, which generally housed Buddha images inside for devotion, ritual and meditation. And it is the place of peace and tranquility, where pilgrims come to pay homage, pray of peace and dedication and meditation. The temple, like the stupa, could contain sacred relics, images of the Buddha, made from precious and costly materials, or precious manuscripts[6].

Religious monuments take a variety of forms and little survives of the great monastic complexes, palace apartments, rest house and other sacred structures, and nothing survives of the original secular or domestic architecture, all of which had been made from wood.[7] Through the study of temples and stupas, their origins and development, the cosmology and the conceptions behind them, their ornaments within and without, and their forms and the functions that related to these forms, a version of all that these areas were begins to unfold themselves.[8] Thus, both temple and stupa have a common symbolism and cosmology, each being, in Burmese, *'Phaya'*, called 'Buddha' or 'Pagoda', and they differ in function.

[4] The literature is based on the version of this group of scholars;
- Donald M,Stadtner, 'Sacred Sites of Burma', Myth and Folklore in as Evolving Spritual Realm, Thailand, 2011, P.220
- Than Tun, 1978, P.129-131

[5] The literature is based on the version of this group of scholars;
- Paul Strachan, 'Pagan: 'Art and Architecture of old Burma', Singapore, 1989, P.15
- Bo Kay, Bagan Research Guide

[6] Paul Strachan, 1989, P.16

[7] Paul Strachan, 1989, P.13

[8] Paul Strachan, 1989, P.1

The main intention of this research is to present the significant spatial composition of temples in Myanmar, to study and analyse their certain functions and how to evaluate, to classify the different types based upon the development and evolution, to present the history of Myanmar Architecture and to support for the building a new temple in the present. In this research, a selection of monuments within those periods is presented, with a more detailed analysis of each monument's architecture and iconography. Here, spatial composition of the temples in Myanmar will be appreciated based upon the development and evolution by the different periods from the different architectural aspects; the principal architectural forms, their origins and the conceptions behind the construction.

1.1. Presentation the Problems defining Areas

The area presently defined as "The Union of Myanmar" had different cultural areas historically: 1. the Northern and North-eastern areas, 2. the central Myanmar areas, 3. the South-eastern areas and 4. the Western areas. Historically, these areas have their own traditional records, and these differ in some points from the archaeological findings, especially concerning dates and periods, which means the dates when these areas reached the civilization level of having kingdoms or urban settlements according to tradition are very early compared to the archaeological findings and other evidence. Based on the archaeological findings, these areas attained the development level of having kingdoms or smaller states starting from about 1st century AD and the Rakhine areas in the southwest reached that same level of development about 2 or 3 centuries earlier.[9]

The North and North-eastern cultural areas are covered in mountain chains, which resulted in smaller states or princedoms developing in these areas, and this situation also prevented these states from merging into a large kingdom of their own.[10] Regarding the middle Myanmar areas, traditional history mentions that the kingdom in the middle Myanmar areas started in Tagaung, presently a small town about 110 miles (176km) north of Mandalay on the

[9] The literature is based on the version of this group of scholars:
- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.5
- Aung Thaw, 'Historical Sites in Burma', Ministry of Culture, 1972

[10] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.9

Ayeyarwaddy River; the second capital was Sri-Khit-Tra, now on the outskirts of a town called Pyi (formally Prome), about 160 miles (250km) from Yangon[11], and later on, the capital of the kingdom moved to Bagan.[12]According to Myanmar traditional history, Bamars are the descendants of Pyu, whose inscriptions and artifacts are found in Sri-Khit-Tra and in some other settlements in central Myanmar and in Bagan, indicating that Bagan is the continuation of the cultural and religious practices of Sri-Khit-Tra. Bagan culture is the continuation of the Pyu culture of Sri-Khit-Tra and later on also received cultural inputs from Mon and also from South India. Most heads of the archaeological department in Myanmar adopted this concept, and research and excavations were carried out based on this concept.

Concerning Bagan, starting from the beginning of 20th century, specialists of many scholars dedicate their works to the study of Bagan from various aspects and now over one hundred years have been passed and yet many disagreements still exist, showing that researched works are still needed about the facts of Bagan. There are also differences of opinion relating to the subject of architecture; "one important question is how many buildings are in Bagan" because there are many different traditional accounts and counts of the numbers of monuments. When an archaeological survey from India started to operate in Bagan at the beginning of 20th century, 2,171 monuments, monasteries, libraries and all other ancient structures were registered,[13] but that does not include some mounds, which were buildings which collapsed in the past. Since Bagan is bordered by the Ayeyarwaddy River in the west and the walls and gates in the western portion are missing, many scholars have the opinion that a large portion of Bagan's old city has been eroded away during the past hundred years.[14]

The south-eastern areas of Myanmar were historically called *'Ramannadesa'*, which is a Pali word: *'Desa'* mean place or location, the word together means 'the place of Raman' and the dominant ethnic group in this area historically is supposed to be Mons, based on which the

[11] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.10

[12] Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.6

[13] The literature is based on Bagan architecture with intensions of writing their versions Myanmar history;
- Kyaw Lat, 2009, P. 1
- Tin Naing Toe, '*Bagan Zedi Pahto Myar Thamine Hnint Kha Yee Thwa Lan Hnyun* (History of Bagan Pagodas and Travel Guide)', Yangon, 2008, P.19

[14] Kyaw Lat, 2009, P.1

present term 'Mon State' is derived.[15] In the early periods up to 11th century, there were two kingdoms mentioned in the traditional history, with the names of Suvannabumi and Hanthawaddy; it seems that Suvannabumi is the older one.[16] The main problem of studying this area is that the scholars could not find out the exact location of Suvannabumi, a name quite common in Southeast Asia.[17] Based on traditional records, Bagan had contacts with Suvannabumi in the 11th century and received cultural input from that area.[18]

The geographical situation of Rakhine state - the western areas, bounded by mountain ranges in the northeast and parallel to the sea course - created opportunity to develop a kingdom in the fertile flat land between the mountain range and the sea course, and of staying quite independent without many wars with the neighboring areas in the past history. The capitals of the kingdom changed from time to time: it was located first at Danyawaddy, then Vaisali, Le-Myo and finally Mrauk-U. According to some scholars, this area was able to form a kingdom already in the 2nd century BC.[19] Concerning Mrauk-U, according to the survey and records from Archaeological Department, there are 163 known ancient structures, which can be treated as their origin of structure forms. There were over two hundred Kings who reigned throughout in all the ancient Rakhine dynasties.

1.2. Hypothesis

Many scholars with many counterarguments confronted the hypothesis, which was conjectured by Mr. Luce; the general ideas of these from the publications are different. Concerning Sri-Khit-Tra being sacked in the 9th century, there is no archaeological or inscriptional evidence that Sri-Khit-Tra was destroyed by Nan-Chap troops, although the art of writing and inscriptions in Sri-Khit-Tra have been found since the 4th century. If a capital

[15] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.9-10

[16] Kyaw Lat, 2010, P.10

[17] The literature is based on the version of this group of scholars:
- Kyaw Lat, 2010, P.10
- Hla Thaung, 'In search of Suvannabumi', 2009, the whole books deals with these problems

[18] Kyaw Lat, 2010, P.10

[19] The literature is based on the version of this group of scholars:
- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.9
- Aung Thaw, 'Historical Sites in Burma', Ministry of Culture, 1972, P.117

of a Pyu kingdom was sacked by Nan-Chap troops, according to Chinese record, it could be one of other Pyu capitals; it is most likely to be Halin because the excavation at Halin revealed that the city was destroyed by fire in the 9th century.

The Burmese were the heirs to the Pyu civilization in more senses than simply a chronological one. The connections are most explicit, numerous and conscious between Sri-Khit-Tra - the last and greatest of the Pyu capitals - and Bagan. However, all three of the Pyu capitals represent different stages in a continuous process of Pyu economic and social development over a period of some thousand years from around the second to the first century BC to the ninth century AD. Although certain cultural attributes will be seen to disappear with the Pyu, others survived to play a very real part in shaping the Burmese culture of the Bagan and later periods.[20]

As to the inscriptional and other evidence found in Bagan, there are a number of artifacts, mainly votive tablets, with inscriptions in the Pali, Sanskrit and Pyu languages found in Bagan. The inscriptions in Pali, Sanskrit and Pyu means these are early, from around the 7th or 8th centuries, which confirm that Bagan existed before the alleged "coming of the Bamars" in the 10th century and that Bagan culture is connected with or a continuation of Pyu culture.

The traditional architecture is the symbol of the national character and cultural heritage. The styles of the buildings reflect the situation of each period and the minds of builders at that time politically, socially, culturally and economically. And, they explain that these buildings are monumental memorials in space and form. Therefore the traditional archtiecture can be considered emphatically how it is delicate to approach in accordance with time, place and condition as well as harmonization to architectural technology of the past and present for the solving of the cooperation and integration of Myanmar architecture. This research will identify the development of historic religious structures by architectural aspects such as space utility, form composition, proportion, material utility and decorative items. Then findings will be explored and recommendations concerning to the spatial composition will be made

[20] Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-Made Landscape, Cambridge, 1990, P.146

according to the development and evolution of the temples throughout the history of Myanmar architecture.

1.3. Method of Research

The main intention of the research is to analyze and classify the temples by the development and evolution and to present the concepts and histories with theories and hypotheses of the relevant scholars, as well as the archaeological and scientific findings. In order to do it scientifically, these three phases will be used: firstly, the studies, secondly, the analysis; and thirdly, the classification.

The first phase attempts to provide a general overview of the history of and cultural areas in Myanmar and the ethnic groups in the country. This portion can provide the historical, technical and architectural linkages with the sites which flourished in central Myanmar areas before Bagan rose as the center of a kingdom and religions adopted in these pre-Bagan historical areas, and the sites in the western part area after the Bagan period developed as the kingdom of Rakhine ethnic group. And this portion contains the case studies of specific monuments in the environs of Pyu, Bagan and Mrauk-U, with photos, plans, and drawings of important buildings with technical data and their historical background.

In the second phase, the different cities and periods will be considered in turn: by Part I, Pyu; Part II, Bagan; and Part III, Mrauk-U. This portion attempts to study and analyze the development and evolution of the spatial composition of the selected temple monuments by the different architectural aspects: the historic period, concept, plan, design, technology and form. This portion also presents the technical and functional aspects of Pyu, Bagan and Mrauk-U architecture, the development and evolution of the temples and the analysis of design principles and building expressions.

In the third phase, on the basis of the above analysis, the classification of different temple types will be provided. This portion is mainly about the different plan types of the temple groups in each of the periods and area locations. Depending on the analysis and classification of the temple types in the ancient periods, and whether it is of the Pyu, Bagan or Mrauk-U

periods, the reflection of the historic architecture of Myanmar can be compared and recommended with the present temples in Yangon.

1.4. Structure of Thesis

This research will be comprised of seven chapters:

Chapter One, “The Introduction”, will generally give an overview of the temples in Myanmar and their spatial composition concepts. And the research reviews will be presented concerning the classification and evolution of the temples by the data of field survey, past research and literature.

Chapter Two, “Background Study of Myanmar Religious Architecture”, will show the background history of Myanmar Buddhist architecture. This chapter presents Pyu, Bagan and Mrauk-U as their locations, the historical background, social condition, economic conditions, religious believes, culture and inscriptions, and physical background.

Chapter Three, “Architectural Typology of Temples”, this will present the origin of the temples in Myanmar. And this chapter explains the main features of the temples such as the central shrine, vestibule and the porch and then the sub-features of the central shrine such as the pedestals, the windows, the foreparts and the niche.

Chapter Four, “Study of the Architectural Aspects in the Temples”, will present the architectural aspects; the space, form, decorative elements and physical aspects; the axis and orientation, construction materials and structural systems, and environmental control; ventilation and lighting by the significance of different periods; Pyu, Bagan and Mrauk-U. This chapter attempts to present the meaning of architectural component and aesthetic achievements of historic periods.

Chapter Five, “Analysis of Temples – Development and Evolution of Spatial Composition”, will analyze different locations and periods: in Part I – Pyu, in Part II – Bagan and in Part III – Mrauk-U. The development and evolution by the aspects of historic period, by the plan, by

the design and technology, by the architectural form will be considered to analyze the temples.

Chapter Six, "Classification of Temples – Classification of Spatial Composition", will classify according to the above analysis the different location and periods: Part I – Pyu, Part II – Bagan and Part III – Mrauk-U. Upon these, there will be a classification of types based upon the different formation of shrine and different formation of doorways.

Chapter Seven, "Findings and conclusion", will classify the spatial composition of the temples and the influence of the ancient temples on the temples of more modern periods by comparing the ancient temples with the temples in Yangon at the present time.

1.5. Research Review

1.5.1. Literature Review

Pioneering scholars focused on the religious monuments of the great traditions, the Pyu, Mon, Burmese and Rakhine, partly because ruins remained at ancient sites whereas other buildings made of less durable materials did not survive. They have survived since the Burmese believe that the restoration of religious buildings is important. Furthermore, at that time, the monumental architecture in Myanmar had not been much studied and recorded. Therefore, the studies were often archaeological reports regarding the exploration and preservation of religious monuments. At the same time, those pioneering early scholars themselves were interested in the art and architecture which related to the elite, to Buddhism and to the great traditions of the Pyu, Mon, Burmese and Rakhine, and often had Orientals ideas, viewing art of the Buddhist great tradition as exotic. "High culture" is viewed as a timeless and universal beauty and is associated with the elite, intellectual, professional and middle classes.

Around the second half of the nineteenth to twentieth century, the forerunners of architectural historians such as Gordon Hanningston Luce, Charles Duroiselle, Taw Sein Ko, Ba Shin, Aung Thaw and Lu Pe Win were linguists, historians, archaeologists and architects. These pioneering scholars were interested in the art and architecture of the remains of the great

Burmese, Pyu, Mon and Rakhine traditions. They emphasized the Burmese historical sites: the former capital cities such as Bagan, Amarapura, and Mandalay; the ancient cities of the Pyu such as Sri-Khit-Tra, Beikthano, and Hanlingyi; the Mon capital cities such as Thaton and Pegu; and the Rakhine capital city at Mrauk-U. They used linguistics and early literature, such as chronicles and inscriptions of the great Burmese, Pyu, Mon, and Rakhine traditions to understand their art, religion and society.[21]

Taw Sein Ko, who introduced the western discipline of archaeology to Burma, concentrated on archaeological reports.[22] He was the director of the Burma Circle, an archaeological report on Burma, a part of the Survey Reports of the Archaeological Survey of India. Another one, Ba Shin (Bo Mu) focused on Bagan and wrote a book and an article about the temples. Aung Thaw's books discussed the archaeology of the historical sites of the Pyu, Burmese and Mon, and focus on the excavations at Beikthano, the former Pyu capital city.[23] Lu Pe Win was interested in the monumental architecture of Bagan and Mandalay.[24]

Gordon Hannington Luce specialized in Bagan history and art. Luce used the languages and literatures of the old Burmese and Mon. He wrote "Old Burma-Early Bagan", an encyclopedia of Bagan studies, filled with Burmese history, iconography and architecture.[25] Luce also translated inscriptions and wrote many articles about old Burma, Bagan, Pyu and Mon.[26] The studies of Charles Duroiselle, a scholar of Pali, Mon and Burma, included the archaeology, architecture, and art of Burma, Pyu and Mon - for example, "Excavations at Hmawza", "the

[21] Chotima Chaturawong, 'The Architecture of Burmese Buddhist Monasteries in Upper Burma and Northern Thailand, The Biography of Trees', Ph.D. Dissertation, Thailand, 2003, P.3

[22] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.4

[23] The literature is based on the version of this group of scholars:
- Chotima Chaturawong, , 2003, P.6
- Aung Thaw, 'Historical Sites in Burma', Rangoon, Ministry of Union of Culture, 1972

[24] The literature is based on the version of this group of scholars:
- Chotima Chaturawong, 2003, P-6
- Lu Pe Win, 'Pagodas of Pagan', Rangoon, Buddha Sasana Council, 1966

[25] The literature is based on the version of this group of scholars:
- Chotima Chaturawong, 2003, P.5
- Luce, G.H., 'Old Burma-Early Pagan', Volume 3, Locust Valley, New York: J.J, 1969-1970. He also wrote 'Phase of Pre-Pagan, Burma', Volume 2, Oxford University Press, 1985

[26] The literature is based on the version of this group of scholars:
- Chotima Chaturawong, 2003, P.5
- 'The Origin of the Burmese', 1912

Rock-Cut temples of Powun Daung" [27] and "the Ananda temple of Bagan" and studies of "the Mandalay palace and monasteries". Duroiselle also translated the Burmese manuscript of "the Pageant of King Mindon leaving his Palace" and a number of the inscriptions, mostly of the Mon, such as the Talaing plaques on the Ananda temple.[28]

Besides these scholars, contemporary historians who studied Burmese architecture focused mainly on the "high art" of the great traditions, Burmese, Mon, Pyu and Rakhine as well; for example, Pierre Pichard, Sylvia Fraser-Lu, Elizabeth Moore, Paul Strachan, Irene Moilanen and Sergey S.Ozhegov, Pamela Gutman and Janice Stargart. Pierre Pichard, an architect, focused on the architecture of Bagan.[29] Pierre Pichard's books concentrated on measuring surveys of architectural remains in Bagan. They provided plans, drawings and pictures of all ancient buildings in Bagan. Their fieldwork was carried out during regular missions financed by the United Nations Development Program (UNDP) from 1982 to 1991, using specially printed recording file cards. They provide a check-list for identifying the main features of the monuments as they appear in the Inventory: number, name if any, type, location, size, site characteristics, and a description of the plan, construction, decoration and epigraphy. And the plan of the monuments, and orientation and references of photographs were noted.

Sylvia Fraser-Lu, who was interested in Burmese arts and crafts, wrote about Burmese wooden houses and monasteries.[30] Elizabeth Moore, an art historian, wrote about Burmese religious architecture and art, especially those of Bagan, Mandalay and Yangon. Paul Strachan's book is about the art and architecture of Bagan. Irene Moilanen and Sergey S.Ozhegov wrote about Burmese woodcarving, wooden sculpture and architecture, such as houses, monasteries and palaces. Pamela Gutman and Janice Stargardt have attempted to analyze the meaning of art and architecture. Pamela Gutman focuses on Rakhine art and architecture, and Janice Stargardt focused on those of Pyu and their irrigation system.

[27] The literature is based on the version of this group of scholars:
- Chotima Chaturawong, 'The Architecture of Burmese Buddhist Monasteries in Upper Burma and Northern Thailand, The Biography of Trees', Ph.D. Dissertation, Thailand, 2003, P.5
- 'The Rock-Cut Temples of Powun-Daung', 1914-1915

[28] Chotima Chaturawong, 2003, P.5

[29] Pichard, Pierre, 'Inventory of Monuments at Pagan', Volume 8, Paris: Unesco, 1992

[30] Sylvia Fraser-Lu, 'Splendor in Wood: The Buddhist Monasteries of Burma', Bangkok, Orchid Press, 2001

In the "Evolution of Bagan temples", written by Dr. Kyaw Lat, a Burmese scholar, it has been considered mainly from structural and architectural aspects, other aspects such as development of painting and sculpture arts, etc. Because of the above mentioned opinion that interior decoration in temples was perhaps changed in later renovations, leading to lack of coherence in the line of evolution, Dr. Kyaw Lat analyzed the evolution and the approach method to study the changes in design and technology applied at buildings and to establish the line of evolution.[31]

The other books about the architecture of temples are not scientific research books; they are tourist instruction books by non-professionals for showing architectural development. But some dissertations at Yangon Technological University and Mandalay Technological University, approach the subject in different ways. Among them, some studied the small temple types in the Bagan period under three main groups by such criteria as by the size of structures, by the site of structures (analysis made from the map), by the plan of structures under the categories of plan, form, space, building materials, construction system and decorative elements.[32] Some did research specifically about the Stupas, whether the hollowed space stupas[33] or solid type stupas and emphasized the architecture by one period. Some research provided the architectural concepts and interpretation of religious structure in ancient Mrauk-U period and investigates the different types of the structures compared with the Bagan period.[34]

However, there was considerable research of the temples in Myanmar. Although they dealt with the great intention, past studies of the architecture of the temples have been incomplete up until the present day. They provided a general view of form, style and decoration but often did not make use of theories and other disciplines. Furthermore, the information from earlier research and the analysis of Pichard Pierre, and the other researchers which are useful,

[31] Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.46

[32] Nay Thu Win, Thet Thet Mon, Nan Saw Htet Htet Lin, 'Study on the Architecture of small temples in Bagan Period', M.Arch. Thesis, Department of Architecture, Yangon Technological University, 2004

[33] Khine Minn Mon, 'Evolution of Hollowed Space Stupas in Myanmar', Ph.D. Dissertation, Department of Architecture, Mandalay Technological University, 2008

[34] Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Department of Architecture, Mandalay Technological University, 2008

provide pieces of knowledge and need study. The scholarly interpretation of Myanmari traditional buildings is lacking.

1.5.2. Literature study concerning the methods of classification and evolution of temples

1.5.2.1. Pyu

Depending on the research of former scholars[35], there are found three main groups of temples in Sri-Khit-Tra;

1) The solid temple with niches,
2) The temple with porch and central shrine, and
3) The temple with central solid pillar and corridor.

1.5.2.2. Bagan

There are over two thousand monuments in Bagan; half of the total structures are temples. As for architectural typology, the temples varied considerably in the formation of both the interior spaces and the exterior forms. The varied space is categorized by former scholars[36] as the following:

1) Temples with a solid core,
2) Temples with a central shrine,
3) Temples with central shrine and corridor.

The varied form is also categorized as the following:

1) Temples with a stupa type,
2) Temples with square tower type, and
3) Temples with Mahabodi type.

For the entrances, the scholars have divided into two categories the following;

1) Single entrance with the main vestibule or hall and the image in the central sanctum, and

[35] Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Department of Architecture, Yangon Technological University, 2004, P.13
[36] Min Bu Aung Kyaing, 'Architecture of Bagan Ancient Monuments', 2007, P.39

2) The other type which has two or more entrances and almost all the entrances are of the same with some exceptional temples which have a main entrance, and a slightly larger vestibule which is usually on the eastern side.

And the ancient structures were summarized to classify into the following various approaches made by the scholars U Sun Oo;
Approach 1: By the size of structure,
Approach 2: By the architectural style of its origin,
Approach 3: By chronological order of date of construction and
Approach 4: By principal architectural form and its composition of interior spaces.[37]

Arts and architecture historians also participate in such classifications by using a number of approaches;
- By studying the line of evolution of architectural forms,
- By analyzing the spatial composition,
- By analyzing the level of advantage of technology, construction methods, and structural framing systems and materials usage.[38]

Depending on the interest and professions, the buildings in Bagan have been categorized according to different aspects by different authors. The following is the view from the mixed aspect of history, architecture and functions of buildings by U Lu Pe Win, former head of the Archaeological Department;
1) Temples with forms from north India,
2) Temples with form from middle India,
3) Temples with form from south India.

It is quite interesting to see that this method attempted to provide information on the temples' history, linkage of architectural forms and spatial design principles in Bagan. Among all of them, the method of U Aung Thaw, the head of Archaeological Department is too general; all

[37] Sun Oo, 'The Architectural Aspects of the Monasteries of Bagan', Ph.D. Preliminary Research Report, Yangon, 2001, P.3
[38] Sun Oo, 2001, P.6

Bagan buildings are divided into two types, the solid structures and the buildings with inner space.[39] This definition from U Aung Thaw is simple and straightforward and it can be interpreted that the solid structures as the Stupas and the buildings with inner space are temples, Pitika libraries and Theins (ordination halls).

And another researcher, Dr.Luce, classifies the development of masonry structures in Bagan by historic periods, based on his concepts as the following;[40]

1) Pre.Anawrahta period (from 956 to 1044 AD),
2) Anwarahta period (from 1044 to 1077 AD),
3) The reigns of Saw-Lu and Kyansittha (from 1077 to 1113 AD),
4) Changing period (from 1113 to 1165 AD).

The classification of Bagan buildings based on stylistic periods is from his work published in 1970 and this has been changed from the former classification he published in the literature of 1950s, and basically the same the terms have been changed from Mon type, Intermediary type and Burmese type.

And another scholar, Dr. Kyaw Latt, analyzed the evolution of Bagan temples; his approach methodology is to study the changes in design and technology applied at the buildings and to establish the line of evolution. For this reason the study starts with the earliest temples found in Sri-Khit-Tra and gradually follow the changes in Bagan.

Starting with the two prototypes originated in Sri-Khit-Tra, the temples in Bagan evolved into several variations; roughly these can be classified into five main types:[41]

1) Single shrine temples,
2) Temples with solid pillars,
3) Temples with inner load-bearing elements,
4) Multi-storeyed temples,

[39] Aung Thaw, 'Historical Sites in Burma', Ministry of Culture, 1972, P.16
[40] The literature is based on the version of this group of scholars:
- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.16
- Luce.G.H, 'Old Burma, Early Bagan', Volume 3, New York, Augustin, 1970
[41] Kyaw Latt, 2009, P.17

5) Temples having exceptional designs and forms.

Another method of some scholars is to judge the period of construction based on the ornaments, murals and interior decorations. There are several temples in Bagan which were renovated some decades after the original construction and the decorations and the ornaments, and even the inscriptions may have been changed at the time of renovation.

1.5.2.3. Mrauk-U

As to the architectural typology, the temples in Mrauk-U also varied considerably depending on the formation of both the interior spaces and the exterior forms. The varied space is categorized by scholars[42] as the following:
1) Temples with solid core and corridor,
2) Temples with central shrine,
3) Temples with central shrine and corridors.

And another scholar[43] described that the temples in Mrauk-U were built in conformity with the weather and technical specifications, based on the construction technology from Le-Myo period and the structure of temples was influenced by the India culture. The following temples types which he studied are:
1) The temples which consist of the access and the chamber,
2) The temples which consist of the accessible arch and the inner pavement. The above two kinds of temple were found in early Mrauk-U period and the temples were rarely found in the middle and later period except the Stupas.

1.6. Conclusion

This chapter has aimed to introduce the research title and previous literature on the temples in Myanmar in the Pyu, Bagan and Mrauk-U regions. In Myanmar, the history of architecture

[42] Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Department of Architecture, Mandalay Technological University, 2008, P.129
[43] Ngwe Soe, 'Study on Religious Architecture in Mrauk-U, Rakhine', M.Arch. Thesis, Yangon Technological University, 1998, P.92

has been changing in different periods according to the different locations. These architectural effects of the selected three sites have also different character effects depending on the geographic, economics of that time and other effects of from neighboring countries. Throughout history, there have been a few kingdoms developed in the areas presently defined as Myanmar, however there has never been a kingdom which was so stable and whose flourishing period was so long as the Bagan Kingdom. Regarding history, these areas have their own traditional records, and these differ in some points from the archaeological findings, especially in the dating of the starting periods.

Due to its historical background, Myanmar and the neighboring countries to the east of Myanmar, such as Thailand, Laos and Cambodia, share a similar culture and associated development; the majority of the people in these areas are Theravada Buddhists, the religion and culture received from India centuries ago. These countries reached the civilization level of having small states or small kingdoms approximately at the end of first millennium BC or at the beginning of urbanization period, and this is also the time Hindu-Buddhist culture from India arrived in this region. Because of that, the architecture and other artifacts at the early urban settlements in this region are usually connected with Hindu-Buddhist culture. Due to differences in geographic locations, the travelling routes for Hindu-Buddhist culture to these countries were different, and associated with that, there were variations in the time of arrival to these areas, but generally they arrived by sea or by land routes, and the time was around the turn of first millennium BC to first millennium AD.[44]

In the areas of present Myanmar, the beginning of urbanization in Rakhine in the south-west was around 2nd century BC, the Pyu areas in the center of Myanmar was between 1st century BC[45] and 1st century AD[46] and the Mon-Dvaravati areas presently located in the areas of

[44] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.4

[45] The literature is based on the version of this group of scholars:
- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.4
- Aung Thaw, 'Historical Sites in Burma', Ministry of Culture, 1972, P.117

[46] The literature is based on the version of this group of scholars:
- Kyaw Lat, 2009, P.4
- Sein Maung Oo, '*Sri-Khit-Tra Myohaung* (Old City Sri-Khit-Tra), 1968

Thailand and southeast Myanmar was around the 1st or 2nd century AD[47]. However, architecture must be seen in the context of historical and socio-economic background. When the word 'history' is mentioned, the question immediately arises, 'history told by whom, whose version of the history, is the presented history based on tradition or on scientific findings, or on theories and hypothesis of some scholars, etc.'?[48] History is interpreted differently by different scholars; many scholars have attempted to present various views, opinions, theories and findings on the subjects.

In the research review in this chapter, it reviews the existing literature for further study of later chapters. Depending on the previous literatures, the author can consider and study which types will be classified from the different architectural point of view and can highlight the development and evolution in the different periods and locations in Myanmar. It will be, in the end, an interesting analysis for the history of Myanmar architecture, in temples from the past to the present. The expected recommendation and innovation of the temples according to different period in Myanmar can be contributed to the planners and architects for the effective control of architectural identity to the contemporary buildings in Myanmar.

[47] The literature is based on the version of this group of scholars:
- Kyaw Lat, Dr, 2009, P.4
- Myint Aung, 'Excavations of Ayethama and Winka (Suvanabumi)', Studies in History, Volume 1, Yangon, 1999

[48] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.2

CHAPTER II

Background Study of Myanmar Religious Architecture

CHAPTER II

2. BACKGROUND STUDY OF MYANMAR RELIGIOUS ARCHITECTURE

Myanmar has historically been more aligned with the cultures of Southeast Asia. It shared a Mon ethnic heritage with Thailand and was also strongly influenced by the Theravada Buddhism of Sri Lanka. Although Buddhism is seen in Myanmar early in the first millennium, the first appearance of the distinct Burmese style and the oldest Buddhist structural remains coincide with the Bagan period (1044-1287). The assumption of the throne by King Aniruddha in the mid-eleventh century began the unbroken dominance of Buddhism and although Mahayana and Tantric practices did continue, the ultimate triumph belonged to the Theravada, cultivated by Sri Lankan influence.[1] The people of Southeast Asia reached the civilization level of living in settlements in about 6th century BC, and a few centuries afterwards, small states with urban settlements developed in about 2nd century BC.[2] The emergence of these urban settlements is at about the same time as the arrival of Hindu-Buddhist culture from India; therefore the early sites with urban character in Myanmar are associated with Hindu-Buddhist religious buildings and cultural artifacts.

Roughly from the end of the first millennium BC to the end of the first millennium AD, a period of about 1,000 years belong to the proto history of those countries, and there is evidence that these settlements with certain cultures existed, however exact inscriptions and records are not found about the historic events and the traditional records are also very often mixed with myths and legends. After about the 9th or 10th century AD, the proto history became history and many historic events have inscriptional and other evidence; this is also about the time that larger and stronger kingdoms emerged in the Southeast Asian region. Bagan was a kingdom of this kind; however, Bagan developed as a large and stable kingdom in approximately the 8th or 9th century AD.[3] Parallel to Bagan there were also other kingdoms in the region, like the Khmer kingdom which flourished from 9th to 15th century in Cambodia, and although located in the south, there was a Srivijayan kingdom flourishing between the 7th

[1] Robert E.Fisher, 'Buddhist Art and Architecture', Thames and Hudson world of art, Singapore, 1993, P.183
[2] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.14
[3] Kyaw Lat, 2010, P.4

to 15th century AD which was centered in Sumatra. Both these kingdoms produced some of the world's heritage architecture recognized by UNESCO: Angkor Wat, built between 1113 and 1150 AD, and Borobudur in Java, built in the 9th century. Although the architecture of Bagan is not as famous as Angkor Wat, it has also a unique character of a comparable rank. The design of Angkor Wat is distinctive for the layout planning, achieved harmony and the proportions fitting into the environment; Angkot Wat is a harmonious combination of sculptural art and architecture and technology. Bagan architecture is remarkable for its technology, and the combination of art and technology to achieve its goal to have constructed thousands of structures within a few centuries.[4]

Studying Myanmar architecture, the Burmese stupa is a distinctive, multi-tiered combination of both Indian and Sri Lankan sources, continuing the traditional three-part division, with a square, stepped base, bell-shaped body and towering spire. Of brick construction, like the Burmese temple, it also had the appearance of Indian monolithic stone construction. The typical Burmese style is preserved at the Shwedagon in Yangon, first constructed in the 14th century but many times refurbished and one of Asia's best-known monuments. The beauty of the Burmese stupa lies in the merging of the parts into a single unit, from a squared base to a round body and finally to the multiple umbrellas and pointed finial. Unlike the builders of many earlier examples, such as those from Gandhara, where the base, body and spires are clearly demarcated, the Burmese achieved a coherent unit, distinguished by its smooth profile and tapered tower. This was aided by eliminating the Hamika, a prominent element in Indian and Sri Lankan stupas, in favor of a slender column of umbrellas, and by multiplying, but not widely separating, the horizontal elements. This effect has a beautiful aesthetic whether it occurs on colossal structures, as with the Shwedagon, or on the small votive stupas carried home by pilgrims, or on the countless versions decorating the terraces of temples. Among the many variations of the stupa across Asia, the Burmese remains one of the most artistically successful, subordinating the parts into a coherent whole that unified the original form while retaining the dignified majesty of its purpose.[5]

[4] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.4

[5] Robert E.Fisher, 'Buddhist Art and Architecture', Thames and Hudson world of art, Singapore, 1993, P.186

Map 2.1: Historical Sites and Historic Culture Areas in Myanmar

Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical Background', 2010, P.13

2.1. Background Study of Pyu

Pyu have long been recognized as the architects of Burmese's earliest civilizations and both linguistically and culturally as the forerunners of Burmese. The important historical sites before Bagan in the middle Myanmar are;

1) Beikthano, about 200 miles (320 km) north of Yangon in Magwe division,
2) Halin about 65 miles (105 km) west of Mandalay and Sagaing division,
3) Tagaung about 127 miles (204 km) north of Mandalay on Ayeyarwaddy River, (according to traditional history, Tagaung was the capital of first Myanmar kingdom), and
4) Sri-Khit-Tra about 160 miles (258 km) north of Yangon.[6] Of these three known Pyu cities, Beikthano, in the Magwe District, with a walled area of 9 km^2, appears at present to be the oldest. Carbon dating samples from Beikthano date it back to the beginning of the Christian era. As these come from the first destruction levels of the site, its origin must lie still further back in the first or second century BC.[7] Halin, or Halingyi, in the Shwe Bo District of the Mu River some 500 km to the North of Beikthano, lies in a different environment. Halin's walled area, at 5 km^2, is somewhat smaller in extent than Beikthano. The earliest carbon dating from Halin comes from the destruction of part of its extensive outer fortifications in the second century AD. The origins of the city therefore extend back at least to the first century AD if not still further.[8] Sri-Khit-Tra, the largest and most elaborately constructed city of Pyu, lies in the Nawin River Vally in the Prome (Pyi) District. Its walled area embraced a vast 8.8 km^2. There are at present no carbon dating for Sri-Khit-Tra but the earliest epigraphic evidence from the site is usually dated to the 4^{th} and 5^{th} centuries AD.[9]

Beikthano's external walls are squarish, those at Halin rectangular, and those at Sri-Khit-Tra elliptical. Each of these forms is, however, an admissible shape for a capital city, according to

[6] The literature is based on the version of this group of scholars:
- Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.14
- Aung Thaw, 'Historical Sites in Burma', Ministry of Culture, 1972

[7] Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.46

[8] Janice Stargardt, 1990, P.48

[9] Janice Stargardt, 1990, P.48-51

the classical Indian treatises on architecture.[10] The great Pyu urban sites, Beikthano and Halin, offer a precious scientific documentation on the indigenous development of urbanization in South-East Asia, without major external influences, at the latest from the 2nd and 1st century BC to the 4th century AD. This is a period and a critically important process for which other data are at present sparse.[11] Beikthano had a long, continuous history of occupation, from the second century BC up to the 5th or 6th century AD. At about that time, it passed to the control of the other Pyu city, Sri-Khit-Tra, which became even larger and more powerful than Beikthano. Although Beikthano probably continued to be occupied throughout the Pyu period (ending in 832 AD), and even experienced a brief period of re-occupation during the Bagan period, its wealth and importance were probably considerably less than those of Sri-Khit-Tra, and possibly also less than Halingyi, from the period from the 5th to the 9th century.[12]

2.1.1. The Archaeological and Historical Background

Until about the year 2000, scholars believed Beikthano was the earliest historical site and was identified as occupied by humans between 1st to 5th century AD[13], however since about 2002, artifacts and building foundations from the same period as in Beikthano were found at Tagaung, which is traditionally accepted as the capital of first Myanmar kingdom. Concerning Sri-Khit-Tra, traditionally accepted as the second capital, the archaeologists in the 1960s identified that the founding period was from about 3rd century AD[14]; however, since recently, a few underground structures were found, although these were not excavated, there are reasons to believe that these are also from the early centuries of the first millennium as Beikthano. Relating to Halin, the excavations carried out in the 1960s found buildings, Pyu

[10] Janice Stargardt, 'The Ancient Pyu of Burma',Volume one, Early Pyu Cities in a Man.mane Landscape, Cambridge, 1990, P.105

[11] Janice Stargardt, 1990, P.42

[12] Janice Stargardt, 1990, P.71-72

[13] The literature is based on the version of this group of scholars:

- Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.14
- Aung Thaw, '*Beikthano Myohaung* (Old City Beikthano)', University Research Paper, 1968, P.61

[14] The literature is based on the version of this group of scholars:

- Kyaw Lat, 2010, P.14
- Sein Maung Oo, '*Sri-Khit-Tra Myohaung* (Old City Sri-Khit-Tra), 1968, P.203

inscriptions and artifacts with early urban character[15]; however, since recently, bronze tools, polished stone tools and iron tools were found around that area at some layers[16].

Regarding the history, these areas have their own traditional records, and histories. According to traditional history, both the first Myanmar kingdom Tagaung and Sri-Khit-Tra were founded in about the same time in the 5th century BC, and later on the capital of the kingdom moved to Bagan. The time when Bagan was founded is given differently in different traditional history books, either 2nd or 7th century AD; although it is possible that the area around Bagan was inhabited since the early centuries AD. The latest archaeological findings indicate that these early settlements; Tagaung, Sri-Khit-Tra, and a few others in the central Myanmar had parallel development rather than serial development and reached the urbanized level at the end of the first millennium BC[17].

These settlements were inhabited by an ethnic group called Pyu, although Pyu as an ethnic group has been mixed with Bamars and cannot identified as a separate ethnic group at present, the areas occupied by them are commonly identified by their ritual of burning the bodies after death and buried the rest in pots at burial sites, by their script, and by the presence of so called Pyu coins. According to tradition, Bamars identify themselves as the descendents of Pyu and Bagan is the continuation of cultural and religious practices of Sri-Khit-Tra.[18]

At the end of the 1950s, an ancient settlement called Beikthano was rediscovered roughly in the middle of Myanmar; the results from this excavation showed that the Beikthano settlement had a Pyu character and was inhabited from about the 1st century AD until about the 5th century AD. Among all the excavated sites in the central Myanmar areas, Beikthano is the earliest settlement which reached the urbanized level of civilization, but there are a few other

[15] The litearature is based on the version of this group of scholars:
- Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.14
- Myint Aung, '*Halin Myohaung* (Old City Halin)', 1968, P.184-195

[16] The literature is based on the version of this group of scholars:
- Kyaw Lat, 2010, P.14
- Gutman, Pamela and Hudson, Bob, 'The Archaelogy of Burma (Myanmar) from the Neolithic to Pagan', RoutledgeCurzon, Taylor & Francis Group, P.13

[17] Kyaw Lat, 2010, P.10

[18] Kyaw Lat, 2010, P.10

settlements in this region with Pyu or similar character, inhabited also in about the same period, and recently some artifacts similar to those from Beikthano were also found in Tagaung, traditionally believed to be the capital of the first kingdom in the central Myanmar region.[19] The historical site of Beikthano was rediscovered in the late 1950s. The radiocarbon dates of Beikthano indicate activity between outer limits of 180 BC and 610 AD[20] and the director of Beikthano excavations, U Aung Thaw, the archaeologist who excavated the site in the 1960s, proposed that there was a short period of overlap in the 5th century[21] and concluded that the site was occupied by people of the Pyu culture between the 1st century and the 5th century AD[22].

Regarding Sri-Khit-Tra, the archaeological department has been engaged in this area since the early 1900s because of a few ancient structures and numerous artifacts found at this site. Based on some inscriptions and other artifacts found before the 1990s, the archaeologists identify the beginning period of occupation to be about the 3rd century AD. It can be estimated that these artifacts are from the same age as those found at Beikthano, inferring the Beikthano and Sri-Khit-Tra existed in parallel for some time, just as the traditional histories describe. Concerning Halin, the archaeologists found out that the large area around the historical site Hain was inhabited by people since Neolithic, Bronze and Iron ages[23] and destroyed by fire between the 8th and 9th century AD[24].

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[19] Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.7

[20] The literature is based on the version of this group of scholars:
- Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.17
- Gutman, Pamela and Hudson, Bob, 'The Archaeology of Burma (Myanmar) from the Neolithic to Pagan', PDF file from Internet, 2004, P.11

[21] The literature is based on the version of this group of scholars:
- Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.145
- Aung Thaw, 'Report on the Excavations at Beikthano', Rangoon, Ministry of Union Culture, 1968, P.62

[22] The literature is based on the version of this group of scholars:
- Kyaw Lat, 2010, P.17
- Aung Thaw, 1968, P.64

[23] Gutman Pamela and Hudson, Bob, 2004, P.13

[24] The literature is based on the version of the group of scholars:
- Kyaw Lat, 2010, P.17
- Gutman Pamela and Hudson, Bob, 2004, P.13

2.1.2. Pyu's Religion, Culture and Artifacts

The Pyu were Buddhists but probably also worshipped Hindu gods, much like other early Southeast Asian communities, such as the Mon in lower Myanmar and Dvaravati culture in Thailand.[25] And it cannot be said with certainty exactly when the Pyu became acquainted with Buddhism. In the mid-fourth century, Buddhism had been adopted at Beikthano on a level that led to the construction of a major monastery. That date marks the beginnings of recognizably Buddhist architecture at Beikthano, but not the beginning of Buddhism itself. Therefore, this date was taken as a 'latest possible' benchmark of Pyu attitudes to Buddhism in the preceding centuries by previous scholars.

Going back to the earliest evidence at Beikthano, the great pillared halls of the period from the 2nd century BC to the 3rd century AD was constructed of bricks of the classical Asokan dimensions. That is to say, they were built of bricks similar to those used in the stupas formed under the stimulus of Asokan Buddhism both in Northeast India at Patalipura and Orissa, and in South India along the Krishana River Valley. Brick building certainly appears to be an imported technology among the Pyu (though the bricks themselves were locally made) and it has been shown how these early monuments were transitional from architecture in timber to that in brick.

The correspondence in the size of Pyu bricks to the Indian prototypes is so precise that the source of Pyu inspiration in the development of this new and much more durable building material cannot be doubted. Therefore, it must be assumed that the Pyu had at least some knowledge of the Buddhist architecture of those areas of India mentioned from around the 2nd - 1st century BC, and possibly also of the religion as well. And the monuments that constructed by Pyu have no evidence that suggests an initial connection of Buddhism when drew their architectural inspiration and from Pyu building traditions. The later introduction in the seventh century of an offering platform at one end of the halls and the fragments of offering vases and oil lamps found there show their rituals of veneration and offerings were

[25] Donald M,Stadtner, 'Sacred Sites of Burma', Myth and Folklore in as Evolving Spritual Realm, Thailand, 2011, P.204

carried out in these halls up to a late stage in Beikthano's history, by which time Buddhism was a central feature of Pyu culture.[26]

At both Beikthano and Halin, specific resemblances can be pin-pointed between the brick sizes and the styles of monuments of the two cities; more importantly, this is true of monuments at both sites belonging to the pre-Buddhist as well as the early Buddhist phases, a point which is of particular importance in tracing the parallel evolution of culture at two sites physically separated by a considerable distance. Similarly, specific resemblances between monuments at Sri-Khit-Tra and Biekthano can also be recognized some centuries later. Finally, the practice of multiple cremated urn burials must be regarded as a fundamental attribute of Pyu culture and seems on present evidence to have been one of the features that distinguished them from other ancient urbanized communities of Burma such as the Arakanese and Mons.[27]

Culturally, according to the Chinese records, Pyu cities had high standard of civilization. The culture of Pyu cities was influenced by the Andhra state in southern India. That could be seen in religious structures, and also the finding of coins in Beikthano, Halin and Sri-Khit-Tra, and also in Thailand and Khmer; it could be assumed that there were cultural exchanges in that period.[28] As far as economics, Pyu had an advantage because of its location at a crossing point between China and Southern India. Their main products were handicrafts, and they used canals for irrigation in agriculture. The barter system was practiced in trading and they used gold and silver coins for it.[29] The Pyu language belongs to the Tibeto-Burman family but has largely defined decipherment. Inscriptions at Sri-Khit-Tra, in Pyu, Pali and Sanskrit are written in a script derived from the southeast coast of India, probably from as early as the 5th

[26] Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.191

[27] Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.147

[28] Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. thesis, Department of Architecture, Yangon Technological University, 2004, P.6

[29] The literature is based on the version of this group of scholars;

- Mya Mya Hnist, Khin Lin Nwe, 2004, P.5
- Hudson, Bob, Nyein Lwin, Win Maung (Tampawady), 'Digging for Myths: Archaeological Excavations and Surveys of the Legendary Nineteen Founding Villages of Pagan'

century.[30] The Pyu may have called themselves Tircul but are known as the Piao in old Chinese chronicles and as the Pyu in later Burmese sources. The Pyu specialized in habitation areas encircled by thick, high earthen walls faced with baked bricks.

The complexity of the social and economic organization of Beikthano culture has been revealed by its hydraulic works as well as by its monumental achievements. It is quite unlikely that the degree of long-term co-ordination revealed by all this could have been achieved without reliable systems of recording and communication, in short - writing. While the greater part of what was written in any society in ancient India and Burma was undoubtedly recorded on palm leaf manuscripts, which have only survived under exceptional conditions, unusually important documents were recorded on stone and metal. Elsewhere in Burma such documents have survived from the 4th century AD onwards.[31] This would in any case be simply improbable after the 5th century when it had come under the influence of Sri-Khit-Tra, where writings from around that time have survived. Instead, it seems reasonable to suppose that the inscriptions were carried away with the statuary, a possibility that is all the stronger because – as it can be seen at Sri-Khit-Tra and Halin, the inscriptions of the Pyu were often on the statuary.[32]

2.2. Background Study of Bagan

As to its geography, Bagan lies on the eastern bank of Ayeyarwaddy River in the dry zone of central Myanmar. The area is about 16 square miles. Though Bagan's origins are in the mid-9th century, the large scale construction of temples did not begin until the mid-11th century under the first historical ruler Anawrahta (1044-77). There were 55 kings who ruled in Bagan from King Thamudarit to King Sawmunnit. According to the inventory of monuments list of the Archaeology Department in Bagan, temples are 48% of the total, stupas are 28%,

[30] Donald M,Stadtner, 'Sacred Sites of Burma', Myth and Folklore in as Evolving Spritual Realm, Thailand, 2011, P.204

[31] The literature is based on the version of these group of scholars;

- Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.290
- Johnston, E.H. 1944, 'Some Sanskirt Inscriptions of Arakhan', IX, P.357-85, San Tha Aung, 'The Buddhist Art of Ancient Arakan', Rangoon, Ministry of Education, P.4-8

[32] Janice Stargardt, 1990, P.290-291

monasteries are 22%, caves and others are 2%. The number is approximate because 2,157 were listed by Mr. Taw Sein Ko, the Archaeological Superintendent in 1902. According to the inventory taken in 1968 by the Archaeology Department, it was 2,217. The total number may be more over three thousand as jointly listed by the Archaeology Department and Dr. Pierry Pichard, international coordinator under sponsorship of United Nations Development Program (UNDP).[33] So the number of Bagan monuments which existed originally can't be exactly guessed. Compared with the traditional history on the founding of Beikthano and Sri-Khit-Tra as presented in above, the founding of Bagan is straightforward. Regarding the founding period of Bagan, there are three different periods; two of which are given in two different traditional books and another conjectured by one modern scholar, G.H. Luce. Those periods are:

- Sri-Khit-Tra ended as the capital of the kingdom in 94 AD due to internal unrest and Bagan was founded by King Thamudarit at Yon-Hlut-Kyun in 107 AD[34].
- Sri-Khit-Tra ended as the capital due to internal unrest and a new Bagan kingdom was established at Yon-Hlut-Kyun in 661 AD[35].
- The Burmans (Bamars) arrived at Kyakse in the 9th century and founded Bagan in the 10th century[36].

Therefore, these are three different periods to compare and analyze for the most likely period; firstly, we should begin with the reasons and grounds of the statements and hypothesis. The first two statements, that Bagan was founded in the 2nd century AD or in the 7th century AD, were based on traditional records delivered from generation to generation and deviated from one another during the process of copying or interpretations, therefore these are not based on logical arguments, but on tradition. The third statement, that it was founded in the10th century, is a hypothesis established by one professor, G.H.Luce. This hypothesis on the founding of

[33] Min Bu Aung Kyaing, 'Bagan Monuments', 2007, P.8

[34] '*Man-Nan-Yarzawin-Taw-Gyi* (Glass Palace Chronicles)', 2nd Volume, Ministry of Information, 1993

[35] Hla Tha Main, 'Bagan Vista Version', Yangon, 1999

[36] The Hypothesis was expressed in several lectures and publications:

- Luce, G.H, 'The Ancient Pyu', Journal of Burma Research Society, Vol. XXVII, 1932
- Luce.G.H, 'Economic Life of the Early Bagan', Journal of Burma Reseach Society, Vol. II, 1940, P.323-77
- Luce, G.H, 'Old Kyakse and the coming of Bamars', Journal of Burma Research Society, Vol. LXIII, 1959, P.77-79

Bagan is connected with another hypothesis by the same scholar on ethnic groups and their migration into the country, and this is supposedly based on Chinese sources.[37]

2.2.1. The Archaeological and Historical Background

Bagan was a Pyu community for much of the first millennium, but no standing structures survive from that long period. Pyu bricks were employed now and then in later buildings, and some temples were even erected over earlier Pyu structures. The Pyu fell to the Nanzhao dynasty from Yunnan according to Chinese sources, but this has never been verified. The Pyu or the Nanzhao are thought to have been replaced in upper Myanmar byt the 9th or 10th century by the advancing Burmans from the north, but the earliest concrete evidence for an independent dynasty at Bagan does not appear until the 11th century, during the reign of Anawrahta or Aniruddha (1044-1077). The nature of Pyu influence at Bagan is hotly debated, but Mon culture contributed far more to Bagan's civilization, in as much as its residents were largely Burmans who had filtered into areas bordering the Irrawady by the neighbouring by the beginning of the second millennium. Lower Myanmar was then in the hands of the Mon, but far less is known about its monuments and traditions. The ancient Pali name for the city 'Bagan' was Arimaddanapura, or 'City of Crusher of Enemies'. Its original local name was Pukam, Pokam, which was often used together with Arimaddanpura throughout Burmese history. It came to be Pagan by the 20th century, but its official name now is Bagan, following the national system of Romanisation adopted in the 1990s.[38]

When Bagan was founded in the 9th century AD, Bagan already had full characters as center of a kingdom with city walls and permanent structures. The areas under the kingdom in the 9th century may not very large and in the 11th century, starting from king Anawrahta period, the areas in the northern and north-eastern areas which were ruled by their traditional rulers became part of the kingdom as associated states. 11th century was a period of unification and enlarging process, starting from the end of 11th century under Kyansittha, the kingdom went

[37] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.26

[38] Donald M,Stadtner, 'Sacred Sites of Burma', Myth and Folklore in as Evolving Spritual Realm, Thailand, 2011, P.214-215

through a peaceful and prosperous time until the fall in the 14th century. Based on these facts, the history of Bagan can generally be divided into four epochs[39];

1) The proto-historic and foundation period: early part of 1st millennium until the end of 1st millennium AD,
2) Period of unification process and growth: 10th century until the end of 11th century,
3) Period of peace and prosperity: end of 11th century until the end of 13th century, and
4) The downfall period: end of 13th century until middle of 14th century.

Bagan after the 11th century AD must be seen as the first kingdom to emerge after Pyu kingdoms centered in Sri-Khit-Tra or Halin. The official version in textbooks on Myanmar's history is that Anawtahta's Bagan was the first Myanmar kingdom, and defines three epochs and three unifying events of Myanmar, these are:

1) Anawrahta (1044-1077 AD)
2) Tabin-Shwehti (1530-1554) / Bayinnaung (1544-1581 AD) and
3) Alaung-Hpaya (1752-1760 AD).

Map 2.2: The Former Locations of Bagan

Source: Kyaw Lat, Dr, Art and Architecture of Bagan and Historical Background, 2010, P.31

[39] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.31

Based on this version, the Bagan kingdom was the first kingdom on Myanmar soil, and together with the associated states in the northern and north-eastern regions, the area under a Bagan kingdom would be almost the same as the present Union of Myanmar and relatively large as a kingdom for that period, and it was stable from the beginning of 11th until the end of 13th century. There were no big wars; having peace for a few centuries is uncommon throughout Myanmar history or in the histories of Southeast Asian nations.

Approximately in this period, there were also no strong kingdoms in the neighborhood of Bagan; the Dvaravati in central Thailand ended in the 11th century, the new ethnic group the Thais have just arrived in that area and were beginning to consolidate to establish the Sukhothai kingdom.[40] There was the Khmer kingdom in present Cambodia, flourishing in about the same time as Bagan (the Khmer Angkor kingdom was from the 9th to 15th centuries)[41]. The nearest kingdoms were the Rakhine and Yunnan. In the 11th and 12th centuries, Yunnan was still under Nan Chao but declining. The Rakhine kingdom in the southwest was similarly separated by Rakhine mountain ranges. According to the records, there were occasionally envoys to China and obviously regular trade with the neighboring countries was maintained throughout Bagan history. These were the political environments of Bagan and the neighboring areas during the early centuries of second millennium. In brief, the Bagan kingdom had a peaceful and stable period of about 3 centuries until Kublai Khan invaded at the end of 13th century, and which was also the main reason for the downfall of the kingdom.

According to *Hman Nan Yarzawin* (the glass palace chronicle of the kings of Burma), fifty-five kings ruled Bagan over twelve centuries. There are four palace sites (in Map: 2.2); the first palace site was at the east of *Turintaung* Hill, called *Paukkan* and built by King *Thamadarit* in 107 A.D who was the founder of Bagan dynasty, consolidated by 19 Pyu villages. Six kings ruled over the first palace, named *Yonhlut Kyun,* for about 237 years. Then the 7th king, King *Thinlikyaung*, built another palace at the *Kyauksagar* site and named it

[40] The literature is based on the version of this group of scholars;
- Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.41
- Chih-hung Yen, 'A Review on the Studies of the Art of Thailand: Davaravati'

[41] Early History of Cambodia, Wikipedia, the free encyclopedia

Thiripyitsaya. The five kings ruled that kingdom for about 172 years at that palace. Then the 12th king, King *Thaiktaing,* built a 3rd palace named *Tampawaddy* at *Phwasaw*. Twenty two Kings ruled that kingdom for 333 years. The palace in the present city wall of Bagan was built by King *Pyinbya*, the 34th king of the dynasty who transferred the capital from *Tampawaddy* in 849 A.D. The authentic history of the Bagan dynasty as supported by epigraphical evidence began only with the reign of King *Anawrahta* (1044 AD - 1077 AD).

2.2.2. Bagan's Religious, Culture and Artifacts

Concerning the religions and beliefs and the arrival of Buddhism in Myanmar, the archaeological findings indicate that Buddhism or Hindu-Buddhist faith was in Myanmar at Beikthano, already in the early centuries of the first millennium, practiced throughout Sri-Khit-Tra period and continued in Bagan. As the traditional history *Hman Nan Yarzawin*, the Glass Palace Chronicles mentions that Buddhism became deviant and corrupted in the 11th century. *Hman Nan* went on further that Anawrahta had to bring the true Theravada Buddhism, the pure original Buddhist texts from Mon areas of Thaton in 1057 AD.

The concept of the "traditional modernist" is that Bagan culture is the continuation of the Pyu culture of Sri-Khit-Tra and later on also received cultural inputs from Mon and also from South India. Pyu areas and Pyu artifacts are seen as evidence; however, the civilization of Pyus belong to proto history, and there are differences of opinion among the scholars whether the Pyu areas were united under one kingdom or these were separate states with the same culture, on traditions and findings at sites before Bagan.

Moreover, the inscriptions between the 5th century until about the 11th century are scarce, although the people in Myanmar had adopted the art of writing already in about the 4th century. The remarkable point about Bagan inscriptions is that these are in many languages: Pali, Sanskrit, Pyu, Mon, Bamar, Chinese, Tamil, Thai and Shan.[42] The early inscriptions in Bagan are in Pali and Sanskrit, and later after 11th century, Bamar and Mon were commonly

[42] The literature is based on the version of this group of scholars;
- Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.48
- Report of Archaeological Survey of Burma, 1959-60, Rangoon, 1962

used, whereas Mon was used more during the reign of King Kyansittha (1084-1113 AD); the reason is probably to maintain peace and harmony with southern Mon areas which rebelled during the reign of his predecessor King Saw Lu.

The inscriptions on stone slabs before Kyansittha period are scarce, and after about 1090 AD, many stone slab inscriptions are found, including Kyansittha's record about his palace construction, Shwe-Zi-Gon stupa, etc. where exact years, months and even dates are given detail.[43] Concerning the Pyu language, although it was the main language at Sri-Khit-Tra and Halin, it is incomprehensible that there are not many found in Bagan in this language as stone inscriptions, but it is found mostly only as on votive tablets and characters on some bricks. The question remains why the people of Bagan have not written much in the Pyu language on stone slabs, although evidently, the Pyu language was in use in Bagan until about the end of 13th century based on the language used on the votive tablets and on the three inscriptions found in Bagan.[44]

And one other artifact of historic interest is the bricks, also worth studying academically; bricks in Bagan have sizes with slight variations, and some have writings in Pyu or other alphabets, and the bricks with one, two or three finger marks are identified as Pyu bricks because such bricks are also found at other Pyu sites, and bricks with writing indicate the villages they were produced.[45] Concerning the economy, the kingdoms in Southeast Asia during this period were either agrarian kingdoms or maritime kingdoms according to some literatures;[46] in this case Bagan was clearly an agrarian kingdom, since Bagan was not located on the sea course. Anawrahta started constructing irrigation canals and dams in the 11th century to ensure agricultural production. Bagan and the surrounding areas have a relatively

[43] The literature is based on the version of this group of scholars:
- Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.49
- Shwe-Zi-Gon inscription, inscription no. Ra 116

[44] The literature is based on the version of this group of scholars:
- Kyaw Lat, 2010, P.48
- Report of Archaeological Survey of Burma, 1959-60, Rangoon, 1962

[45] Kyaw Lat, 2010, P.49

[46] History of Southeast Asia, Wikipedia, the free encyclopedia

dry climate and receive annual rainfalls between 500 to 900 mm (20 to 35 inches)[47] and therefore construction of dams and irrigation canals are important for rice production.

2.3. Background Study of Mrauk-U

The Rakhine State, where Mrauk-U situated, is located in the westernmost part of Myanmar and it is a narrow strip of coastal region. It is bounded on the east by Rakhine Yoma (ranges) and on the west by the Bay of Bengal. Mrauk-U was the last royal capital of the Rakhine Kings. The old settlements occupy a strip of land that is only between 15 and 35 km wide, and perhaps 60 km from north to south; to the north, west and east are hills, and to the south the combined deltas of the two rivers meet the sea. Mrauk-U was founded by King Min Saw Mon in 1430 AD. It flourished for nearly 355 years, from AD 1430 up to AD 1785. According to the records from the Department of Archaeology (Mrauk-U), there are one hundred and sixty-three known religious structures and many more remaining unknown. According to the inventory of monuments in Mrauk-U, temples are 9% of the total, stupas are 81%, libraries are 4%, Buddha images and shrines are 6%.

The geographical situation of Rakhine state, bound by the mountain ranges in the northeast which are parallel to the sea course, created opportunity to develop a kingdom in the flat land between the mountain range and the sea course and of staying quite independent without many wars with neighboring areas in the past history. The capitals of the kingdom were changed from time to time. And the Myanmar interloper known as King Anawrahta came from Bagan but unsuccessfully invaded Rakhine in the middle of 11th century AD. And Rakhine also suffered from invasions by Myanmar King Min Khaung of Innwa and a famous King Razadirite from Hanthawady in the early 15th century. The civilization of Rakhine history emerged Dhannyawaddy, Waithali, Laymyo and Mrauk U periods. According to history records, there were over two hundred Kings reigned throughout in all ancient Rakhine dynasties:

1) Dhannyawaddy Period - before 327 AD
2) Waithali Period - 372 AD - 818 AD

[47] Statistical Abstract, Central Statistical Organization, Ministry of National Planning and Economic Development, 1995, P.4

3) Laymyo Period - 818 AD - 1430AD

4) Mrauk-U Period - 1430 AD - 1784AD. Mrauk-U flourished from AD 1430-AD 1784, the forty-eight kings ruled to Mrauk-U for 345 years. The history of Mrauk-U can generally be divided into three periods: the early Mrauk-U Period (AD 1430 - AD 1531), the middle Mrauk-U Period (AD 1531 - AD 1638) and the later Mrauk-U Period (AD 1638 - AD 1784).

2.3.1. The Archaeological and Historical Background

The Arakanese call their kingdom Rakhine. The name is tradionally derived from the Pali Rakha, synonymous with the Burmese Bilu. The kingdom is said to have been named Rakhapura by Buddhist missionaries from India because of the ferocious nature of its inhabitants and the transition from Pakha to Rakhine to have taken pace at the time of the establishment of the first city, Dhannyawaddy. The physical boundaries of Arakan determined on one hand the extent of control possible by a central authority and on the other the opportunities for the migration of peoples and cultures from Bengal on the west and Burma proper on the east. The early capitals were based on the narrow alluvial plain in the north, comprising a region between 12900-15480 sq km in area, and the addition of the small stripes to the south gives it a maximum area of 38,700 sq km.[48]

The archaeological evidence points to the founding of Waithali around the beginning of the 6th century. The chronicles report that in the building of the city, the king was assisted by subject kings from the surrounding areas, who would have supplied labor in return for protection. Lying further to the south, Waithali was more even open to western influence than Dhannyawaddy. More easily reached by the overland route, it also took the advantage of increased trade in the Bay of Bengal during the 6th century and later.[49] There are traditional claims in Arakan of royal capitals dating back to 3000 BC.[50] However, the historical record begins with the c. AD 729 Anacandra inscription which describes how the founding king of the Candra Dynasty, Dvancandra (c. 370-425 AD), 'built a city adorned by surrounding walls and a moat'[51]. This is Dhannyawaddy, whose Gupta period sculptures point to the 5th century

[48] Pamela Gutman, 'Ancient Arakan', Ph.D. Dissertation, Australian National University, 1976, P.1-3

[49] Pamela Gutman, 1976, P.21

[50] Tun Shwe Khaing, 'A Guide to Mrauk-U: An Ancient City of Rakhine', Yangon, 1992, P.20

[51] The literature is based on the version of this group of scholars:

AD[52]. Dhannyawaddy is located 6 miles (9 km) east of the Kaladan River and about 16 miles (25 km) north of Waithali and 21 miles (33 km) north of Mrauk-U, and was built in the middle of the 11th century. The city walls, made of bricks and roughly forming the irregular circle, have a perimeter of about 9.6 km and enclose and area of about 4.42 sq km, almost the same size of Pyu city of Halin[53]. Within the city, a similar wall and moat enclose the palace site, which has an area of 26 sq km. Another singe wall surrounds the square area of the palace proper, enclosing about 12 sq km.[54]

Art history and numismatic studies place Waithali between perhaps the 6th and 10th centuries AD[55]. Waithali lies 5 miles (8 km) north of Mrauk-U and its city wall is area of 2.7 square miles. It is enclosed by a brick wall, with an area of 6.2 sq km. The walls, almost straight in the east and west, are rounded at the north and south, forming an irregular oval shape enclosing an area of about 7.02 sq km.[56] The inner wall area, known as the 'Palace site', is situated at the center of the city. It is recorded that twenty kings ruled in the Waithali Period between the 4th and 8th century AD. The Waithali Kingdom arose from Dhannyawaddy in the 4th century AD. At that time, it had flourished in good relation with Ceylon (Sri Lanka) to carry out a Buddhist missionary operation. At least thirteen kings reigned in the Waithali dynasty, where extraordinary peace and prosperity held, according to an Arnanda Chandra pillar inscription. Waithali was ephemerally displeased by the Pyu invasion in 9th century AD.

- Bob Hudson, 'Ancient Geography and Recent Archaeology: Dhanyawadi, Vesali and Mrauk-U', Archaeology Department, University of Sydney, Australia, 'The forgotten Kingdom of Arakan', History Workshop, Chulalongkorn University, Bankgkok, November, 2005, P.1
- Johnston, E:H. 'Some Sanskirt Inscriptions of Arakan', 1944, P-357-385
- Pamela Gutman, 1976, P.63

[52] The literature is based on the version of this group of scholars:
- Bob Hudson, 2005, P.1
- Pamela Gutman, 2001, P.29

[53] The literature is based on the version of this group of scholars:
- Pamela Gutman, 'Ancient Arakan', Ph.D. Dissertation, Australian National University, 1976, P.18
- Myint Aung, 'Excavations at Halin', 1970, P.55,62

[54] Pamela Gutman, 1976, P.18

[55] The literature is based one the version of this group of scholars:
- Bob Hudson, 'Ancient Geography and Recent Archaeology: Dhanyawadi, Vesali and Mrauk-U', Archaeology Department, University of Sydney, Australia, 'The forgotten Kingdom of Arakan', History Workshop, Chulalongkorn University, Bankgkok, November, 2005, P.2
- Nyunt Han, 'The Study of Ancient City Waithali', Department of Archaeology, Yangon, 1984
- Pamela Gutman, 'Burma's Lost Kingdoms: Splendours of Arakan', 2001, P.41

[56] Pamela Gutman, 1976, P.21

The Mrauk-U period went from the 15th to 18th centuries AD, and seems to have been preceded by settlement activity along the Lemro River to the east in several centers. Geographically, Mrauk-U lies at the head of a tributary, the Kaladan River, about 45 miles from the sea coast, but the largest sea-going ships of that period could reach it through a network of deep creeks by which it was surrounded. The city was built on a valley within the series of parallel ranges extending a little to North-west. The whole city was covered with a network of numerous creeks and canals forming a maze of interconnecting channels. Mrauk-U's unique position in the Bay of Bengal, with both land and sea routes to the east and west, resulted in the development of its commercial and cultural centre which later emerged as a highly flourishing country because of tis strategic location between India and South-East Asia. It also received the Buddhist religion and Indianized civilization from the west.

2.3.2. Mrauk-U's Religious, Culture and Artifacts

In religious belief, Buddhism is the main religious faith of the people of Rakhine. Buddhism was not different from the ancient periods to the present time. Buddhism was introduced from South India and Sri Lanka. It is said that there was an interrelationship between the Mrauk-U and Sri Lanka according to Buddhism. When the relation of Rakhine with India started, it is to be believed that the relations of these two regions had been developed since the early year of AD, because of the easy access of these two regions according to the records.[57] The pre-Buddhist civilization of Dhannaywaddy was very probably based on the earlier Northern Indochinese bronze-using culture. The first evidence of Buddhism, a century after the establishment of Dhannawadda, is, surprisingly, that of a fully developed Mahayana cult. The majority of Buddhist remains from the period are much cruder in conception than the Hindu images, indicating a popular cult. There is no implicit evidence of Mahayana, and in style, a continuing contact with Sri-Khit-Tra throughout the 6th and 7th century in evident. Gradually, the naturalistic rounded modeling of Gupta Buddha images becomes abstract and angular, and drapery is all but forgotten.[58]

[57] Ngwe Soe, 'Study on Religious Architecture in Mrauk-U, Rakhine', M.Arch. Thesis,Yangon Technological University, 1998, P.9

[58] Pamela Gutman, 'Ancient Arakan', Ph.D. Dissertation, Australian National University, 1976, P.184-187

The geographical position and the nature of the economic and ancient Arakanese cities, however, indicated a different rational for nation building. Looking at the Mrauk-U economy, there were two types found, an internal economy and external economy. The agriculture is the main sector for internal economy. Most external and internal communications is by water. Archaeological evidence further corroborates the existence of a sea-route from south India to northern Arakan from about the end of the 4th century and another route from Sri Lanka was used by at least the 7th century.

As far as location, Mrauk-U traded with Portugal, Dutch, Srilanka, India. From the trading, Rakhine kings also received the Portugese merchants to prevent the power of Mongo. Besides, they were appointed in the places of royal-guard army, the bodyguard army, the Chittagong garrison and navy. The Portuguese gave military training to the military servants serving under the Rakhine kings. Rakhine kings attempted to expel the Portuguese and connected with the Dutch in their place after realizing the danger posed by the Portuguese. In AD 1653, the chief of the Dutch and the representative of Rakhine king signed the agreement for trading in Mrauk-U. According to the agreement, the Dutch contingent was allowed to run the Dutch store and stay in Mrauk-U. The cultural history of Arakan is best reconstructed through the diversity of forms in its sculpture and architecture. It will be shown that these reflect not only the art of the immediate region – Bengal and the Pyu centres but also the art of South-east Asia in its widest sense. The whole gamut of northern and southern Indian influences, generally associated with the history of the better –documented schools of Indochina is equally apparent in Arakan.[59]

2.4. Conclusion

Myanmar occupies the largest continuous land area in Southeast Asia and it is the only Southeast Asian country directly bordering on the two giants of Asia, China and India. In the study of the background history of Myanmar, some of the facts are mixed with traditional and legend of tales. Although the facts in the traditional records cannot be always taken as the reality, some of the facts cannot be discarded entirely and are useful in the historical research.

[59] Pamela Gutman, 1976, P.184

Regarding to the history of Myanmar, these selected areas for the research have their own traditional records and some differ in some points from the archaeological findings.

The time in which settlements with walls and moats appeared in Myanmar was around 2nd century BC, the earliest urban settlements found in middle Myanmar are Tagaung near Mandalay, Bikthano near Magwe, Sri-Khit-Tra near Pyi, Halin in Sagaing Division; these sites were identified to have reached the level of urban forms in around 2nd century BC[60]. These urban settlements or the city-states were obviously small in the beginning because a certain population size and area is needed as hinterland to supply the urban settlements with food and labor, therefore it seems that these existed as small units parallel to one another in the beginning and it took several centuries until these could be consolidated into larger kingdoms.[61]

By the 9th century, Burma proper was divided into three kingdoms, each of which was to influence the history of Arakan during the next 200 years. Central Burma, from the northern Shan states to Sri-Khit-Tra in the south, was controlled by the Pyus, whose relations with Arakan were generally friendly, but who occasionally took advantage of weak governments at Waithali to attack the north and the south. The Mons of Ramanyadetha, their capital northeast of Pegu, are said in the chronicles to have occupied the south in the 10th century.[62] Rakhine were the significant group to come to Arakan. The date of their arrival is contentious, with the chronicles exaggerating the authority of their hold on the land. Therefore, both culturally and linguistically, the Rakhine are closely related to the Bamars, although they regard themselves as the older branch of that race.[63]

Studying the background history of the ancient cities in Myanmar, it is found that there are many gaps in the knowledge of the history of ancient Pyu, Bamars and Arakan which need to

[60] The literature is based on the version of this group of scholars:
- Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.8
- Aung Thaw, 'Report on the Excavations at Beikthano', Rangoon, Ministry of Union Culture, 1968

[61] Kyaw Lat, 2010, P.8

[62] Pamela Gutman, 'Ancient Arakan', PhD. Dissertation, Australian National University, 1976, P.320

[63] Pamela Gutman, 1976, P.16

be filled, though the facts in the traditional records cannot always be taken as the reality and are often mixed with legends, and some of the facts cannot be discarded entirely and are useful in the historical research. Nevertheless, this background history can support the research by one way: the history changing; physical condition changing; and other religious and civilization influences. In the conclusion of this chapter, the different cultural areas changed the way of architectural thinking when the people built the buildings and it is also accepted that the economy and geographic conditions of the local sites and the kings' growth of power affected things at that time. These can be considered the facts of above historic records and findings for the further studies.

And it is also to be admitted that there are words and terms not familiar to the foreign readers, with explanations and meanings which are given in the glossary and indexes to make it easier for those readers. However, there can still be complications concerning the names and pronunciation of names and locations because different spelling are found in different books: eg; 'Bagan' and different spelling 'Pagan' which is found in most of books in western languages written up to 1990, in addition to the names of pagodas, stupas and temples. To avoid as much confusion as possible, the monuments' numbers and the locations are given together with the alternate names and monuments in the later chapters.

CHAPTER III

Architectural Typology of Temples

CHAPTER III

3. ARCHITECTURAL TYPOLOGY OF TEMPLES

3.1. The Origin of Buddhist Temples

The earliest Buddhist temples built in India were obviously of light materials like timber or bamboo and therefore cannot be seen today. In the 3rd century BC Emperor Asoka sponsored the third Buddhist council and after that period, masonry buildings appeared together with other artifacts. The earliest Buddhist temples which still exist today were hewn into the hills, called 'rock-cut temples'; a large group of them are found in Ajanta hills in Indian State of Maharashtra and were inhibited by Buddhist monks between the 2nd century BC and 7th century AD. The general design idea of these rock-cut temples is that these were halls with two rows of columns and a small Relic chamber or Stupa places at the end of the halls. The medium temples have dimensions of around 20 ft. in width and 100 ft. in length (6 x 30 m), two rows of columns from the larger nave in the middle and two aisles, and basic designs which resembled Greek temples or the Roman Basilicas. The colonnades were not structural members in the case of rock-cut temples; they were only decorative elements to imitate the former timber halls. In the original case of timber halls, obviously these were structurally necessary to have larger hall-widths to support the roof members. Similar to many cases in the history of architecture, when the people started to build in stone, they still want their buildings to look like timber structures and therefore the caves were decorated with timber elements like roof joists, timber columns, etc. although these were structurally not required in man-made grottos.[1]

There are also evidences of technical influences continuing to reach Central Burma from India - the bricks of the oldest monuments in Beikthano have the same dimensions as Asoka's bricks of the 3rd century BC - there is no evidence of Indian cultural influence at this time. Instead of 'Hinduization' proving the impetus for the building, the Pyus accomplished the transition to urbanization without abandoning their own religious beliefs. Evidence of cultural contact in the 4th century is more conclusive, however, as it is then that the earliest Buddhist

[1] Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.7

monuments appear at Beikthano. Among them are some styles that can be traced to specific monuments at Nagarjunakonda, while other Beikthano monuments suggest Buddhist influences from several sources - Sri Lanka as well as the Krishna Valley.[2] The first specially Buddhist monuments along the Krishna valley were the stupas. Whether or not the stupa figured also as Pre-Buddhist funerary monument in the South as it had in the North of India is one of the many disputed questions of Indian protohistory. It can be considered that the Buddhist period at Beikthano and also what Buddhist sects of South India and Sri Lanka may have been involved in the introduction of Buddhism at Beikthano.

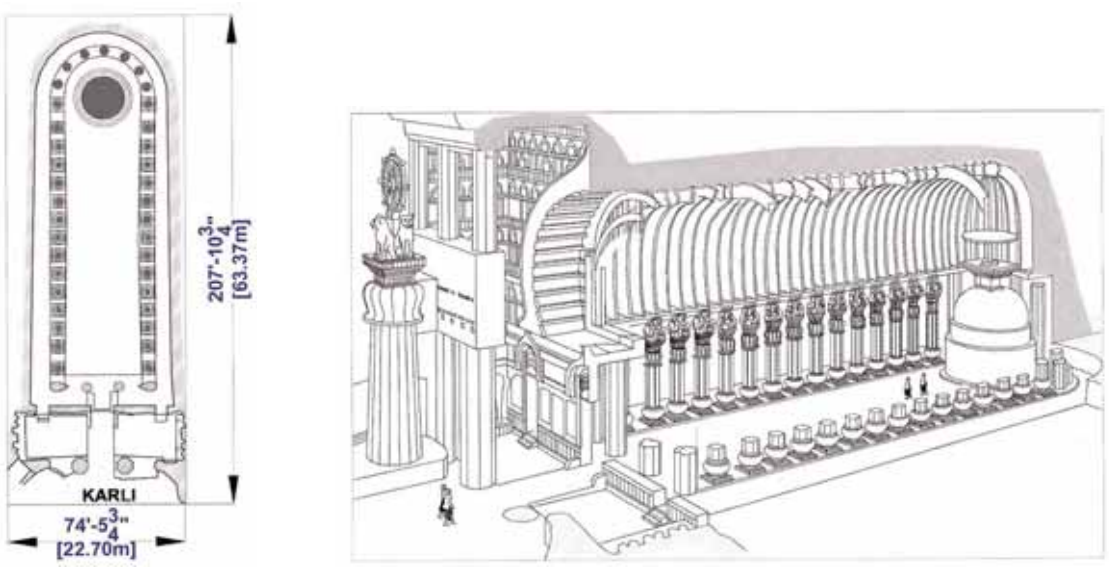


Fig 3.1: Rock-cut temple Karli in India

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical Background', 2010, P.62

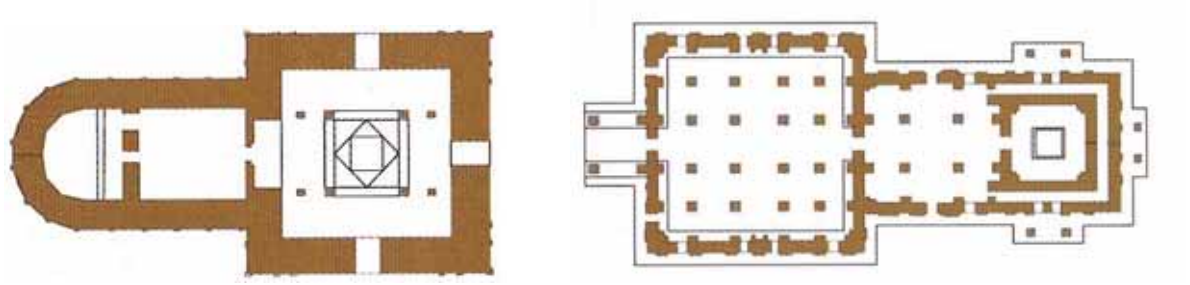
The earliest free standing temples found today in India are from Gupta period of between the 4th and 7th century AD;[3] the buildings were small compared to the rock-cut temples. The two temples accepted by the scholars as the earliest temples are one at Ter near Scholapur and the other Chezarla in Guntur (Kistna) District of the Andra State and they are estimated to have been built in the 5th century AD. Both were made entirely of bricks, and are approximately of the same dimensions of approximately 23 ft. x 9 ft. (7 x 2.7 m) and rounded wall at the end of

[2] Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.38-39

[3] The literature is based on the version of this group of scholars;

- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.7
- Rowland, Benjamin, 'The Art and Architecture of India', 1970

the building. The design of the temple at Ter has been improved by adding a Mandapa or vestibule, which became an essential design element with the later temples.



Ter, Trivikrama temple Papanantha temple at Patadakal

Fig 3.2: Early free standing temples in India, Gupta period, 4th to 8th century AD

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical Background', 2010, P.62

The main reason for these temples being too long and too short is the technological problem of covering the large hall width with durable materials. The interior of the building was 22 ft. (6.7 m) high, and the roof was constructed with brick vault by using large slabs, each horizontal layer was laid with the slight offset inward as it rises to the ridge. The main technical problem of early free standing temples in India was covering of the rooms with durable materials. It was easy to construct walls with bricks and with natural stones, but the problem was covering these inner spaces.[4]

In the construction system, all Hindu and Buddhist structures of the early period in India were built with the corbelled arches and vaults as seen with temples at Ter and Chelzarla or using natural stones as lintels or slabs to cover the rooms and openings. [5] The disadvantage of corbelled vaults is that the attainable span is narrow and occasionally they collapse with slight land movement because each layer is cantilevered and can stand very little lateral force. Another main disadvantage is that heavy loads cannot be added onto these roofs, although this is essential since the temples need Sikhara. The other alternative, to use stone beams or slabs,

[4] The literature is based on the version of this group of scholars;
- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.8
- Brown, Percy, 'Indian Architecture' (Buddhist and Hindu Period), Bombay (Mumbai), 1959, P.41-42

[5] The literature is based on the version of this group of scholars;
- Kyaw Lat, 2009, P.8
- Brown, Percy, 1959

is durable and this method has many advantages, but it is a time-consuming technological process, cutting the stones into required sizes and lift them to two or three storey heights and place them on the rooftops, etc., require large amount of manpower and longer construction periods. The scientific vaults and arches in India were applied only in the later periods after 13th centuries. [6]

3.1.1. The First Temples in Myanmar

The Archaeological Department in Myanmar has excavated many sites in middle Myanmar areas, some in South-West Rakhine and one site in South-East Mon area. Among the excavated sites, Beikthano, about 200 miles (320 km) North of Yangon showed the oldest artifacts and the site has direct cultural links with Sri-Khit-Tra and Bagan and the main period of human inhabitation at Beikthano was from about the 1st to 5th century AD. Since some Buddhist structures in Beikthano are similar in plan to those found in South India, it was concluded by some scholars[7] that Buddhism was introduced in about the 2nd or 3rd century AD. From the aspects of building science, the people were at the experimenting state to construct with brick masonry structures, but had not yet fully mastered the technology. Kiln fired bricks were already in use, and the brick sizes were still very large. The average size was 19" x 9 ½" x 3" (48 x 24 x 7.5 cm), and the way the bricks were laid showed imperfections, as joint and joint brick laying were found at many places and the walls were built without foundations but to prevent subsidence into soil. These walls were very thick, about 4 ft. (1.2 m) and the knowledge of covering the buildings with durable materials was not yet known and therefore these were covered with timber, which is the reason that roofs were missing at all the excavated buildings.[8]

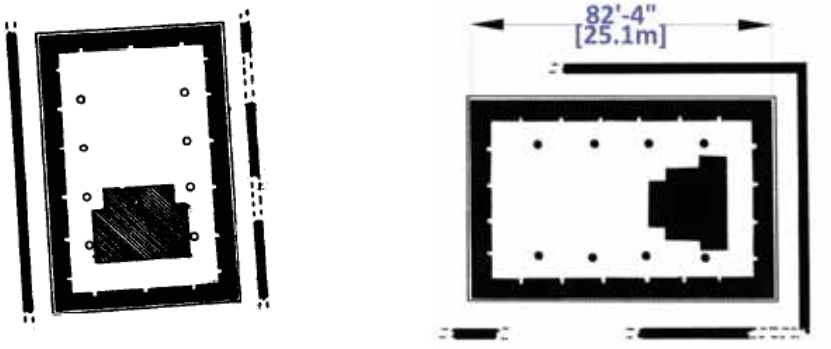
Among the excavated locations in the sites at Beikthano, the groups are great pillared halls; monuments shaped like a monastery; monuments shaped like a stupa; monuments shaped like

[6] The literature is based on the version of this group of scholars;
- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.9
- Brown, Percy, 'Indian Architecture' (Buddhist and Hindu Period), Bombay (Mumbai), 1959, P.176

[7] The literature is based on the version of this group of scholars;
- Kyaw Lat, 2009, P.9
- Aung Thaw, 'Report on the Excavations at Beikthano', Rangoon, Ministry of Union Culture, 1968

[8] Kyaw Lat, 2009, P.9

a temple; brick tombs; a possible throne room, store rooms and a control point. Among the excavated structures at Beikthano are the sites KKG_9 and KKG_{11}. KKG_9 was in the south-west of the palace area, inside the city. It is the very large monument with a rectangular form; four pairs of wooden columns evenly spaced down the interior (long axis) and entrance door on North wall. Forty urn burials were placed inside and immediately outside the hall in foundation layer. KKG_{11} was inside the North wall and gate, and it is similar in design and character to KKG_9 but larger still and oriented east-west rather than north-south. The entrance door was on west wall and it contained 13 urn burials both inside and immediately outside the hall in foundation layer.[9] These sites were pillared halls, and the archaeologists could not find out what purpose these buildings served. There are some few architectural point of views are considered: both the structures have rectangular plans without wall partitions, inner dimensions of both buildings are close to each other, 38 ft. 4 in. x 75 ft. 1 in. (11.68 m x 22.88 m) for KKG_9 and 39 ft. x 78 ft. 4 in. (11.88 x 23.87 m) for KKG_{11}, the plans have raised alters constructed of bricks at other end from the entrance, in the case of KKG_9 at the south since the entrance of that building faces north and in the case of KKG_{11} at the east since the entrance of it was at the west, and both plans have two rows of holes for round timber columns, each row of columns has four columns, with distances of around 17 ft. (5.2 m) and the distance between the rows (colonnades) is about 22 ft. (6.7 m).[10]



Site KKG_9 Site KKG_{11}

Fig 3.3: Plans in Beikthano, likely to be the first temples in Myanmar

Drawing Source: Aung Thaw, 'Excavations at Beikthano', 1968

[9] Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.149-153

[10] Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.10

From the design arrangements, having such a hall without partitions, with raised platforms or altars at one end, and the 3-shift basilica plan with larger nave and two aisles on each side indicate that the buildings had a resemblance to the early Buddhist rock-cut temples in India as presented above. From the structural aspects, the two colonnades are about 22 ft. (6.7 m) apart, just about the maximum span of a large circular timber member 18 in. (45.72 cm) and the additional aisles were designed to have a larger hall width of about 40 ft. (12.2 m). The niche-like slits in the internal sides of the walls are 6 in. to 10 in. square (15 to 25 cm). These are clearly secondary columns placed at the wall ends to support the templates for the rafters to rest. From architectural and structural aspects these were temples or prayer halls, the descendants of rock-cut Buddhist temples in India.[11]

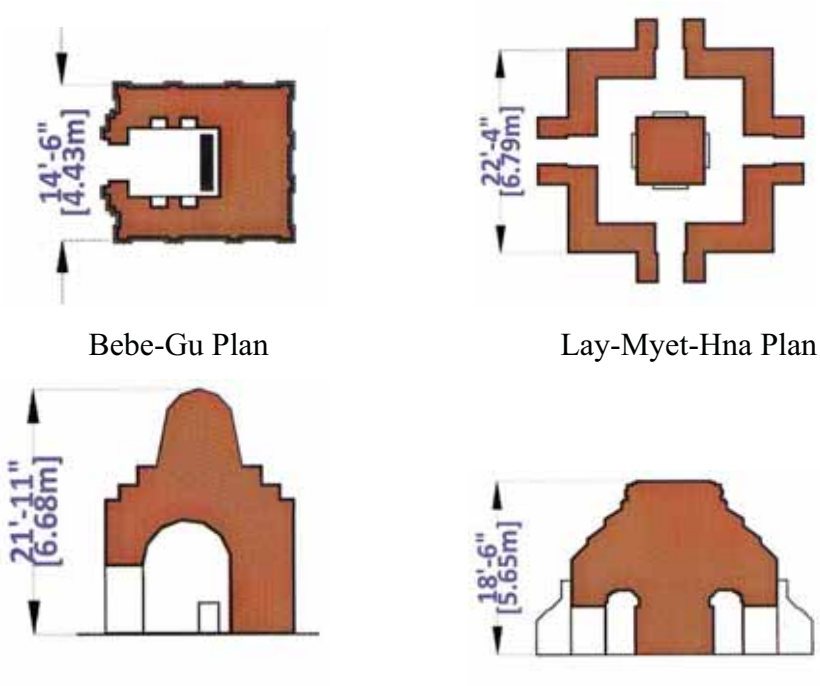
3.1.2. Temples in Sri-Khit-Tra

Starting from about the 5th century AD Sri-Khit-Tra, about 80 miles (130 km) south of Beikthano, became the strong and consolidated center of the Pyu cultural area. The structures like KKG_9 and KKG_{11} in Beikthano, with plans of large hall covered with timber rafters, are identified as the first temples or prayer halls in Myanmar which continued to exist in Sri-Khit-Tra. There are other structures in Sri-Khit-Tra which bear a resemblance to Bagan temples and show the technological linkage between Sri-Khit-Tra and Bagan, and the arching and vaulting techniques started in Sri-Khit-Tra were an essential structural system applied in Bagan later.

In Sri-Khit-Tra, there are a few temples that can be called 'the prototypes of Bagan temples'; Bebe-Gu, East-Zegu and Lay-Myet-Hnar are simple brick structures built of true vaults and are the same as the Bagan temples in the basics, from the aspects of design and structural system in applying vaults, to cover the inner spaces. In addition to these well-known examples, there are a few structures that can be identified as in the experimental stage searching from means to cover the inner spaces before reaching the level to build true vaults.[12] And it can also be seen in a very small temple called Yahanda-Gu, this has exterior dimensions of 29 ft. x 12 ft. 6 in. (8.8. m x 3.65 m) and the inner dimensions of 14 ft. 10 in. x

[11] Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.10
[12] Kyaw Lat, 2009, P.12

8 ft. (4.5 m x 2.43 m), and this temple was also constructed with technology similar to the early free standing temples in India, and covered with corbelled vault. In the study in Sri-Khit-Tra temples, it can be seen from the technological aspects, the two temple types, the first like Bebe-Gu or East-Zegu, a simple shrine covered with vaults, and the second like Lay-Myet-Hnar, with a solid pillar inside the shrine forming a passage, are the two prototypes of Bagan temples and several temple types in Bagan evolved out of these two basic prototypes.



Bebe-Gu Plan | Lay-Myet-Hna Plan

Bebe-Gu Section | Lay-Myet-Hna Section

Fig 3.4: Examples of temples in Sri-Khit-Tra

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical Background', 2010, P.24

3.2. The Main Features of Temples

Temples, which in Burmese are called 'Gu', or cave, function differently from a stupa and, at least in the early period, are intended to evoke the spirit of the early Buddhist caves of North India. Like real caves, often the homes of hermits, they are places for devotion, ritual and meditation. The Hindu concept of *bhakti* (devotion), with the emphasis on an intense relationship between the devotee and an anthropomorphized object of worship, that had influenced the development of the Mahayana, in India, was applied to the early cave temples.

The temples could contain sacred relics and images of the Buddha made from precious and costly materials, and precious manuscripts; such enclosures were protected by Hindi or even Tantric guardian figures that could include images of contemporary members of the royal family, countries and soldiers. Before the shrine was sealed, devotees would throw gems and various other precious items into the shrine.[13] Temples were designed for worshippers to enter a sanctum that featured one or more principal Buddha images. Generally, there are two basic types, with the one based on a solid brick core encircled by a vaulted corridor, while the other has an open vaulted sanctum, usually also surrounded by a covered corridor. Three main features and functions of the temples can be distinctly identified with the following example temples:

a) The central shrine

b) The vestibule

c) The porch

d) The solid core.

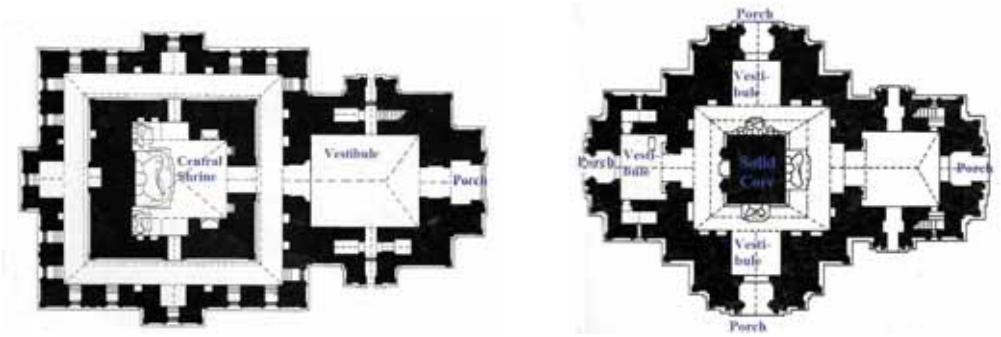


Fig 3.5: Basic Features of the Temple

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Bagan', 1993

3.2.1. The Central Shrine

The central shrine is a chamber to keep the Buddha image. It is also a sanctuary. They are composed of two units, the hall and the shrine, which are usually oriented in an east or north-facing direction, though there are numerous exceptions, and it was less concerned with

[13] The literature is based on the version of this group of scholars:

- Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.15-16
- Bronze examples of Tantric figures were found in Scovell's Pawdawmu and at Paung-Gu; illustrated in Luce, P.446-444

cosmologically arranged orientation than its Indian counterpart. The hall may be said to be the Indian *mandapa* built up and in the structural system of the central shrine, and it typically was built of brick and covered with a vault and enclosed on three sides by thick brick wall. The rear wall of the central shrine has the niche; sometimes it consists of perforated windows. The central shrine is intentionally designed to be dim. The temples faces east, the daylight through the perforated windows at the southern and northern exterior walls and through the openings of interior walls provide barely enough light for moving around the shrine during the evening hours. The part of the roof in the east has usually a light-well which is adjusted with the morning sun angle to beam at the image in the inner shrine.

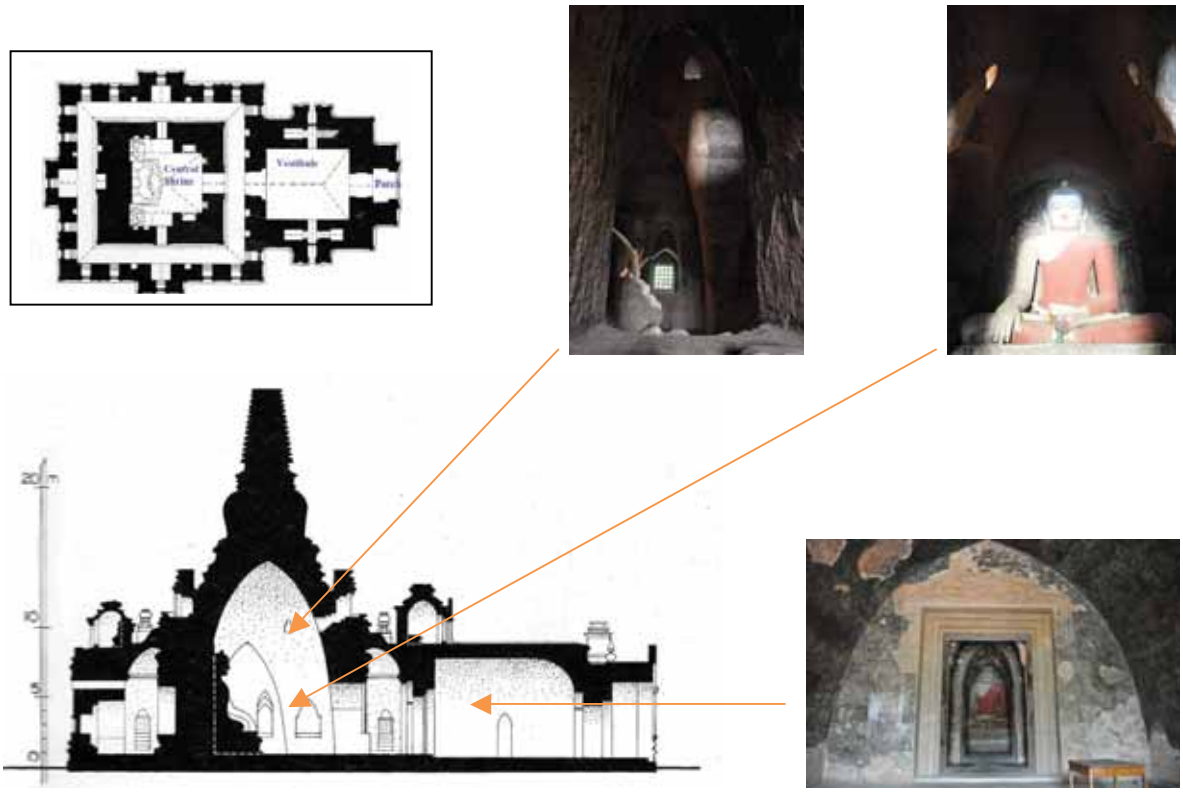


Fig 3.6: Examples of the central shrine and vestibule in Pa-Hto-Tha-Myar temple

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Bagan', 1993

Photo Source: Author

3.2.1.1. The Sub-Features of the Central Shrine

The sub-features of the central shrine are the foreparts, the niches and the windows or openings. Between hall and shrine, whether set in a recess or cella, is an ambulatory that runs

continuously around the central block or shrine, which is decorated with the frescos and mural paintings on the interior wall. The forepart, the extra room of the central shrine, which is a place for the Buddha image but the image size is smaller than the main Buddha image in the central shrine mostly at the east side. It is usually constructed with brick barrel vaults and the height of foreparts is adjusted depending on the height of the central shrine. The niche is a place to house the Buddha image, which is cut into the central block and is opened out to form a cell. The windows are not fully opened in the temples and decorated with the perforated stone screens. It seems to get the dim light and ventilation inside the temples. The shape of the opening is decorated in the circle, square and, sometimes, flower shape. And in some temples, small window-like square opening are seen on some of the walls.

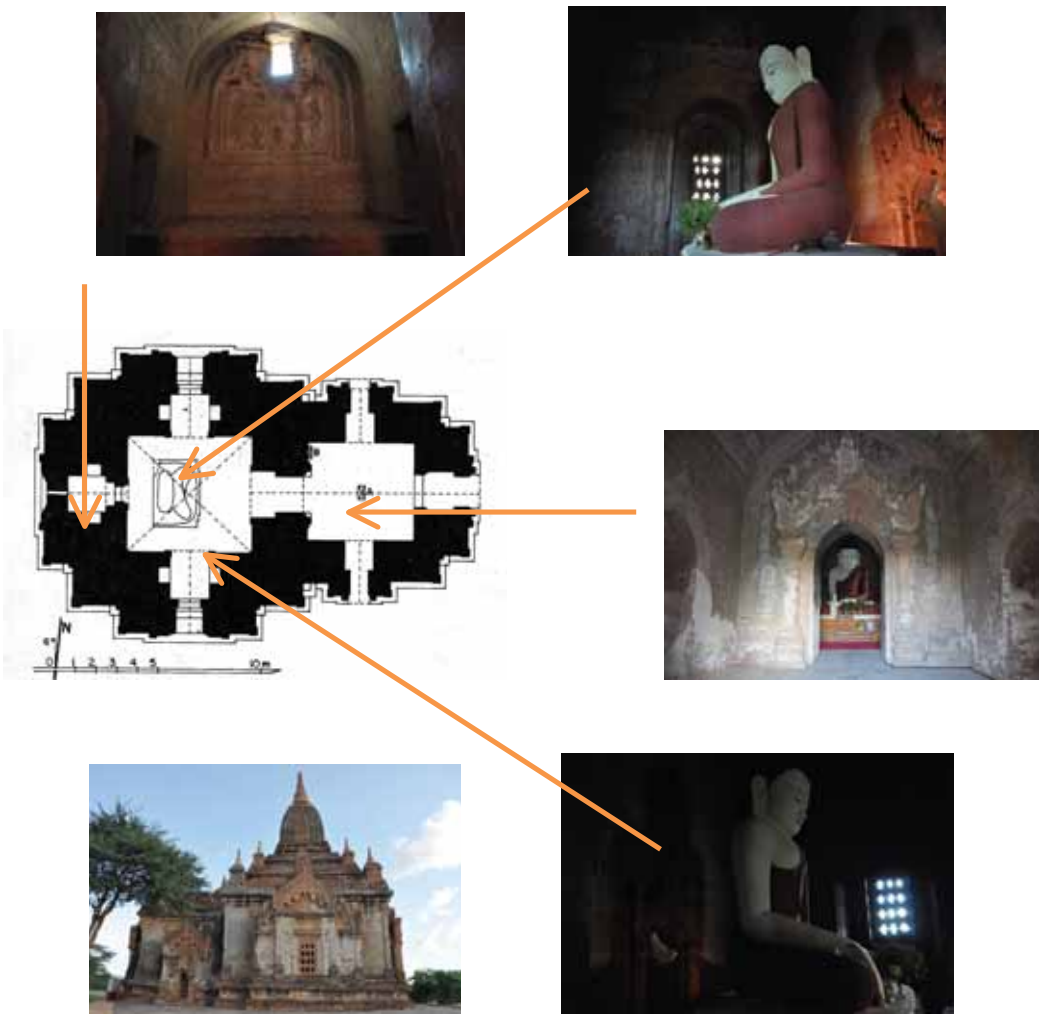


Fig 3.7: Examples of sub-features of the central shrine in Winido temple

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Bagan', 1993

Photo Source: Author

3.2.2. The Vestibule

The vestibule is a prayer hall before a Buddha image, which is called the anti-chamber of the central shrine. The halls are usually at a lower level than the ambulatories; at the steps leading into the temple's base are the main Buddha images set against a reredos on all sides but in the east there are exceptions at the same level. The hall fronts have tall, arched and pediment window openings to each side of the porch. It is built of bricks enclosed on two side walls under the barrel vaults. The interior walls of the vestibules are normally plastered and some of them are decorated with frescos. The passage links the central shrine and vestibule, and attaches with the entrance hall. And another structural system in the vestibules is using the four columns to have the wider vestibules. This system is used by the columns as load bearing elements in the inner space.

The sub-features of the vestibule are the entrance hall, the passage and the staircase. The entrance hall is connected in front of the shrine and covered with the vault. The passage is the connection between the central shrine and the entrance hall. In some big temples, there is a passage way like the corridors in which one enters the interior from the entrances, with broad, spacious porches, and one passes through the ambulatories into the temple's core. These ambulatories have a half-barrel vault and diaphragm arches which are required to pass the thrust of the greater mass of the superstructure out to the earth. Thereafter, the binding of stone masonry into the brick work to strengthen joints and other stress bearing points. The outer ambulatory was conceived as a gallery for sculpture, devised to educate the people in the *bodawin* (the life story of the Buddha). The outer ambulatory inner wall and the inner ambulatory niches contain reliefs of the Buddha. There are also a random selection of scenes from the life of Buddha in the halls and shrines. In the cross passages between the two ambulatories are a number of other miscellaneous *bodawin* scenes. Typically, the windows are beside the passage. The difference in level from the entrance hall to the shrine sometimes is from high to low and sometimes low to high. The floor of central shrine is usually paved with natural stone slab or sometimes bricks. And the staircase was typically inside the entrance hall up to the roof or to the upper story in the multistoried temples. Some staircases are about 4 ft. (1.2m) wide but some are just 2 ft. (0.6 m). There is the small opening inside the wall along the staircase to get the dim light but not enough. In most temples, the stairway

is usually relegated to a duct-like passage passing through the thickness of exterior walls. In some temples, it rises from the arch up to the 1st level to the entresol. The purpose of the entresols was to reduce the mass of the main blocks; they contain neither paintings nor images and thus it have no didactic intention.

3.2.3. The Porch

The porch is positioned before arrival into the entrance hall and seems to be a place to prepare to go to the central shrine. The porch is either on one side of the temple or on all four sides and leads to a shrine area through the passage. It is usually built of brick barrel vault and is usually decorated with stucco moldings. Sometimes there are lateral porches inside the entrance hall. In some temples, the lateral porches and the perforated windows are inside the walls. Sometimes the niches with the small Buddha images are positioned on the interior wall and typically decorated with the mural paintings without the porches.

3.2.4. The Solid Core

The solid core is created inside the temple in the place of the central shrine and sometimes solid pillars are used which are the same structural principle with it. Buddha images with pedestals were placed at one side or four sides of solid core, in which sometimes is cut into the solid core. The innovation of the solid core is the four niches extracted from the pillar at the four cardinal directions, therefore forming four visually separate shrines, which are connected through the vestibules and the passages. From the technical point of view, that pillars has three functions; 1) to stand for barrel vaults spanning the main shrine and the exterior walls, 2) to have built-in niches for the images as the main function of the temple, and 3) to take over the functions as load bearing element for Sikhara.[14] Typically, the solid core was used in the large temples, which seem to provide the building load. The solid core with a broad area, approximately 105 ft. x 105 ft. (32 x 32 m), is meant to bear the loads from top to the bottom and to distribute it equally to the ground to avoid the concentrated pressure directly to the soil at certain points, since the vertical loads, especially under the Sikhara tower, are very high. So the solid core is designed with an extra large area not only because it

[14] Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.24

is aesthetically needed to designate this as an important building, but this core is also assigned with the additional task to reduce point loads by having broader area in the plinth level.[15] The sub-features of the solid core include the corridor, the inner corridor and the outer corridor. The solid core was run with single or double corridors inside the temples.

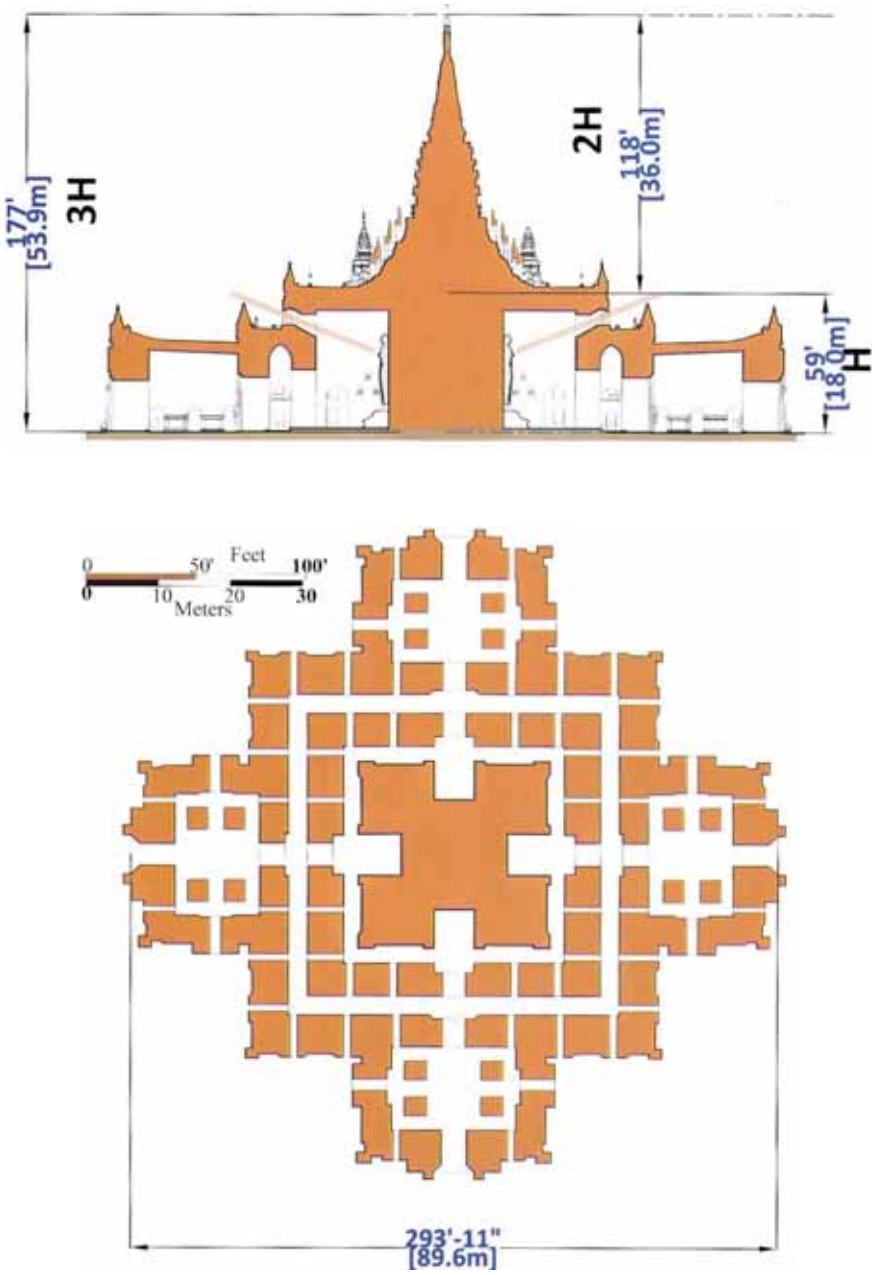


Fig 3.8: Examples of the solid core in Ananda temple

Drawing Sourc: Kyaw Lat, Dr, Art and Architecture of Bagan and Historical Background, 2010, P.124

[15] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.88

3.3. Conclusion

The temples also are originated from the stupa from the version of Philip Rawson. According to him, the Burmese arrived at the idea of their own temple based on the rock-cut stupa within a Buddhist cave-sanctuary in India with a carved figure of the Buddha. By burrowing into the undercroft of their stupas, as into the sacred mountain which the terraces suggested, they could open up as internal temple areas, in which the Buddha image would occupy the central spot. The stupa dome would serve as a mountain peak. The stupa would naturally be thought of as extending down into the undercroft to contain the Buddha image. The surrounding terraces of the sacred mountain could then also be interpreted as lean-to roofs around the base of the stupa drum. Rwason concluded that in this way, the exterior of the temple could still suggest the idea of the sacred mountain crowned by its stupa. But the new logic of the interior would add a fresh dimension to the idea, as a place to be entered for a direct encounter with the true doctrine. Sculpture and painting on the halls, corridors and doorways could recount the live of Buddha, and present the example of his previous lives.

The design of the temple revolves around the Buddha, and having his image enshrined within; each mass and sign and carving of the building must relate to him. The whole temple stands as a crown about him. The outer flame archway and the small but eloquent flame arch pediment framing the image, seems to warn one that he has entered not a building but an idea, and are confronting not a person but a fact. On entering the porches, one may encounter transitional series of spaces. First, we cross the vestibule or the hall and the lines of corridors outer and inner, and penetrate the darkness of the image-chamber passing through all the gradations from bright sunlight to deep gloom. Yet the effect is not oppressive; the pointed arches, the groined ceiling of the chambers shouldering up, one above the other, towards the mighty altitude of the central masses gives the effect of spiritual up lift. The linked spaces, each possessing a particular quality and each related to the other, has an effect on the people entering the temple as a continuous, unbroken flow of impressions working on their senses as they move through it.[16]

[16] The literature is based on the version of this group of scholars;

- Min Thet Mon, 'Appreciation on The Reflections Of Buddhism In Early Bagan Architecture (11th to 12th century)', M.Arch. Thesis, Yangon Technological University, 1998, P.40-42
- Rawson, Philip, 'The Art of Southeast Asia', Thames and Hadson, London, reprinted 1993

However it may have evolved, the temple's main purpose was to enshrine the Buddha image and to give sanctuary for worship and meditation. Until the Buddha is enshrined within, it is nothing but a shell. He is the center of the idea, as of the design, with the whole temple standing like a crown about him. The interior of the Gu varied considerably in shape. The core might be a solid pier, four sided, with the four Buddhas seated or standing, back to back, against or within its four faces, with single or double corridors surrounding the whole. Such a symmetric temple, found already at Sri-Khit-Tra, was called the four Buddhas, or in Burmese 'Lay-Myet-Hna" the four faces of four cardinal facades. Or again, the core might be a hollow cell containing the image, the four walls groining to a peak, like petals meeting above the Buddha's head. About this shrine there might or might not be a corridor.

It is intended that this chapter would introduce the typology of the temples and their features. Though there are many kinds of different formation and designs for temples, their concept is the same and the monuments themselves are an equally valid and elucidating source for understanding of the dynasty in all its aspects. Through the study of stupas and temples, their origins, their conceptions, their forms and functions can unfold themselves from the origin, and Bagan begins to unfold itself.

CHAPTER IV

Study of the Architectural Aspects in Temples

CHAPTER IV

4. STUDY OF THE ARCHITECTURAL ASPECTS IN TEMPLES

4.1. Study of the Space

The temples varied considerably in the formation of both interior spaces and exterior forms. The varied spaces can be divided as follows by previous scholars[1]:

1) Temples with a solid core: The core is a solid pier, normally four sided, with four Buddha images seated or standing, back to back, against or with its four faces, with single or double corridors surrounding the entire structure. There might be a porch and a hall or antechamber, either on one side of the temple or on all four sides, leading to the shrine area through a narrow passage. The temple is in a plan, based around a solid, or at least inaccessible, central block: there are thus four faces and each face symbolizes one of the last four Buddhas, or time period, the west-facing Buddha being for Sakyamuni, the Buddha Gotama, who is generally known as 'the Buddha', i.e. the most recent Buddha to manifest in the present time cycle. Recessed into the block at the cardinal points are niches, each of which contains an image of one of the Buddhas.

2) Temples with a central shrine: Temples with a central shrine were found in single-storeyed temples based on the rectangular and circular plan-shaped. The central feature of the central shrine temples is a hollow type containing the image inside. The porch is on one side of the temples or on all four sides.

3) Single-storeyed and multi-storeyed Temples: Single-storeyed temples are simple structures in which the vaulted shrine is atop the upper structure whereas in the multi-storeyed temples

[1] The literature is based on the version of this group of scholars;
- Strachan, Pual, 'Bagan, Art and Architecture of Old Bagan', Kiscadale publications, Singapore, 1989
- Lwin Aung, '*Bagan Bithuka Letya Hinlin Du Phye Si Pon* (Spatial Composition in Bagan Architecture)', Science Paper, November, 1974
- Nay Thu Win, Thet Thet Mon, Nan Saw Htet Htet Lin, 'Study on the Architecture of small temples in Bagan Period', M.Arch. Thesis, Department of Architecture, Yangon Technological University, 2004, P 21

the upper storey normally has a central shrine. The multi-storeyed temples are massive and towering but invariably are broader at the base, which forms a cubic terrace.

4.1.1. Spatial Composition

Spatial composition is the vital center of the traditional architectural identity and includes the architectural elements (space defining elements such as walls, floors and roofs etc.) and space enhancing elements such as the decorative elements of color, texture, ornamentation and other detail elements. The spatial character can be formed by their activities, living styles, custom and their different need and that can be termed as national characters. The confined space becomes different. It means every nation has a different spatial concept. Every building in the past was built for a purpose, which was meaningful in its time, by methods which were the most advanced for its time, and decorated in a manner which was the logical outgrowth of the culture of its time.[2]

4.1.1.1. Significance of Pyu Period Architecture

Pyu, Rakhine and Mon are the oldest civilizations in Myanmar. From all the sites of old cities in Myanmar excavated up until now, the sites in Beikthano seem to be the oldest because of the radiocarbon dating results of charcoal from Beikthano; these are found to be from between the 1st century B.C and 1st century A.D. So the historians agree that the beginning of civilization could be from Pyu in Myanmar.[3] From the Bagan period onward, Sri-Khit-Tra was included in the long list of the country's capitals preserved in major chronicles, right into the 19th century; Beikthano, however, is noticeable in its absence.[4] Therefore, the architecture of Pyu will be studied before the architecture of Bagan because some structures and foundations still remain there. Although Pyu cities or sites were found at many places in

[2] The literature is based on the version of this group of scholars;
- Khin Shwe Oo, 'Shaping Our Built Environment With Traditional Architectural Elements', International Conference, Malaysia, 2008, P.249
- Walterson, Joesph. Architecture: 'A Short History'. New York: W.W. Norton & Co.Inc. 1968

[3] Aung Thaw, '*Beikthano Myohaung* (Old City Beikthano)', University Research Paper, Volume 1, Part, 2, Rangoon, 1966

[4] Donald M. Stadtner, 'Sacred Sites of Burma', Myth and Folklore in as Evolving Spritual Realm, Thailand, 2011, P.208

Myanmar, the main sites are in Srikshetra near Pyay, Halin near Shwebo, and Beikthano near Taungtwingyi (see in Map: 2.1). A handful of brick temples from the Bagan age or later can be seen at Sri-Khit-Tra, together with twenty brick mounds from this period. In the study of the architecture of Pyu, it is divided into 3 parts depending on the old cities there:

1) Remaining structures at Beikthano
2) Remaining structures at Halin
3) Remaining structures at Srikshetra.

1) Remaining Structures at Beikthano

Archaeological research at Beikthano began in the early years of the last century with the surveys of Mr. Taw Sein Ko in 1905. That research was formulated with the aim of obtaining evidence on the earlier phases of civilizations in Burma, prior to the stages represented at Sri-Khit-Tra. The most numerous examples of the early Buddhist architecture at Beikthano are the remains of cylindrical brick stupas. Among them, based on the plan of KKG_3 which seems a stupa and also the plan of KKG_2 with ten cells for meditation indicated that the people of Beikthano already had Buddhist faith. Based on the other artifacts found in Beikthano, the people practiced Hindu arts parallel to their faith in Buddhism. This Beikthano city was destroyed in about the 4th century A.D because of outside attack according to the records.

Fig 4.1: Plan and reconstructed stupa KKG_3 at Beikthano in the 4th and 5th century AD

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.2

The main feature of the monument KKG_3 is a large cylindrical structure 9.3 m in diameter and 3 m in height. It is faced with large bricks to a depth of 1.2 m, while the core of the monument is brick rubble. At approximately the cardinal points, i.e., some 17° west of north, there are

four almost square projecting platforms (3.3 x 3m) which are also faced with the same kind of brick. The central structure is surrounded by two large circular walls, embracing a total diameter of 42 m. Each wall was originally 2.1 m wide. Their original height were probably not greater than 1.3 m, because the remains of four sets of low brick steps ascend the outer wall on the same alignments as the projecting platforms on the stupa. The width of the circumambulatory path defined by these two walls is 3 m.

When attempts have been made to compare KKG_3 with stupa base at Nagarjunakonda, in particualar stupa 8 at the Indian site by the scholars, that building plan is also similar with the stupa plan in Nagarjunakonda, Andhra Region in India. This is unconvincing because this Indian stupa belongs to the highly distinctive class of southern stupas whose foundations are built like the spokes of a wheel. In addition, on this stupa there were no circumambulatory walls and the *āyaka*, or offering, platforms were much lower and smaller in relation to the stupa than they appear to have been at Beitkhano. In India, and again in Srilanka, the *āyaka* platforms were the focus of the finest sculptural ornamentation of the building as a whole, fashioned in stone or stucco. The Beikthano stupas revealed no traces at all of ornamentation in durable materials, although one cannot exclude the possibility that an original painted plaster on this stupa may have eroded away or there may also have been ornamental wood-carvings in the early phases of Burmese Buddhism. If a direct comparison with stupa 8 cannot be sustained, it is nonetheless true that the Andhra school of stupa architecture to which Nagarjunakonda belongs was the inspiration of KKG_3.[5]

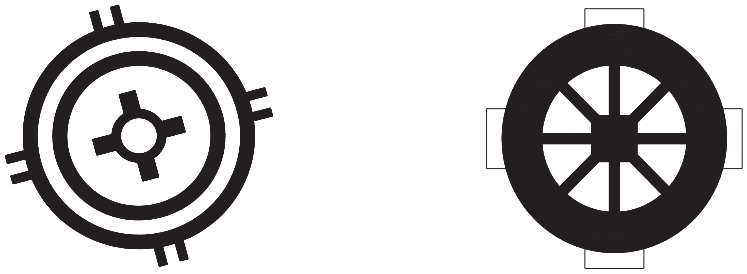


Fig 4.2: Plan of KKG_3 in Beikthano and Plan of $Site_8$ in India

Drawing Source: Aung Thaw, '*Beikthano Myohaung* (Old City Beikthano), 1966

[5] Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.202-203

KKG_2 at Beikthano is an earlier building style of a monastery. It is almost perfectly symmetrical, consisting of a long rectangular main structure with an entrance chamber in the middle of East façade. The main structure is 29 x 10 m (external dimensions) and the entrance chamber measures 6 x 4 m. The main rectangular was internally divided in half down the long axis to form a great communal hall on the East and eight small cells on the West. All the external walls and the main partition wall were 1.35 m thick, while the walls between the cells were only 50 cm thick. The interior dimensions were 6.85 x 2.62 m in the hall and 3 x 2.85 m for each cell. The doorways to each cell were placed in the center of the wall and balanced by a window on the outside wall.

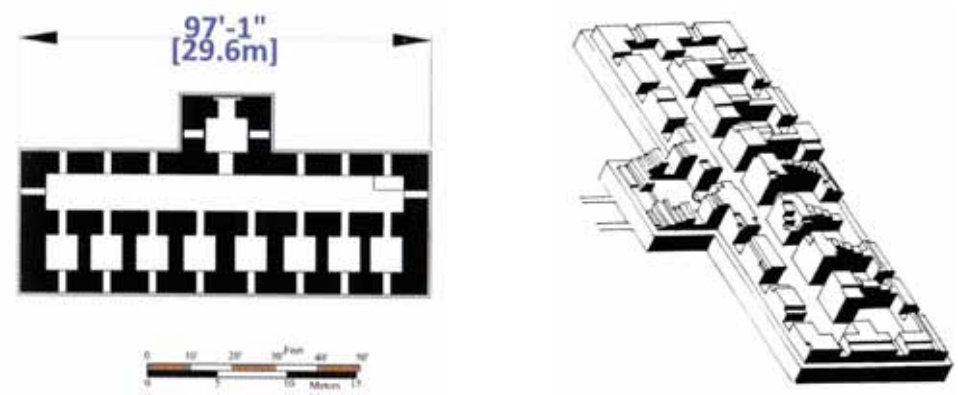


Fig 4.3: Ground plan and isometric drawing of monastery KKG_2, Beikthano, 4th century AD

Drawing Source: 1) Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.21

2) Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.194

Fig 4.4: Ground plan of Buddhist monastery, Nagarjunkonda Site [20] in India, early 4th century

Drawing Source: Janice Stargardt, 1990, P.196

U Aung Thaw noted that the most ancient monastic complexes in India consisted of rows of cells of similar size and format to those at KKG_2, opening directly onto a court of more or less

regular rectangular shape. He saw, moreover, a specific prototype for KKG_2 in one of the monastic complexes uncovered at Nagarjunakonda ($Site_{20}$), where the typical row of small cells is fronted by a corridor and then by a central entrance chamber.[6] The plan containing small cells may be compared with those of some monasteries sites of 2nd century A.D at Nagarjunakonda, the old city from Andhra Region, situated in south-east of India, and are found similar to KKG_2 at Beikthano.

Fig 4.5: Ground plan of KKG_9 (2nd century BC) and KKG_{11} (1st century AD) in Beikthano

Drawing Source: Aung Thaw, '*Beikthano Myohaung* (Old City Beikthano), 1966

In considering the ritual structures of Beikthano, we will examine each in turn. KKG_9 was a very large rectangular brick hall measuring 25.2 x 14.7 m. Its long axis ran from north to south, with a deviation of 10° west of true north. Its walls were very thick, 1.27 m across, and constructed of the largest size in the range of Beikthano brick, measuring 50 x 26.25 x 8. 75 cm. The monument contained only one vast chamber. At regular intervals down its long axis, there were four pairs of large wooden pillars set at a distance of 2.4 m from the walls on either side. There were eight timber-posts which are supported to be the compartments. The pits for timber posts are 14 ft. (4.3 m) apart from each other. That structure looks like a temple supported with an axis, without knowing how the upper part of building is made, according to the Archeological Department. KKG_{11} is slightly larger than the other two halls at 26.4 x 14.4 m. It is oriented east-west, not north-south, with its opening to the west. As at KKG_9, an offering platform was built at one end of the hall at a late stage in the building's history. In this case, the platform was square stepped. There is an interesting technical difference between KKG_9 and KKG_{11} in the matter of cross-bracing. At KKG_{11}, a combination of

[6] The literature is based on the version of this group of scholars:

- Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.195
- Aung Thaw, 'Excavations at Beikthano', P.64-66

straight lateral bracing and diagonal bracing appears to have been used – a more sophisticated development than the method used in KKG_9.[7]

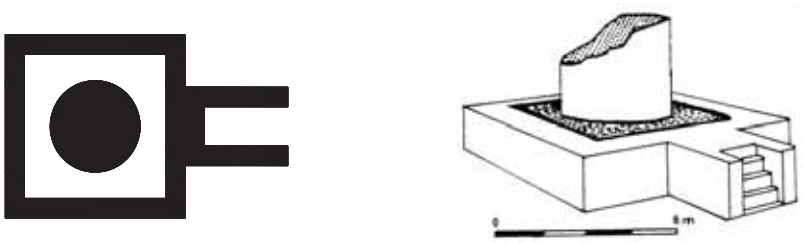


Fig 4.6: Ground plan and east section of KKG_{18}, an isolated Buddhist stupa of the early phase, in Beikthano, 5th century

Drawing Source: 1) Aung Thaw, '*Beikthano Myohaung* (Old City Beikthano), 1966

2) Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.209

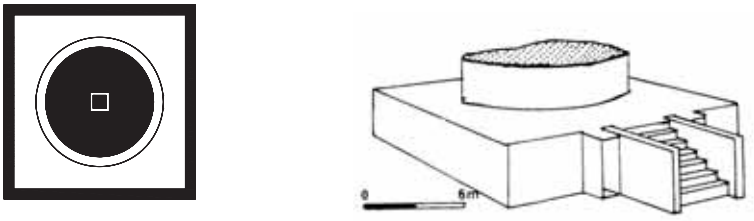


Fig 4.7: Ground plan and south section of Mohra Moradu stupa, Taxial in India, 4th century

Drawing Source: 1) Aung Thaw, 1966

2) Janice Stargardt, 1990, P.209

The above temple shape is a square-shaped brick wall, and is filled with brick bats between the square-shaped wall and the circular plan. One can suppose it to be a building concerned with the tradition of cremation because of the discovery of skeletons and bones there, and it is similar to the plan shape in India[8]. At KKG_{14} and KKG_{18}, there was a rectangular projection on the enclosure wall – on the north side at the former and the east at the latter. These projections formed an entrance way or stairway to the earthen terrace surrounding the stupa itself. In the ground plan, the monument resembles rudimentary pediments surmounted by a

[7] Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.177-183

[8] Aung Thaw, '*Beikthano Myohaung* (Old City Beikthano)', University Research Paper, Volume 1, Part, 2, 1966

stupa. The specific Indian prototype for KKG_{14} and KKG_{18} at Beikthano is to be seen in the large stupa at Mohra Moradu stupa.

The separate elements of the Beikthano stupa, KKG_{14} and $KKG_{18,}$ do reveal Indian architectural influences at work - the characteristics of the cylindrical stupas certainly relate them to the Andhra tradition of small stupas without *āyaka* platforms, some of which were constructed around a core of rubble. The walls enclosing this stupa have become more than precinct walls; by the elevation of the space between the walls and the stupas with packed earth, a clay terrace was formed with the incidental result of transforming the outer walls into a rudimentary pediment of the monument's platform. This function is further developed with the addition of an earthen entrance platform, similarly encased in brick, terminating in brick steps. For this practice, the building form can be seen realized at Taxila as a possible source of inspiration, though the style may have reached Beithano through other intermediaries in South and East India.

The orientation of KKG_{14} and KKG_{18} towards the north and east, respectively, is indicative of an imperfectly assimilated Indian influence, for, as mortuary monuments, an orientation towards the west would have been more appropriate than the east. Sites such as Mohra Moradu were to influence early Indian temple architecture; they represent a form of stupa architecture which incorporated the raised square masonry terrace, the beginnings of an entrance chamber and the masonry entrance stairs. It is widely held that temple architecture was indebted to the elaboration of stupa structures, although most of the stages of this development cannot be recovered in India owing to the destruction of temple structures earlier than the late 5^{th} and early 6^{th} centuries.[9]

2) Remaining Structures at Halin

In the temples in Halin, $Site_9$ will be taken as an example. At this site, 84 timber posts are supporting the compartments. Most of them are out of order and the rest of the 58 posts are

[9] Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.208-210

1ft. (0.3 m) in circumference. The building is inclined 19º 56' to the west. The archeologists assumed that is an assembly hall of its respective era.[10]

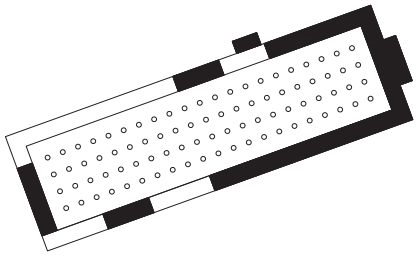


Fig 4.8: Plan of $Site_9$ in Halin

Drawing Source: Myint Aung, '*Halin Myohaung* (Old City Halin)', University Research Paper, Volume 3, Part 3, P.76

3) Remaining Structures at Sri-Khit-Tra

According to the reports of the archaeologists, Beikthano was destroyed by fire and abandoned as a settlement in the 5th century and in the 11th century there were signs of partial occupation at one excavated building.[11] Starting from about the 5th century, Sri-Khit-Tra, about 80 miles (130 km) South of Beikthano, became strong and consolidated and became the center of Pyu cultural area. The temples in Sri-Khit-Tra are like the structures KKG_9 and KKG_{11} in Beikthano. The interior spaces were created with a corridor in the temples in Sri-Khit-Tra. The niches are present along the corridor and the Archeological Department assumed that the building is a prototype of early Bagan temples, according to the remaining plan[11].

In view of the cultural connections between these two sites from at least the late 5th or early 6th century onwards, it seems reasonable to allow for a considerable lapse of time between the Beikthano stupas and their much larger and technically superiors descendants at Sri-Khit-Tra.

[10] The literature is based on the version of this group of schoalrs;

- Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Department of Architecture, Yangon Technological University, 2004, P.18
- Myint Aung, '*Halin Myohaung* (Old City Halin)', University Research Paper, Volume 3, Part 3, P.76

[11] The literature is based on the version of this group of scholars:

- Aung Thaw, 'Excavations at Beikthano', 1966

They are unlikely, therefore, to date from later than the mid 5th century and may be slightly earlier. The rather simple cylindrical stupas of Beikthano stupas can be seen as the forerunners of the square temples at Sri-Khit-Tra, built to similar ground plan dimensions, with an entrance chamber and surmounted by large stupa on the roof. The isolated stupas of Beikthano, KKG_{14} and KKG_{18}, thus form the parent stock of both the main branches of Pyu monumental activity of later centuries – stupas and temples – and as a result possess considerable significance in the history of Pyu architecture[12].

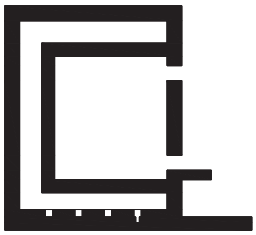


Fig 4.9: Plan of $Site_5$ West-Zegu temple in Sri-Khit-Tra

Drawing Source: Sein Maung Oo, '*Sri-Khit-Tra Myo Haung* (Old City Sri-Khit-Tra)', 1968

4.1.1.2. Significance of Bagan Period Architecture

Bagan begins in the 10th century AD, and the people in Bagan started building pagodas only after the 11th century AD. Concerning the stylistic periods of Bagan architecture, one group of scholars divided it them into the Mon type, Semi Burmese type and Burmese type; the Mon type supposed to mean temples with dark shrines built in the mid 11th century, the Burmese type means temples with ample daylight built in 1113 AD and the temples between these periods were termed Semi Burmese or intermediate types.[13] The Pyu model, known in Burmese as Lay-Myet-Hna, or four faced, is derived from North Indian prototypes and came to Myanmar by an overland route. The temples at the nascent stage in Bagan are just one rectangular shrine and an entrance without a large vestibule. Such simple single shrine temples were constructed in Bagan from the beginning period until the periods of Bagan and

[12] Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.211

[13] The literature on Bagan architecture with intentions of writing their versions Myanmar history;

- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.4
- Luce, G.H., 'The smaller Temples of Pagan', the fifth Anniversary Publication of the Burma Research Society, Vol.2

therefore there are many which belong to this type. The plan is only partly traceable; however, it shows its direct lineage from Bebe temple in Sri-Khit-Tra, and therefore the construction period of this small temple was probably from the 9th century AD or even earlier, because Pyu bricks with 3 parallel finger marks and a Pyu inscription were found when clearing the ruins in 1901.[14]

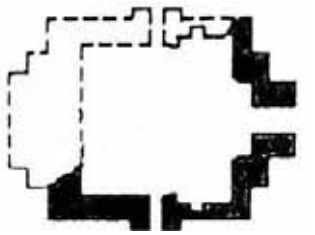


Fig 4.10: Monument No. 996 – dotted lines are conjectural

Drawing Source: Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.22

The early period temples are composed of two units, the hall and the shrine, which are usually oriented in an east or noth facing direction. The hall may be said to be the Indian *mandapa* built up and covered with a vault. The development after simple single shrine temples are the temples with larger extended vestibules, similar to the prototype of some temples in Sri-Khit-Tra. One step up in development from simple single shrine temples are the temples with larger extended veistibules, similar to prototype East-Zegu temple in Sri-Khit-Tra in which the shrine has a square plan and Sikhara is round. And then another type of single shrine temple with multiple vesitibules developed, of which there are several in Bagan; it is possible that these temple types were constructed in the later period of the12 or 13th century.

Among the simple single shrine temples, some small temples with circular plans are found in Bagan, since this form of temple is absent in Sri-Khit-Tra and in Beikthano, it seems then that circular temples or temples with Stupa shape originate in Bagan and the period when these were constructed for the first time is likely to be before the 10th century AD[15]. The first circular temples in Bagan are small and the inner dimensions are not more than 20 ft. (6 m)

[14] The literature is based on the version of this group of scholars;
- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.20
- The information from Archaeological department in 1964

[15] Kyaw Lat, 2009, P.21

because of the spans, which has to be limited due to the additional loads of Sikhara, and the principle of designing solid pillars inside the circular shrines was not applied in these temples.

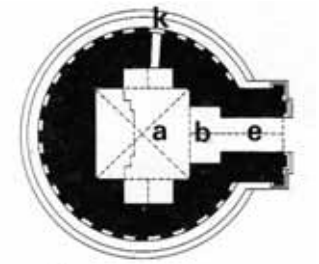


Fig 4.11: Monument No. 474 (a=central shrine, b=vestibule, e=porch, k=aperture)
Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

One step of development, the design of temples with solid pillars inside the inner spaces is applied since about 7th or 8th century AD in Sri-khit-tra. In Bagan, temples with inner shrines were built only at the end of the 10th century AD. The temple designs in Bagan have evolved from one pillar in the shrine, at the next improvement of having niches in the pillars, and then to the walls of the inner shrine substituting for the structural function of the pillar. This step by step improvement started from about the 9th century AD since the estimated time of temple building technology came to these people from Sri-khit-tra, until about the end of the 10th century. The temple in Bagan with this new design feature, likely to be the earliest, is Pahto-Thar-Myar temple (monument no. 1605), which is the first temple according to traditional history, and was consturcted at the end of 10th century.[16] Another criterion for dating early temples is the evolution of the upper shrine and here, four upper shrines were placed. This interest in equilibrium is the basic plan. It is a play of squares. From the porch, extending outward from the east wall, one passes through the hall, a perfect square, with door openings instead of windows on the north and south sides, under the base wall arch. Facing it is a second arch leading to the (once again) square shrine, positioned beneath the *Sikhara*. The shrine arch is framed by a splendid brick and stucco pediment arrangement, with a spinode cinquefoil superimposed upon a hierarchic scheme of horizontal tiers, reminiscent of the *pyatthat*, rising to a relief *Sikhara* and finial.[17] The period when this temple was constructed is

[16] This literature is based on the version of this group of scholars:
- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.25-26
- Khin Maung Gyi, P.83

[17] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.54-56

an important issue, since the design features like light-wells from ceiling and inner shrines continued to be applied in the later temples built in the 11th and 12th centuries.

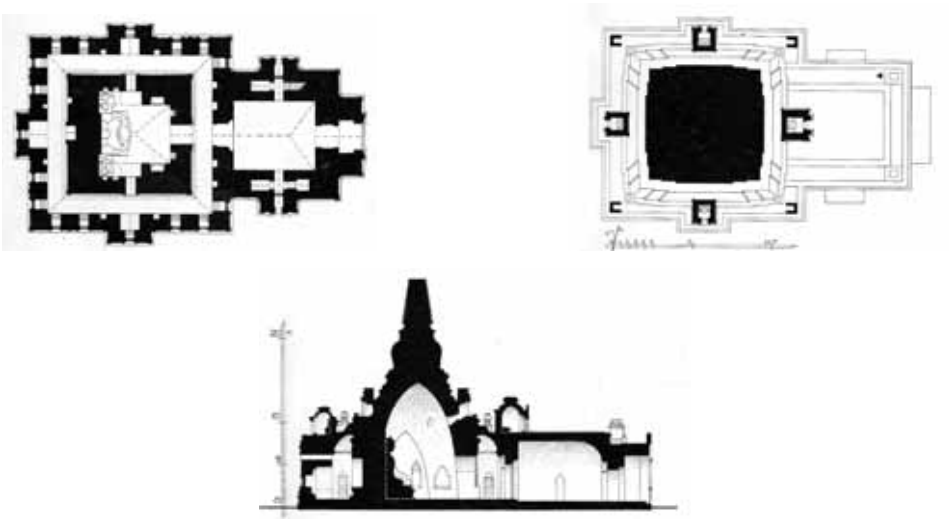


Fig 4.12: Ground floor plan, upper floor plan and cross section of Pa-Hto-Tha-Myar temple

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

Another alternative or another evolutionary step was to design large shrines without solid pillars or to have only columns and no inner walls. This structural system provides one advantage of having one integrated large shrine without a separating corridor and the daylight in the main shrine is provided directly through the windows from the exterior walls. Among the many temples in Bagan, there are only two temples with this structural system where the stone widely used though the main structure is actually brick, the stone work being a facing for aesthetic or protective purposes and imitating the form of bricks.

Nan Phaya temple is designed to utilize this the new structural system of having one integrated large shrine without a separating corridor and having the shrine well ventilated with ample daylight. The plan is a simple double unit, one of hall and one of shrine. The Sikhara is carried by four freestanding piers. The space between them is directly beneath the centrl mass above. Sky-lights transmit a dim light down onto the emty pedestal upon which the Buddha must have stood. Here, the central core and Pyu prototyes is hollowed to create the cella framed by the four massive piers. It is the next logical step in the evolution of Bagan temple. Above the retored pedestal is an upper open space with four openings that pass through the base of the Sikhara, here there is also a cornice running about the four sides of this upper open

space. However, behind this, in the vault between the two west piers, is a further aperture. It may be conjectured that, originally, an image stood between these two piers, and not to the center, and that the upper space, inside the base of the Sikhara, was in fact an attic with boards covering the opening held by the cornice.

The hall vault is masked by two simple crenellated terraces and over the shrine a third one runs beneath the Sikhara. The medial openings protruding about the base of the Sikhara are skylights. Rising from the steep, horizontal lines of the base moulding is the Sikhara, a vertical stroke countering the horizontality of the temple's sub-structure. This type of Sikhara with square base and curved, tapering, upwards and inwards panels was the current form used in contemporary north-eat India. It may have been carried to Myanmar in this portable medium to influence the temple design. This whole superstructure is set well within the low-lying terraces and there is no steep, energetic climb.[18]

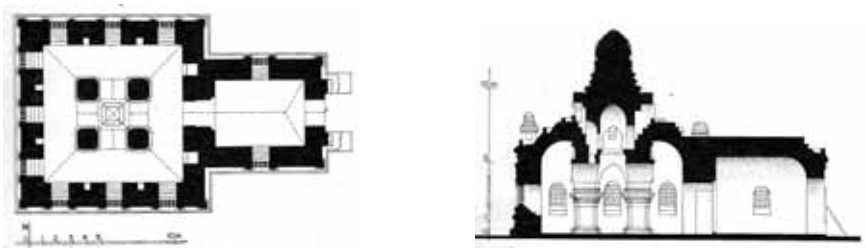


Fig 4.13: Ground floor plan and cross section of Nan-Phaya temple

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris:Unesco, 1992

The next evolution, multi-storeyed temples with solid pillars in ground level, are in line with the structural prinicples, and many storeys can be built based on this system. This system is structurally the safest and it is only one sequential step after having experience with single storeyed temples with solid pillars inside. In some temples, the pillar is designed to be elongated, and pillar acts as the main supporting structure, all along up the second storey where another large shrine is located. One example of this temple type is Kya-Sin temple (Monument no. 1219). It is a dual shrine temple built on a smaller scale similar to the large temples likes That-bin-nyu, Sulamani, built in 12th or 13th centuries. It is probable that this small temple is a forerunner of the later highest and most majestic temples like That-bin-nyu,

[18] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.46-49

from the aspects that the design offers two shrines, one in the ground floor and another in the second floor, whereas the shrine on the top floor is designed to be bright and airy, which some scholars name "Burmese type".[19]

In this temple, the hall opens uninterrupted out into the shrine, forming a T plan. A much narrower central core is used, for the thrust of the super structure is carried directly down through the outer walls. Thus the central core in a number of late period temples is reduced to a screen-like wall against which the colossal images are placed, seated upon a continuous throne that extends from the wall towards the open space of the hall. The shrine space to the force of this dividing wall is covered with a quadripartite vault which springs from this wall. Between the ground and upper shrines, there is an intermediary level. In the later period, architects were beginning to explore the possibilities of these levels, which in the past generally had been sealed up, for their function had been purely to reduce mass.[20]

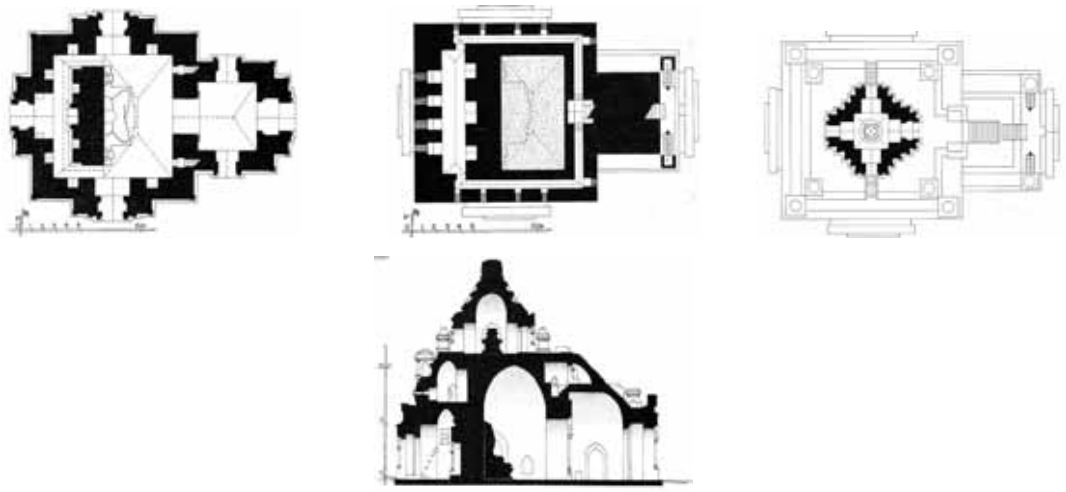


Fig 4.14: Ground floor plan, first floor plan, upper floor plan and cross section of Kya-Sin temple

Drawing Source: Pichard, Pierre, "Inventory of Monuments at Pagan", Paris: Unesco, 1992

As one of different type, temple with elongated shape, some with laying images but sometimes with images in sitting or in standing position. In the example temple, Manuha, the

[19] The literature is based on the version of this group of scholars;
- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.33-34
- Ba Shin, 'Law Ka Hteik Pan'

[20] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.113-114

block-like form and contains a similar monumental seated image if the Buddha entirely filling the interior. The colossal central image is flanked by lesser, though by no means small, images to each side, set in equally claustrophobic recesses. On the west side, at the back, is another colossal image, his head directed towards the north.[21] Starting with the design of main shrine, 32 x 27 ft. (9.7 x 8.2 m) with two smaller shrines at both sides each with the dimensions of 27 x 21 ft. (8.2 x 6.4 m), is the exceptional design in Bagan. In the main shrine, there is the sitting Buddha image, 52 ft. (15.8 m) high, with a clear height of 54 ft. (16.5 m) and at the back of the main shrine, there is another shrine with a lay image with a dimension of 93 ft. (28.3 m), in which the room length is 96 ft. (29.3m), image width is 10 ft. 6 in. (3 m) and the room width is 12 ft. (3.65 m).

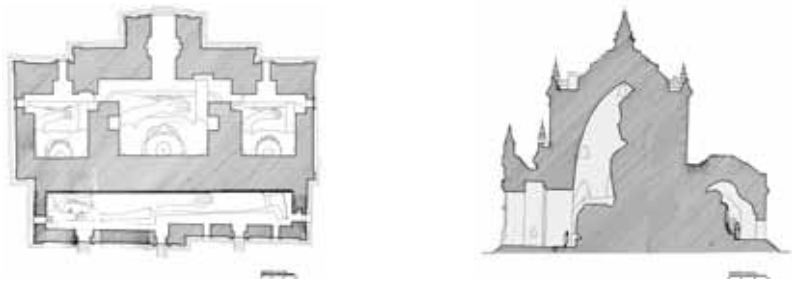


Fig 4.15: Ground floor plan and cross section of Manuha temple

Drawing Source: Pichard, Pierre, "Inventory of Monuments at Pagan", Paris:Unesco, 1992

The development of this type, temples with polygonal pillars, has 5 or 8 sides with 5 or 8 images. In this type, there are a number of temples with five or eight sided pillars with five or eight sided entrances; all of these are from the later period. Regarding temples with five faces were built in the 13th century and temples with eight were from 18th to 19th centuries. The design of temples with polygonal is not a new technological innovation, but only a different form. After the 18th century, a few temples with octagonal columns with eight images and eight vestibules were built in Bagan. Lay-Myet-Hna concept, that dated in Myanmar back to Pyu times, was revived at Bagan towards the end of the Early Period in temple architecture, likewise, it had been a predominant theme in ground plans, especially in stupas, which has a square base wit heach side representing one of the last four Buddhas of this time era.

[21] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.46

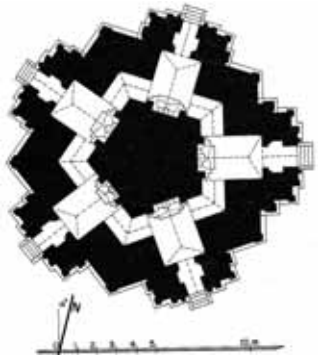


Fig 4.16: Ground floor plan of Nga-Myet-Hna temple (Monument no. 607)

Drawing Source: Richard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

4.1.1.3. Significance of Mrauk-U Period Architecture

The significance of the temples of Mrauk-U is the hale which sent out the ray of light to the inner pavement. The structure style of the temples was influenced by Indian culture. In the early Mrauk-U period (AD 1430-AD 1531), the plan shape of the temple is square and the four archways were stuck out to the four cardinal points. We will take Lay-Myet-Hna temple as one example of these, is one of the central pillar type, which is similar to the Lay-Myet-Hna temple of Sri-Khit-Tra. The shape of the central pillar of Lay-Myet-Hna temple in Sri-Khit-Tra is square but Mrauk-U is octagonal in shape. In this temple, the plan is square with four vaulted portals surmounted by the solid stupa. The vaulted passage with decorated archway protrudes at four cardinal points, which signalled the four successive Buddhas who had already attained enlightenment in this world. Seen from the plan view, the sacred throne was built in the form of a lotus which is meant to the noblest, most elegant and auspicious nature of the lotus flower. The octagon around the bottom of the pillar was symbolize the eight-fold path, which is the true way to Nirvana and it consists of a right view, right thought, right speech, right action, right livelihood, right effort, right mindfulness and right concentration.[22] The octagonal inner chamber was encircled by niches, which once contained seated Buddha images. Each part of the interior wall has five niches and each niche has an image of Buddha. There are five images and totally four light holes which meant to the former Buddhas, namely the Kakuthan Buddha, the Kawnagon Buddha, the Kathapa Buddha and the

[22] Ngwe Soe, 'Study on Religious Architecture in Mrauk-U, Rakhine', M.Arch. Thesis, Yangon Technological University, 1998, P.112

Gawdama Buddha and the fifth niche was meant to be the Arinmiteiya Buddha who will be coming to spread enlightenment on this world.

Fig 4.17: Ground floor plan and cross section of Lay-Myet-Hna temple

Drawing Source: Measured drawing by Department of Architecture, Yangon Technological University

Another step of development is Andaw-Thein temple, the central pillar type in which based on the octagonal plan shape and the two inner octagonal corridors which arranged to be harmony to the plan, connected to the shrine at its outside. Sixteen smaller shrines, each containing a Buddha image, are placed around the northwest and southwest corners. A large prayer hall has been added in front of the eastern entrance. The first passage has thirty-two niches and in the center is an eight-sided solid core, each side with an image enshrined in a niche.

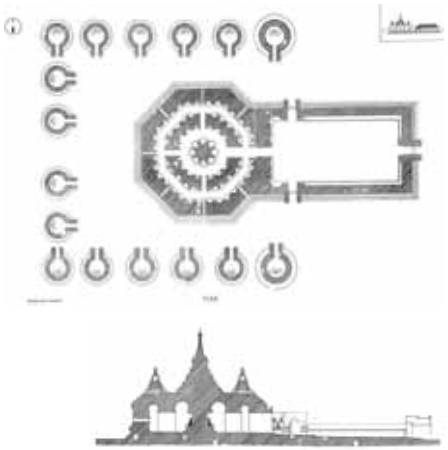


Fig 4.18: Ground floor plan and cross section of Andaw-Thein temple

Drawing Source: Measured drawing by Department of Architecture, Yangon Technological University

In the middle Mrauk-U period (AD 1531-AD 1638), the plan of temples is developed to form rectangle with the arch-way in the east of every temple. The temples were built by a main

stupa and the small stupas surrounding it. The temple types are solid pillar and central shrine with the corridors. In the Shit-Thaung temple, which means in Burmese 'the temple of eighty thousand images temple', as one example, the main image sanctum is at the center of the shrine and the outer two spirals like corridors are created to connect to the outer small stupas leading to the inner shrine. Forchammer's plan, made before the restorations of the 1920s and 1950s and the bombing during World War II shows a square within a rectangle.[23] The shrine is approached through a flight of stairs from the south, leading to the main platform on which it stands. It is entered through a large hall on the eastern side. On the northern side of the entrance is a massive four-sided pillar. Three parallel vaulted passage ways extend from the southeast to the northeast around the central image, which is in an inner shrine, facing east opposite a large entrance hall. From this hall, one can pass first to the outer passage, where the outer is interspersed with twenty-eight niches each with life-size images of the seated Buddha placed back to back, one facing the outer platform and one the inner passage. There is no doubt represent the successive Buddhas of the past and present eras.[24] This temple type is the most spectacular architecture of Mrauk-U period.

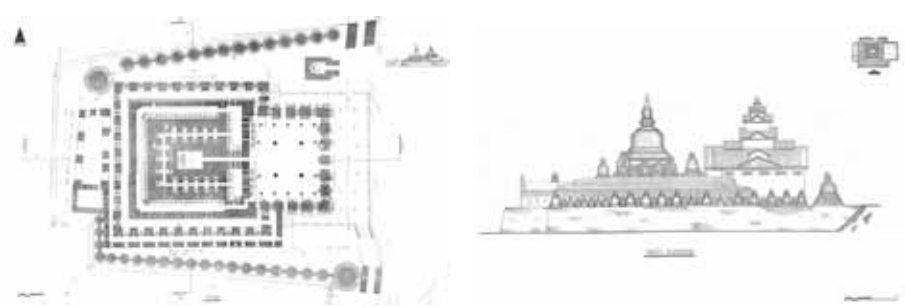


Fig 4.19: Ground floor plan and elevation of Shit-Thaung temple

Drawing Source: Measured drawing by Department of Architecture, Yangon Technological University

The next step in development is a plan with the combination of square and semi-circular form and rectangular ordination hall extends from the curve. In the Htuk-Kan-Thein temple, it can be seen that the two spirals are like vaulted corridors to the central shrine and give one a maze-like feeling walking in the corridor. The entrance opens into a two-tiered winding vaulted passage, leading to the central shrine where the seated Buddha image is lit through an arched aperture in its eastern wall. There are two inner pavements inside the structure and 164

[23] Pamela Gutman, 'Burma's Lost Kingdoms: Splendours of Arakan', 2001, P.95

[24] Pamela Gutman, 2001, P.95

niches with Buddha statues in sitting posture along the corridor. A vaulted hall may have been used for prayer and meditation or for royal ceremonial is entered by a passage to the southwest.[25]

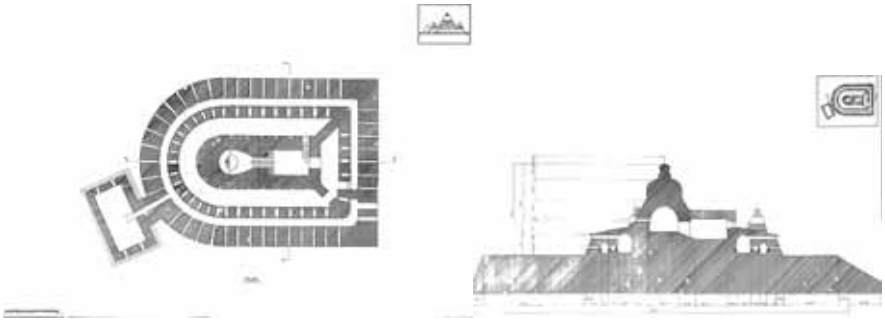


Fig 4.20: Ground floor plan and cross section of Htuk-Kan-Thein temple

Drawing Source: Measured drawing by Department of Architecture, Yangon Technological University

4.2. Study of the Form

Religious monuments take a variety of forms. Stupas are the solid structures that enshrine a sacred relic or a particularly potent image of the Buddha. The ground plan is usually square, though five-sided types developed in the later period. The base is terraced, with three or five terraces, and the terraces rest on an elaborately moulded plinth. The terraces reflect the tired slopes of the cosmic mountain, Mount Merum a Brahmanic conception that had been, by this time, absorbed into Theravada Buddhism. Though there is common symbolism with the Brahmanic Mount Meru, the stupa is more than simply an architectural imitation of this cosmic mountain: it becomes, in its own right, the cosmic mountain. Mount Meru was the template upon which architect philosophers of early Buddhism modeled their monuments. This most fundamental architectural form, though conceptually Buddhist in origin, was designed according to Brahmanic cosmological thought. And the stupa's terraces and structural elements, likewise, reflected the hierarchically ascending slopes of the great mountain. Likewise, stupas may be periodically re-cased, with structure radiating from structure. Just as the conceptions behind these two types of monuments, stupas and temples, are shared, and the design of temples is related to that of stupas.[26]

[25] Pamela Gutman, 'Burma's Lost Kingdoms: Splendours of Arakan', 2001, P.117-124

[26] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.2-16

4.2.1. Form Composition

The main features of the temples are the plinth, the body and the upper part. Generally, the upper part consists of a square terrace or circular terrace, niche, corner stupa, and forepart with apertures, forepart with porch, and forepart with niche, window, lateral porch, corner urn, lower terraces and upper terraces used as sloping edge. The top of the upper part is usually ended with the stupa which consists of square tower *(Sikhara)*, spire, and umbrella, conical spire, belled shaped dome, and (sometimes tiered tower or *Pyathat*)**.** Stupa motifs or *zeidi,* were placed at various points on the temple terraces and a stupa finial crested the *Sikhara*.

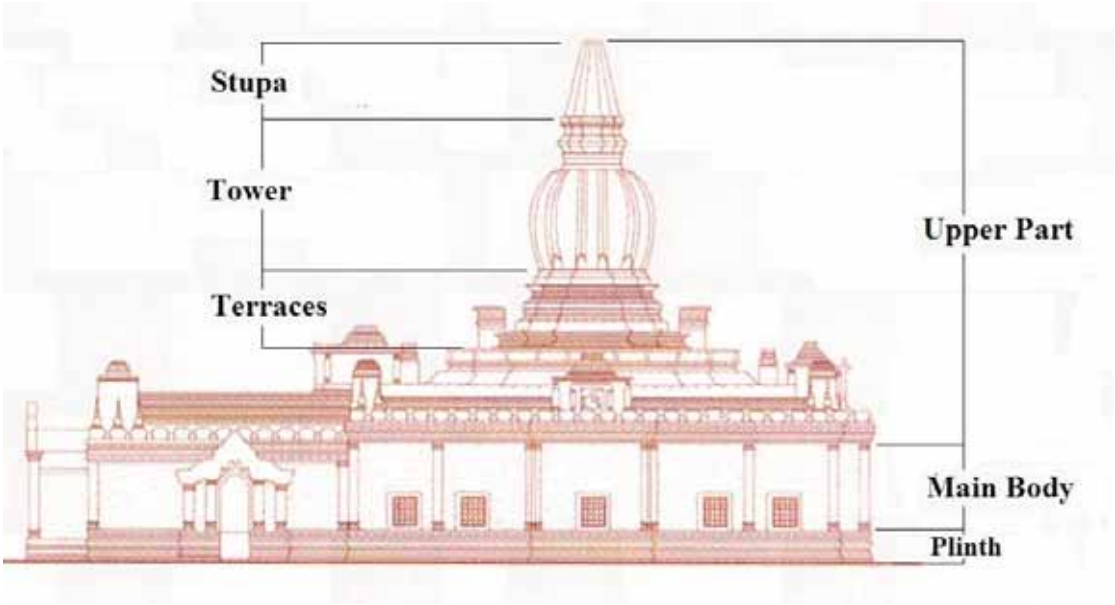


Fig 4.21: The features of the form of the temple

Drawing Source: Author based on the drawing of Pa-Hto-Tha-Myar temple by Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

The *Sikhara* is, in essence, no more than an evolved adaption of the stupa *anda* and *chatravali*, crowning the *Phaya*. The *Sikhara* was, though, not always preferred on temple superstructures and following the Pyu, who do not seem to have used this form on their temples, a current which runs through our periods where a stupa, either concave or convex in shape, rose from a temple's terraces. Thus both temple and stupa have a common symbolism and cosmology, each being *phaya*. They differ in function, for the gu is conceived of as a

cave-like house for an image before which daily rituals were performed, judging by the pictorial schemes on the interior walls. Sikhara was said to be taken from Hindu architecture; it was adapted at once to the general idea of the aspiration and to the individual genius of each significant temple. The architectural important of the Sikhara seems to lie in its beautiful transition from the square to the round, the form being the dominant shape of the lower masses of the building, the latter being the necessary from of the topmost terminal pagoda[27].

The features of the upper stupa are composition of conical spire and bell-shape dome and at the top of it is composed of spreading lotus petals (in Burmese *Kyar-lan*), inverted lotus petals (in Burmese *Kyar-hmauk*) and small lotus petals (in Burmese *Kyar-Nu*). In the religious buildings, these lotus petals are usually used as decorative elements and referred to as the birth of Buddha upon it. The corner stupas, the mini-stupas obelisks, or the corner pots (in Burmese *Kalasa* pot), which are used at each of the corners of the temple and placed above north, south and west foreparts are spread out on each of the descending terraces, in each of the cardinal directions. And it has lower terraces and upper terraces. In the lower terraces of the upper part, there are three terraces with projections that have corner stupas with corner turrets. In the whole form, each height of lower and upper terraces has an almost equal size. The terrace served a practical as well as a symbolic function; they acted as an open air gallery from which the pilgrim could view pictorial depictions of fundamental texts, usually *Jataka*, the 550 tales of Gotama, the last Buddha's former incarnation, each tale illustrating a major event in each of his 550 past lives. On each of the early period stupas' faces medial stairways cut through the terraces and lead to an upper platform from which the *anda*, either concavely or convexly-shaped superstructures, rises from an octagonal band set within the upper terrace. The *anda* itself was covered with stucco, with moulded lotus petals.

4.2.1.1. Significance of Pyu Period Architecture

The dimensions of length, width and height of the temples at Sri-Khti-Tra are nearly similar and the form of those temples is based on cube which is a static, recognizable form. The main form of Pyu Temples is composed with a cube on top which the receding terraces surmounted

[27] Min Thet Mon, 'Appreciation on The Reflections of Buddhism in Early Bagan Architecture (11th to 12th century)', M.Arch. Thesis, Yangon Technological University, 1998, P.42

by plain conical *Sikhara*. The building form of Pyu realized as a possible source of inspiration, though the style may have reached Beikthano through other intermediaries in South and East India and temple architecture was indebted to the elaboration of stupa structures. Not only do the rather simple cylindrical stupas at Beikthano represent an important stage in the local architectural experiments that made the lofty stupas of Sri-Khit-Tra, but also the heightened terraces and entrance terrace that distinguish the Beikthano stupas can be seen as the forerunners of the square temples of Sri-Khit-Tra, built to similar ground plan dimensions, with an entrance chamber and surmounted by large stupa on the roof.

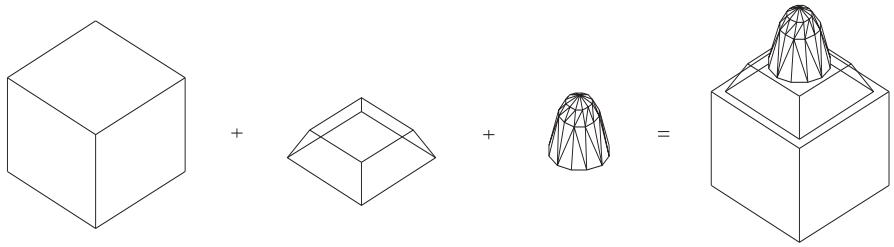


Fig 4.22: Form composition of the Pyu temples

Drawing Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch Thesis, Department of Architecture, Yangon Technological University, 2004, P.60

This kind of composition can be seen at the Bebe temple. This is composed of a small, nearly square sanctuary (shrine) and a forepart with a porch facing east. Above the hollow cubical form there are three receding terraces on which stands a plain cylindrical pinnacle with rounded top called '*Sikhara*'. There have the foreparts on exterior walls, except to the east, where two arched niches on each side wall, radiating arch at east entrance.

Fig 4.23: Bebe temple

Drawing Source: 1) Mya Mya Hnist, Khin Lin New, 2004, P.29

2) Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-made Landscape, Cambridge, 1990, P.210

Additionally, East-Zegu Temple, which is composed with not only the cube, but was also developed by projections and the vestibule and the porch. It is supposed that East Zegu temple is also the same as Bebe temple, but only this has an entrance porch and vestibule and it could be improved one in later period. But at East-Zegu temple and Lay-Myet-Hna temple only the cube is left, on which the receding terraces are placed.

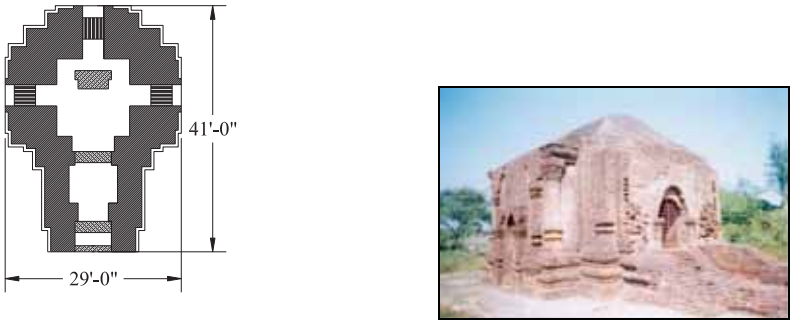


Fig 4.24: East-Zegu temple

Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Department of Architecture, Yangon Technological University, 2004, P.31

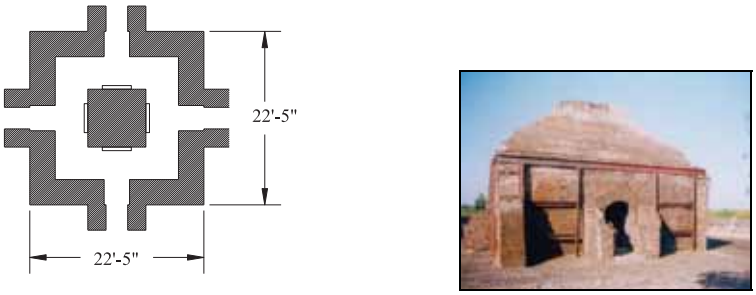


Fig 4.25: Lay-Myet-Hna temple

Source: Mya Mya Hnist, Khin Lin New, 2004, P.31

4.2.1.2. Significance of Bagan Period Architecture

When the form composition of Bagan temples are studied, the temples is composed with one-storeyed to four-storied structure on which the tiers of terraces crowned by not only square tower (*Sikhara*) but also bell shaped dome and ringed conical spire. The severity of the base is contrasted by the sumptuousness of the crenellated terraces and *Sikhara*. Square blocks strengthen the elevation at the corners; there may once have been crowned with copies of the central *Sikhara* motif or mini stupas, their outer faces are adorned with the *Sikhara* stupa from

in relief. Obelisk *kalasa* pots were placed on the terrace corners. Over the ambulatory vault two further terraces rise to meet the horizontal bands of mouldings incised into the dome, varying in width and shape, which work up in a crescendo to form the crowning Sikhara. At the medial points on the lower second of the shrine terraces are block-like upper shrines, detached from the base of the *Sikhara*.

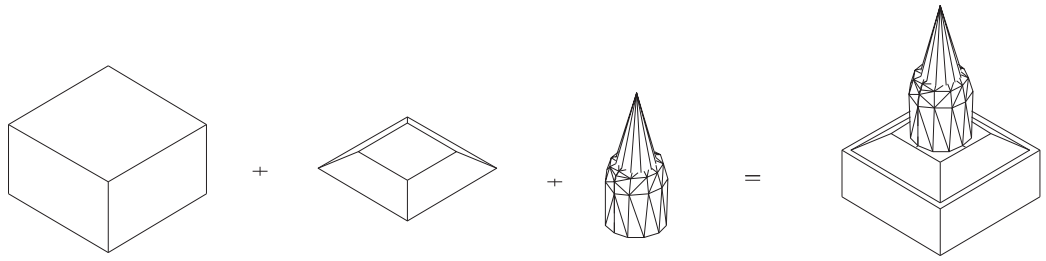


Fig 4.26: Form composition of the early Bagan temples

Drawing Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch Thesis, Department of Architecture, Yangon Technological University, 2004, P.66

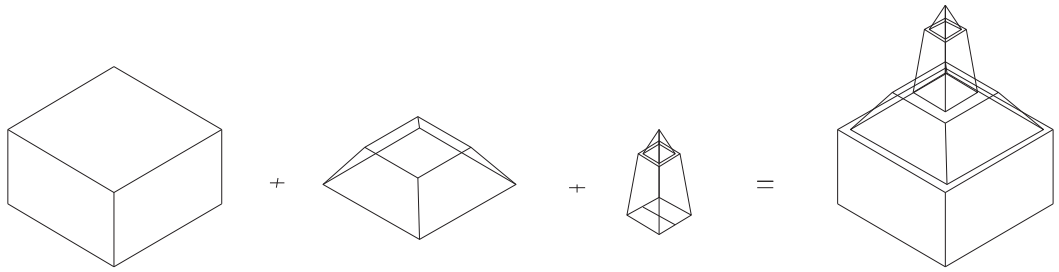


Fig 4.27: Form composition of the later Bagan temples

Drawing Source: Mya Mya Hnist, Khin Lin New, 2004, P-66

The temples in Bagan were found as the stupa type, square tower type, Sinhalese type and Mahabodi type. Stupa types of temples can be seen at many places in Bagan and square tower types are mostly found in the one to four-storied temples. It is composed of a bell-shaped dome, conical spires, lotus flowers and umbrella above square tower. Temples of the Sinhalese type are found in the single-storied temples. Some temples have round *Sikhara* found in Pa-Hto-Tha-Myar temple (1086 AD) as an example with its splendid onion shape may be derived from Indian architecture.[28] There was one pillar in the shrine as the load

[28] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.55

bearing element for the *Sikhara*, with the walls of the inner shrine substituting for the load bearing function of the pillar.

Fig 4.28: Ground floor plan and elevation of Pa-Hto-Tha-Myar temple

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

Photo Source: Author

Another composition of the temples, square tower types can be seen at That-Byin-Nyu temple (1144 AD), 200 ft. 3 in. (61 m) in high. In its exterior form it is a great play of cubes. The upper storey experiments culminate in the lifting of the main image and its sanctum from the ground level to an upper level. The plan is square based, with the hall extending towards the east from the base block. There are further entrance openings at the cardinal points, slightly projecting outwards, breaking the flat surface of the base wall. The ground level ambulatory is lit by windows, with the pediment super-imposed upon a five-tired Pyatthat. Above are three terraces, and at their corners, stupa obelisks rise from square based blocks with passages passing through them. The massive upper cube contrasts the close detailing of the terraces and openings are reduced to the minimum and there is scarcely any ornamentation other than double pediments over the arched entrance openings. And all this is surmounted by the extraordinary Sikhara, a square broad form that acts on the great play of masses beneath, like a pressure value holding down some powerful and energetic force. This dramatic play of forces and volumes, this comprehension of the energies inherent in the juxtaposition of architectural forms, seems unprecedented at Bagan. Its interior planning makes it one of the most unique and innovative of Bagan temples. In other temples, past and future, the stairway is usually relegated to a duct-like passage passing through the thickness of exterior walls. At this temple, the stair passage becomes a significant architectural feature in itself. Facing the main opening, in place of the usual sanctum and image, the stairs rise from the arch up to the 1st level or entresol. The purpose of the entresols was to reduce the mass of the main blocks.

To reach the first story, one thus passes above the 1st entresol onto the ground level hall terrace and up the broad exterior stair-bridge linking the ground floor hall with 1st floor hall. Here, the image is placed in a giant niche on the east face of the central block, looking out to the shrine-hall. The second entresol is directly above the shrine level ambulatory and is again no more than a mass reducing device. From here, further passages of steps climb up through the outer wall to the upper terraces.[29]

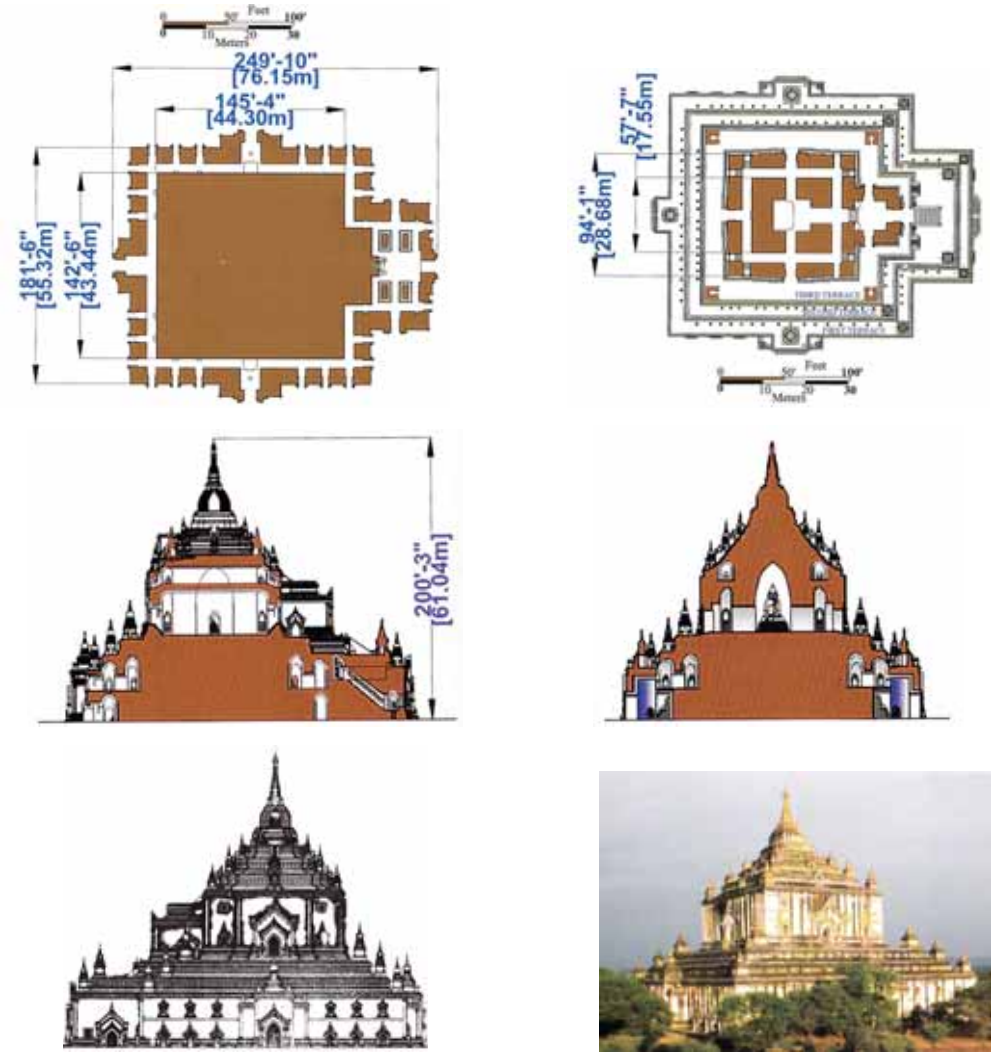


Fig 4.29: Ground floor plan, section and elevation of That-Byin-Nyu temple

Drawing Source: 1) Richard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

2) Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

Photo Source: Kyaw Lat, Dr, 2010

[29] Strachan,Paul, 'Pagan: Art & Architecture of Old Burma', 1996, P.84-85

Temples of the Mahabodhi type are rarely found in Bagan. The introduction of this type of Sikhara, perhaps initially here at the Mahabohdi, which, with its pyramidal shape, straight edges and flat planes, is a direct copy of the Bodh Gaya type, was to lead to this form's proliferation across the Bagan area. The temple's elevation is tall and narrow, its height emphasized by the four receding planes of the monumental pilasters, each topped by a stupa finial. The innermost front stupa is made of obelisks which are shortened versions of the main Sikhara. The *Sikhara* itself rests on an upper shrine, reached by stairs that pass up through the lower hall walls. This upper shrine's exterior is indented with panels, each bearing a figure of a Buddha. The multiplication of Buddha image, seated and touching the earth, in stucco, throughout and at all levels of the exterior is highly novel feature for Bagan temples exteriors.[30]

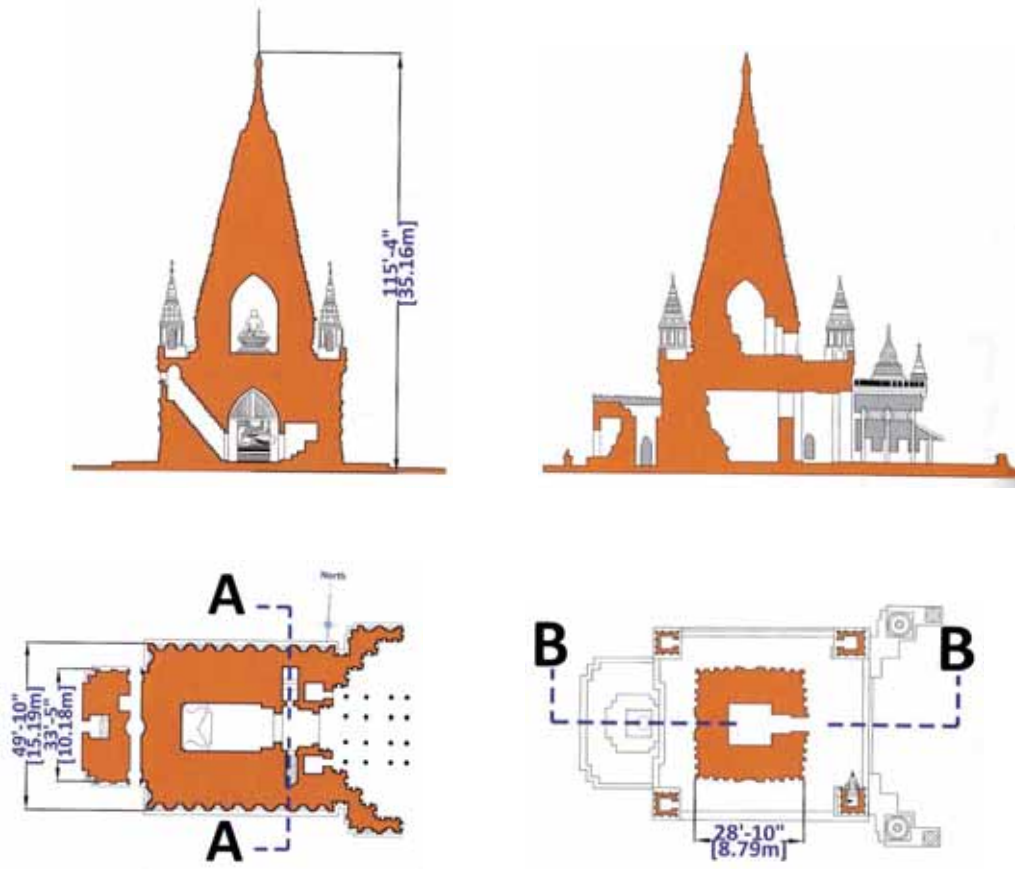


Fig 4.30: Ground floor plan, upper floor plan and cross section of Mahabohdi temple

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.144

[30] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.99-100

4.2.1.3. Significance of Mrauk-U Period Architecture

The forms of the temples in Mrauk-U are very simple with the main body and prototype style or conical shaped stupa surmounted on the centre of the roof and stupa with Hamika surmounted on the temples.[31] In the small temples, there are cubic main bodies and conical shaped stupas are surmounted on the roof like hemispheric dome and four conical shaped corner stupas are surmounted on the main body. In the large temples, stupas with Hamika are surmounted on the roof. It was composed of the main body or shrine with a square base (sometimes octagonal base) and four proceeding vaulted porches at each cardinal points.

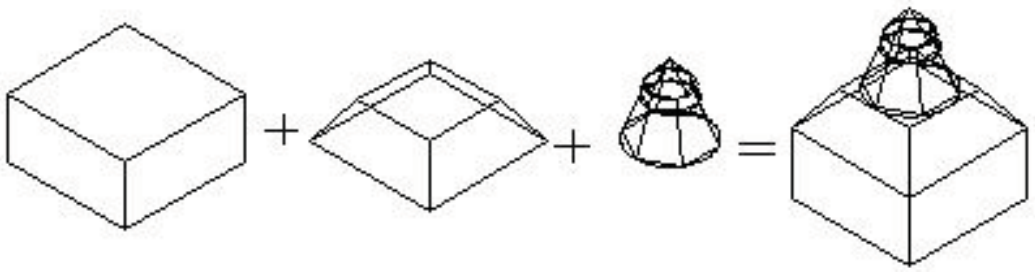


Fig 4.31: Form composition of the Mrauk-U temples

Drawing Source: Author

In the large temples in Mrauk-U, there are small stupas around the main temple. This kind of composition can be seen in the Shit-Thaung temple, Koe-Thaung temple and Andaw-Thein temple. The Koe-Thaung temple is square in plan, measuring about seventy-seven meters on each side. The outer body of the shrine is composed of five receding terraces each ornamented with small stupas, originally 108 in all. Its central image was approached via a two-tiered stairway on the east side. The first tier reaches a wide open platform from which two ambulatory passages, similar in concept to those of the Shit-Thaung, can be entered. The second tier of the entrance stairway leads to an upper platform having at its center a large stone Buddha image seated on an ornate throne. Behind this image is an octagonal brick stupa which would have contained the holy relics enshrined when the temple was built. It is Buddhist practice to worship the Buddha by walking around the central image of his shrine three times, at all times keeping the image to the right. At Koe-Thaung, this ritual

[31] Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Department of Architecture, Mandalay Technological University, 2008, P.162

circumambulation would therefore take place around the inner and outer passages and then the image itself in the center of the upper platform. The terraces were covered with tiles glazed in the Middle Eastern manner common to shrines from the time of Min Bin's conquest of Bengal. Originally a terracotta-tiled roof supported with massive wooden pillars covered the interior. Wide holes left by the pillars after they rotted away, are found at the exterior corners of each of the terraces and on either side of the entrance stairway. Until today no other shrines covered by terracotta-tiled roofs have been found in Arakan. Tiled roofs were known in earlier in Srilanka, and also at Bagan and Sukhothai. While the shape of the roof is difficult to determine on the present evidence, it is possible that the small stupas on the terraces reflect the form of the shrine as a whole.[32]

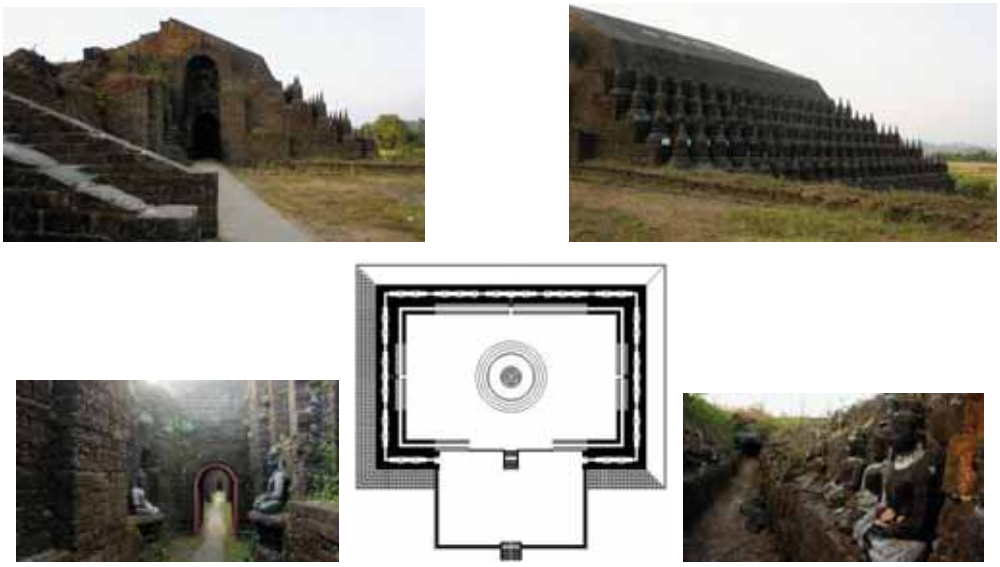


Fig 3.32: Koe-Thaung temple - 1553 AD

Drawing Source: Measured drawing by Department of Architecture, Yangon Technological University

Photo Source: www.panoramio.com

In Andaw-Thein Temple, the main shrine is crowned by a bell-shaped stupa, its dome segmented in the manner early period temples, but surmounted by a ringed conical spire with a lotus-shaped finial. Around this at each corner are another eight stupas of identical shape, the roof again recalling the multi-domed architecture pre-Mughal Bengal.[33] The central stupa and eight small corner stupas are surmounted on the roof of the octagonal shrine or the main

[32] Pamela Gutman, 'Burma's Lost Kingdoms: Splendours of Arakan', 2001, P.106-112

[33] Pamela Gutman, 2001, P.114

body. The temple is surrounded by 16 stupas on the platform. The stupa on the roof and stupas on the platform are the same form.

Fig 4.33: Andaw-Thein temple in Mrauk-U

Drawing Source: Measured drawing by Department of Architecture, Yangon Technological University

Photo source: Pamela Gutman, 'Burma's Lost Kingdoms: Splendours of Arakan', 2001, P.112

4.3. Study of the Decorative Elements

Originally the stupas and temples exteriors were covered in protective plaster, whitewashed with a lime-based coating, and the stucco ornament was enlivened with bright colours. The significance of the enshrinement was that the relics and valuable images, the actual *phaya*, emanated a force out from the central mass and further images were placed in recess on the outer sides of the central block, usually made of brick and stucco.

4.3.1. Meaning of Architectural Components and Aesthetic Achievements

The decorative elements are divided into two parts: exterior decoration; stucco, pediments, friezes and corner pots (in Burmese *Kalasa* pots) and interior decoration and mural paintings. Traditionally Myanmar's brick pagodas and temples have been embellished by a covering of gleaming white stucco with ornamentation by stucco in relief. The arch-facade, the flame arch-pediment which adorns the tops of doors and windows, is the most prominent architectural feature of the temple. The corner pot (*Kalasa* pot), which has flowers over-flowing from the upper rim, over its arching body there are pediments which are also covered with floral designs which decorate the four corners on the upper terrace of the stupa. The most striking feature of the exterior ornament is the flame arch-pediment, especially its upper part,

the pediment or fronton, which encloses either singly, doubly or trebly almost every door, archway and window of the temples. The flame arch-pediments above and around all the door ways and windows curl upon the contour of the arch below, narrow and flatten against the wall as they rise. The windows of the temple are each dressed with the same pattern on a smaller scale. At the apex of the pediments the tongues usually break free altogether from the wall-faces, and in the porches, at least, tower far upwards into space. Pediments are also looking over the forepart and porch. Textures with symbolic designs are inscribed depending on their beliefs with various designs. The size and shape of the pediment mainly depends on the size and height of the buildings. In large multi-storeyed temples, the pediment forms a double layer pediment in order to maintain the scale and proportion of the buildings. Some scholars and historians believe that the original form of the pediment came from a mark of Pyu coin inscription called "Sirivatsa" which means "the holy house"; its profile and shape resemble the shape of the pediments.[34] Some also believed that the origin of flame pediment derived from the palm leaf convention in a timber bargeboard and the scroll ornament below the palm leaf or flame derived from the symbols of Buddhism and formed the shield of the Trident.[35]

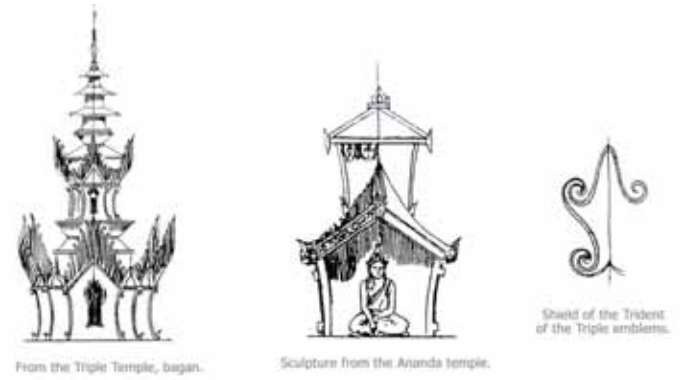


Fig 4.34: Origin of flame pediment

Drawing Source: Thant Zaw, 'Utilization of Myanmar Traditional Motif and Decoration in Modern Building Design', M.Arch. Thesis, Hlaing Thar Yar Technological University, Yangon, 2005, P.41

[34] The literature is based on the version of this group of scholars;
- Thant Zaw, 'Utilization of Myanmar Traditional Motif and Decoration in Modern Building Design', M.Arch. Thesis, Hlaing Thar Yar Technological University, Yangon, 2005, P.43
- Min Thet Mon, 'Appreciation on The Reflections of Buddhism in Early Bagan Architecture (11th to 12th century)', M.Arch. Thesis, Yangon Technological University, 1998, P.53

[35] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989

These types of pediments are also called flame pediments which consist of Banana Chute (in Burmese *Nga-Pyaw-Phu*), Yama forefingers (*Yama-Latt-Nyo*), and Lotus Pedals (*Kyar-Nyat*). The component of the pediment of *Yama-Latt-Nyo*, the two pillars, the *Kyae-Kwe*, the *Sainh-Paung*, has a brick core which is ornamented with stucco relief. Many of these, especially repetitive motifs are molded.

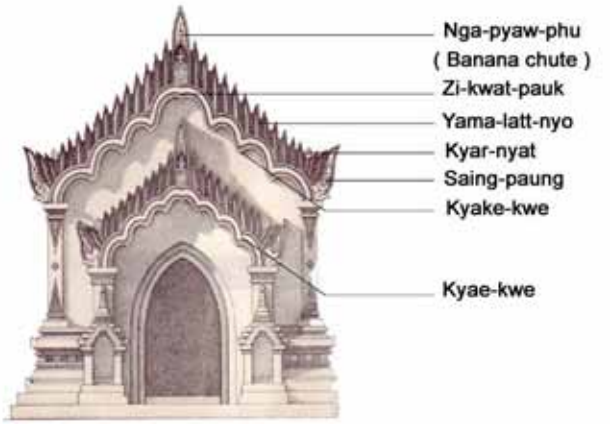


Fig 4.35: A double-layer pediment of Bagan temple

Drawing Source: Drawing Source: Thant Zaw, 'Utilization of Myanmar Traditional Motif and Decoration in Modern Building Design', M.Arch. Thesis, Hlaing Thar Yar Technological University, Yangon, 2005, P.39

4.3.1.1. Significance of Pyu Period Architecture

Other exterior or interior ornaments were not found as decorative elements in Sri-Khit-Tra, but the Buddha images flanked by a stupa or disciple on each side expressed by a sculpture stone slab are used inside the shrine. One example is the Bebe temple that incorporates a huge stone panel containing three seated figures with an effaced Pyu inscription at the bottom. The lower left hand of the Buddha, rather than the usual right, is difficult to explain. This large panel was once the centre slab of a triad, a configuration found only at Sri-Khit-Tra. This sculpted slab was considered sacred by later people who built a temple to encase it. The Bebe has been restored so often that it is hard to reconstruct its original exterior appearance. Another later temple containing Pyu sculpture is the Lay-Myet-Hna temple, where three Pyu panels were placed around its central core centuries after the monument was built in the Bagan period or later. It has a central square pillar against each side of which was originally placed a stone slab bearing a seated Buddha Image flanked by stupa on each side. In Yahanda

temples, the eight seated Buddha Images bearing from stone slabs rest on the interior south wall.

Fig 4.36: The seated Buddha images inside Bebe, Lay-Myet-Hna and Yahanda temple

Photo Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Yangon Technological University, 2004, P.26-34

4.3.1.2. Significance of Bagan Period Architecture

In the large temples in Bagan, they have a base with a recessed form and decorated with glazed elements at the base with lotus flowers. There are four entrances in which the east or main entrance was a flaming arch-pediment with two layers and other three entrances were flaming arch- pediments. And then there are secondary porches and windows which also have flaming arch-pediments and crowning with square tower. The pediments form a double layer, which is a normal size pediment backed by a large pediment of various designs (sometimes a miniature stupa shape and others, a *Pyatthat* shape and also a miniature temple with *Sikhara*). This type of pediments was also used in window opening which gives an effect of reinforcing the front small and weak flaming pediment, to become a strong and forceful ones. In the early temple of Bagan which consists a dark central shrine, a corridor is lit by perforated stone windows. These perforated windows are set in frames of pilasters on which rest bold arch-pediments (sometime a *Kalasa* pot was set in this place), the sand stone carving of the perforated window, a variety of shapes of small opening, slightly sloping outwards, can be seen (heart shape, circular shape, square shape, diamond shape, cross shape, etc.). And also detail ornament was embellished around this various shape opening. At the windows of Pitikat-Tike building from Bagan, a carved lion figure was set between this opening and the window border was set with floral and bass line of relief.

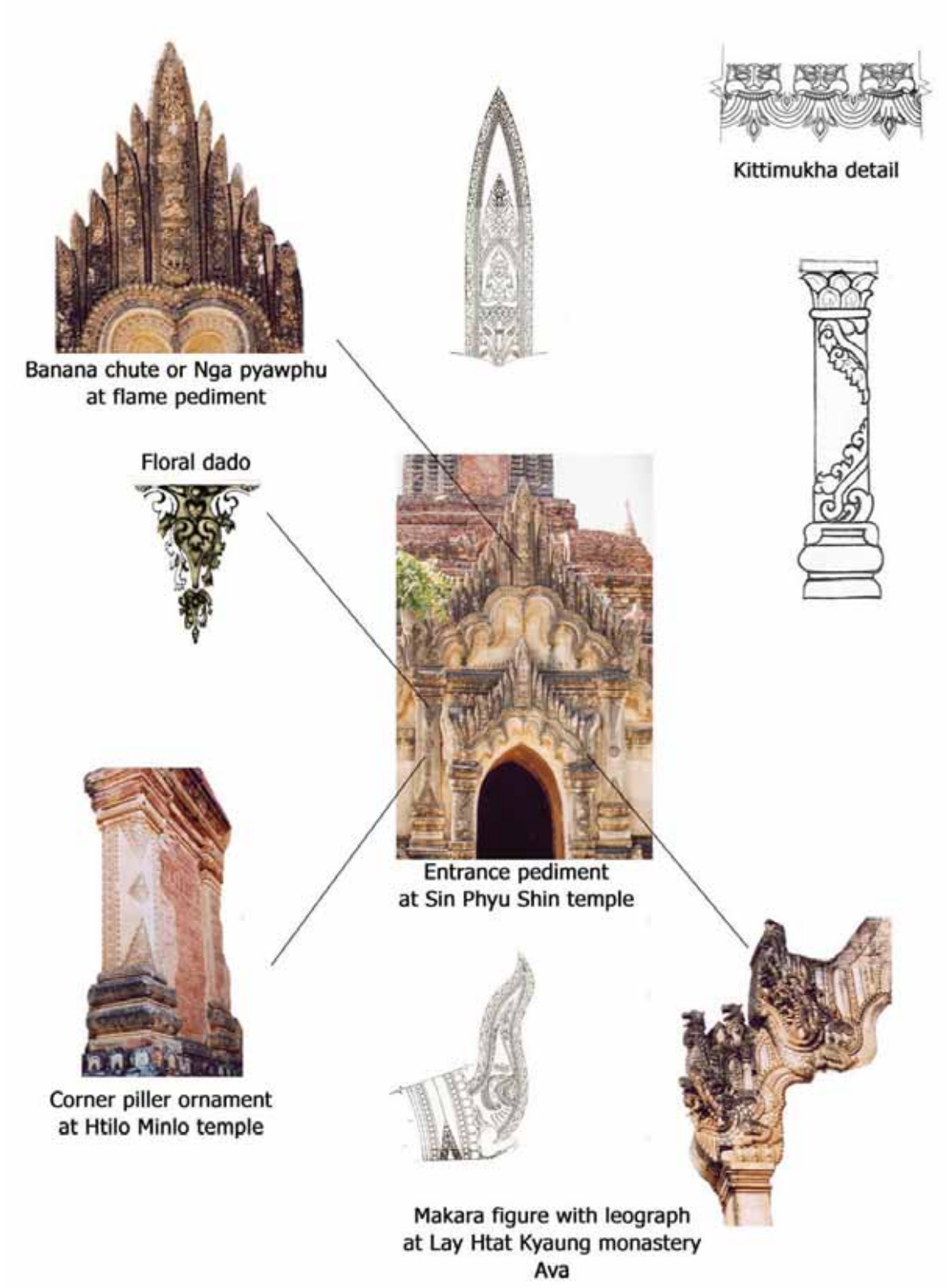


Fig 4.37: Some decorative elements of a double-layer pediment

Drawing Source: Drawing Source: Thant Zaw, 'Utilization of Myanmar Traditional Motif and Decoration in Modern Building Design', M.Arch. Thesis, Hlaing Thar Yar Technological University, Yangon, 2005, P.40

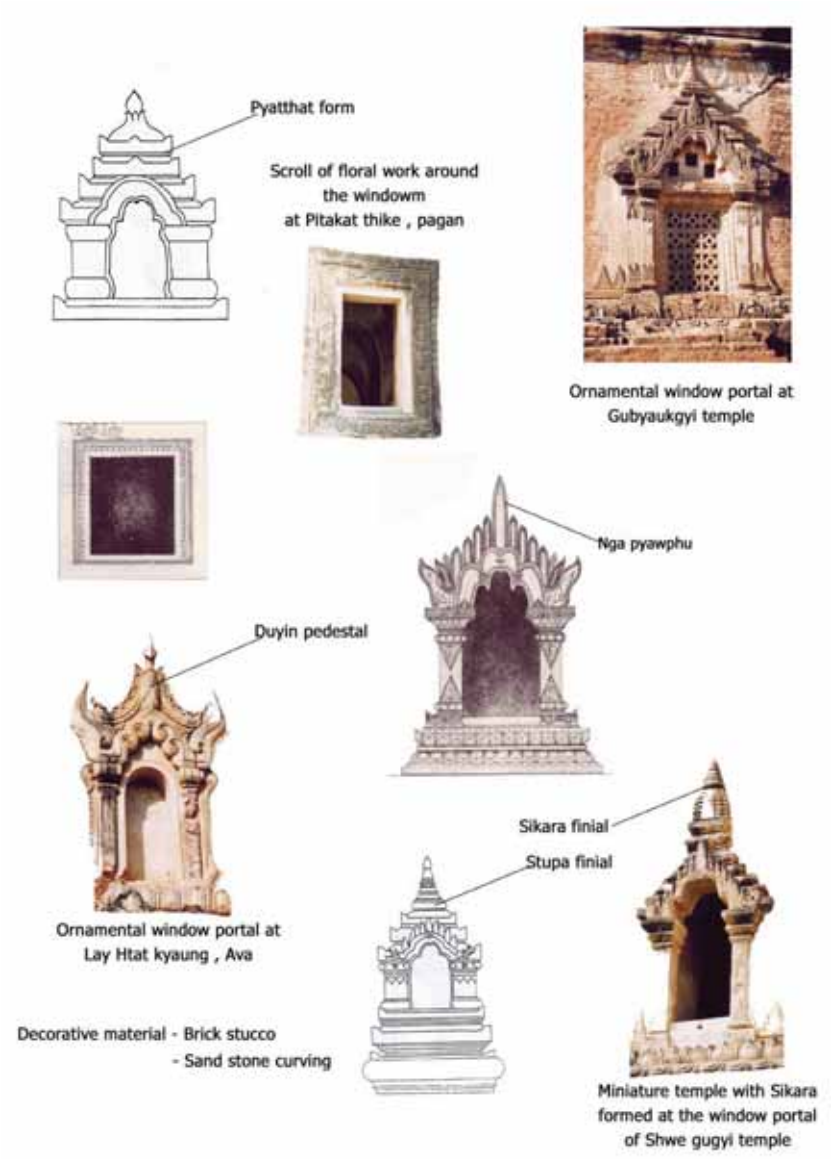


Fig 4.38: Types of window pediment in Bagan temple

Drawing Source: Drawing Source: Thant Zaw, 'Utilization of Myanmar Traditional Motif and Decoration in Modern Building Design', M.Arch. Thesis, Hlaing Thar Yar Technological University, Yangon, 2005, P.43

In some temples, it was placed as a decorative feature around the corner stupas, which can be seen at Pa-Hto-Tha-Mya temple. The lowest base portion is combined to form a profile of a *Kalasa* pot and above this the blooming lotus (in Burmese *Kyar-Ohn*) was placed on which the temple emerged. In other types of temples, an ornament which was sometimes decorated with ceramic plaques (in Burmese *Man-Kwet*) was placed and the profile of their composition forms a throne-like shape. According to the decorative features and position of the ornamentation, most of the scholars point out that there are two types of Bagan temples which

represent the symbolic meaning of Throne, Lotus, Pagoda and *Kalasa* pot. The first type is the temple which is represented by placing a lotus flower on a *Kalasa* pot and the pagoda emerged from the lotus. The second is by placing the lotus flower on the throne and the pagoda forms above the throne.

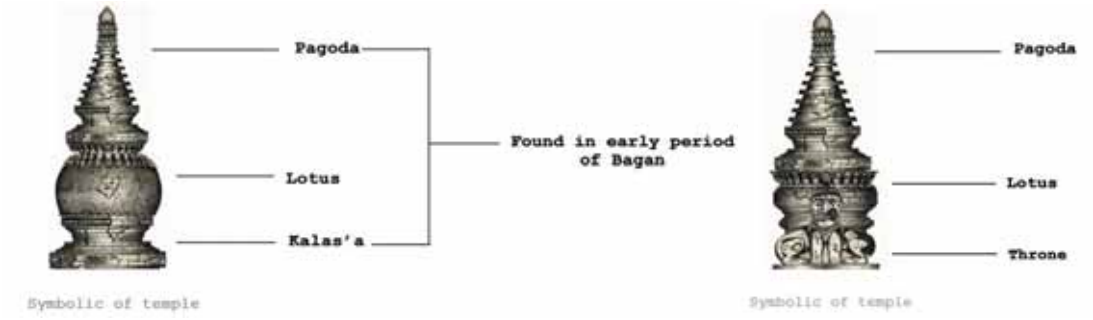


Fig 4.39: Symbolic meaning of throne, lotus, *kalasa* pot and pagoda

Drawing Source: Drawing Source: Thant Zaw, 'Utilization of Myanmar Traditional Motif and Decoration in Modern Building Design', M.Arch. Thesis, Hlaing Thar Yar Technological University, Yangon, 2005, P.37

In general, the decorative elements such as the blooming lotus (*Kyar-Ohn*), *Khin-Meik-Toe*, ovolo moulding (*Hpone-Lone-Dan*), ogre frieze (*Balu-Pan-Swel*), dado (*Pan-Htaung*), *Pa-Yone-Done* are common and decorate most of the temples in Bagan.

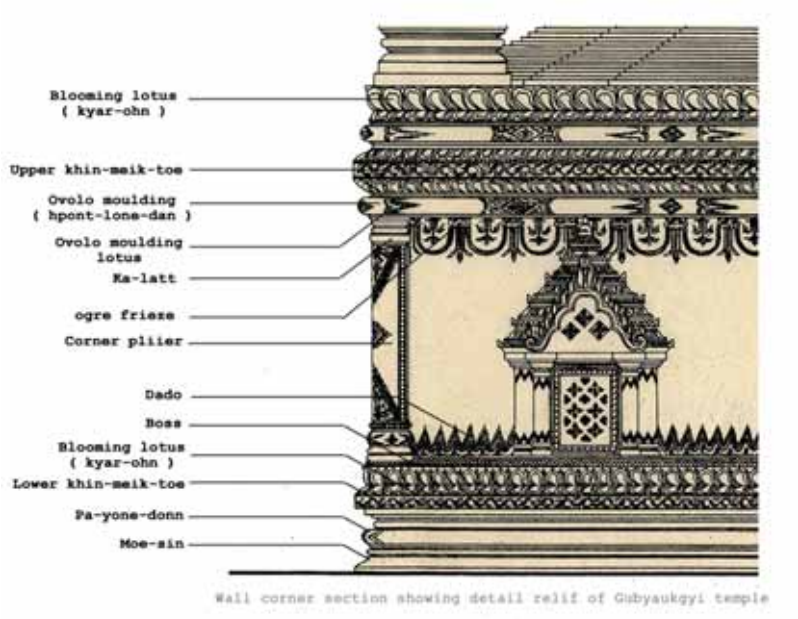


Fig 4.40: Some decorative elements of Bagan temple

Drawing Source: Thant Zaw, P.38

In most of the temple, a row of square shaped *Sein-Dann* masonry ornaments can be seen above the Upper-Chin-Meik-Toe and sometimes formed a low protective fence around the monastic architecture, called *"Sein-Daung"*. There are three basic types of masonry *Sein-Daung* ornaments which have been classified according to shape; a pointed saw-tooth example is referred to as *Sein-Chun*, while one that is rounder in form is called *Sein-Wong*. A bald or more oval example is called *Sein-Gadon*. Most of Bagan temples use *Sein-Gadon* shape and called them *"Sein-Dann"* ornaments, which is usually not ornamentation but sometimes is decorated with Brahman figures and ceramic plaques which can be seen at Nat-Gyi temple, Bagan. The *Sein-Daung* ornaments are always decorated with crispy modeled floral, vegetal and ogre forms in relief.

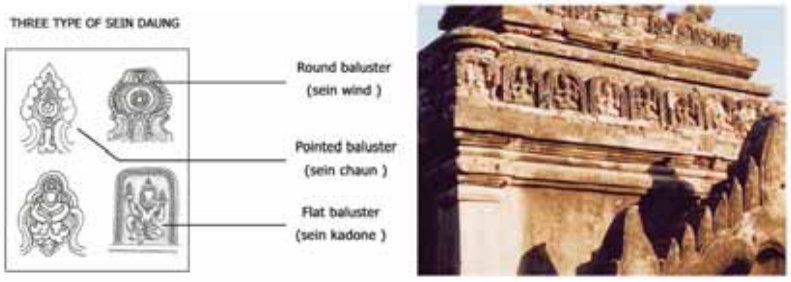


Fig 4.41: *Sein-Daung* ornaments of Bagan period

Drawing Source: Drawing Source: Thant Zaw, 'Utilization of Myanmar Traditional Motif and Decoration in Modern Building Design', M.Arch. Thesis, Hlaing Thar Yar Technological University, Yangon, 2005, P.47

Ogres as guardian figures were a favorite theme in decorative architectural elements; they appear in friezes on classical Bagan period edifices as heads disgorging bands of pearls which enclose floral pendants. They are usually formed under the upper Chin-Meik-Toe of temples and as a belt around the bell shape of stupas. The ogre is as a work of art is an admirable thing which is fearsome and at the same time graceful.

Fig 4.42: Ogre friezes of pagoda and temple in Bagan

Drawing Source: Thant Zaw, 2005, P.48

Fig 4.43: Types of tracery windows in Bagan temple

Drawing Source: Drawing Source: Thant Zaw, 'Utilization of Myanmar Traditional Motif and Decoration in Modern Building Design', M.Arch. Thesis, Hlaing Thar Yar Technological University, Yangon, 2005, P.44

The function of this perforated window was presumed to limit the outside bright light coming into the building and formed some sort of restriction in visual and spiritual relation to the outside world. Limiting the outside light gives an effect of stillness, meditation and self containment. The slightly sloping outwards side of the small opening were presumed mainly for protection of rain water. One scholar[36] noted that "…some form of this opening was represents some meaning, like a circular shape was surrounded by four Banyan tree leaves, represents the "enlightenment of the Buddha" and a circular shape was surrounded by four wheel supports-like shape represents the "Dama-Satkya" (The first Sermon of the Buddha)…".

Fig 4.44: Symbolic meaning of opening in tracery window

Drawing Source: Drawing Source: Thant Zaw, 2005, P.45

Other interesting features of the temples are the numerous green-glazed terracotta tiles ornamenting the base and the receding terraces which represent the Jataka stories. In Ananda temple, the upper four terraces were decorated with 389 scenes illustrating the last ten great

[36] Min-Bu Aung Kyaing , 'Architectural Work Of Bagan', 1997

Jatakas. The lower terraces of each Jataka are represented by only one scene. This vast collection of plaques on a single building is, so far as ascertained, unique in the whole of the Buddhist world. From an aesthetic point of view, the placement of simple set ceramic plaque between two complex rows of molding formed visual contrast.

Fig 4.45: Glazed terracotta tiles at a receding terrace in Bagan temple

Drawing Source: Drawing Source: Thant Zaw, 'Utilization of Myanmar Traditional Motif and Decoration in Modern Building Design', M.Arch. Thesis, Hlaing Thar Yar Technological University, Yangon, 2005, P.46

Most of the surviving pieced of art in Bagan are mural paintings. The color palette in Bagan paintings contains black, dark, red, light red, deep cream, light cream, yellow and white, and in later Bagan art, green and blue are used more frequently. Although the word 'frescos' is used most literature on Bagan murals, scholars found out that these were painted after the plaster dried and therefore the murals in Bagan are technically not 'frescos'. As to the painting styles, according to some scholars, Bagan painting had a West Indian influence in the 10th or 11th centuries, and in later periods after the 13th century.[37]

Fig 4.46: The fresco wall painting inside Gu-Byauk-Gyi temple, Bagan

Photo Source: Pierre, Pichard, 'Inventory of Monuments at Bagan'

[37] The literature is based on the version of this group of schoalas;

- Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.76-77
- Aung Thaw, U, Excavations at Beikthano, 1968, P.91

The painting was done the whole width of the temple's interior or the part of it which used the floral scrolling in various sizes and styles; it mostly was painted with illustrations of the life of the Buddha, and the composition of the painting is found to be systematic and graceful. In the fresco wall painting inside the temple, the wall is plastered, frescoed and polished so that their structure is completely hidden. The brickwork has not been allowed to distract attention from the shrine itself. The artists painted the interior shrine wall with same color and same grid and pattern, which holds all sides of the wall together. There is beautiful interplay between the dim illumination and the intense color of the central shrine hall. Pure colors become richer and more saturated when seen in half-light. The use of intense bright hues in primary colors would not be half so effective in brilliant sunlight. But here, where the architect has consciously employed contrasting lighting effects by using tracery windows to control outside bright light, it is very effective. Beside, the colors also make a fascinating background for the central Buddha images.

Fig 4.47: The fresco wall painting Law-Ka-Hteik-Pan temple and Hpaya-Thonzu temple

Photo Source: Author

Fig 4.48: The fresco wall painting inside the Gu-Byauk-Gyi temple, Bagan

Photo Source: Drawing Source: Thant Zaw, 'Utilization of Myanmar Traditional Motif and Decoration in Modern Building Design', M.Arch. Thesis, Hlaing Thar Yar Technological University, Yangon, 2005, P.117

4.3.1.3. Significance of Mrauk-U Period Architecture

The image of the Lord Buddha art of stone sculpture is the primary sculpture found in Mrauk-U era, in which they were carved out of only one stone. The Buddha's life stories are sculptured in stone. The art of making decorative work in relief in stucco in the Mrauk-U period is found by studying the inscribed stucco. In the Mrauk-U period, the techniques of enameling were advanced by a new invention. These colorful enamel stone slabs with the grand designs of animals and flowers are mostly used in stupas. There are Buddha images sitting in posture on the altars in the shrine which were constructed with stone and carved in many kinds of designs. The stone carvings are used for decoration. From the images of the Buddha and his life stories, mankind, the animal world and the world of the deities are depicted in carving. They were found at the walls of the temples, the thrones of the Buddha, the archways, the ornamental backdrop of a throne. The figures, the flowers and the rinse that brought in from stone carving were painted in multi-colour.

Fig 4.49: Buddha images at Koe-Thaung temple

Photo Source: Pamela Gutman, 'Burma's Lost Kingdoms: Splendours of Arakan', 200, P.108-109

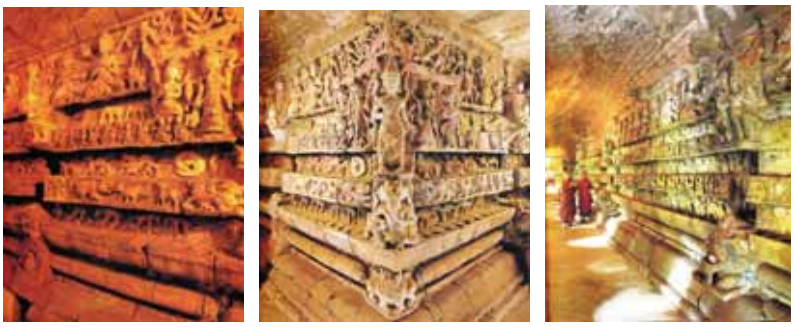


Fig 4.50: Relief sculptures at the corner and on the sides of walling at Shit-Thaung temple

Photo Source: Pamela Gutman, 2001, P.101-105

4.4.Study of the Physical Aspects

4.4.1. Axis and Orientation

The temples were constructed on two axes, the major axis XX and the minor axis YY, which are on the horizontal plane, and the vertical axis ZZ in the third direction.

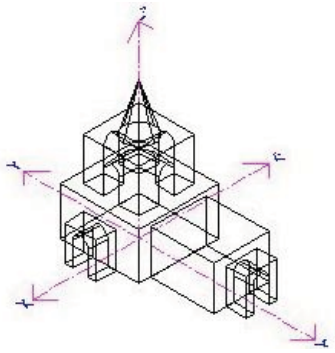


Fig 4.51: Formation of axes in temple

Drawing Source: Nay Thu Win, Thet Thet Mon, Nan Saw Htet Htet Lin, 'Study on the Architecture of small temples in Bagan Period', M.Arch. Thesis, Yangon Technological University, 2004, P.53

4.4.1.1. Significance of Pyu Period Architecture

The temples in the Pyu period face one direction to the east; however, later the vestibule in the plan shape seen in Bebe and East-Zegu temples was developed, though there was some exception to the north and west direction in the Yahanda temple. But in the later period, it developed to the four faces at the four directions seen in Lay-Myet-Hna temple which is a prototype of Bagan temples.

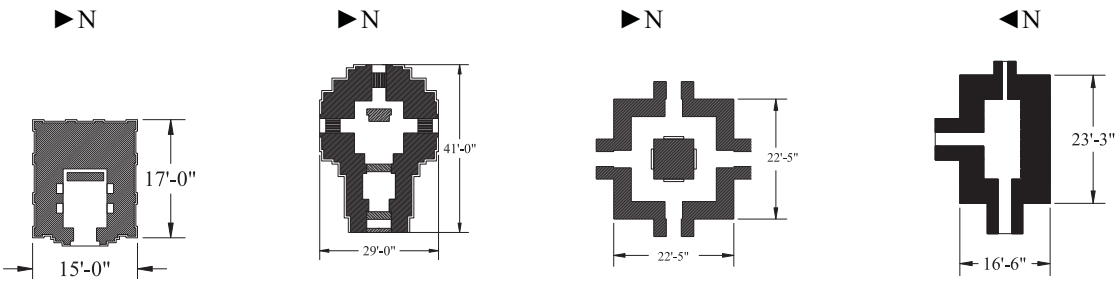


Fig 4.52: Bebe, East-Zegu, Lay-Myet-Hna and Yahanda temple in Sri-Khit-Tra

Drawing Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Yangon Technological University, 2004

4.4.1.2. Significance of Bagan Period Architecture

The spaces mainly develop along the major axis XX and the stories or multiple floors developed along the ZZ axis from the ground up. The main axis of the temple was aligned on an east-west direction as a result, with the Buddha image facing to the east, although there are some exceptions. Most are facing to the north or south but some are facing to the four faces according to the planned shape development in the large temples. The Early period temples are composed of two units, the hall and the shrine, which are usually oriented in an east or north-facing direction, though there are some exceptions. The central shrine, entrance hall, narrow corridor and porch are all arranged in a linear composition along that XX axis, which can be called the main axis. Concerning the buildings with one side orientation, or with one entrance, different positions are found and not necessarily towards east and south. There are quite a variety of orientations; however, the majority of the monuments face east.

4.4.1.3. Significance of Mrauk-U Period Architecture

As is the case with most other temples at Mrauk-U, it is oriented to the east, and its central image faces that direction. In the great temples in Mrauk-U, the space developed along both XX and YY directions as the space mainly developed along major axis XX. The main axis of the temple aligned on an east-west direction perpendicular to the common walls between the shrine and inner corridor. The Buddha image in the central shrine is kept facing to the east. The plan is symmetrical along the main axis in an east-west direction. In the temples in Mrauk-U, there are no stories or multiple floors developed along the vertical axis ZZ from the ground. The space is developed along the horizontal axis rather than the vertical axis.

4.4.2. Construction Materials and Structural Systems

The favorite material for Burmese architecture is brick, covered by stucco, which is decorated by carving into it and adding terracotta plaques. Covering the brick with stucco created the appearance of stone construction, giving Burmese temples the look of massive Indian stone temples. Thus, the larger temples at Bagan, such as the Ananda, and the multi-tiered Pitakat Taik library, have the heavy, horizontal emphasis of Indian shrines. Only when viewed

closely do the Burmese surface decoration, the finials and acroteria, and ultimately the brick and stucco decoration become visible. In this regard, Burmese architecture differs from that most of South-East Asia, where wooden styles generally continued to be followed despite the shift to more permanent materials.[38]

4.4.2.1. Significance of Pyu Period Architecture

In Sri-Khit-Tra there are a few temples that can be called the prototypes of Bagan temples, namely East-Zegu and Lay-Myat-Hna temple. These are simple brick structures built of true scientific vaults and from the aspects of design and structural system they are the same as the Bagan temples in the basics. These temples with true scientific vaults were from a later period in Sri-Khit-Tra, and there are a few structures that can be identified as at the beginning stage, experiments to search for a means to cover the inner spaces before reaching the level to buildvaults. The structural system applied in Sri-Khit-Tra, the cloister vault and the arch at the entrance is probably one of the first using these technologies in Myanmar.[39] The voussoir arches are used at the east entrance and interior niches, and the cloister vault is used above the central shrine, entrance porch and vestibule; therefore, it could be an improved one in a later period. The corbelled arch is used at three entrances and the corbelled vault is used inside the temple.

In a very small temple called Yahanda temple the corbelled vaults were used as in India. Later on, people discovered the technique of making true vaults and constructed two temple types; the first type was a simple single shrine temple covered with cross vault and the second type was with a pillar inside forming a passage in the shrine. These two types became the basic prototypes of Bagan temples; all Bagan temples evolved from these two systems, only the sizes became larger and some design innovations were developed after about 10th century.[40] In the later periods of Srikshetra and in Bagan, scientific arches and vaults were mostly applied though in early periods in Pyu were not seen. After the Bagan period, some of the structures

[38] Robert E.Fisher, 'Buddhist Art and Architecture', Thames and Hudson world of art, Singapore, 1993, P.185
[39] Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Yangon Technological University, 2004, P.29
[40] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.22

were constructed with the technique of corbelled arch. It seems that this Yahanda temple is one of the first temples built with this technique in Srikshetra. Each entrance uses radiating arches and the interior corridor roof with a barrel vault which is now supported by R.C. beam and column, and exterior structure is also supported by a steel frame. In Sri-Khit-Tra, such temples with brick walls and timber roofs were constructed at the beginning, but later in about 7th century, temples only with bricks using true scientific vaults to cover the inner spaces were constructed. The structural system applied here with a central column and vaulting to the four exterior walls is the first ever seen in Myanmar and the only example in the Pyu period. In the later Bagan period, quite a number of temples were constructed with this system, including the most famous Ananda Temple donated by King Kyansittha in 12th century A.D.

4.4.2.2. Significance of Bagan Period Architecture

The main construction materials are bricks but natural stones are also used as corner stones, or as bonding elements or floor materials. Sandstone cut as slabs to use as perforated windows or as water overflow gutters on the roofs are quite common. There are a few temples using natural stones as cladding materials or built with only stones. Therefore almost all other structures were built of bricks and natural stones were used for specialized usage at the corner of the temples. The fundamental of arching and vaulting technology was developed in Sri-Khit-Tra and transferred to Bagan. In Bagan, this was developed further, firstly by developing different kinds of vaults and secondly applying them at different places. In the beginning stage, vaults were spanned only from wall to wall, or from wall to column, and at later stages, they were from used from column to column and often even used to construct stairs, light-wells, etc. There were only two kinds of vaults used in Sri-Khit-tra, a tunnel vault (barrel vault) and a cross vault (groin vault). Further developments in Bagan were:

1) Lean-to vaults or stability vaults
2) Flat vaults
3) Cupola vaults (domes) and
4) Multi-layer vaults.

A lean-to vault is principally the same as the “buttresses” used in European churches normally to support and stabilize the exterior walls from outside and European examples are normally

short arches. Most types of vaults used in Europe are found in Bagan except the ribbed vaults of Gothic cathedrals, and the cupolas found in Bagan had only small spans. The reasons why the builders in Bagan had not discovered the principle of ribbed vaults is perhaps that there was "no requirement to have very high ceilings". A cathedral is an assembly hall, where hundreds of people gather and come to prayer meetings and sing together; to have proper acoustic quality was also important in addition to the impressiveness of a church being a holy place.[41] In the case of Bagan temples, it seems that the builders wanted lower ceiling heights for the inner spaces suitable to human dimensions and yet the outward volume should be large and high to leave an outstanding impression of being a building of importance. For that reason, the builders in Bagan introduced multi-layer vaults, which are layers of vaults with gaps between the lower and the upper vaults; the intention is aesthetically to reduce the ceiling heights and technically also to reduce weight acting on the vaults.

In addition to this type of multi-layer vault described, there is another type of multi-layer vault found in Bagan, but constructed with a different purpose. That is when two or three layers of vaults are touching each other, and this type of vault is for practicality in the construction process. The reason behind this is that a vault must be thick enough to stand the weight resting on it. The heavier the load is, the thicker the vault must be, but it is technologically easier to construct one layer after another than start with a thick and heavy vault; the condition here is that the layers must act as one structural element; therefore, they must really be bonded to each other and act as one unified piece, otherwise the vault would yield. For this reason, stone imposts were used; imposts are wedge-shaped pieces which function to connect two elements, so that these elements act together as one structural element, and normally these are placed at the points where the arch and the column meets or at the position of the key stone where the arches bear heavy loads.[42] These are also some varieties of vaults found in Bagan temples:

A) Vaults with semi-circular arches
B) Vaults with half-arch leaning on the central pillar
C) Vaults with radiating arch or Gothic arch.

[41] Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.41
[42] Kyaw Lat, 2009, P.41-42

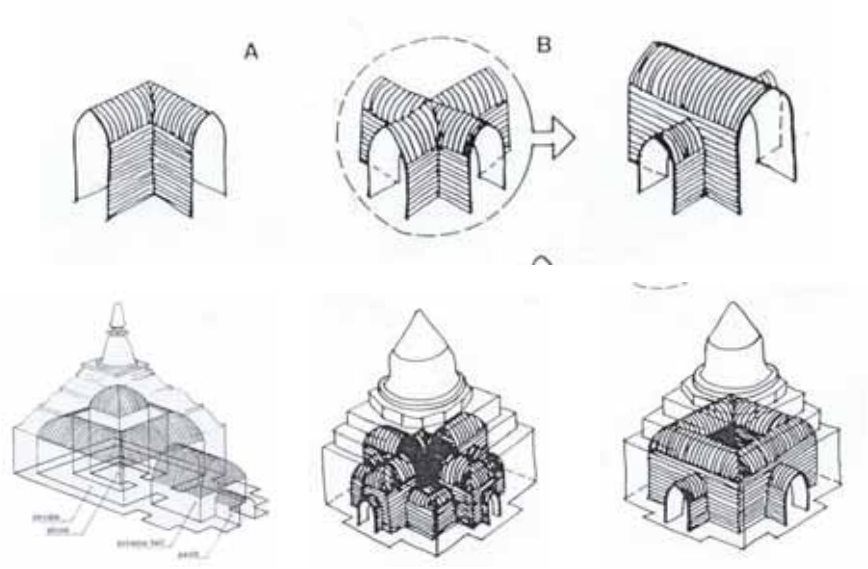


Fig 4.53: Examples of arches and vaults in Bagan temples

Drawing Source: Measured drawing by Department of Architecture, Yangon Technological University

4.4.2.3. Significance of Mrauk-U Period Architecture

Sandstone is the important material to build the important sacred structures. The sandstone is local material along the sea coast. They were cut into the same size to fit each other and constructed with cement. Some stone stupas were built by stone for their exterior structure and built by brick for their interior structure. The stone sculptures in Mrauk-U period were so skillfully conceived and finished; it is assumed that there must have been an earlier, well-developed tradition of carving in stone sculpture.[43] Early stone architecture such as stupa railings also follows wooden construction techniques. However, wood is perishable in coastal region because of its durability, stone became the preferred material for temples and temple sculptures. Probably all stone sculptures were originally painted derived from Natural sources. There are stone carvings on the facade of the entrance in stone stupa. Barrel vaults were used in passage way and corridor of the stupas and temples in early Mrauk-U period. Flat arch and vault are used in the entrance of some temples seen in Htukkant Thein temple and niches of the stupas. Copula, cloister vault and cross vault are used in shrine according to the plan. The corbelled arch and vault are used in the stupas in the later period especially the stupas are built with brick masonry.

[43] Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Department of Architecture, Mandalay Technological University, 2008, P.168-169

4.4.3. Environmental Control (Climate, Lighting and Ventilation)

Many archaeological reports 'normalize' the orientations of the buildings towards East, North, South and West, suppressing the angles of variation away from the true directions and therby losing many valuable insights. Most ancient people are concerned first with the East and West, from whence their light, warmth and life come and to which they go. The significance of changes in the solar azimuths for building activities in South and South East Asia was very great. Ancient architectural treatises in India specify methods for establishing the orientations of a future building that depended on sighting the rising sun. It follows that directions thus established reflected (and still do reflect in traditional building techniques today) changes in the solar azimuths.[44]

4.4.3.1. Significance of Pyu Period Architecture

In the temples, the size and location of the openings can affect on the light which enters into the temple and illuminates its form and surface. The temples in Sri-Khit-Tra face the east and natural lighting can enter only from the main entrance but most temples here lighting can get only from the entrance, however the perforated windows are used on sides which can be achieved circulation of air by perforated windows. But the temples in Sri-Khit-Tra were not created lighting and ventilation effects because they are the first and small temples in that period. But it can be studied in these following example temples, the lighting system in the Pyu period.

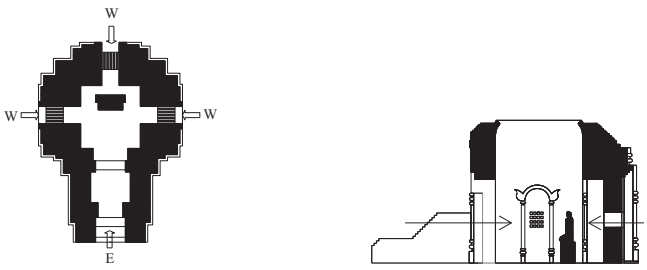


Fig 4.54: East-Zegu temple in Sri-Khit-Tra

Drawing Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Yangon Technological University, 2004

[44] Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-Made Landscape, Volume One, Pascea Cambridge, Institutes of Southeast Asian Studies Singapore, 1990, P.165-166

Another one example in Lay-Myet-Hna temple, the lighting can enter from four entrances according to the plan shape of four faces and the air can circulate from the entrances. Therefore the images of Buddha can receive the suitable lighting from the entrances but the corners of the corridor are a little dark. At Yahanda temple, although light can enter from three narrow entrances, the length of interior space is longer than the amount of light entering the room. Therefore the shrine space can receive the dim light and that is suitable for meditation.

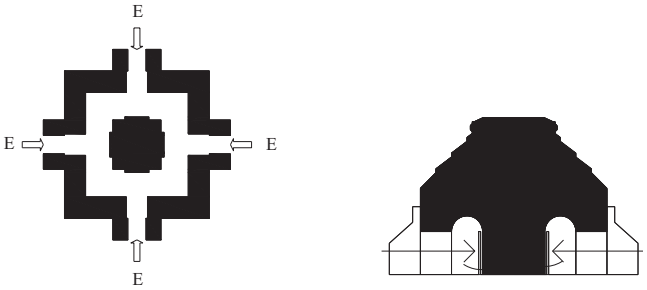


Fig 4.55: Lay-Myet-Hna temple in Sri-Khit-Tra

Drawing Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Yangon Technological University, 2004

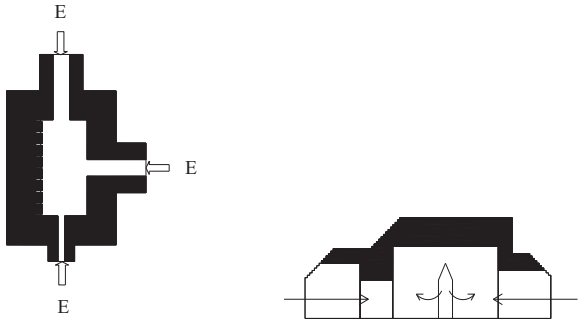


Fig 4.56: Yahanda temple in Sri-Khit-Tra

Drawing Source: Drawing Source: Mya Mya Hnist, Khin Lin New, 2004

4.4.3.2. Significance of Bagan Period Architecture

Climatic condition of Bagan area where has dry type of climate is usually dry throughout the year. The temperature in summer (March to May) is 43° C during the day and 24 degrees C at night and in winter, (November to February) 36° C and 25° C at night. Rainfall is mainly very scanty with moderately heavy at times (maximum 30 inches) only between June and October). Bagan had no danger of being damaged by the rain or due to the rain storm but the

rain water, seeping through the flat roof would impose much damage to the roof. For a long exposure such as number of centuries, may cause deterioration and collapse of the roof. The flat brick roof had absorbed and retained the moisture for centuries after centuries. In such cases, the flat brick roof or even the arched vault can be failed and collapsed due to serve absorption and retention of rain water. Being a dry arid area, the humidity is very low, and as it is in the sandy soil area, whatever rain that showers on to it, is readily absorbed into the soil in no time. Ground level is very low and there will be no dampness. In summer (March to May), the relative humidity is about 55 % in the early morning and about 20 % in the afternoon and in winter (November to February), it is about 30 to 40 %.[45]

The Ananda temple, constructed in 1091 AD, considered as the most advanced and the most proportionate temple in Bagan, applied the system of the light-wells from the ceiling. It is logical that the temples like Ananda, and therefore the first temples with this rudimentary features should have been consturcted at the end of 10th century or in the beginning of 11th century AD.[46] In Ananda temple, the approach corridors from the temple's main entrance to the inner wall of the inner shrine is long, around 126 ft. (38.5 m); in order to provide daylight, side windows were designed at both sides of the corridor, therefore when there were no electric lights (the present time), the effect is the change of dark and bright areas along the passage. When entering the temple, the first inner space is the bright and breezy vestibule, provided with natural cross ventilation from both sides; the vestibule is about 40 ft. (12 m) long in the direction of the inner shrine. From the entrance situation, the inner images in the shrine cannot be seen; only two statues of guardians at the walls of vestibule are to be seen. Passing through the vestibule, one receives the changing atmosphere of dim and bright areas for three times and enters the dim inner shrine. In the shrine one sees mainly the image, which receives daylight from the ceiling's light-well. In some temples, many wide openings are used along the enclosure walls so the air can flow across the interior space. Besides, the entresols at the upper part of the wall, the air circulation can cause between the upper and lower part of the corridor.

[45] Sun Oo, 'The Architectural Aspects of the Monasteries of Bagan', Ph.D. Preliminary Research Report, Yangon, 2001, P.76-80

[46] Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.26

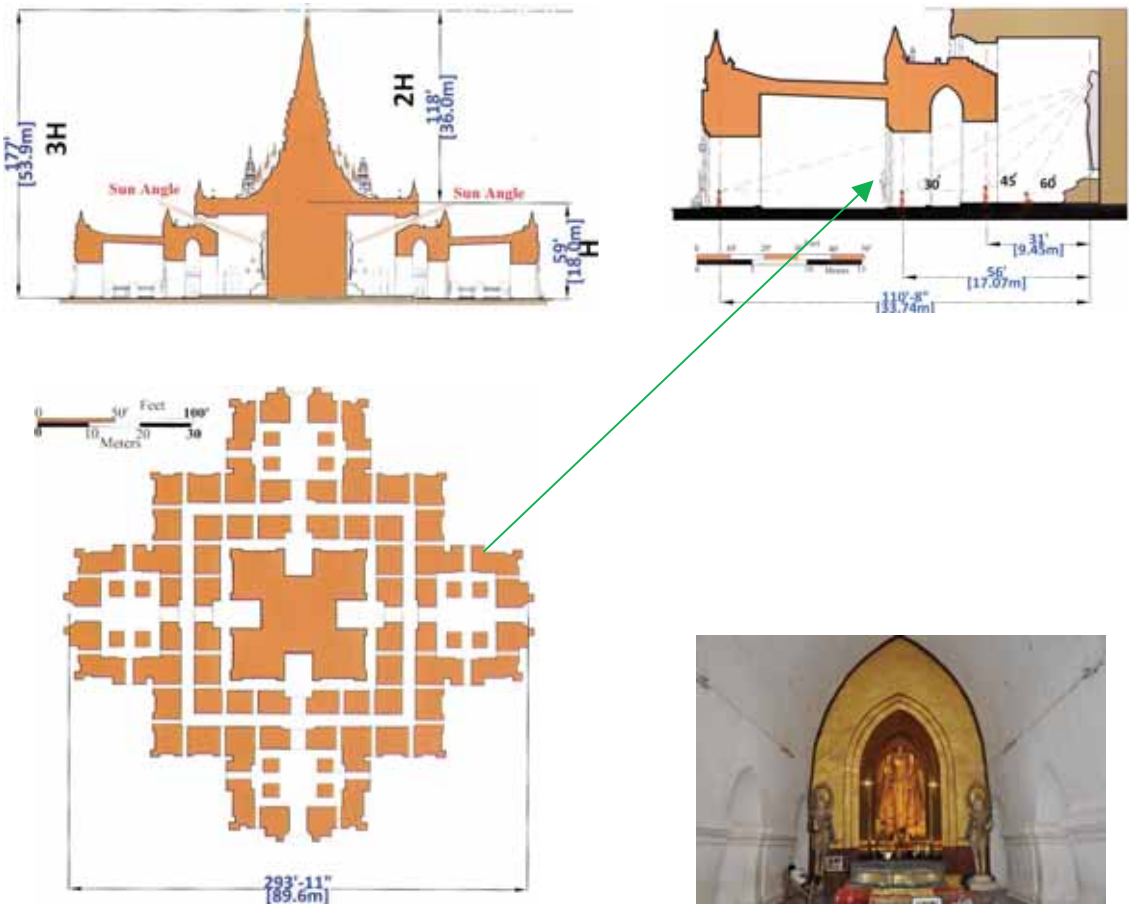


Fig 4.57: Section and plan of Ananda temple

Drawing Source: Kyaw Lat, Dr, 2010, P-124-125

Photo Source: Author

In Bagan temples, the entresols at the height of about 12 ft. (3.6 m) above the floor level can permit the lighting to the interior space of the temples. This method to create lighting in the temple is applied in later Bagan temples, Examples; Pahto-Tha-Mya temple, Ananda temple. In Pa-Hto-Tha-Myar temple, the inner shrine is intentionally designed to be dim; the temple faces east, the daylight through the perforated windows at the southern and northern exterior walls and through the openings of interior walls provides just enough light for moving around in the shrine during the evening hours. The part of the roof in the east has light-well which is adjusted with the morning angle to beam at the image in the inner shrine. The light-well was installed to provide better lighting and the position of the light-well was adjusted with Buddha image for the morning sun angel. The shrine contains a colossal image of the Buddha, that is lit from a skylight set in superstructure, which is hidden by the upper shrine. Squeezed behind

the image, pressed into the space behind his colossal limbs are smaller Buddhas, thus there is triad. There are through-wall light openings from the ambulatory.[47]

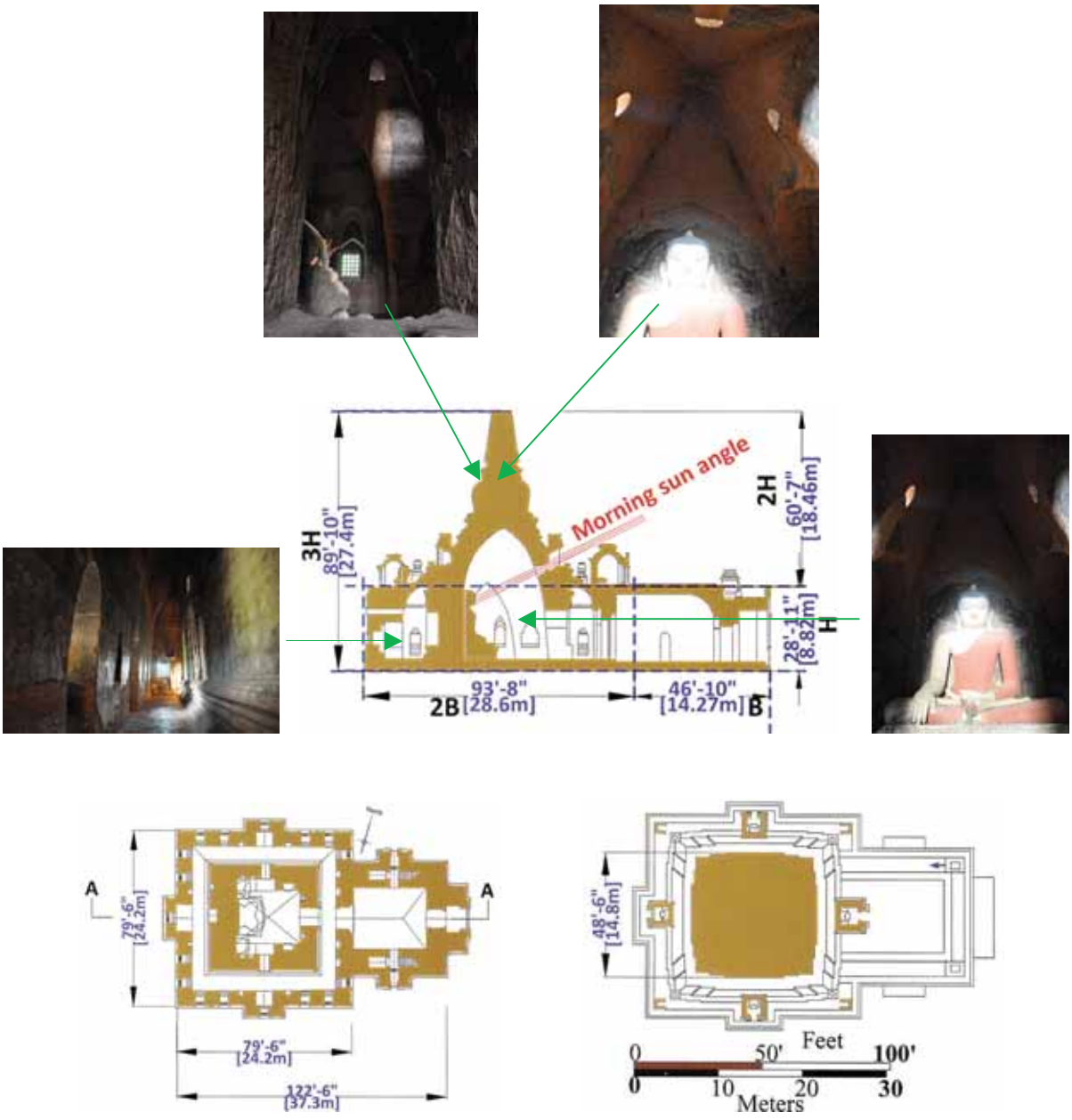


Fig 4.58: Section, ground floor and upper floor plan of Pa-Hto-Tha-Myar temple

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.115

Photo Source: Author

[47] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.54-56

4.4.3.3. Significance of Mrauk-U Period Architecture

Climate condition of Mrauk-U area is dry in summer and heavily rain in rainy season. Adapting to the heavy rain the outer wall of platform, main body and roof of the temples are slightly sloped to drain out the rain water and adjustable to the strongly storm wind form the sea. Therefore almost the important religious structures were built on the hills or high platforms to cover the flooding in rainy season. Being a coastal region, the humidity is very high but there is not wet inside the inner space of stupa or temple in Mrauk-U as they were constructed with sandstones, whatever rain pour on to the structures, they are not easily penetrate but easily evaporate. Rain water cannot penetrate inside the temple.

Lighting and ventilation systems are not sufficient the whole inner space of stupa or temple. But they can penetrate from the entrance. There are small openings to provide lighting to the central shrine. In day time, the level of light in the central shrine of stupa or temples is extremely low when it compares to the exterior. The sun ray never goes beyond the threshold of the central shrine. The inner space of the stupa or temple was like a specially created confined space, which as if had been purposely arranged as a controlled environment. The walls are thick and built with stone or brick. When the temperature is very high, the thick brick or stone walls could reduce the intense exterior heat to some extent and absorb from the certain amount of heat. In the Htukkan Thein temple, it has two spirals like corridors continue to reach the central shrine. Along the corridor, there are 164 niches with Buddha image in sitting posture. In each niche on the inner wall of the outer corridor, it has two Buddha images in back to back position facing to the corridors respectively. This function can be obtained the lighting and ventilation to the inner corridor. The platform, outer wall and roof are slightly slope to adapt the heavy rain. The main central stupa and four corner stupa surmounted on the roof are in the same form with circular terraces, hemispheric dome, Hamika or crowning block of relic chamber, circular umbrella base and bow shaped umbrella. The barrel vault is surmounted on the corridor and copula on the shrine. There is a rectangular dome at the east of the central stupa which provides lighting and ventilation to the central shrine and vestibule. The facade of the dome has stone carving. The lighting and ventilation can be provided to reach the whole temple form the openings of the walls. Lighting is also provided in the ordination hall.

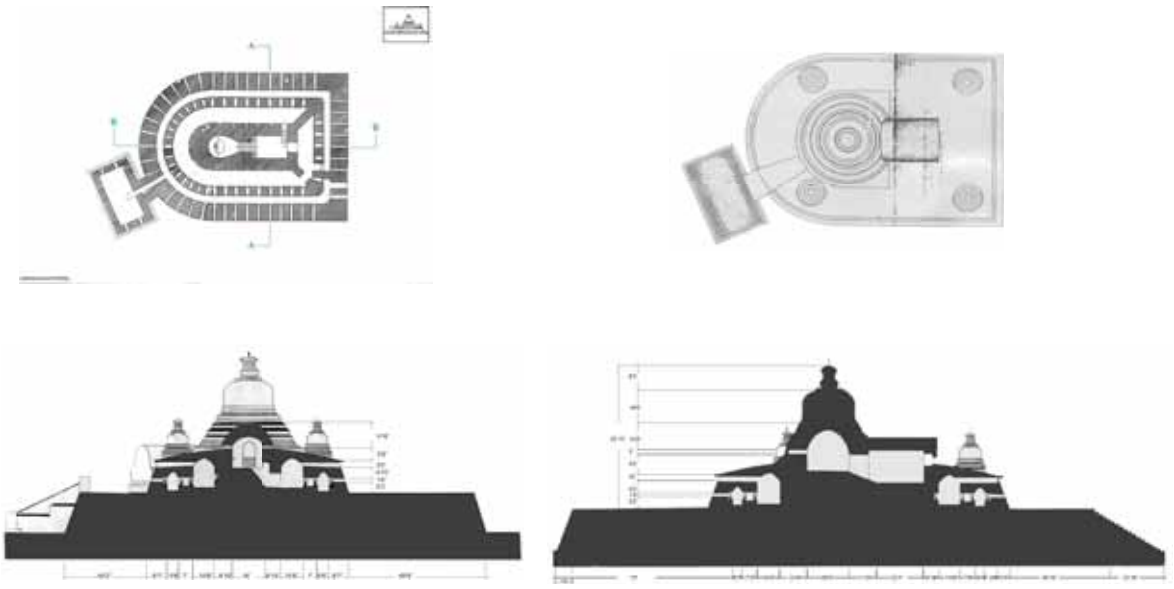


Fig 4.59: Ground plan, roof plan, cross section A-A and B-B of Htukkan Thein temple
Drawing Source: Measured drawing by Department of Architecture, Yangon Technological University

4.5. Conclusion

The oldest civilizations in Myanmar are Pyu, Rakhine and Mon. The plan organization, form composition and construction technology of Bagan temples are based on Pyu temples. In Bagan, forms and spaces of temples are different types although it has many temples. Temples plan-shaped are built by the invention and reformation a plan- shaped from Sri-Khit-Tra temple plan-shaped. Therefore the former scholars48 considered Bagan temple types are derived from the early brick temples of Pyu capital of Sri-Khit-Tra where radiating arches and voussoir type brickwork, of the same kind used at Bagan, are to be found. At both Beikthano and Halin, specific resemblances can be pin-pointed between the brick sizes and the styles of monuments of the two cities; more importantly, this is true monuments at both sites belonging to the Pre-Buddhists as well as the early Buddhist phases, a point which is of particular importance in tracing the parallel evolution of culture at two sites physically separated by a considerable distance. Similarly, specific resemblances between monuments at Sri-Khit-Tra and Beikthano can also be recognized some centuries later.

48 Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.9

In the construction system, the simple single shrine temples, covered only with one vault were constructed in Bagan from the beginning period until the late periods of Bagan and therefore there are many belonging to this type. Compared with Pyu temples, the lighting and ventilation system of Bagan temples are much more improved and complicated. In addition to multiple openings which are well designed with rain protection, the entresols are provided in many developed temples. These entresols were designed in such a way that the faces of Buddha images were directly lighted from these. In this way, the line of development of religious structures can be found from Beikthano, Halin, Srikhetra to Bagan in period to period.

In Bagan, forms and spaces of temples are different; from simple rectangle plan-shaped to the corridor involved in temples and it become creation of architectural space. In early Bagan period (AD 1044-1077), most of Bagan temples were developed by using the basis of the central pillar and corridor type. Although in Pyu temples, the central pillar is small and the corridor space is narrow, in Bagan, the larger size of central pillar, and the wide and high corridor space was created, and in some cases, the niches were created from the central pillar. And then the space for niches, openings, and staircase was subtracted from the main wall. The series of spaces were conspicuously found in the temples and dim light was used by providing with perforated windows. This type was constructed till the late 11th Century A.D and later, the improved edifice structures were developed until 13th Century A.D. In middle Bagan period (AD 1077-1113), porches, entrance hall and central shrine were combined in plan shape. The space of central shrine was created to separate within solid core. By creating like this, space of corridor is more obvious than the early temples. And then the temple sizes are bigger than the early ones. In this period, temples were built on high platform and were created to get high form. Temples have a wide space in vestibule and get enough lighting and ventilation as not like early period temples. Porches and windows were used on south, north and west walls of central shrine and stairs were also placed to climb up upper terraces. Therefore the middle period was a transitional and experimental phase in the architectural history of Bagan. The balance between the vertical and horizontal that had been a feature of the early period 'cave' temple exterior was to be repeated without monotony to form a myriad of types and designs through this period.[49] In the later Bagan period (AD 1113-1165), the

[49] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.93

temples are high and light forms with flat terraces. Though the temple plan shape based on early and middle period temples, the plan shape became different and distinct characters with required invention and reformation. The architectural edifices of temples were based on early and middle period temples.

In Mrauk-U period (AD 1430-1784), the temples were rectangle and square in form and were found with accessible arch, inner corridors and central shrines were found. The plan-shape was octagonal shape and the terraces were set in serial order above the octagonal shape stone. The bell like part and the upturned bowl were built on those terraces. Above them, the octagonal shaped mouldings were set. At the top, octagonal shaped golden bowl were built. In the construction technology, arch and vault were widely used like Bagan; pointed arch, semicircular arch, flat arch and vault, corbel vault and barrel vaults were used in passageways and corridors and cloister vault and copula were used in central shrine.

In conclusion, this chapter attains to study the different space formation of the different periods in Myanmar and shows some examples of the temples. Therefore the selection of some monuments representative of the various periods, and movements within those periods, is presented, with a more detailed analysis of each monument's architecture, and the evolution and development changing; the principal architectural forms, their origins and the conceptions behind their construction. That will be a part of study to know the architectural aspects of temples in Myanmar though it cannot be possible to present all temples those ancient periods.

CHAPTER V

Analysis of Temples - Development and Evolution of Spatial Composition

CHAPTER V

5. ANALYSIS OF TEMPLES - DEVELOPMENT AND EVOLUTION OF SPATIAL COMPOSITION

In this chapter, the spatial composition of temples will be analysed by their different areas and then in the conclusion they can be compared. Firstly, when the temple types are analyzed according to the spatial composition, basically four types based on the plan shape can be recognized: 1) cicular type 'C', 2) rectangular type 'R', 3) pentagonal type 'P', and 4) octagonal type 'O'.

'C' 'R' 'P' 'O'

Fig 5.1: Four basic types of temples

5.1. Part I - Pyu

5.1.1. Development and Evolution by the Aspects of Historic Period

To determine the construction period of the temples in Sri-Khit-Tra, an estimated time can be based on the Buddha images, artifacts and buried urns found in the temples because other clues as to the construction date have not been found there. The image, in the form of a relief found in East-Zegu temples, was identified by the Archaeological Survey of India in its report of 1907-1908, as from the Gupta period of about 7th century AD or earlier;1 based on this statement and with some hedging factors, these temples in Sri-Khit-Tra could have been constructed at the end of the 7th century or in the 8th century AD. Additionally, looking at the earliest inscriptions, which are bricks with Pyu characters found at some structures, and the temples with timber roofs and temples with masonry materials found in Sri-Khit-Tra, one can

1 The literature is based on the version of this group of scholars;
- Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.13
- Marshal, Sir John, 'Report of Archaeological Survey of India', 1907-1908, P.42

infer that they are from around the 7th or 8th century AD. Also, recently some structures 12 ft. (4 m) underground were found in Sri-Khit-Tra, and although these are not yet thoroughly studied, based on the inscriptional evidence, Sri-Khit-Tra had already been developed between the 5th and 9th centuries AD[2]. In the building technology at the historical sites, the builders at Sri-Khit-Tra developed a method to build scientific vaults and arches, which was transferred to Bagan in a simple shrine covered with a cross vault, and with a solid pillar inside the shrine, forming a passage.

5.1.2. Development and Evolution by the Plan

All temples found in Sri-Khit-Tra include the type 'R': rectangular plan shape and their plans can be analyzed in detail by the following three types:

R_1 - the temple with niches at four cardinal points,

R_2 - the temple with central shrine, and

R_3 - the temple with solid pillar type.

5.1.2.1. Temple with Niches - R_1

When the type R_1 is analyzed by the organization of its plan, the spaces are extracted from a solid plane to create niches at the four cardinal points. The plan shape is square and has the extracted four axes at the four cardinal faces (see in Fig: 5.2).

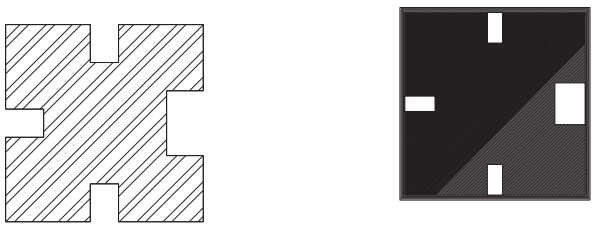


Fig 5.2: Organization of temple type R_1 - Payataung temple

Drawing Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Yangon Technological University, 2004, P.55

[2] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.29

5.1.2.2. Temple with Central Shrine - R_2

In the type R_2, the interior space is created to form a central shrine in the 'U' shape plan. The plan forms an introverted organization and terminates an axial condition. It is a simple square in plan with one main entrance and it is the first creation of the central shrine type in Sri-Khit-Tra. This kind of organization can be seen in (Fig. 5.3) and this type is well developed in Bagan in the small temples.

R_2 R_2

Fig 5.3: Organization of temple type R_2 - Bebe temple

Drawing Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Yangon Technological University, 2004, P.56

The next development is the type temple R_2 that is created with three entrances to the central shrine. The shrine space is formed inside the 'U' and 'L' shaped configurations. The voids between these planes become openings. The central shrine can be accessed by those three entrance ways by the formation of porches. That can be seen at the Yahanda temple (see in Fig. 5.4) that is composed with this organization, and the extended passage with porches at the entrances. Rarely is this type with three entrances found in this temple type and this is also the only one in Sri-Khit-Tra.

R_2 R_2

Fig 5.4: Organization of temple type R_2 - Yahanda temple

Drawing Source: Mya Mya Hnist, Khin Lin New, 2004, P.57

5.1.2.3. Temple with Solid Pillar - R_3

Another step in temple development is type R_3 which might have been developed from the type R_2, with an extended entrance interlocking with the space between parallel vertical planes. The shrine space inside the 'U' shaped plane is at first like the Bebe temple and then is emphasized by approaching with parallel vertical planes at the entrance to form the vestibule. The plan of the East-Zegu temple (see in Fig. 5.5) is based on this organization and also improved with projections and this plan shape is the forerunner of the Bagan period and well developed in the whole Bagan period.

Fig 5.5: Organization of temple type R_3 - East-Zegu temple

Drawing Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Yangon Technological University, 2004, P.56

The last development step is the temple type R_3, where the ambulatory space is formed around the central solid pillar or core and it is developed symmetrically by creating the four entrances at the four cardinal faces. This organization is found at Lay-Myet-Hna Temple (see in Fig: 5.6) with dimensions of 22 ft. 4 in. x 22 ft. 4 in. (6.8 x 6.8 m), however, this is a small version, that is well developed in the construction techniques based on this type. That is also the prototype of the famous temples of the Bagan period like the Ananda temple, Dhaman-Yan-Gyi temple, etc.

Fig 5.6: Organization of temple type R_3 - Lay-Myet-Hna temple

Drawing Source: Mya Mya Hnist, Khin Lin New, 2004, P.57

5.1.2.4. Findings and Conclusions

When analyzing all the temple plan shapes found in Sri-Khit-Tra, the type R_2 with square and rectangular plan shapes with a central shrine though each of the entranceways and the openings are not all the same. Here, the design with the extended vestibule, as well as side and rear openings for better ventilation and lighting, can be considered an improved design with added functionality and aesthetic elements of extended entrance space. To conclude, in these temples of the type R_2, the design features developed such that the first step has one entrance formation of a simple square in the plan shape, then the second step created the hall extension from the main entrance which one can pass through the hall to main shrine, and then the third step developed with the three entrances.

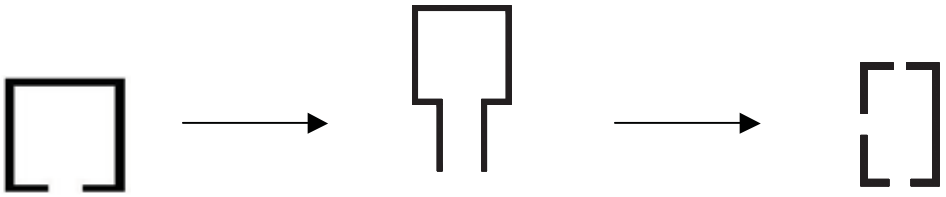


Fig 5.7: Evolution of central shrine temple types with selected examples

As another comparison of the type R_1 and R_3, R_1 - solid type temple with niches at the four faces and the R_3 - solid pillar with four porches with formation of an inner corridor, R_3 is created with space for a shrine inside with the porches at the four sides and it formed the ambulatory space around the solid pillar or core, though R_1 created the space for a shrine outside with the niches at four sides. It might be said R_3 type can be the next step in the creation of central shrine from the type R_1 with niches at the outer faces of the temples.

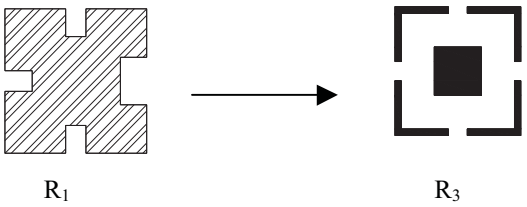


Fig 5.8: Evolution of solid temple types with selected examples

Drawing Source: Mya Mya Hnist, Khin Lin New, 2004, P.57

5.1.3. Development and Evolution by the Architectural Form

5.1.3.1. Temple with Niches - R_1

On the exterior form, the form of Pyu temples is based on the simple square cube, on which the receding terraces and the plain square tower (*Sikhara*) are formed. The plinths of the temples are at nearly the same level as the ground. In proportion, the dimensions of length, width and height of the temples at Sri-Khit-Tra are nearly the same, based on the cube. Payataung temple (see in Fig: 5.9), has a simple square plan which has exterior dimensions of 38 ft. x 38 ft. (11.6 m x 11.6 m) and the volumes are subtracted from a cubic to create niches in the vertical and horizontal of the recesses. The ratio of length and height of the space is nearly 1:0.75.

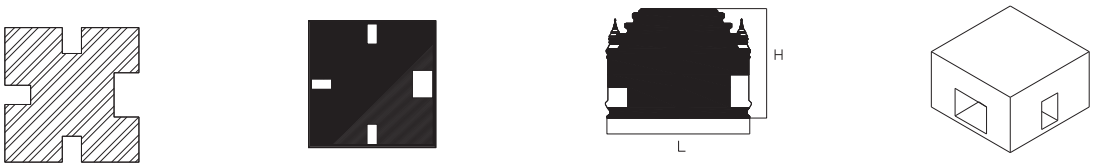


Fig 5.9: Spatial composition of temple type R_1 - Payataung temple

Drawing Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Yangon Technological University, 2004

5.1.3.2. Temple with Porch and Central Shrine - R_2

On the exterior form of this type, a 'U' shaped configuration of vertical walls creates a central shrine space, which has an inward focus on the Buddha image as well as a specific orientation towards the entrance. In the Bebe temple, the exterior dimension is 17 ft. x 14 ft. (5 m x 4 m) and the ratio is about 1:1.4. The *Skihara*'s form with a dome shape might be said to be derived from an India temple.

Fig 5.10: Spatial composition of temple type R_2 - Bebe temple

Drawing Source: Mya Mya Hnist, Khin Lin New, 2004

In the Yahanda temple, the other two entrances between the walls are too narrow to enter the shrine though it might be created to get the lighting and ventilation into the temple. The shrine space is a combination of 'U' and 'L' shaped vertical walls with an exterior dimension of 29 ft. x 12 ft. 6 in. (8.8 m x 3.65 m); here, the length of the temple is longer than the height and the ratio is 1.7:1. The upper form is ruined and it cannot be said which Sikahara was used though the temple's base and the body is reconstructed again by the Archaeological Department - that will be further studied.

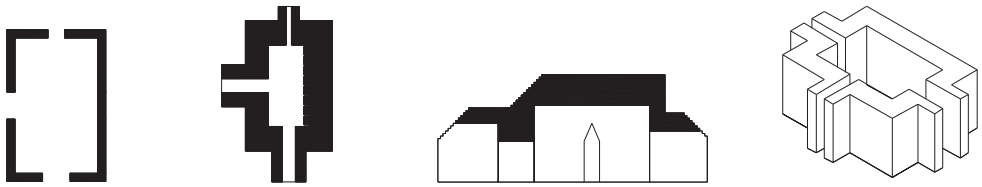


Fig 5.11: Spatial composition of temple type R_2 - Yahanda temple

Drawing Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch. Thesis, Yangon Technological University, 2004

5.1.3.3. Temple with Central Solid Pillar and Corridor - R_3

This type of temple is composed with a vestibule and the design features are created to emphasize the Buddha image by passing the series of spaces from the porch to the vestibule and then the central shrine. This composition started at East-Zegu Temple in Sri-Khit-tra and this first attempt at Sri-Khit-Tra can be seen in Fig: 5.12. Their exterior dimension is 29 ft. x 41 ft. (8.8 m x 12.4 m) and the ratio of length and height of the shrine space is nearly 2.3:1. In this type, though this design features with extended vestibule is further well developed in Bagan Temples, sometimes with multiple-entrance halls or anteroom chambers, it cannot be said the form is also linked with Bagan temples; however, the construction techniques of the arch and vault system are copied from here.

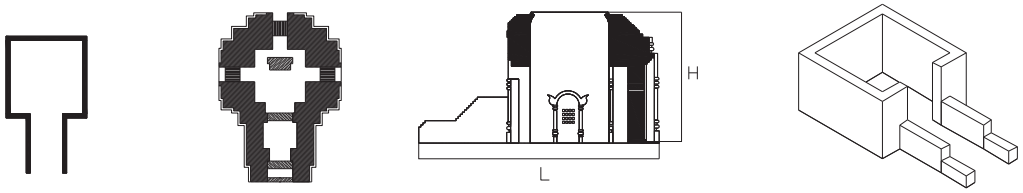


Fig 5.12: Spatial composition of temple type R_3 - East-Zegu temple

Drawing Source: Mya Mya Hnist, Khin Lin New, 2004

The next development in temple type R_3 has a central solid pillar surrounded by an ambulatory space and four Buddha images are placed at the four cardinal points of the central pillar, facing the four entrances. In the Lay-Myet-Hna temple, it has a square plan shape with exterior dimensions of 22 ft. 4 in. x 22 ft. 4 in. (6.8 m x 6.8 m) and the length and height ratio is 1:1. However, this type is also the prototype of Bagan temples, and the upper superstructures of all of the temples are ruined and it cannot be said which Sikhara was used in its form.

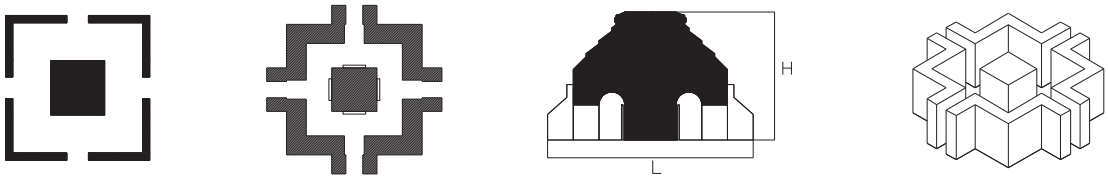
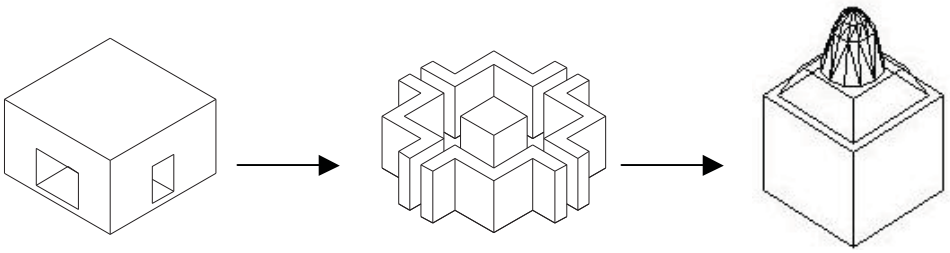


Fig 5.13: Spatial composition of temple type R_3 - Lay-Myet-Hna temple

Drawing Source: Mya Mya Hnist, Khin Lin New, 'Comparative Study of Pyu and Bagan Architecture before 11th Century AD', M.Arch Thesis, Yangon Technological University, 2004, P.57

5.1.3.4. Findings and Conclusions

In the comparison of these two solid types R_1 and R_3, in the first stage, the shrine space is created outside the building but later it has a solid pillar with the inner ambulatory. However in the plan shapes, though in this design feature in $R_{3\ it}$ might be said that it is a development or change from the type R_1, it cannot be said the exterior forms have a linkage. But here it can be said that the upper part of the temples might be the simple form with the terrace upper the body and then Sikhara will be upon it; however, the Sikhara shape is derived from the Indian form of the dome shape.



1st step 2nd step

Fig 5.14: Evolution of solid temple types with selected examples

Drawing Source: Mya Mya Hnist, Khin Lin New, 2004, P.57

To conclude, the step of evolution of the temples form in Sri-Khit-Tra can be summarized as such: that the first step is a simple form inside the central shrine, then the second step develops the central shrine with extended vestibule, with the first attempt of creation of this sort being the central shrine at Pyu temple. Then the third step involves the creation of three entrances from the main shrine. Normally the form of the temples is a simple cube with the receding terraces surmounted by the conical plain *Sikhara* with no decorative ornamentation. Though the temples found in Sri-Khit-Tra are small ones it can be said they have this simple form and it can be seen that they have the plan shapes and construction techniques in the structural system for the first attempt. Therefore it can be said these are the previous temple types in Myanmar and the first creation of attempts to build a temple design, though their exterior forms cannot be traced at the present time, but might be further studied by future scholars.

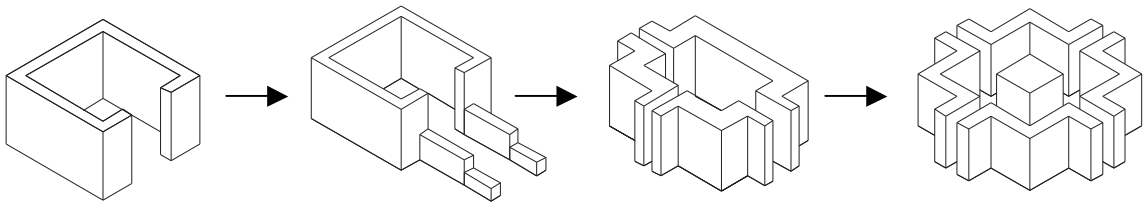


Fig 5.15: Evolution of temples with selected examples

5.1.4. Development and Evolution by the Design and Technology

From the technological aspects of the temples in Sri-Khit-Tra, the two temple types of the first temples, the Bebe temple or East-Zegu temple, have simple single shrines covered with vaults, and Lay-Myet-Hna temple has a solid pillar with four entrance porches. These are the two prototypes of Bagan temples which then evolved out of these two basic types to several other types by improving design technology aspects. At Bebe temple, the technology has become more advanced; the temple was constructed with proper scientific tunnel vault with much thicker walls to support the upper Sikhara. The thickness of the side walls are nearly 4 ft. (1.2 m) and rear wall is 6 ft. (2 m) and the vault thickness is 4 ft. (1.2 m). The design of East-Zegu temple includes the extended vestibule as well as side and rear openings for better ventilation and lighting, which is an improved design with added functional and aesthetic

elements of an extended entrance space. This temple is also constructed with a scientific vault, it is larger than Bebe temple and has articulation at the walls with corners, from which one can infer that this was constructed after Bebe temple. Lay-Myet-Hna temple, which is technically one step further or perhaps another direction of construction, was built with a solid pillar in the shrine, and the tunnel vaults are spanned from exterior walls to the pillar, forming an inner passage. From structural aspects, this is the same structural system as that of Ananda temple constructed in 11th century AD in Bagan, and from the design aspects, one or two passages are planned with the basis of this technology as in the case of Ananda. Lay-Myet-Hna and East-Zegu temple in Sri-Khit-Tra were at the beginning stage, where the wider vault at East-Zegu temple was about 12 ft. (3.6 m), but later the spans in Bagan temples reached up to about 28 ft. (8.5 m).

There are other examples in Sri-Khit-Tra, where superstructures have lost, and only the plans are found, most likely because the technology to cover the inner spaces was not durable; it is possible that these were of corbelled arches as in Yahanda temple. And the openings at Payahtaung temple were of an experimental stage based on the structural principle of arching and vaulting and were probably not applied to cover the inner space. However, there are other structures in Sri-Khit-Tra which have a resemblance to Bagan temples; these should be focused to determine the technological linkage between Sri-Khit-Tra and Bagan and how the arching and vaulting techniques started in Sri-Khit-Tra, which were the essential structural system applied in Bagan periods. That is why in Sri-Khit-Tra, and afterwards in Bagan, mastering the vaulting and arching techniques is the main reason for being able to build thousands of structures.

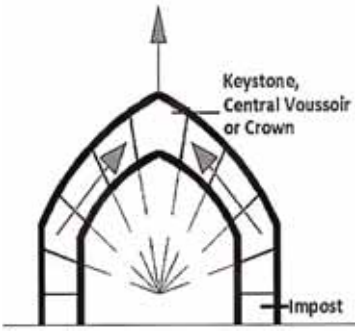
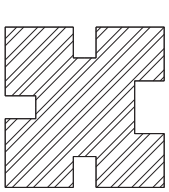


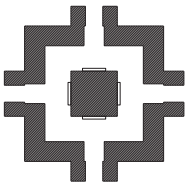
Fig 5.16: Principle of vault at Pauataung temple

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

Development of Solid Core Temples



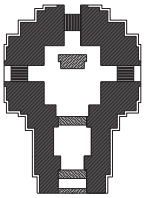
Payataung



Lay-Myet-Hna

Development of Central Shrine Temples

Bebe



East-Zegu

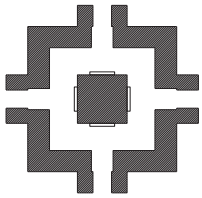
Yahanda

Development of Temples by the Formation of Entrances

Bebe

East-Zegu

Yahanda



Lay-Myet-Hna

Example Temples in Sri-Khit-Tra

Bebe

East-Zegu

Lay-Myet-Hna

Table 5.1: Evolution of temples in Sri-Khit-Tra with selected examples

5.2. Part II – Bagan

5.2.1. Development and Evolution by the Aspects of Historic Period

However it is not an easy task to find out the date of construction of over 2000 ancient structures in Bagan where only a few buildings had the stone inscriptions recorded through which the date or at least, the year of construction can be traced. Moreover studying the mural paintings of the interior wall and ceilings, the date or year of construction and analyzing iconography of the images and sculptures on the change in art style and decorative motifs or ornament elements might be recorded or by carbon dating.

The term 'Bagan period' also has many controversies and opinion differences among the scholars. One group of scholars has the opinion that Bagan begins in 10th century AD and another group of scholars mentions that Bagan was founded in the 2nd century AD. As the radiocarbon dating results of the scholars from Sydney University, the building activities with masonry structures in Bagan could begin in about 8th or 9th century AD. This statement does not imply there are no people living in that area before this period, it is likely that this area was continuously occupied by people during stone ages, then became a settlement and it is likely that the area gradually evolved an urban settlement. Based on these, it can be derived that the technology to build masonry structures was transferred from Sri-Khit-Tra probably in about 8th century, and then became a center of a kingdom afterwards. Bagan ceased to be the capital of kingdom in the end of 14th century. The end of 14th century and the shift of the capital from Bagan to Pinya does not mean that the building activities in Bagan were at the end, there are some interesting examples of temples and stupas continued to be constructed unitl 19th century AD in or around that area.[3]

From architectural aspects, Bagan architecture is the continuation of Sri-Khit-Tra architecture and there are concrete evidences that the technology from Sri-Khit-Tra was transferred to Bagan. A few centuries later, around 12th century AD, Bagan builders created the new form of architecture with the significant difference from their usual old style and then Bagan had evolved the new style which the buildings came up with its own characteristics. The

[3] Kyaw Lat, 'Evolution of Bagan Temples', Yangon, 2009, P.3-4

emergence of this unique style of Bagan period architecture influenced much on the designs of later period buildings throughout the country. Though the new style had been developed in Bagan period, adaptions of other architectural styles of the neighboring countries were also introduced in some buildings. Such examples could be seen in some stupas which have the adaption of Singhalese (Srilanka) style stupas and one another example Mahabodi temple topped with an Indian style in Bagan. As also the origin of Buddhism was from India, the influence of Indian architecture style was quite common in the very early period of Bagan, however the basic features of the Bagan structures were inherited from the Pyu and Mon. It is said that the early Bagan period structures were influenced by Mon, Pyu and other styles, though in the middle Bagan period buildings were transforming into Myanmar style, as a period of transformation, and the late Bagan period as the period of the Myanmar style buildings.

5.2.2. Development and Evolution by the Plan

Here, the development and evolution of the temples in Bagan by analyzing from the period to period. When analyzing the temples in Bagan, the rectangular types were mostly found in all of temples though circular types were found in the small ones and mostly found in the stupas. To details analyze the temple plan shapes, it can be specified into the following three types:

R_1 - the temple with central shrine,

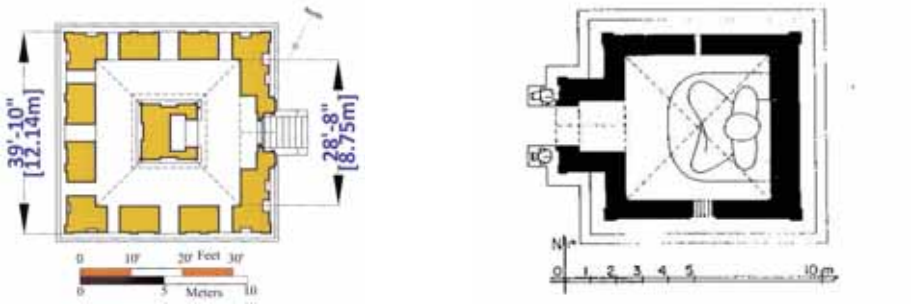
R_2 - the temple with solid core, and

R_3 - the temple with solid pillar type.

5.2.2.1. Temple with Central Shrine - R_1

When the type R_1 is analyzed by the organization of plan, this type can be divided into the simple single central shrine $R_{1\text{-}A}$ and then central shrine with extended elongated vestibule $R_{1\text{-}B,}$ central shrine with multiple vestibules $R_{1\text{-}C}$ and central shrine temples jointly connected $R_{1\text{-}D}$. Type $R_{1\text{-}A}$ is found in the small temples (see in Fig: 5.17). These are almost the same plan shape with Bebe temple in Sri-Khit-Tra though changes the formation of the exterior *Sikhara* and included more ornamentation upon it. However, this type was much not found in Bagan

but only in the small temples and from the aspects of development changes, it can be said it is linkage with the Sri-Khit-Tra temple.



11th century AD
Nat-Hlaung-Kyaung

13th century AD
Than-Daw-Kyar

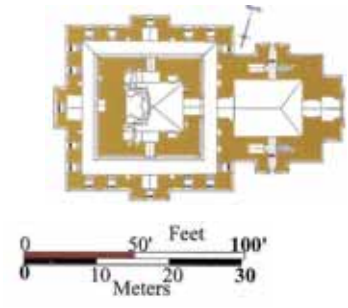
Fig 5.17: Organizaton of simple central shrine type - $R_{1\text{-}A}$ with selected examples

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

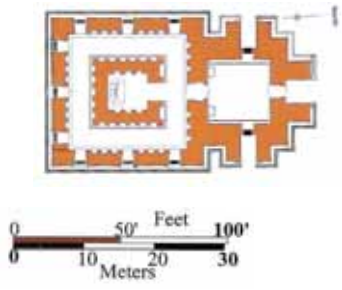
The type central shrine with extended elongated vestibule, $R_{1\text{-}B}$ is developed along the Bagan period and found in the medium size temples about 32 ft. to 82 ft. (10 - 25 m) and the large ones 82 ft. to 164 ft. (25 - 50 m). The following example temple plan shapes (see in Fig: 5.18) show that formation of type $R_{1\text{-}B}$, it can be seen at Pa-Hto-Tha-Myar temple (monument no.1605), Abe-Yadana temple (no.1020) and Naga-Yon temple (no.1192) and then Gu-Byauk-Gyi temple (no.1323). These temples designs are possibility types with the innovative design features; the inner shrine and light well in the 11th century AD and starting evolution of 12th century AD.

As the architectural aspects of these temples, the central shrine is created by the inner four walls, cutting the pillar and the corridor is separated around the inner shrine and then connected with the elongated vestibules from the main entrance. The window openings three or five at each side are lined at the walls of the central shrine. The inner walls of the hall, and both sides of the ambulatory, are lined with niches and the ambulatory walls are covered throughout paintings. The sculpture in those niches mark a further step in the development of iconography and style of the Buddha images at Bagan and Bagan' growing knowledge of the Buddha legend. The inner shrine is also designed to get dim light along the corridor way from the perforated windows at the exterior walls for moving around the shrine. Whilst this dimly-lit temple must certainly offered its visitors a mystical experience. Such colorful, decorative

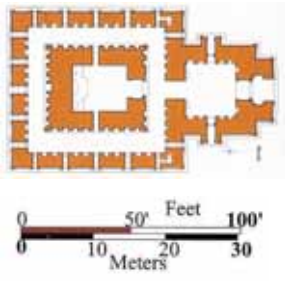
figures embellish the temple, filling awkward spaces at the corners and between niches and openings; it is unlikely that they were themselves actual focal points for people's devotions.



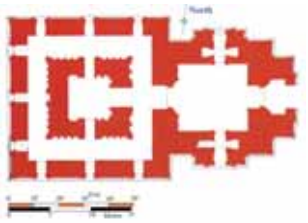
end of 10th century AD
Pa-Hto-Tha-Myar



end of 11th century AD
Abe-Yadana



end of 11th century AD
Naga-Yon



beginning 12th century AD - Gu-Byauk-Gyi

Fig 5.18: Central shrine with extended vestibules type - $R_{1\text{-}B}$ with selected examples

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

The architecture of Abe-Yadana appears to be lass mature than the Naga-Yon's, which may indicate a dating earlier than has been originally supposed.[4] Also, far less light is admitted to this interior than to its counterpart across the way. If the development of Bagan architecture is to be measured by a gradual increase in the luminosity of temple interiors, then this, too, would suggest that the Abe-Yadana temple may slightly pre-date the Nga-Yon. The vestibule hall has side entrances instead of window openings, is this respect there is similarity with Pa-Hto-Thar-Mya temple. The ground plan, a play of squares, likewise must predate the longitudinally inclined Naga-Yon and the orientation is at the northern one. To enter the shrine, one must pass beneath an arch and a vault covered with paintings. Symbolically, one passes from one world into another through the cosmic firmament. The sanctum is very dark

[4] The literature is based on the version of this group of scholars:
- Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.59-61
- Luce believed each of these works to date to the early part of Kyan-Sit-Thar reign, with the Naga-Yon preceding the Abe-Yadana, P.311

and a torch is an essential piece of equipment.[5] In the architecture of Naga-Yon temple, the ground plan continuous the distinction between hall and shrine generally found at the early period temples. However, the shrine is no longer square in plan likewise Pa-Hto-Thar-Myar. Its emphasis is longitudinal, the base plan is rectilinear, however, the medial projections of the Pa-Hto-Thar-Myar temple base walls are dropped in favour of a longitudinal effect.

The next development step of R_1 type is the central shrine with multiple vestibules $R_{1\text{-}C}$ type. It was mostly found in the medium size temples in Bagan and developed from 12th century to the 13th century of Bagan period. The temples with these design features can be seen at the Kya-Mar-Ba (monument no.1620) and Kya-Sin (no.1219), also see in Fig: 5.19. In this type, the base seems regular enough and the main shrine is square in plan with the niches at each side of the inner wall but sometimes niches at inner wall of the lateral porches, and the hall extending out to the east, also with the foreparts. The central shrine can be accessed from the main vestibule and the other three sides lateral porches. Normally the main entrance is existed at the east or north and might have the two secondary porches in it. And the Buddha image is placed on the pedestal in the central shrine, sometimes with the solid pillar like a interior wall and there are also found the small Buddhha images in the niches on the inner walls along the short way of passage and the vestibules. Normally there is no creation of the window openings at the walls in these types but lighting system can get well into the temple because of the four porches and it can access to the main Buddha image very well.

12th century AD
Kya-Mar-Ba

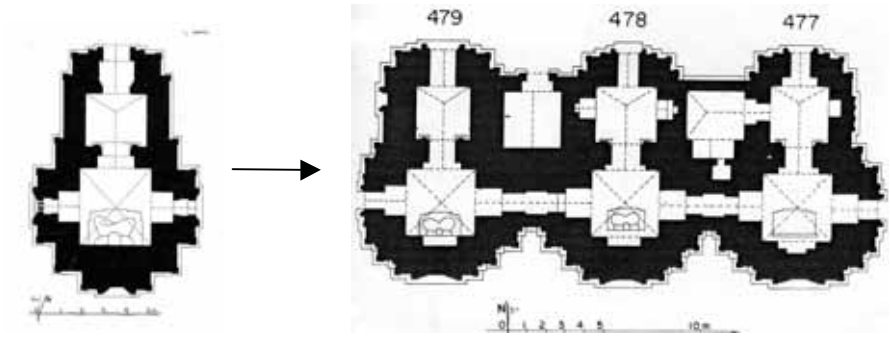
13th century AD
Kya-Sin

Fig 5.19: Central shrine with multiple vestibules type - $R_{1\text{-}B}$ with selected examples

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

[5] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.59-61

Then as the next step development of this type is the connection of three central shrine temples by the inner passage to each other. This temple type $R_{1\text{-}D}$ is found in the small temple size and this design feature can be seen in Pha-Ya-Thon-Zu temple (monument no.477, 478, 479), see in Fig: 5.20. It is the only one temple type in Bagan and this temple oriented to face the north, is carried on a low-lying and unadorned platform which extends out to the front in a similar way to a *Mandapa*. In the plan, the three identical temple-units, each comprising of a shrine and hall with their own vestibules, are connected by a passage from shrine to shrine which are also covered by tunnel vaults and created the secondary entrances at the end of this passages each. In addition, the central shrine through which one now enters is naturally darker as it lacks the end openings of the other two. Each of the units is essence the standard, small scale, late period single storey temple with the hall and shrine divided by a cross wall and arch. A less unified version of this type of ground plan, in which individual architectural units of the some temples and it must be approximately contemporary to the Pha-Ya-Thon-Zu suggesting that it followed from the earlier experiment. As has been said, each unit consists of a hall and shrine separated by a broad arch, a 'T' plan.



13th century AD — Wut-Kyin

13th century AD — Pha-Ya-Thon-Zu

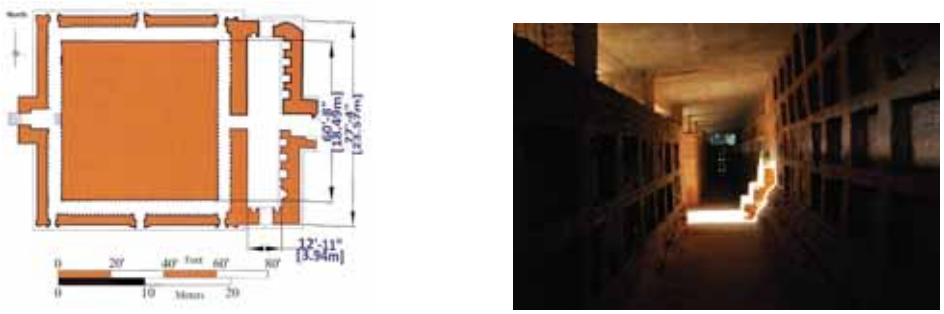
Fig 5.20: Connected central shrine temple type - $R_{1\text{-}C}$ with selected examples

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

5.2.2.2. Temple with Solid Core - R_2

When the type R_2 is analyzed by the organization of plan, it can be found four different types; the solid core with niches along the corridor $R_{2\text{-}A}$ and then solid core with one vestibule type $R_{2\text{-}B,}$ solid core with multiple vestibules type $R_{2\text{-}C}$, solid core with multiple vestibules -

symmetrically development $R_{2\text{-}D}$ and large solid core type $R_{2\text{-}E}$. In the type $R_{2\text{-}A}$, it has the characteristic of having small niches with illustrations of Jatakas along the long and narrow corridors, it can be seen at Fig: 5.21, East-Phet-Leik temple (monument no. 1030). In this temple, the original structure is the combination of temple 'gu' and stupa, in which there is a covered ambulatory running about the base of stupa. Those ambulatories were intended as galleries for the Jataka series.



11th century AD East-Phet-Leik

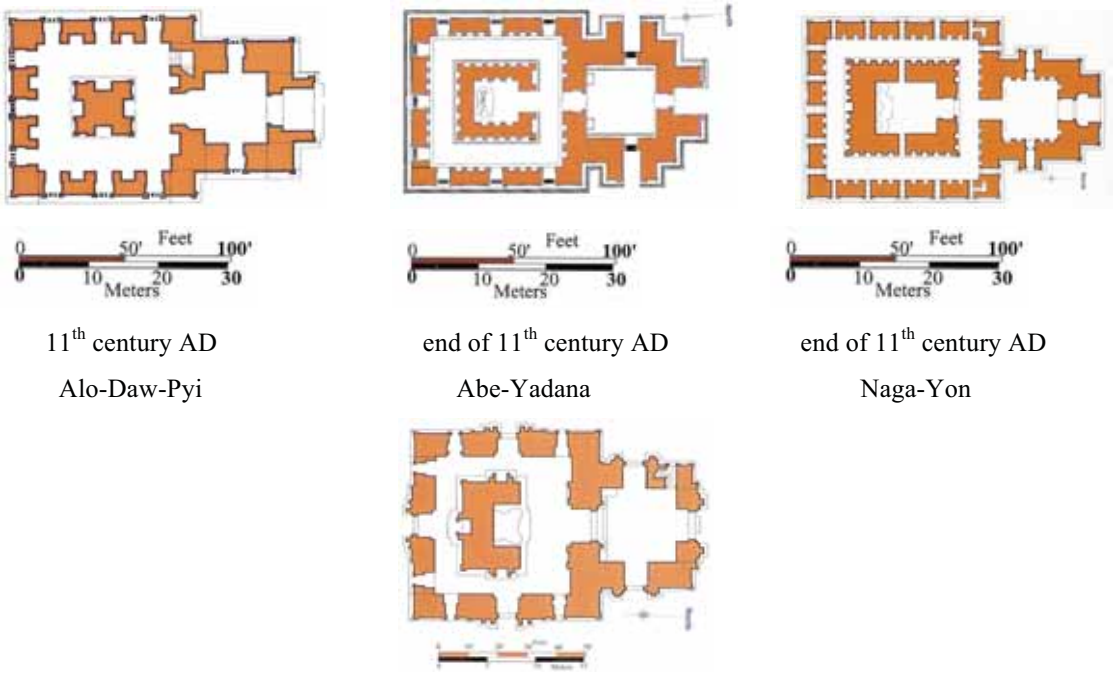
Fig 5.21: Solid core with niches along the corridor type - $R_{2\text{-}A}$ with selected example

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

Photo source: Author

And one step of development is the solid core with one vestibule $R_{2\text{-}B}$. In this type, the solid pillar has two types; the first one is four niches facing four cardinal points and also the walls have built-in niches for the small images can be seen at Fig: 5.22, Alo-Daw-Pyi temple (monument no.374), then Abe-Yadana temple (no.1202) and Naga-Yon temple (no.1192), in which the niches run along the ambulatory outer wall and this temple type can also be called central shrine type because of the formation of shrine in the center core, and the second one is the solid pillar has one niche like Shwe-Gu-Gyi (no.1589). As the architectural aspects of these temples, in Alo-Daw-Pyi temple, the shrine has no inner cella and between hall and shrine the arch is flat. The interior is lighter than the other early temples that Luce suggested that is transitional work. This returns to the question of chronology: is this a Pyu derived work continuing the Lay-Myet-Hna planning tradition of Sri-Khit-Tra or is this another example of the central block revived, that is to say, part of the movement active at the end of the 11th

century[6]. And in the architecture of Shwe-Gu-Gyi, the emphasis is on the north hall facing image, with a lesser recessed image to the south and two minor niches on the northern part of the east and west walls. The ambulatory thus combines with the shrine and shrine with ambulatory, again the prototype of late period temple. The dividing arch between the two units of hall and shrine has been broadened[7].



11th century AD
Alo-Daw-Pyi

end of 11th century AD
Abe-Yadana

end of 11th century AD
Naga-Yon

12th century AD
Shwe-Gu-Gyi

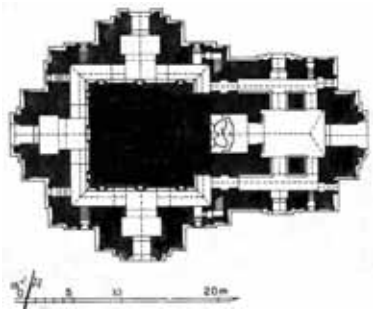
Fig 5.22: Solid core with one vestibule type - $R_{2\text{-}B}$ with selected examples

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

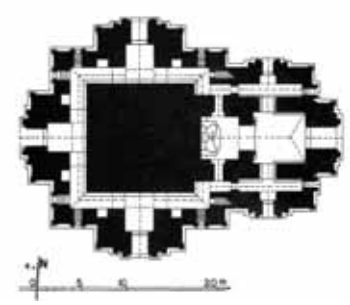
Next step development is solid core with multiple vestibules $R_{2\text{-}C}$ in which the vestibules and lateral porches extended from the central solid core to the four cardinal faces but the main vestibule is created to be larger than the other three lateral porches and normally is existed at the east or north side. By the plan shape, the corridor is surrounded around the solid core and the openings are lines at each side of the solid core's wall, at the end of ambulatory passage way, the lighting and ventilation can get from those openings on the wall. And the formation

[6] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.77-78
[7] Pual Strachan, 1989, P.81-82

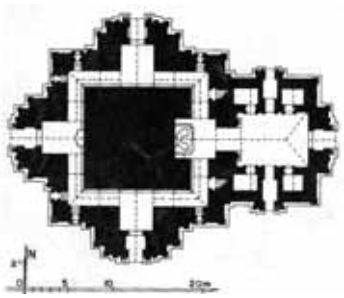
of the niches at the central core changes; which laterally the main Buddha image at the east side is subtracted from the solid core though the other three images are placed on the pedestal at another three sides of solid core and can be accessed from the other three entrances and porches. These features of the temple types can be seen in the medium to large in size temples as at Tha-Beik-Mauk temple (monument no. 744), Law-Ka-Mahn-Kin-Ywar-Haun-Gyi temple (no.1791), North-Guni temple (no.766) and Ta-Yok-Pyay temple (no.539).



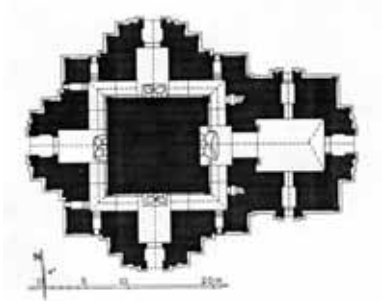
12th century AD
Tha-Beik-Mauk



13th century AD
Law-Ka-Mahn-Kin-Ywar-Haun-Gyi,



13th century AD
North-Guni



13th century AD
Ta-Yok-Pyay

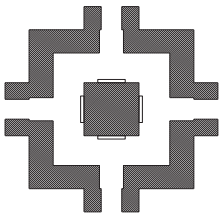
Fig 5.23: Solid core with multiple vestibules type - $R_{2\text{-}C}$ with selected examples

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

In these temples, on the ground level access is permitted not only from the east front but also on the north and south sides of the shrine. In the ground plan, the units are separate, not united as in certain of the smaller late temples. The ground level and main shrine unit project out from the central block across the ambulatory and into the hall. The ambulatory may be accessed from the hall, through the side arches – to the north and south of the central shrine arch beneath broad diaphragm arches, or from within the shrine itself which has narrower arched openings on its north and south lateral sides passing into the ambulatory. The shrine is

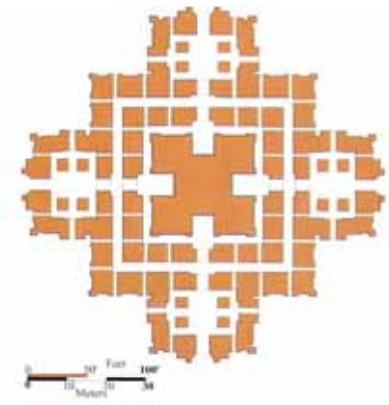
one step higher in level than the remaining floor space and all the floors have been surfaced with stone flags, whilst on the upper level brick was used. In some temples, there are no images on the north, south and west faces of the central block, the emphasis being on the east, though some temples have four images at four sides.

The solid core with multiple vestibules - symmetrically development $R_{2\text{-}D}$ type is found at the large temple size in Bagan as at Ananda (monument no. 2171) and Dhamma-Yan-Gyi temple (no. 771), both are symmetrically develop with large solid core. That symmetric plan shape of this type might be considered based on the Lay-Myet-Hna temple in Sri-Khit-Tra before 7th century AD (see in Fig: 5.24), though this temple is literally the small size, it can be considered the basic plan shape upon this comparison.

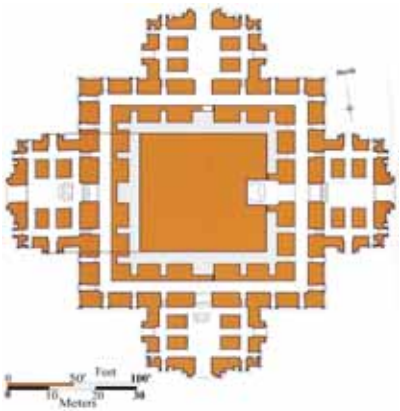


Lay-Myet-Hna temple in Sri-Khit-Tra - before 7th century AD

Fig 5.24: Solid core with multiple vestibules - symmetric type - $R_{2\text{-}D}$



Ananda - 11th century AD



Dhamma-Yan-Gyi -12th century AD

Fig 5.25: Solid core with multiple vestibules - symmetric type - $R_{2\text{-}D}$ with selected examples

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

In these temple types, the basic design idea is symmetric: the temple has two symmetrical planes, resulting four equal segments having mirror images and four entrances; in some literature, this kind of plan is called 'Greek Cross', however such plans are more common at the Renaissance cathedrals of Europe and the Greek temples have normally rectangular plan with triangular entablature on top.[8] And the former scholars also suggested that the 'Greek Cross' plan of Ananda originates from the Pyu temple is redeveloped and there is a double ambulatory around the central mass. In the interior planning of Ananda, entering the interior from the four, broad, spacious porches, one passes through the two ambulatories into the temple's core. The outer ambulatory was conceived as a gallery for sculpture; possible the ambulatories were covered in the mural paintings. The four shrines, medially placed, are opposite the halls and connect with them through tall pointed arches in the base and ambulatory walls.

The architecture of Dhamma-Yan-Gyi temple takes also the form of a 'Greek Corss' in ground plan, though built well within the middle period, the temple in plan, but in its elevation, marks a return to the Ananda type that dates from the early period. The halls are on a lower level than the ambulatories; at the steps leading into the temple's base are the main Buddha images set against a reredos on all sides but the east, where aces to the shrine is permitted. Though there would have been a double ambulatory with four medial recesses into the central block acting as shrines for the four Buddha images, for some reason, the arches and window openings between two ambulatories have been bricked up and the inner ambulatory filled to the level of its vaults with rubble. That was no attempt to increase the base's support for the superstructure because the structure itself is strong enough. Paul Stratchan said that this was a deliberate attempt to seal off the inner ambulatory and the north, south and west shrines. The eastern shrine has large shrine vestibule, and from there the main image in the inner shrine is reached, whereas at other three directions, the images were placed in the vestibule, although there should have been the inner shrines also from these, presumably originally as in the case of the building with four equal segments as Ananda temple. But in this temple Dhamma-Yan-Gyi has just only one shrine is created in the eastern side though creating the other three equal vestibules at three sides. This is one of the unknown

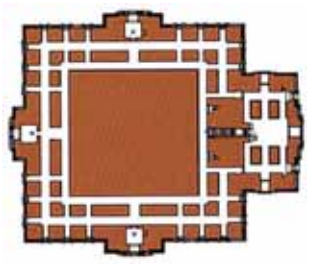
[8] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.125

technologies of this temple and one of those great architectural mysteries. And this temple Dhamma-Yan-Gyi itself was never completed as the suggestion of former scholars. However, the middle period was a time of architectural transition and experimentation, after the Dhamma-Yan-Gyi's construction Bagan builders were never to attempt a monumental 'depressed' type on a 'Greek Cross' plan again.

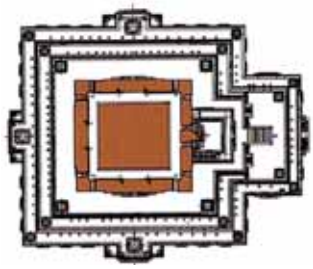
In the another large solid core type $R_{2\text{-}E}$, it is also found in the very large temple sizes with the multi-storeyed temples starting built in the 12th century AD whereas the first temple is That-Byin-Nyu temple (monument no.1597), the highest monument in Bagan with 201 ft. (61 m) from ground level to the top. Together with two entresol levels; one between ground floor and the upper shrine, another one top of the upper main shrine, the temple is counted as four-storeyed temple. Other temple belongings to this type like Sula-Mani (no.748) and Gaw-Daw-Palin temple (no.1622) have no entresol levels and therefore counted as three-storeyed building (see in Fig: 5.26).

That-Byin-Nyu's interior planning is the makes it one of the most unique and innovative of Bagan temples. In other temples, past and future, the stairway is usually relegated to a duct-like passage passing through the thickness of exterior walls. At the That-Byin-Nyu, the stair passage becomes a significant architectural feature in itself. Facing the main opening, in place of the usual sanctum and image, the stairs rise from the arch up to the 1st level of entresol. The purpose of the entresols was to reduce the mass of the main blocks, they contain neither paintings nor images. In the upper entresol the original guttering system are still in use. It had been suggested by Stratchan Paul that the area within the central block was hollow or rubble filled, however, that in fact temple cores were solid masses of brickwork and not hollow. The lower ambulatory contains some fragments of paintings; perhaps more survive beneath the centuries of encrusted lime wash. To reach the first storey, one thus passes above the first entresol onto the ground level hall terrace and up the broad exterior stair-bridge linking the ground floor hall with the first floor hall. Here the image is placed in a giant niche on the east face of the central block, looking out to the shrine-hall. In the shrine, light is unlimited and the atmosphere cool and airy beneath the tall vaults. The second entresol is directly above the shrine level ambulatory and is again no more than a mass reducing device. From here, further passages of steps climb up through the outer wall to the upper terraces. It seems unlikely that

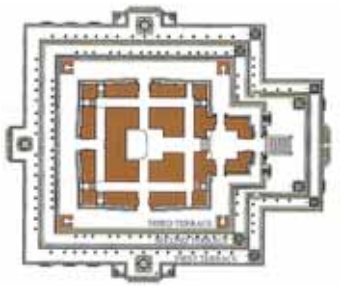
the builders saw to the That-Byin-Nyu as a mountaineering expedition to the peak of the cosmic mountain.[9]



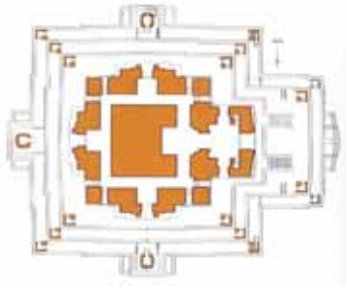
Lower Entresol Plan



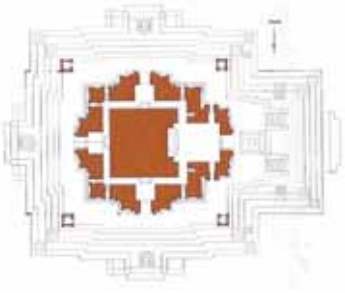
Upper Entresol Plan (That-Byin-Nyu)



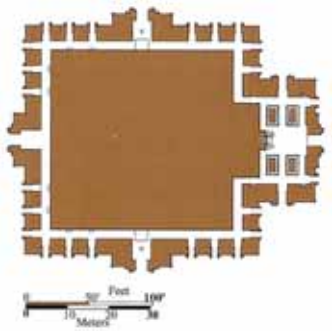
Upper Floor Plan



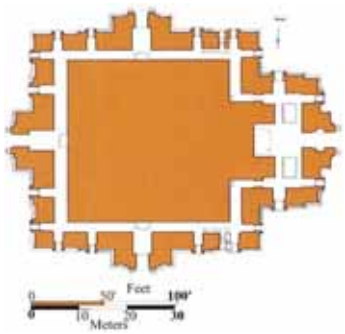
Upper Floor Plan



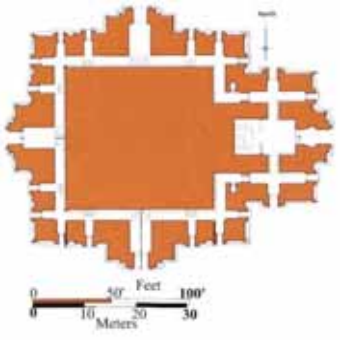
Upper Floor Plan



Ground Floor Plan
That-Byin-Nyu
12th century AD



Ground Floor Plan
Sula-Mani
12th century AD



Ground Floor Plan
Gaw-Daw-Palin
13th century AD

Fig 5.26: Solid core with multiple vestibules type - $R_{2\text{-}E}$ with selected examples

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

As the structural system and design principles applied in That-Byin-Nyu temple of 12th century have been completed, the temples or other structures constructed in the later centuries are repetitive application of the same technology and design principles. Therefore That-Byin-

[9] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.84-87

Byu is the forerunner example using that technology improvement to built multi-storeyed temples in Bagan. In the late period, the large two-storey temples: Dhama-Yan-Gyi and That-Byin-Nyu were to be harmonized into a classical architectural compromise of the Hti-Lo-Min-Lo and Sula-Mani temples.

In the architecture of Sulamani, it has the square-based plan with a hall projecting to the east that is repeated on the upper level. Though the east hall on the ground level is recessed into the central block, the other three cardinal images are simply placed against the inner ambulatory wall. In it, the massive block arrangement of the That-Byin-Nyu is combined with the monumentally of the Dhamma-Yan-Gyi. In its interior planning, there are also two stair passages from the ambulatory to the upper shrine. Here, the builders has rejected the That-Byin-Nyu concept of a central stair feature, preferring the more traditional hidden stair passage passing up through the walls, the walls passages themselves are both more spacious and better lit than earlier stair passages.

The design feature of Gaw-Daw-Palin is the four faces, Lay-Myet-Hna type temple. There are four shrines on the ground level slightly receded into the center block, each containing monumental images of the Buddha. In the interior planning, unlike the That-Byin-Nyu, the stair flight is not the central feature of the hall. This feature was never tried at Bagan again and one rises to the upper shrines through a stair passage that passes up through the walls, the shrine within is a well-lit and open space. There are also the shrines at the other cardinal points, facing the arch and open to the magnificent view. The mass of the block or core, though conceptually solid, is said to be hollow in order to reduce the mass and save on the expense of filling the interior.[10]

5.2.2.3. Temple with Solid Pillar - R_3

This design improvement is the way; the shrine was created as open shrine with four columns instead of walls and Buddha statue is placed on the pedestal in the center of four columns. This idea of using columns is also seen in the vestibules at Ananda, Dhamma-YanGyi and That-Byin-Nyu temple, this idea was also applied before at other smaller temples. The

[10] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.97-98

construction of the main shrine with columns makes the advantage of bright and well ventilated shrines. Unfortunately, there is no Buddha image enshrined, however, the central pedestal could have born an image of the Buddha, possibly life-size and standing, for there is a skylight above that would have illuminated a figure of such dimensions.[11]

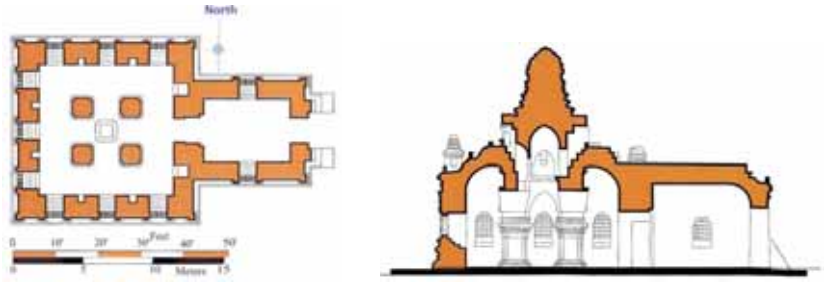
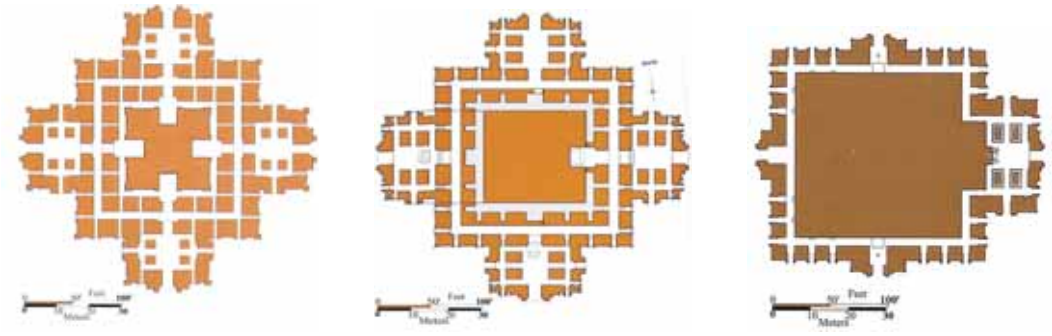


Fig 5.27: Solid pillar type - R_3 in the main shrine in Nan-Phaya temple

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

The construction principle of Ananda is the large solid core at the center, which takes over the function of load bearing pillar with added improvement of double ambulatories. Another innovation is the four niches extracted from the pillar at four cardinal directions, forming therefore four visually separate shrines, which are connected with passages. The plan is the result from having pillar in the shrine and together with four extended vestibules formed a plan which is like a cross.



11th century AD	12th century AD	12th century AD
Ananda	Dhamma-Yan-Gyi	That-Byin-Nyu

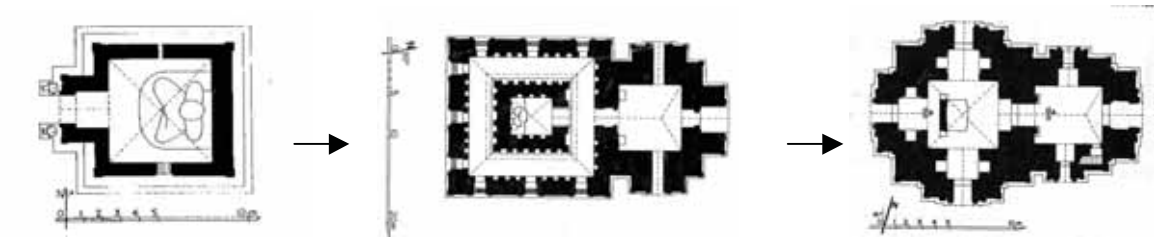
Fig 5.28: Solid pillar - R_3 in the vestibules with selected examples

Drawing Source: Kyaw Lat, 2010

[11] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.46

5.2.2.4. Findings and Conclusions

In case of Myanmar, there were also hall type temples found in Beikthano and Sri-Khit-Tra, starting from about 6th or 7th centuries, the designs also changed into shrine types. Bagan builders adopted the two basic prototypes of Sri-Khit-Tra; the first one is the single shrine temple type and the second one is temple with solid core or pillars inside the shrine. The first shrine temple type evolved into several types: the first step is simple single shrine type, this is the first surviving example of Pyu-derived engineering skills at Bagan and it was intended as a gallery for sculpture, square in plan. The second step of development is to have extended elongated vestibule from the central shrine, the ground plan is a play of squares and continues the distinction between hall and shrine generally, it was found in the early period temples. The third step is to have multiple vestibules and entrances at four faces, there were several in Bagan though this design has no particular advantage from the aspects of building larger shrines compared with solid pillar temples.



1st step 2nd step 3rd step

Fig 5.29: Development and evolution of central shrine temple with selected examples

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

The second type with solid core or pillars evolved into several types: the first step is to have niches for the images by extracting space from the pillars, the hall is square in plan with the medial openings at the lateral walls and the ambulatory surrounds the central block. The second step is the development of inner shrines, the four walls of the solid core are substituted for the structural function and the corridor is separated from the inner shrine. The third step is to have very large solid core in the shrine, the ambulatory surrounds the central block or core; that large core is also the pillar to support the structure used in the multi-storeyed temples. The fourth step of development is to have two layers of corridors; ambulatory surrounds the central core and formed symmetrical shape. The fifth step of the development is to have four

columns in the main shrine which take over the load bearing function and provide to the image in the center with full light and ventilation, also this design might be derived from the Nat-Hlaung-Kyaung temple in the early period and used the solid pillars in the halls of the large temple in size, however, this design is the only one in Bagan but the usage of pillar in the hall have been used further temples in Bagan.

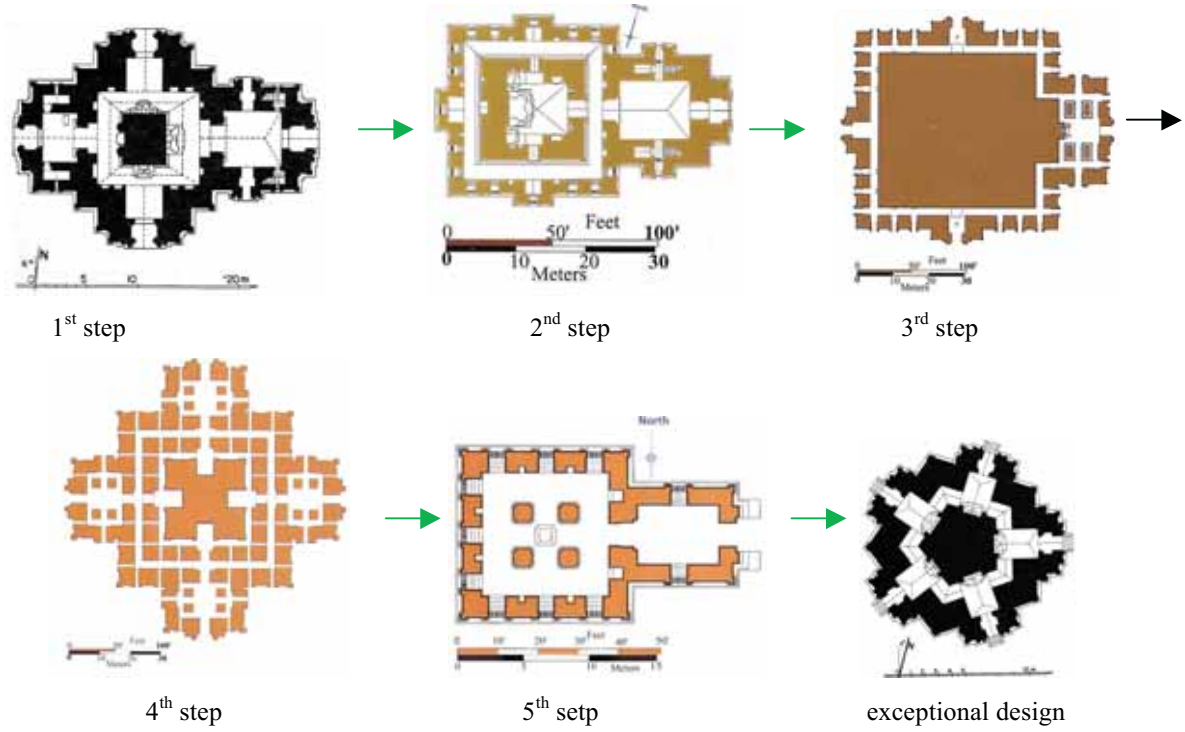


Fig 5.30: Development of solid core and pillar inside central shrine with selected examples

Drawing Source: 1) Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

2) Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

In addition to the evolutionary process above, there are some exceptional designs based on the same structural system of having pillar as the load bearing element but with different plans, examples; temples with polygonal shape - five or eight sided polygons where the pillars also have the same shape and five or eight Buddha images are placed against the pillars (see in Fig: 5.31) at Nga-Myet-Hna temple (monument no.607). From religious aspects, this original square pillars and four images mean devotion to four past Buddhas on this earth and five images mean the four past Buddhas and the future and last Buddha Maitreya to appear on this earth later.

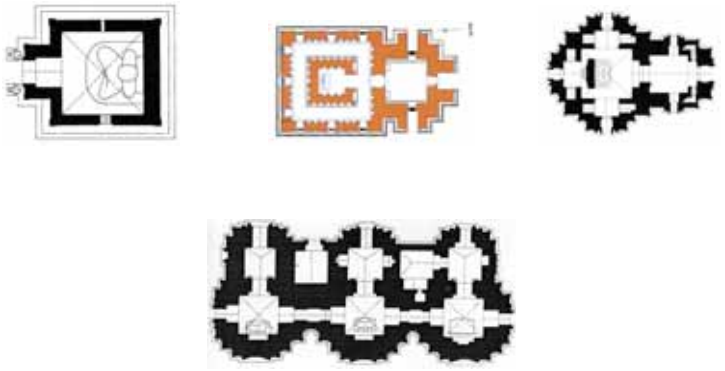
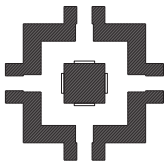
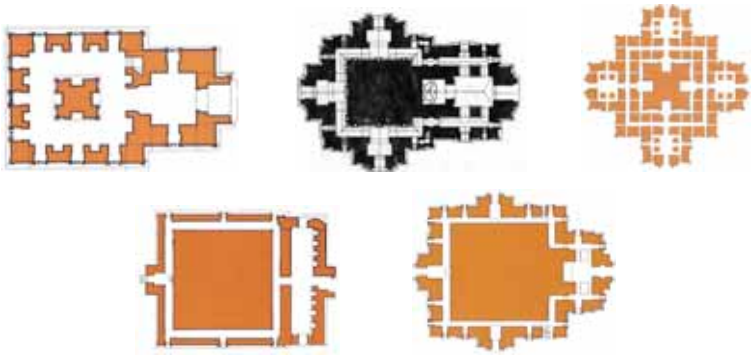
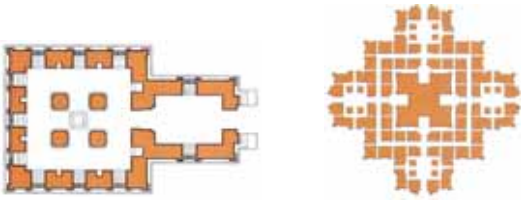
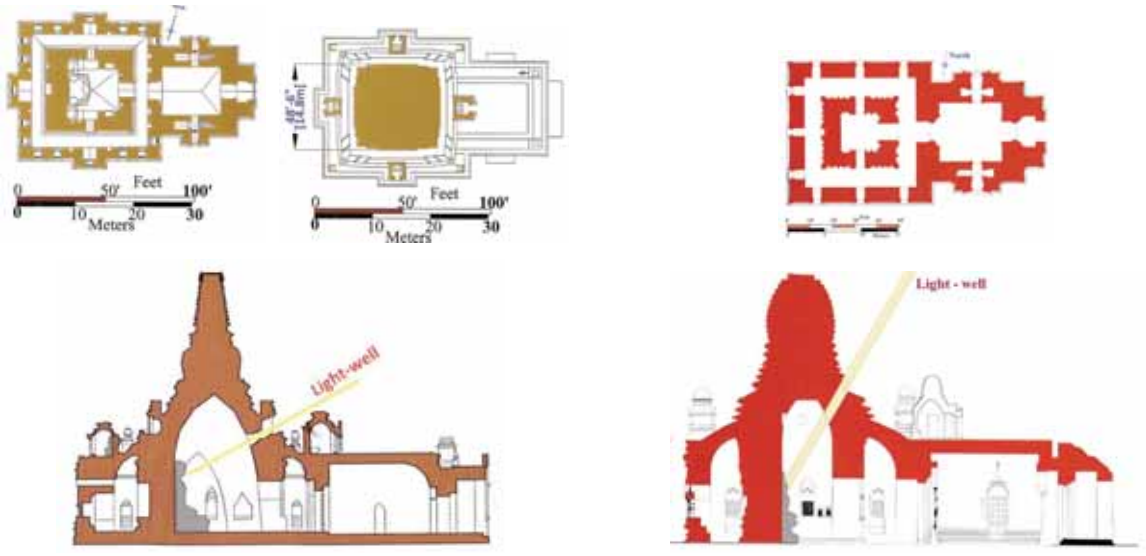
Prototypes	Evolution of Temples by the Plan
 	**Development of Single Shrine Temples** 
 	**Development of Solid Core Temples** 
	Development of Solid Pillar Temples 
	Development of Polygonal Pillar Temples 

Table 5.2: Evolution of temple plan shapes in Bagan with selected examples

5.2.3. Development and Evolution by the Architectural Form

5.2.3.1. Temple with Central Shrine - R_1

In Bagan, temples with inner shrines were built at the end of the 10th century AD, or at least the buildings survived to the present day are from around that period. The building has a square plan with an inner shrine, and it also has openings in the inner walls and the light penetrates through the exterior windows and through the openings of the inner walls, and also from the roof. In the form of central shrine temple with extended elongated vestibule (see in Fig: 5.32), architecturally, the criterion for dating early temples is the evolution of the upper shrine, and here, Pa-Hto-Tha-Mya temple is more articulate and sophisticated work than either Abe-Yadana and Naga-Yon. Pa-Hto-Tha-Mya temple includes the four upper shrines, which is similar to the Gu-Byauk-Gyi temple (Myin-Ka-Bar). These upper blocks mark the beginning of the Bagan builder's first development from a temple with the shrine on the ground, to the middle period development of an upper shrine. These upper shrines contain the images. And the shrine in ground floor is lit from a skylight set in the superstructure, which is hidden by the upper shrine. There are through-wall light openings from the ambulatory.



Pa-Hto-Tha-Mya - End of 10th century AD Gu-Byauk-Gyi (Myin-Ka-Bar) - 12th century AD

Fig 5.31: Evolution of upper shrine with selected examples

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

In the exterior form of the Gu-Byauk-Gyi temple, tall, firmly based Sikhara oblisks are positioned on the terrace corners and serve to strengthen the temple's elevation. Where the hall meets the shrine the Middle period upper storey is born – a small shrine housing an image with pediment frontage and miniature Sikhara above. In these temples, the actual skylight, required to illuminate to the Buddha images inside the central shrine, has been relegated to an unmarked recess in the moulded upper mass, hidden by the upper shrine to its fore. Paul Strachan Paul suggested that, thus, by the beginning of the 12th century, Bagan builders had begun their explorations into the possibilities of a temple's upper levels, where the inclusion of the ground level shrine was completely eliminated.

Fig 5.32: Pa-Hto-Thar-Mya temple and Gu-Byauk-Gyi temple

Photo Source: Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989

5.2.3.2. Temple with Solid Core - R_2

The expression of this type is massive in form and changes the development of the terrace and Sikhara on the temple. The Ananda initiated the doubled terrace type in Bagan then later that concept developed in That-Byin-Nyu temple, breaking the two terrace sections with the shrine block, but here there is no upper sanctum which has reverted to the ground level arrangement with all six terraces run continuously together with no break. The gap between each ascending terrace is shortened as height is gained, the broadcast being the lowest. The whole elevation is strengthened by solid, square-based corner stupas on the lower four terraces. On the exterior of Ananda, symmetry is the dominant force. Each face is a balanced composition of pediments, ascending up through the terraces to meet the superstructure and Sikhara. The base walls have two rows of openings that have no perforations, thus casting more light into the

ambulatories than in previous temples. The inner ambulatory is darker than the outer. The wall between the two ambulatories has cross passages that repeat the outer wall openings. Thus, the outer base wall is really a shell encasing an inner shell built about the central mass. The terraces, superstructure and Sikhara are a well balanced arrangement. The front is repeated on the lower terrace level, between the hall and base wall, and is again repeated on the second terrace, where this pediment arrangement frames the medial skylight opening from which a beam of light is diffused down onto the Buddha's face in the shrine beneath. The third and uppermost terrace has subsidiary Sikhara oblisks, carried on a high base, and mirroring the central form. The heavily moulded superstructure, that carries the Sikhara of previous early period temples, here receives a fuller treatment: it is heightened and broadened to carry a Sikhara taller than ever attempted before at Bagan. The Sikhara has medial panel-niches, five to each face, each containing an image of the Buddha, this arrangement is an extension of the four Buddha theme to include the future Buddha Mettya. Such a super structure arrangement, with the inclusion of three further terraces, pre-empts the That-Byin-Nyu arrangement where an upper shrine is placed between lower and upper terraces.[12]

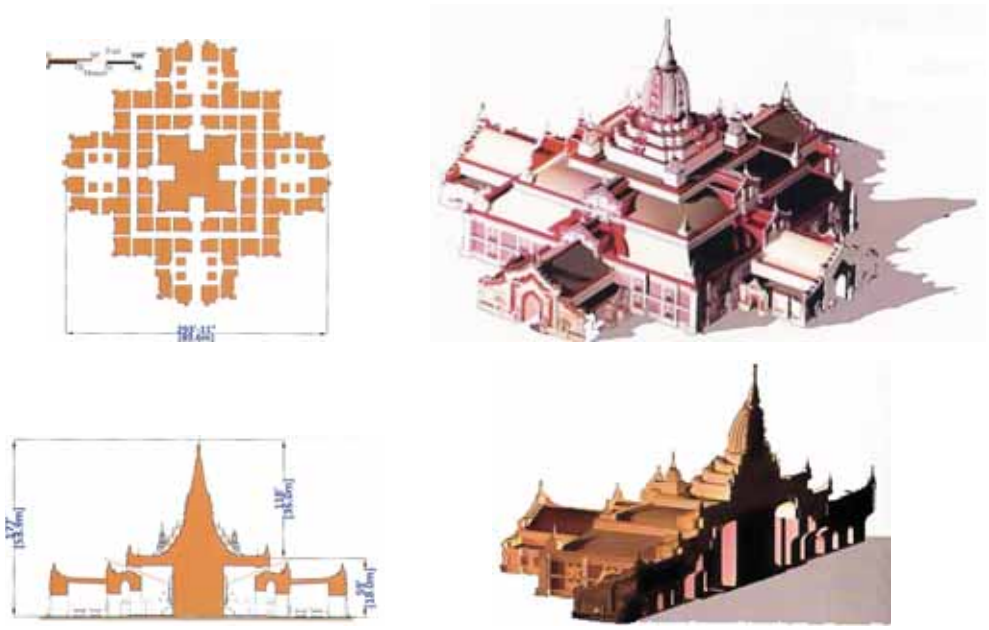


Fig 5.33: Terrace type of Ananda temple - 11th century AD

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

[12] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.67

In its exterior form the That-Byin-Nyu is a great play of cubes. The original gu or cave conception has been left behind and the upper storey experiments culminate in the lifting of the main image and its sanctum from the ground level to an upper level. Above are three terraces, at their corners stupa oblisks rise from square based blocks with passages passing through them. The massive upper cube contrasts the close detailing of the terraces with its sheer blankness: openings are reduced to a minimum and there is scarcely any ornamentation other than double pediments over the ached entrance openings. Above are three further terraces, with corner stupa obelisks and medial recesses. All this is surmounted by the extraordinary Sikhara, a squat broad form that acts on the great play of masses beneath, like a pressure value holding down some powerful and energetic force. The dramatic play of forces and volumes, this comprehension of the energies inherent in the juxtaposition of the architectural form, seems unprecedented at Bagan. Certainly it is on this scale; however, what the architects attempted was a continuance of the longitudinally planned gu type of plan combining with the crescendo effect of the Ananda's elevation.[13]

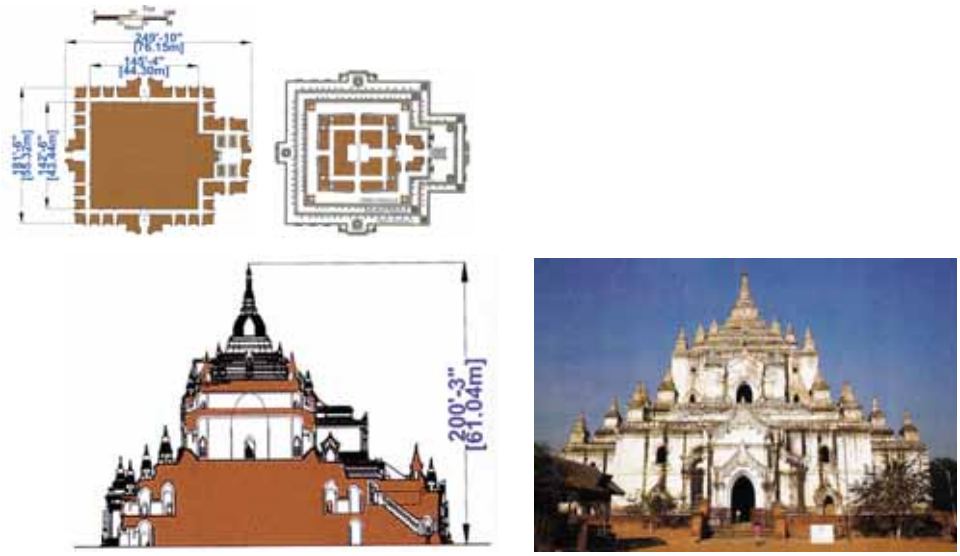


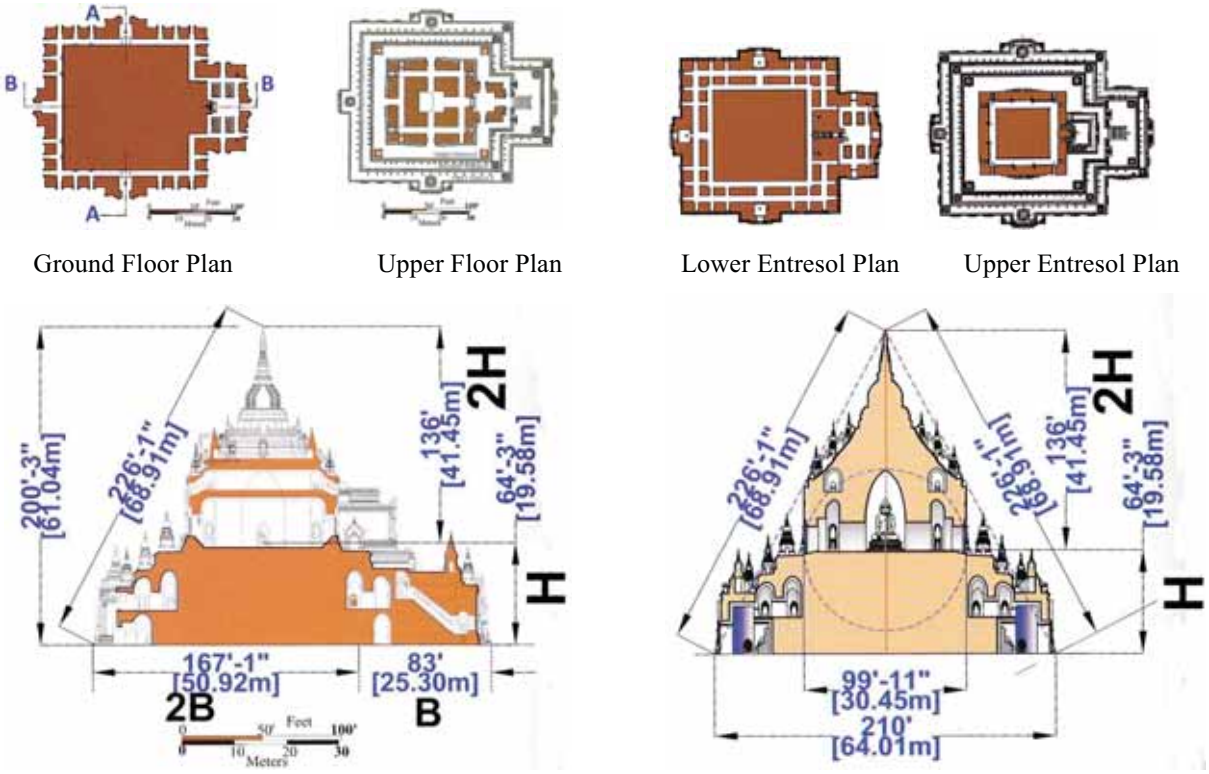
Fig 5.34: Terrace type of That-Byin-Nyu temple - 12th century AD

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

To analyze the proportions of the highest temple That-Byin-Nyu, the front elevation of temple was designed almost as an equilaterally triangle, and the total height of around 200.25 ft. (61

[13] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.84-86

m) was divided into two parts; the first is the distance from the ground to the upper shrine level and the second one is the distance from the upper shrine to the top which makes a ratio of 1:2, meaning the upper portion divided by the total height, 2/3 results to 0.6, which is the golden ratio as defined by the renaissance artists of Europe.[14] And the ratio is also maintained in the side elevation, the ratio between total of the base length and the length up to the end of extended vestibule gives also approximately this ratio of 2:3: the longer division divided by the total length also results in roughly 0.6.



Ground Floor Plan | Upper Floor Plan | Lower Entresol Plan | Upper Entresol Plan

Section B-B | Section A-A

2H/3H = Approximately 0.6

2B/3B = Approximately 0.6

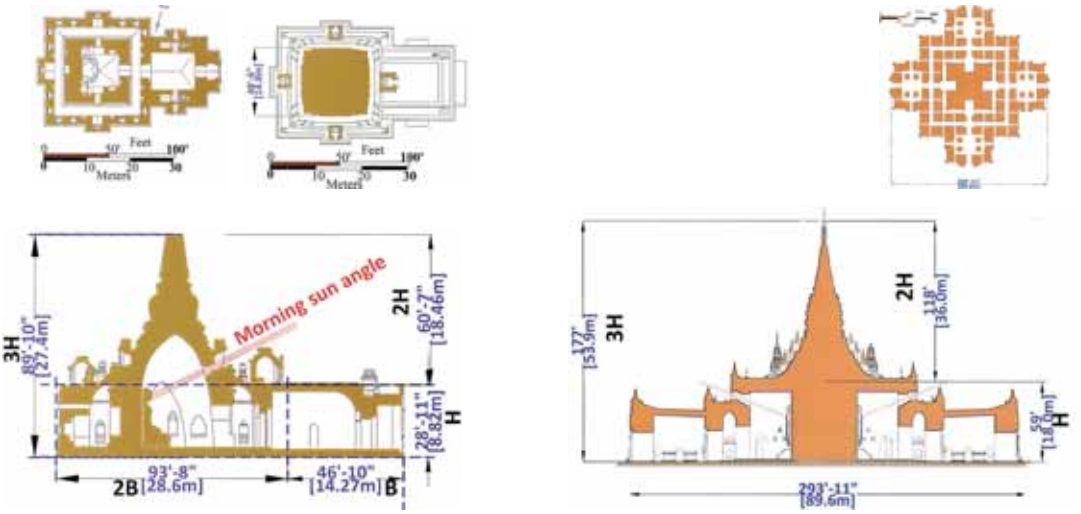
Fig 5.35: Proportion analysis of That-Byin-Nyu temple

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

Concerning the proportions in other temples in the early period, Ananda and Pa-Hto-Tha-Myar temples have a similar ratio of height and width which also results in around 0.6. Ananda, built in the 11th century, is one of the masterpieces of Bagan architecture and the first

[14] Kyaw Lat, 2010, P.132

temple using special effects in the inner space designs and the daylight design from which later examples are built like these effects.



Pa-Hto-Tha-Myar
End of 10th century AD

Ananda
11th century AD

2H/3H = Approximately 0.6
2B/3B = Approximately 0.6

Fig 5.36: Proportion analysis of the early period temples with selected examples

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

5.2.3.3. Temple with Solid Pillar - R_3

The exterior composition of this type is simple in its conception, perhaps even slightly restrained. The plan is simple two units; the hall and the open shrine. This is the type of temple which applies good design features developed in the 11th century AD, and the separate inner shrine and columns and the light-wells from upper roof. In this temple Nan-Phaya, the hall vault is masked by two simple terraces and over the shrine a third one runs beneath the Sikhara which is carried by four freestanding piers. The space between them is directly beneath the central mass above. The openings protruding about the base of the Sikhara are sky-lights which transmit a dim light down onto the pedestal upon which the Buddha image stood between these piers. Rising from the steep, horizontal lines of the base mouldings is the Sikhara, a vertical stroke countering the horizontality of the temple's sub-structure. This type

of Sikhara with a square base and curved, tapering, upwards and inwards panels, and a crown ornament, was the current form used in contemporary North-East India, which may have been carried to Myanmar in the portable medium and influenced temple design.[15] That is why that square base and curved, tapering edge terraces, first introduced into the Bagan with this building of Nan-Phaya in the 12th century AD in which the stupa crown is from Pyu periods. This is an upwardly directed elevation to the temple, lacking in the Pyu versions, which therefore must come from contemporary Indian designs between the fall of Sri-Khit-Tra and the rise of Bagan.

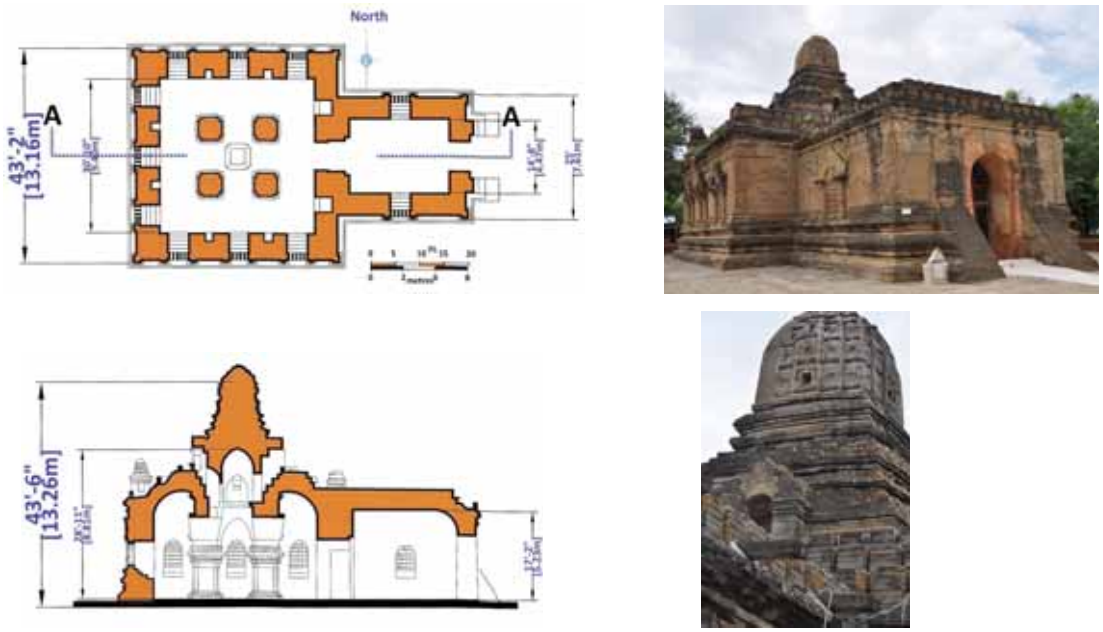


Fig 5.37: Composition of solid pillar temple - Nan-Phaya

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

5.2.3.4. Findings and Conclusions

In a building, the required elements in the plan are influenced mainly by their function; in the case of all Buddhist temples, they basically have the main shrine, one or more entrances in the plan and the Sikhara to place the relic chamber in form. And the technology, the shape of the building, the proportions and ornaments are also the expressions of the building's character. As with the architectural temple types in Myanmar, there has been developed from period to

[15] Paul Strachan, 'Pagan: Art and Architecture of old Burma', Singapore, 1989, P.48

period basically central shrine type and solid core type starting from Sri-Khit-Tra to Bagan. And their design features have also been changed from single storey to the two or three storey temples. The early period temple type was to be phased out by the early 12th century when Bagan builders unconsciously reverted to the cosmically oriented ground plan types of the Pyu Lay-Myet-Hna. The distinction between hall and shrine gradually became reduced, though rarely eliminated, and the temple's components become balanced into a unified whole, an integration evident both from the exterior and interior. The admittance of light was no longer rationed and the dark, mystical early period 'gu' interiors were no longer required when, architecturally, the transition to the middle period took place. In temples, lighter environments came to be preferred, and the predominant architectural tendency was in the upwardly directed possibilities of the exterior, or elevation, rather than the mystical possibilities of the cave interior.

The temples evolved into several types: the first step is with a single shrine in the ground floor and the development of the upper shrine. This movement is Bagan builders' first development from a temple with the shrine in the ground floor to the middle period development of an upper shrine, the greatest, in scale, of That-Byin-Nyu temple. That also gives the impression that it is an upper shrine when viewed from the ground. The second step is with a solid pillar at the ground level, its exterior composition is simple in its conception, perhaps even slightly restrained. But this is the link of Pyu type Nat-Hlaung-Kyaung temple, though the Sikhara form with square base and curved, tapering upwards and inwards panels, may have been an import from India because that form was the current form of contemporary north-east India; Stratchan Paul said that it may have been carried to Myanmar in this portable medium to influence temples design.

The third step in development is a shrine with double ambulatories, in style, this step remains within early period, with an exterior elevation that continues the balance between the horizontal and vertical forces. The ambulatories remain the dimply lit and the shrines have the intense and moving atmosphere characteristics of the early period temple. The Ananda, the early period temple initiated double terrace type at Bagan, That-Byin-Nyu developed the concept, breaking the two terrace sections with the shrine block. And the fourth step is with extra-large solid core, the ambulatories surround the shrine, whereas the large core is the

pillar, which used in the multi-storeyed structures. And among Bagan temples, there are some exceptional designs and forms which cannot be categorized, such as a groups of form like Manuha temple (monument no.1240). This temple type is with an elongated shape with images sitting and laying position; which the image size is too big. This is a remarkable feature at Bagan because the building owner is the king of Mon and Bagan received Buddhism and art from Mon in the 11th century AD. Therefore the early temple types in Bagan are influenced by Mon type but later were transformed to semi-Mon types, then later formed and developed into Burmese type.

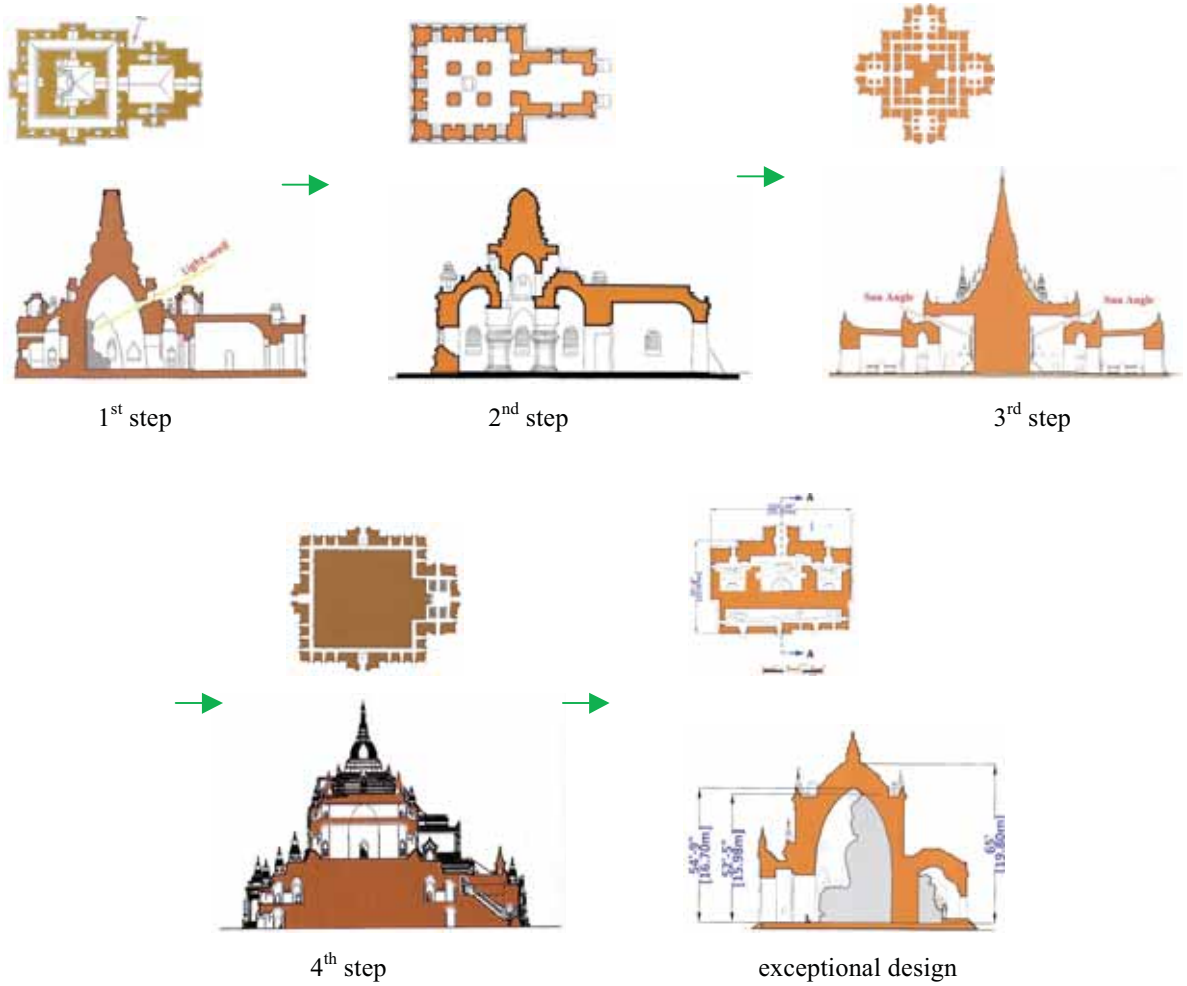


Fig 5.38: Development and evolution of temple plan and form with selected examples

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

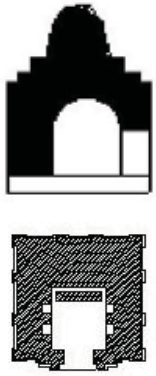
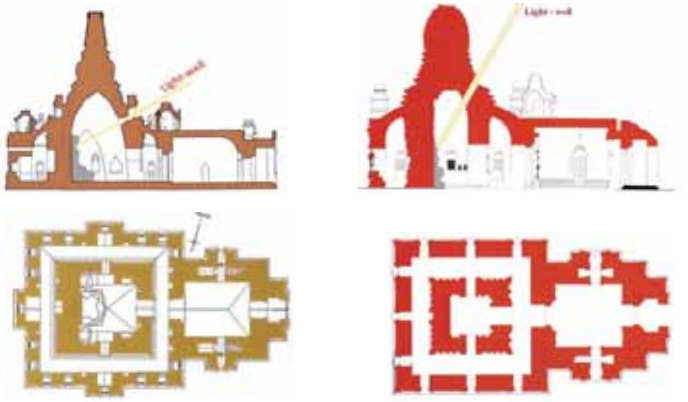
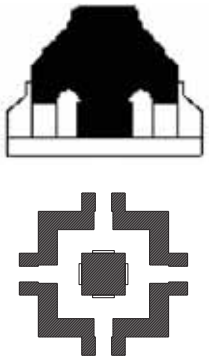
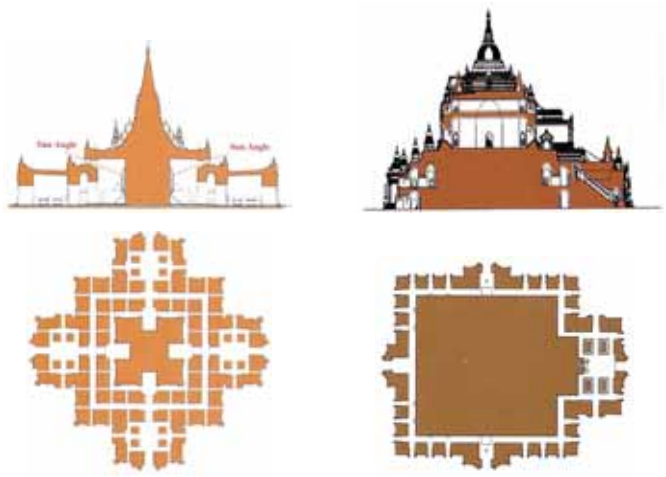
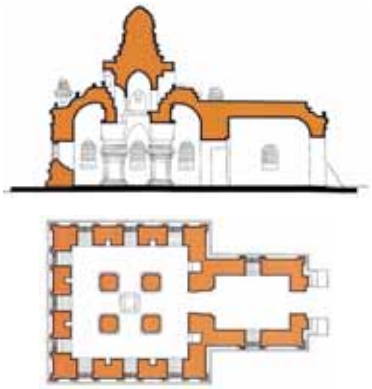
Prototypes	Evolution of Temples by the Plan
	**Development of Single Shrine Temples** 
	**Development of Solid Core Temples** 
	**Development of Solid Pillar Temples** 

Table 5.3: Evolution of temple forms in Bagan with selected examples

5.2.4. Development and Evolution by the Design and Technology

The technology applied to all buildings in Bagan was a brick-masonry load bearing structural system, using brick vaults to cover the inner spaces. The first step is designing inner spaces entirely without solid pillars, to have an inner shrine, the structural principle is that four walls of the inner shrine substitute for the load-bearing function of the pillar. That desire to have an inner shrine may arise from the Buddhist habit of praying in a dim room or may be inspired by Indian examples, but the technical solution must be available to fulfill that desire, and obviously the architects in Sri-Khit-Tra in about the 7th century AD have also tried this kind of design, as seen in East-Zegu temple, and could not manage to build long lasting structures due to lack of technical solution.

The early temples' inner shrine is intentionally designed to be dim; the temples face east or north, and the daylight through the perforated windows at the southern and northern exterior walls and through the openings of interior walls provide barely enough light for moving around in the shrine during the evening hours. The part of the roof in the east has a light-well which is adjusted with the morning sun angle to beam at the image in the inner shrine. The temple designs in Bagan have evolved from one pillar in the shrine, then the next improvement having niches in the pillar, and then walls of the inner shrine substituting for the structural function of the pillar, with this step by step improvement from about the 9th century which is the estimated time of temple building technology coming from Sri-khit-tra, until about the end of the 10th century.

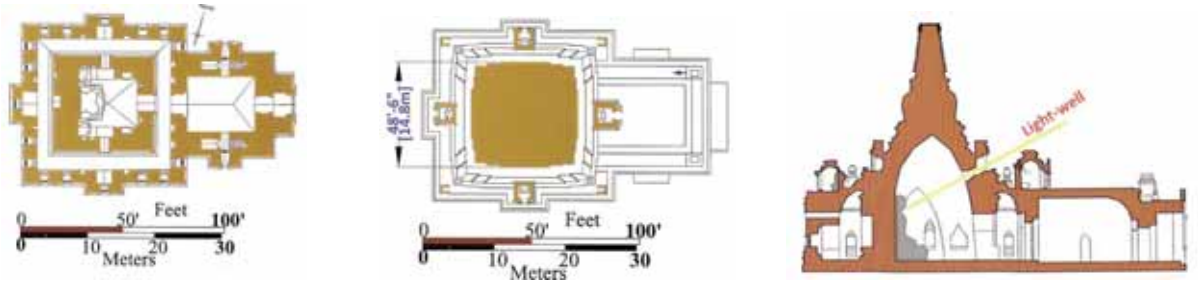


Fig 5.39: Ground floor plan and upper floor plan of Pa-Hto-Tha-Myar temple

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

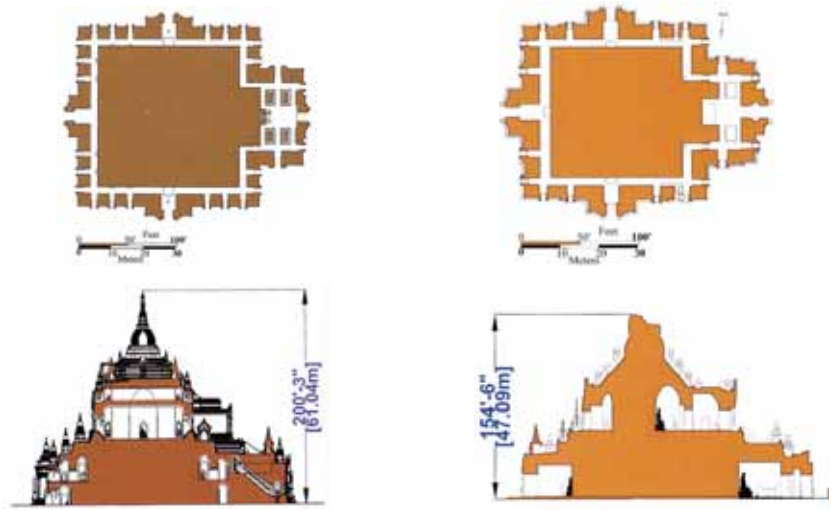
In the materials usage, although Bagan temples used mostly bricks and stone, stones were used as a keystone or sometimes as the floor, but in the Naga-Yon temple, one different technology than in the other temples can be found, in that there are timber elements used as the load bearing members, though people had known to build the building with bricks a few centuries. In Bagan, except in a few two-storey monasteries, where timber floor joists were inserted into the brick walls to make the floor, there were no other temples found in Bagan before or after this only example. Therefore that usage of this structural system is the exceptional design in Bagan.

Fig 5.40: Timber members mixing with masonry elements and multilayer vaults using stone and bricks mixed in Naga-Yon temple

Photo Source: Author

In the design with niches built into the pillars, the niches are covered with internal vaults, and the pillar has the following functions: to stand for barrel vaults spanning the main shrine and the exterior walls, to have built-in niches for the images as the main function of the temple, and to take over the function of load bearing elements for Sikhara. In the single central shrine temples, the larger span vaults are required to cover the shrine area, whereas if a pillar was used in the shrine, the span to cover the passage is smaller and the pillar can easily carry the load of Sikhara; this technology was already known in Sri-Khit-Tra as seen in Lay-Myet-Hna temple, which has a narrow passage of about 5 ft. (1.3 m) around the square solid core which was originally covered with vaults. This feature is likely to have a system of very large solid core which was adopted and developed further to build multi-storeyed temples later. The construction system with very large solid core, which has passages around that solid core, is seen in the temples like the That-Byin-Nyu, Sula-Mani, and Hti-Lo-Min-Lo constructed in the 12th century AD. The fundamentals of this technology were developed in Sri-Khit-Tra and transferred to Bagan, and in Bagan this was developed further, firstly by developing different kinds of vaults and secondly by applying them as different design elements. In the beginning

stage, vaults were spanned from wall to wall, and then from wall to column and finally from column to column and often used to construct stairs and light wells, etc.



That-Byin-Nyu Sula-Mani

Fig 5.41: Large solid core structure in 12th century AD with selected examples

Drawing Source: Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010

Theoretically some temples are called two-storied temples but from the structural aspects these are single storied temples with a possibility to go to the roof, and only small chambers are designed in the roof floor which cannot be defined as shrines because they are too small and do not have too much weight on the under structure and there are no additionally designed structural members to support larger shrines. Therefore in Bagan only the small chambers were placed at the corners where the exterior walls are underneath, and the vault in the ground floor has to carry only the loads of the Sikhara.

5.3. Part III – Mrauk-U

5.3.1. Development and Evolution by the Aspects of Historic Period

The architecture in Mrauk-U was attained from the past periods of Rakhine's old cities of Dhannyawaddy, Waithali and Laymyo. But the religious structures mostly found in those old cities are the stone stupas which were curved to the single stones with different compositional

elements and different heights and sizes. But their basic composition is the same, with a square plinth and cubic base, curved on the plinth to support the upper part, on which the terrace with two or three tires and a cylindrical bell-shaped dome is mounted. Stupas in those periods are simple in form and most are the solid type with a conical shape. Though Indian style stupa shapes with Hamika are influenced by early and middle period of Mrauk-U, and later the Rakhine people invented a new form of the stupa by eliminating the Hamika and umbrella crowned directly on the spires. The hollowed space stupas, which have nearly the same form as the small temples, were found from the early to the later period. That spatial composition of hollowed space stupas which have one entrance and narrow passage way directly leading to the central shrine but not wide space like the temple. And these stupa types were found where they were used at the upper part of the temples, at the corners of the temples and surrounding the great temples like an outer wall. Mostly the temples were built in the middle Mrauk-U period with those design features.

In Mrauk-U, most of religious structures found are the stupa types which are 81% of all religious structures, whereas the temples are just 9% of all religious structures. A few temples are seen in the early Mruak-U period but they flourished in the middle period of the 16th century AD rather than the early periods, though no temples were found and built in the later periods. In the middle period, the great temple structures like Shit-Thaung, Koe-Thuang, Htuk-Kan Thein and Andaw-Thein temples were built with an accessible arch, inner corridors and a central shine. Therefore, though a few temples were built through the Mrauk-U period and can't compare with the ones in the previous periods in Rakhine, these great temples among all other religious structures indicate the amazing architecture of Mrauk-U which was built in the 16th century AD. The features of the temples are with a maze-like spatial composition and the designs were emphasized on the horizontal plane rather than the vertical.

5.3.2. Development and Evolution by the Plan

The temples in Mrauk-U have various plan shapes, and though there are a few, even the great temples are not the same. Therefore, here, the temples in Mrauk-U can be analyzed by different composition each because the same temple types were not found there but it might have been the development change from period to period. When analyzing the temples in

Mrauk-U, the rectangular types and octagonal types were found. To analyze these temple plan shapes in detail, they can be categorized into the following two types of rectangular shape and two types of octagonal shape:

R1 - the temple with central shrine, and

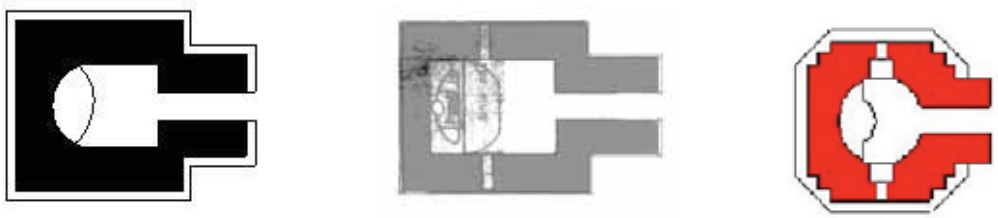
R2 - the temple with solid core.

O1 - the temple with central shrine, and

O2 - the temple with solid pillar.

5.3.2.1. Temple with Central Shrine - R1

When the temple with central shrine type R1 is analyzed by the organization of its plan, different types can be found such as the type with the simple single central shrine R1-A, the combination of rectangular and semi-circular shrine R1-B and the central shrine with vestibule R1-C type. In type R1-A, the central shrine shape is changed with the different types though the outer plan shape is rectangular. The first type is the combination of rectangular and semi-circular shape central shrine type, for example That-Taw-Ya temple (1525 AD), the second one is rectangular central shrine type, for example Shwe-Gu-Gyi temple (AD 1531), and the third one is circular central shrine type, for example Lay-Kar-Htee-Phyu-Saung temple (1531 AD). All these temple types are found in the small temples and the central shrine is connected by a narrow passageway to the entrance and they have one main entrance. Lighting and ventilation can be gotten from that entrance and the secondary passages and porches from both sides of central shrine.

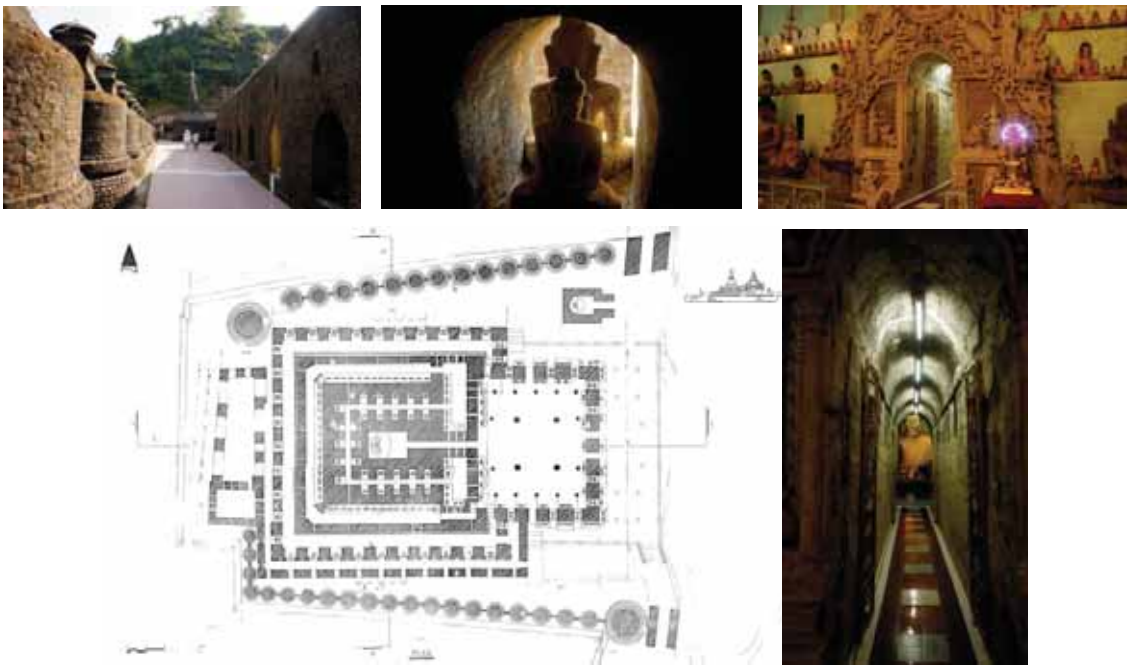


That-Taw-Ya AD 1525 | Shwe-Gu-Gyi AD 1531 | Lay-Kar-Htee-Phyu-Saung AD 1531

Fig 5.42: Temple with central shrine type - R1 with selected examples

Drawing Source: Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Department of Architecture, Mandalay Technological University, 2008

The central shrine with vestibule $R_{1\text{-}B}$ type is seen in the great temples in Mrauk-U and these temple types show the magnificent architecture of that period, for example Shit-Thaung temple (1531 AD) and Koe-Thaung temple (1553 AD). Shit-Thaung temple is an *'eighty thousands Buddha images'* temple because it has eighty thousand Buddha images in the temple. The whole plan shape is rectangular with four corridors and then there is connected with one rectangular ordination hall at the western part, which it is then connected with the outer corridor at the southern part, and then to the entrance hall at the east side. The main Buddha image is enshrined in the center of the central shrine in the 'U' shaped form, where it existed at the center of the temple and is accessed with a narrow passage way from the entrance hall at the east side. The main shrine sanctum is cut into the solid block and the corridor is surrounded by the main central shrine, also cutting the central solid block to form a 'U' shape form which is then accessible to the main image sanctum at the centre of the shrine, by connecting with the second inner corridor. The small niches are lined with Buddha images in a sitting posture, five each at both sides of inner 'U' shape corridor form. And there are a series of Buddha images on the inner ambulatory wall's one side.



Shit-Thaung temple - 1531 AD

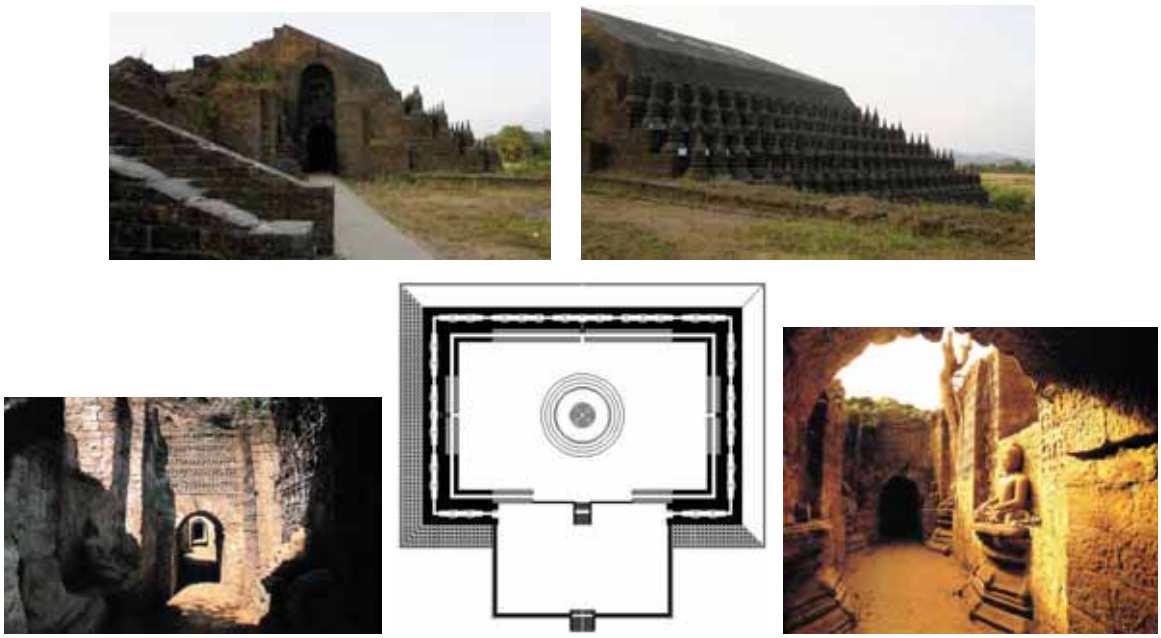
Fig 5.43: Central shrine with vestibule temple type - $R_{1\text{-}B}$ with selected example

Drawing Source: Department of Architecture, Yangon Technological University

Photo Source: www.panoramio.com

This temple is like a gallery of Buddha images and one can enter the temple and pass along the ambulatories corridors, seeing the Buddha images, and then reaching the main image at the center. The outermost corridors are at the south and north where they can be reached directly from the north and south directions and there are also niches with Buddha images with two Buddha images in one niche facing respectively into the corridors. And then the small stupas surround the central shrine temple at the north and south side.

The next step of development, the Koe-Thaung temple, built in 1553 AD, stands on a plain and its name is *'ninety thousand Buddha images or stupas'* temple because it is supposed to have ninety thousand stupas. The temple existed on two platforms about 30 feet (9.14 m) high; the first platform has a stairway and one entrance at the east to reach the wide vestibule hall, and the second, lower platform has two entrances and four passage ways with staircases to reach the upper platform. And there are two Buddha images in sitting posture on the altars of each outside of the entrances and facing to the east.



Koe-Thaung temple - 1553 AD

Fig 5.44: Central shrine with vestibule temple type - $R_{1\text{-}B}$ with selected example

Drawing Source: Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Department of Architecture, Mandalay Technological University, 2008

Photo Source: 1) www.panoramio.com

2) Pamela Gutman, 'Burma's Lost Kingdoms: Splendours of Arakan', 200. P.108

The features of the combination of rectangular and semi-circular shrine type $R_{1\text{-}C}$ type is seen in Htut-Kan-Thein temple (1571 AD); the temple plan is one with the double ambulatory corridors and corridor forms also like the temple plan shape. Then the main building is connected to the small rectangular ordination hall, which extends from the curve at the south-west corner of the main shrine. The temple has only one entrance at the east close to the south-east corner. The niches with Buddha images existed on the interior wall along the corridor way. There are 164 niches inside the temple and the main shrine is reached from that corridor by the stair created inside.

Htut-Kan-Thein temple - 1571 AD

Fig 5.45: Temple with combination of rectangular and semi-circular shrine type - $R_{1\text{-}C}$

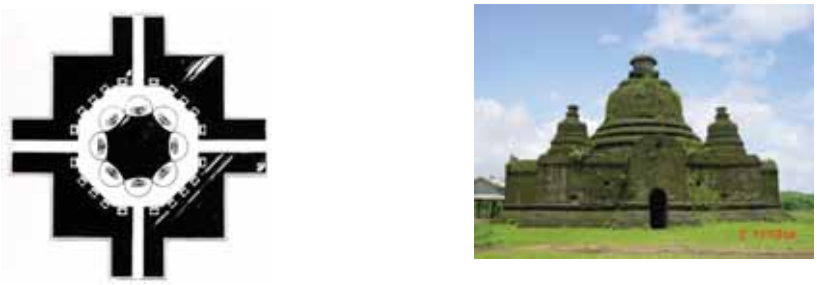
Drawing Source: Department of Architecture, Yangon Technological University

Photo Source: www.panoramio.com

5.3.2.2. Temple with Solid Core - R_2

This type of temple is only one temple seen in Mrauk-U for example Lay-Myat-Hna temple. It has square plan shape with four entrance porches like Lay-Myat-Hna temple in Sri-Khit-Tra. But in this temple type, the central solid core is an octagonal shape composed of octagonal solid core and octagonal corridor. The proceeding porches are facing to the four cardinal points and the four passage ways lead to the inner shrine chamber. Eight Buddha

images are enshrined in a sitting posture at each side of the central octagonal solid core and the niches are cut on the inner ambulatory wall opposite of one face of each octagonal side. In total there are 20 niches and each enshrines five on one side along the inner octagonal shaped corridor.



Lay-Myat-Hna temple (1430 AD)

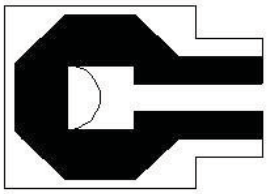
Fig 5.46: Temple with solid core type - R_2 with selected example

Drawing Source: Pamela Gutman, 'Burma's Lost Kingdoms: Splendours of Arakan', 2001, P.87

Photo Source: Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Mandalay Technological University, 2008

5.3.2.3. Temple with Central Shrine - O_1

This temple type is found in the small temples and the sizes are the same as the rectangular temple with central shrine type. But this temple has a rectangular central shrine though the outer plan shape is octagonal in form. This type can be taken as the prototype of one of the great temples, Andaw-Thein temple, though this is a small one. This plan type is seen in Maha-Pyin-Nyar-Kyaw temple built in 1519 AD.



Maha-Pyin-Nyar-Kyaw temple - 1519 AD

Fig 5.47: Temple with central shrine type - O_1 with selected example

Drawing Source: Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Mandalay Technological University, 2008

5.3.2.4. Temple with Solid Pillar - O_2

The organization of this temple type, an octagonal plan shape with a solid pillar, is developed from a combination of Lay-Myat-Hna temple, a rectangular plan with a solid core, and Maha-Pyin-Nyar-Kyaw temple, an octagonal plan with central shrine temple type. This temple type is seen in Andaw-Thein temple constructed in AD 1596. The temple is composed of an octagonal solid core in the center, connected to the rectangular plan shaped prayer hall at the east. The entrance is created at the prayer hall and can reach to the main central core through that prayer hall. The two layers of inner corridors surround the central solid core by the octagonal shape. There are eight main Buddha images on each face of the octagonal central solid pillar. And along the two inner corridors, the niches with Buddha images are located on the interior wall. But the numbers of the existing Buddha images are not the same as the one side to another because the four cardinal passage ways are created from the central solid core and crossed through the two corridors. That passage divides the two corridors by the four narrow passages. In the composition of the whole temple, there are 16 small stupas, of which four stupas are placed at each one side of three other faces except in the east, surrounding the main temple. These small stupas are the hollowed space stupa type with a circular central shrine with one entrance by the porch.

Andaw-Thein temple - 1596 AD

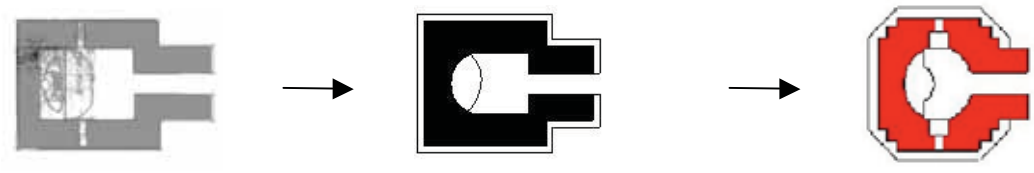
Fig 5.48: Temple with solid pillar type - O_2 with selected example

Drawing Source: Department of Architecture, Yangon Technological University

Photo Source: www.panoramio.com

5.3.2.5. Findings and Conclusions

The development and evolution of the temples in Mrauk-U are not much changed from the rectangular type but are in the central shrine shape. The first development is the simple single central shrine, the second step is the central shrine plan shape with a combination of the rectangular and semi-circular type, then the third step to circular central shrine shape. These design features are seen in the small temples and hollowed space stupa types, though the big temples based on this formation come later. However, the features of the plan shape are not much more evolved except including the secondary porches and passages at both sides of the central shrine though that depends on the formation of geometric shape; rectangular, circular and semi-circular type and also these features are reflected and evolved in the great temples.

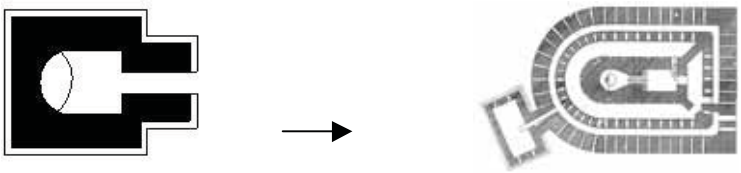


1st step 2nd step 3rd step

Fig 5.49: Temple with central shrine - R1 with selected examples

Drawing Source: Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Department of Architecture, Mandalay Technological University, 2008

And the next development is the form of the main temple shape from the one formation of combination of rectangular and semi-circular shape of the central shrine inside the temple such as the examples of the That-Taw-Ya temple and Htut-Kan-Thein temple. Htut-Kan-Thein temple's plan shape might be the next step development of the That-Taw-Ya temple by taking out just the central shrine shape to form the main temple outside.

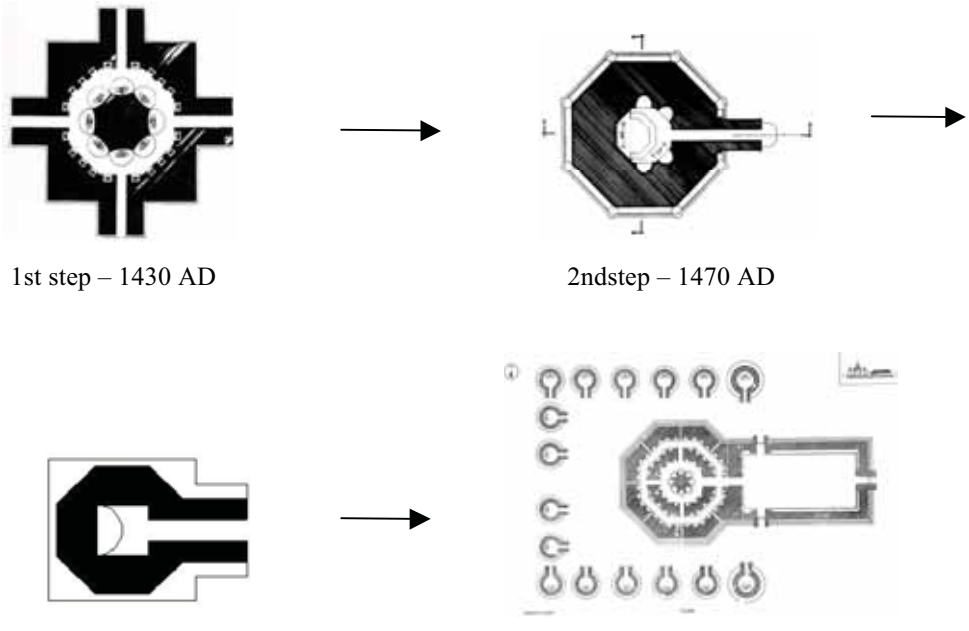


1st step - 1525 AD 2nd step – 1571 AD

Fig 5.50: Development and evolution of combination of rectangular and semi-circular plan

Drawing Source: Department of Architecture, Yangon Technological University

And in the development of solid core and pillar type, a comparison can be made between the Lay-Myat-Hna temple in the early period and Andaw-Thein temple in the middle period because they have similar solid core types in the center but differences in the outer plan shape. Though Lay-Myat-Hna temple is a square shape with four entrance porches around the octagonal solid core, Andaw-Thein has an octagonal form similar with the central solid core and then three entrances at the east side of the prayer hall. Here, though Lay-Myet-Han temple's plan shape might be taken from the temple shapes of the Sri-Khit-Tra and Bagan in the 15th century, this type is not well developed in Mrauk-U. Moreover, that formation and change in the plan shape of the central shrine and solid core might have been developed step by step throughout the Mrauk-U period though it can be found in few temples. Here, the first step is to have the square plan shape with octagonal solid core with four entrances at the four cardinal points and the second step is to have octagonal plan shape with the octagonal central shrine having one entrance way with a long and narrow passage. The third step is to have octagonal plan shape with rectangular central shrine with one entrance way with the passage and the fourth step is to have an octagonal plan shape with an octagonal solid core which forms the two layers of corridor around the solid core and has three entrances at the extended hall. That extended hall might have a wider form and get some space in the massive temple.



1st step – 1430 AD

2ndstep – 1470 AD

3rd step – 1519 AD

4th step – 1596 AD

Fig 5.51: Development and evolution of octagonal plan shape with selected examples

Drawing Source: Department of Architecture, Yangon Technological University

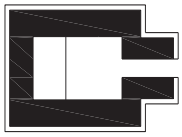
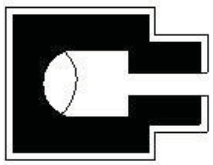
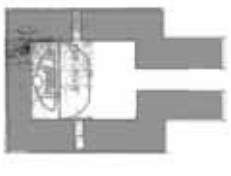
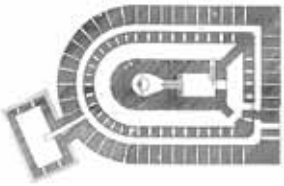
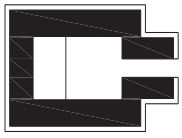
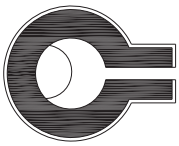
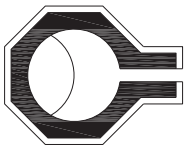
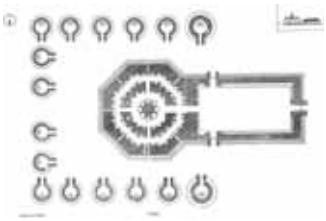
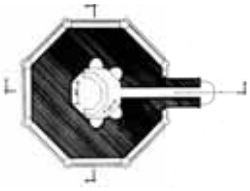
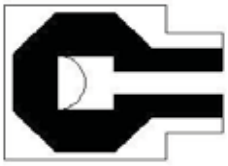
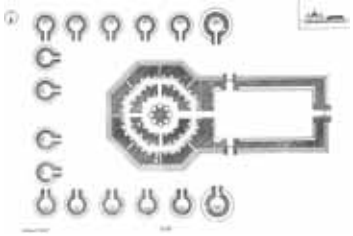
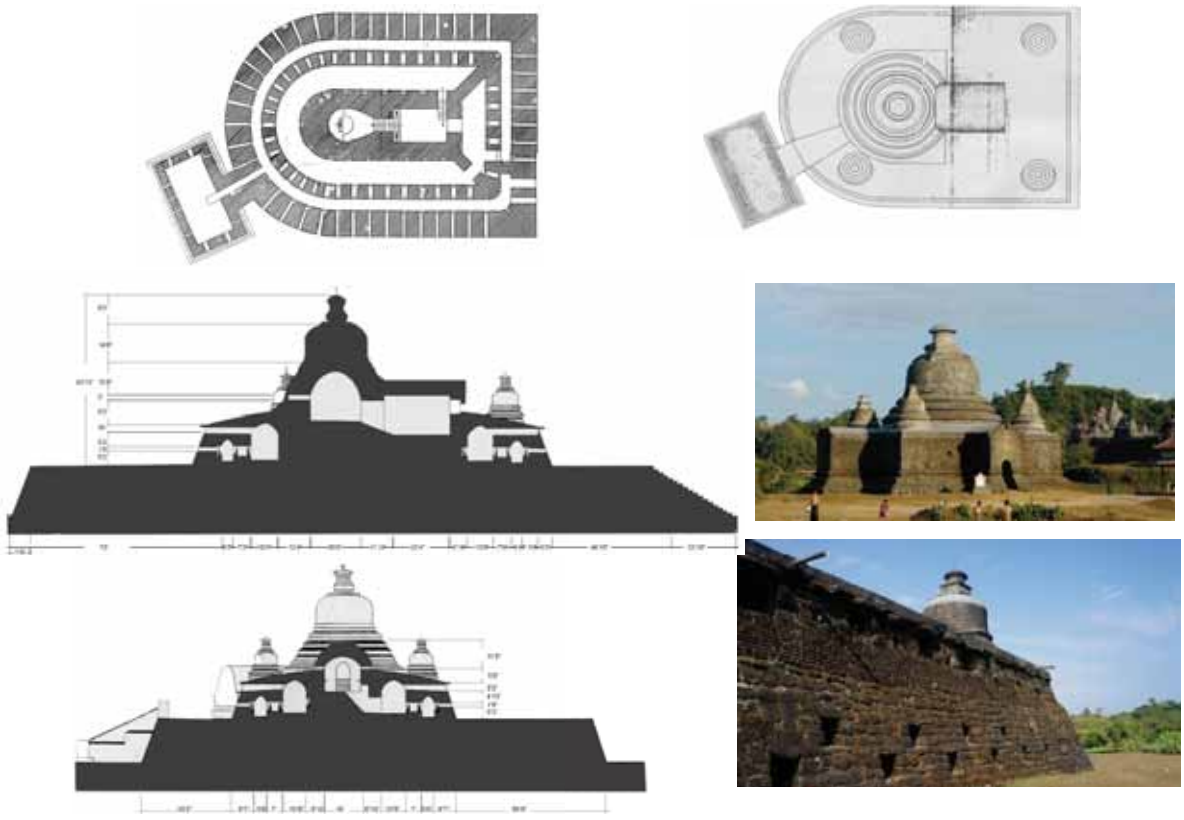
Prototypes	Evolution of temples by the plan
	**Development of single shrine temples**    
  	**Development of solid core temples**   **Development of octagonal plan shape temples**    

Table 5.4: Evolution of temple plan shapes in Mrauk-U with selected examples

5.3.3. Development and Evolution by the Architectural Form

5.3.3.1. Temple with Central Shrine - R1

This combination of a rectangular and circular shrine type is seen in Htut-Kan-Thein temple (1571 AD). It has a raised platform 20 feet (6 m) high, and one has to go up eighteen steps of stone stairs at the east and south. The outer wall and the roof are built at a slight slope to adapt to the heavy rain because it is a coastal region. There is a rectangular dome at the east of the central stupa and it provides the lighting and ventilation to the main shrine. The main central stupa and four corner stupas which surmounted on the roof, have the same form with circular terraces, hemispheric dome, Hamika or crowning block of relic chamber. Lighting and ventilation to the central shrine are provided from the openings of the walls of the rectangular hall at the east of the central stupa.



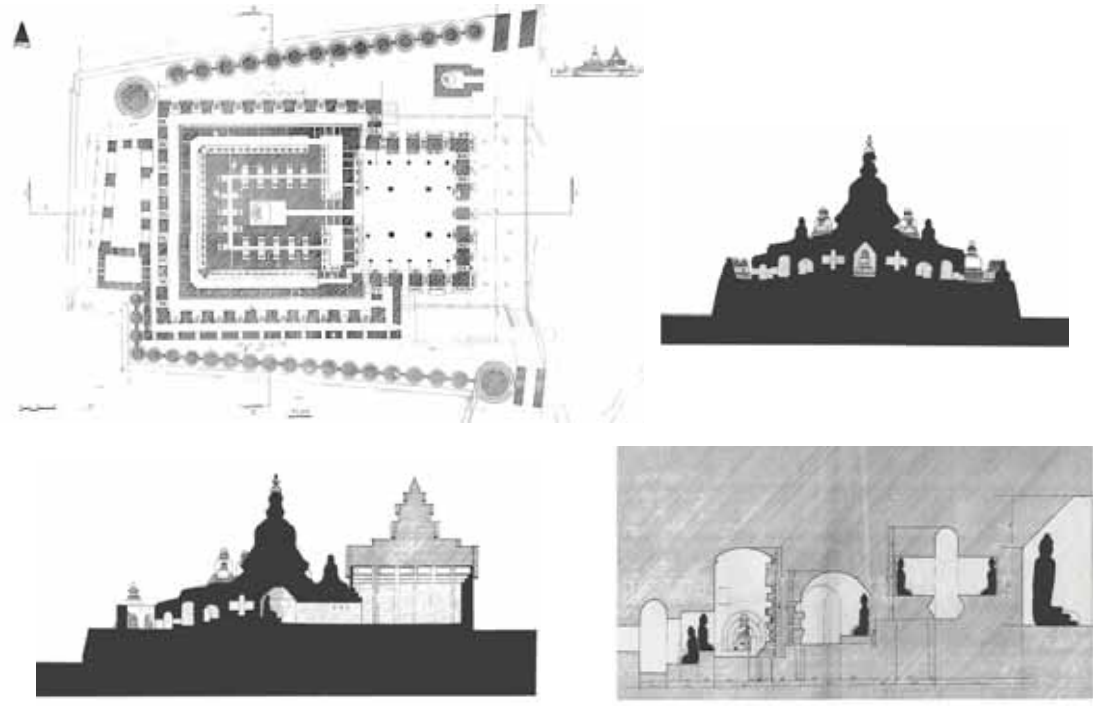
Ground plan, roof plan, section of the Htut-Kan-Thein temple

Fig 5.52: Temple with combination of rectangular and semi-circular shrine type - R1-B

Drawing Source: Department of Architecture, Yangon Technological University

This temple is also well-known for the stone sculpture in the vaulted passages and the barrel vault used on the corridor and copula in the shrine. Along that corridor, there are 164 niches with Buddha images in a sitting posture. In each niche on the inner wall of the outer corridor, there are two Buddha images in back to back position facing to the respective corridors. That function can be obtained the lighting and ventilation to the inner corridor.

In the exterior composition of Shit-Thaung temple, the main central stupa is surrounded outside by the 26 small stupas with a spiral shape. Those small stupas are composed of three circular terraces, a hemispheric dome and Hamika. On the upper platform, stupas existed standing along the north and south direction like the outer walls of the temple; the gaps between them were sculptured with stone slabs on both sides. The outer walls of platforms, main body and roof are slightly sloped.



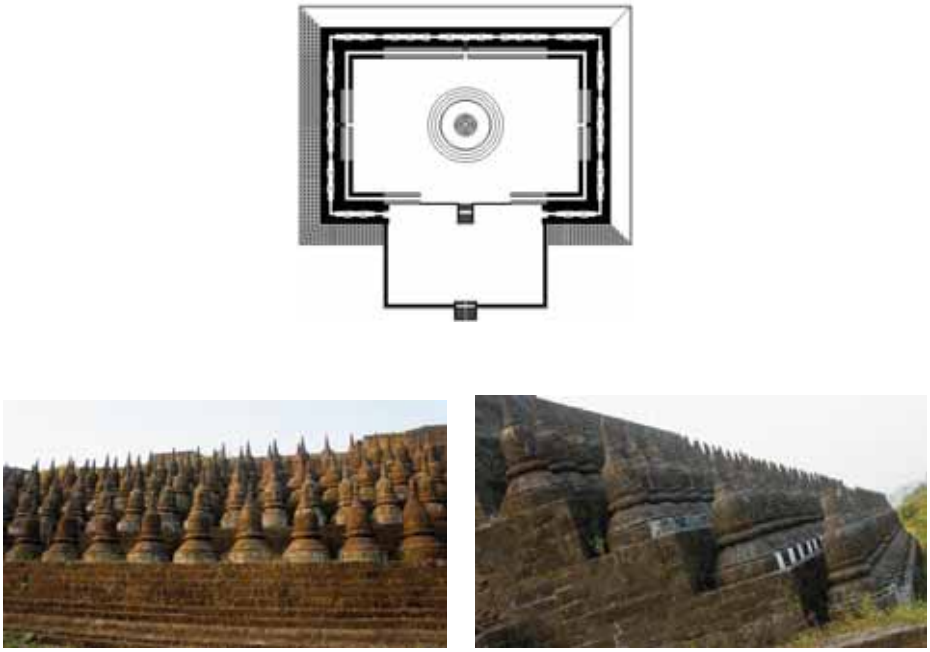
Ground plan and section of Shit-Thaung temple

Fig 5.53: Central shrine with vestibule temple type with selected example

Drawing Source: Department of Architecture, Yangon Technological University

And the biggest sized temple in Mrauk-U is Koe-Thaung temple with a dimension of 230 feet (70 m) from east to west and 250 feet (76 m) from north to south, which was constructed of massive stone walls and terraces. The main stupa surmounted at the center of upper platform.

There are three tires with a series of Buddha images on both sides of the walls of the corridor and the small stone stupas standing in a series of five tiers on terraces on the east and south facades. There are three tires with the series of Buddha images on both sides of the walls of the corridor and the small stone stupas standing in a series of five tiers on terraces at the east and south facades.



Koe-Thaung temple - 1553 AD

Fig 5.54: Central shrine with vestibule temple with selected example

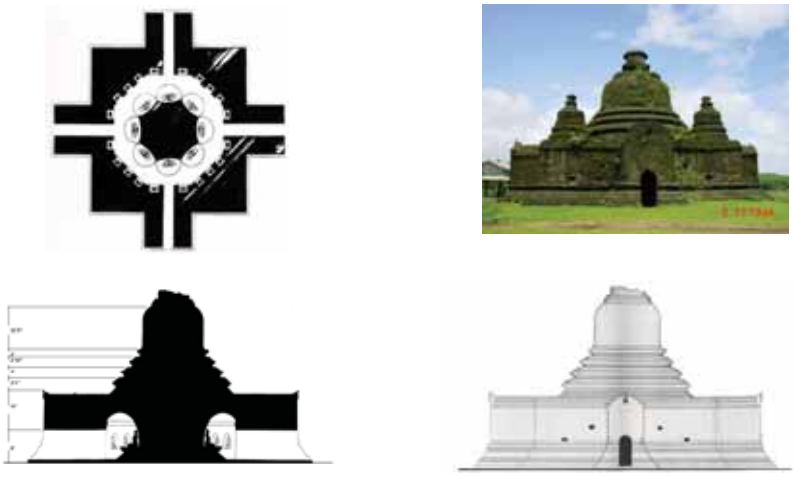
Drawing Source: Department of Architecture, Yangon Technological University

Photo Source: Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Mandalay Technological University, 2008

5.3.3.2. Temple with Solid Core - R_2

In this type of temple, the main shrine is based on the square shape and four porches are proceeding from each of the four cardinal points. The four circular corner stupas are surrounded around the main center stupa at each corner between the two porches and surmounted on the roof. The central stupa and corner stupas have the same form and are composed of three circular terraces and cylindrical hemispheric dome. A barrel vault was used in the passage way and the inner corridor which is 14 feet (4.2 m) high. The horizontal

and vertical proportion of the temple is nearly 1:1. The temple is a massive and stable structure and the central pillar supports the superstructure above it.



Lay-Myat-Hna temple - 1430AD

Fig 5.55: Tempe with solid core with selected example

Drawing Source: Department of Architecture, Yangon Technological University

5.3.3.3. Temple with Central Shrine - O1

In this type of temple, the plan shape is octagonal; therefore, the upper part of the temple is octagonal in form based on the plan and octagonal terraces on which the bell shaped dome or hemispheric dome appear. This temple type uses the barrel vault on the passage way and hemispheric dome is mounted on the central shrine. There are apertures or small openings to provide lighting inside on each side. The proportion of horizontal to vertical is nearly 1:1.

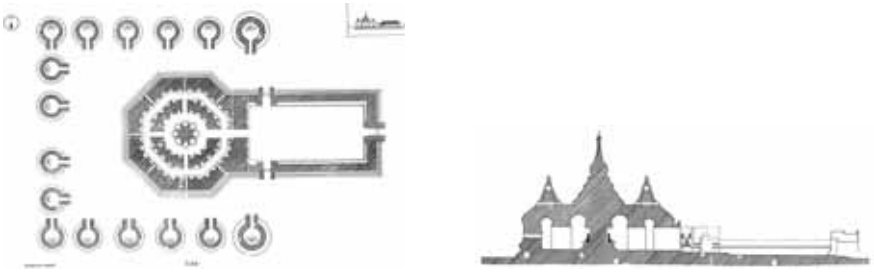
Bohdi-Shwegu temple - 1470 AD

Fig 5.56: Temple with central shrine with selected example

Drawing Source: Department of Architecture, Yangon Technological University

5.3.3.4. Temple with Solid Pillar - O2

This temple type is octagonal in form from base to top, which is supported by a solid core inside which carries the upper structure. This composition of the main temple, of which Andaw-Thein temple is an example, is composed of two octagonal corridors with niches with stone Buddha images on both sides of the wall and four vaulted passage ways at each cardinal point. The arch ways at the four cardinal points on the wall of the inner corridor are decorated with stone curving in a floral design. The barrel vault is used on the corridors and passage ways of the temple. The central pillar supports the central stupa above it. In this temple, the main temple is surrounded by sixteen small stupas around whereas eight small stupas on each side are surrounded around the octagonal main body of the shrine. The forms of the stupas are the same with four octagonal terraces, octagonal hemispheric dome. The whole temple was constructed of an entire block of pure sand stone and is 42 feet (12.8 m) high from ground to top.



Andaw-Thein temple - 1596AD

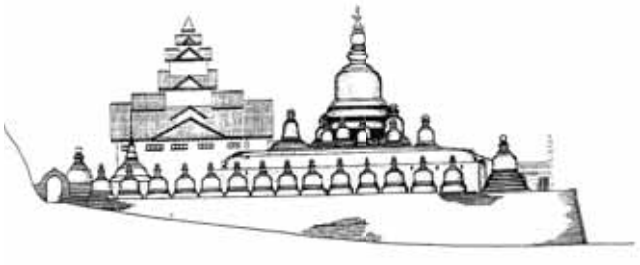
Fig 5.57: Tempe with solid pillar with selected example

Drawing Source: Department of Architecture, Yangon Technological University

5.3.3.5. Findings and Conclusions

Because of the different plan shape, the structural form of the temple based on it, changes. In Mrauk-U, the form of the small temples is not too much changing and is simple with the plinth, receding terraces; octagonal or circular, hemispherical dome or bell shape dome, the spire with mouldings tapering upward to the final upmost part. But in large temples in Mrauk-U, there are mostly found hemispherical domes above an octagonal or circular terrace and the lower part of the temple is based on the high platform from which one can access the ground

level of the temple. And the small corner stupas on the terrace or roof have the same form of the main center stupa shape of the temple. The most significant feature of a Mrauk-U temple is the composition of small temples around the main temple like the outer wall or sometimes like the passage corridor ways.



Shit-Thaung temple

Fig 5.58: Composition of small stupas around the main temple with selected example

Drawing Source: Department of Architecture, Yangon Technological University

The magnificent temples such as Shit-Thaung, Koe-Thaung, Htut-Kan-Thein and Andaw-Thein temples were built in the middle Mrauk-U period (AD 1531 - AD 1638). These temples included the inner passage ways, outer passage ways and chambers with an accessible arch. The significant of temples features are that important religious structures with single or double enclosure walls and the main structure is centered in the enclosure walls. Traditionally, the temples are not built for the majority of people to worship but just for the king and his relatives and the wide space platforms were created to assemble the people. And these great temples might be intended to hold the ceremonies for royal people because the temple space is focused more in the gallery and long corridor way rather than having enough space for meditation as is the norm in other temples. Moreover, most temples were built on a high platform and sometimes were created with the lower and upper platforms, that might be as a result of the weather of that region and the geographical conditions. To conclude, the temples in Mrauk-U, the form is more emphasized than the function and generally the main temples are massive in form with the many surrounded small stupas and their solid volume is two thirds of the open volume. As to the aesthetic views, the horizontal effects were present in the temples but the vertical effects were in the upper main part and surrounding stupas. As to the style of the corner stupas on the roof of the temples, Sri-Lankan and Indian style influenced their design.

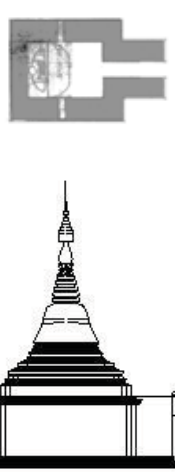
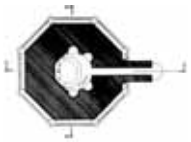
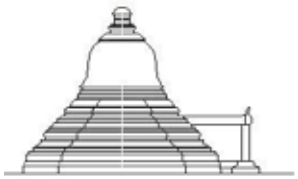
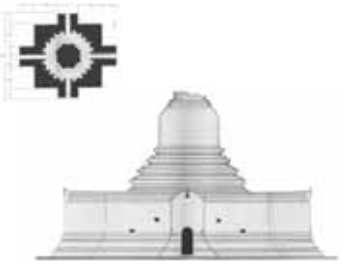
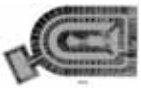
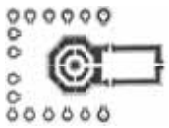
Prototypes	Evolution of Temples by the Form
	**Development of Dome Shape**         

Table 5.5: Evolution of temple form shapes in Mrauk-U with selected examples

5.3.4. Development and Evolution by the Design and Technology

The construction technology of the religious structures was adopted in the one after one period in Rakhine, therefore, the architecture of religious structures in Dhannyawaddy, Waithali and Laymyo periods reflects on those of the Mrauk-U period. In the construction technology, in the early Mrauk-U period, barrel vaults were used and in the later period, the corbelled vaults were also used. Pointed arches, semi-circular arches, flat arches, corbel vaults and barrel vaults were used in passage ways and corridors. Cloister vaults and copula vaults were used in the central shrine. The significant design feature of the temple of Mrauk-U is the hale which sent out a ray of light on to the inner pavement. In the middle Mrauk-U period (AD 1531-AD 1638), the archway-cave is found on the east side of every temple. The structure of the temple is like the structure of the early Mrauk-U, as the entrance archway is built with an arch with a keystone. The roof of the chamber was built with the arch with a keystone to be durable ever since the early Mrauk-U period. The temples built in the early Mrauk-u period were based on the construction technique of the Laymyo period because it was found that the archway of the temple was made with a key stone and the roof of the chamber was piled up by the form of cable in an orderly fashion. These temples are the forerunner of the curving stone and architectural composition of the middle Mrauk-U period.

Shit-Thaung, Koe-Thaung, Htut-Kan-Thein, and Andaw-Thein temples are temples in which an accessible arch and inner pavement and the chamber are included. The Andaw-Thein and the Htut-Kan-Thein temple have the two inner pavements each. And the arches and vaults are created with the keystone and the wall is built to a thickness to stand the stupa's own weight. The long corridor was divided by arch ways to make the chambers with Buddha images in a sitting posture. The small stupas on the terraces of the outer walls are made of sandstone and the Buddha images are made of stone curving. Htut-Kan-Thein temple shows the sophistication of this technology of construction system, using sand stone with smooth cemented stone blocks to create its massive size. In Mrauk-U, stone is the main material for the important religious structures and brick is widely used only in the later Mrauk-U period but in that period, temples were not built and only stupa types were developed. However, the stone curving art and technology were mostly found and studied at the temples in Mrauk-U,

though theses stone arts cannot be studied and analyzed here; they will be further studied by future next scholars.

5.4. Conclusion

There are many pagodas, stupas, temples and monasteries in Myanmar built by Myanmar kings and people in the periods of the Pyu and old Mon dynasties, the Sri-Khit-Tra, Wai-Sa-Li, Hanlin, Dagaung, Innwa, Pinya, Sagaing and the latest Kong-Baung period. But none is as significant as the monuments in Bagan. They were built in different periods, each with its own characteristics of its own time. And most of architectural treasures of wooden structures, except a few built in the last days of the Kong-Baung dynasty, were destroyed by the elements because of a lack of proper maintenance throughout these centuries and most of the timber structures were destroyed by fire in the Second World War II. After the British came into Myanmar, the development of ancient Myanmar traditional architecture was interrupted and replaced by western architecture in the office and public buildings and that stopped the development of pure Myanmar traditional architecture in most every kind of contemporary building, though Myanmar architects are trying to use traditional architectural elements in building today, but that cannot be suitable usage for the concerned buildings, for example, the roofs the religious buildings were used in the other buildings.

In the history of Myanmar, the Pyu period is the beginning of Myanmar culture and three main Pyu cities, Sri-Khit-Tra, Wai-Sa-Li and Hanin, were founded. As the representative architecture of the Pyu period, only masonry structures remain now for posterity to study, but for fodder for archaeological research, there are a lot of buried urns and Buddha statues in that area. To analyze the development and evolution of Myanmar temples, the different formation of architecture has been changed through the periods by periods until the present time after which they have been directly derived from the former and beginning stages of the Pyu period. That is why the architecture of Pyu reflected to the temple design in the Bagan period. Though the architecture is developed from Sri-Khit-Tra to Bagan, the architecture in Mrauk-U is different from those periods and that the architectural style of Bagan and Sri-Khit-Tra except one temple, Lay-Myet-Hna temple, and its architecture is mostly reflected and influenced by the Srilankan and Indian styles. Nevertheless, in this research, the architecture

of Mrauk-U can show how the development change after the Bagan period though it was found they are not related to the Pyu and Bagan period.

The sequence of development in building technology in Myanmar in general is - people started building with timber, then with more durable materials like bricks or natural stones. Religious buildings found at Beikthano, Hain and Sri-Khit-Tra are stupas, monasteries and temples, the same building types found later at Bagan. Regarding the construction methods, the buildings at Beikthano showed the builders were at the experimenting stage with brick masonry technology; however, even the basic rule of brick bonds, to avoid joint on joint connections, was not followed, also most buildings were built without foundations, the walls were about 1.2 meters (4 ft.), or unnecessarily thick, presumably to prevent the soil subsidence of the walls. Two buildings were excavated at Beikthano with large rectangular plans, presumably large two temples, these were constructed with brick walls and two rows of timber columns inside the room to have larger hall widths, from which one infers that the people were not in position to construct entirely with bricks and people could not construct roofs with bricks or with other durable materials, inferring that the builders were at the transition stage from building with timber to building with masonry materials.

The method was developed in Sri-Khit-Tra and transferred to Bagan, and the builders in Bagan were fortunate to have adopted that technology from Sri-Khit-Tra; without this it would be impossible to build thousands of structures in Bagan. As mentioned, the prototypes in Sri-Khit-Tra with scientific vaults were constructed in around the 7th century, therefore it can be expected that temple building period in Bagan started in about the 8th century. That is also starting period of the evolution process of Bagan temples and one can observe that the most proportionate, the highest and the most majestic temples were built in the 12th century AD. All the technical and design possibilities available have been applied in the temples constructed in this period and later structures built in the 13th and 14th centuries were mainly based on the design principles and technological advances. It is nevertheless difficult to identify the construction period of all Bagan temples based on the fact that the builders of later periods may apply the designs and structural systems of the past according to their taste and affordability. Some scholars apply the method of judging the period of construction based on the ornaments, murals and interior decorations. These are several temples in Bagan, which

were renovated some decades after the original construction and the decorations and the ornaments, and even the inscriptions may have been changed at renovation.

In the conclusion of this chapter, all analysis has been made depending on the similar plan shapes of temples with the method of comparing each other from different periods, though they are based on the first evolution of the Pyu period. As mentioned, the temples in the Pyu period were few but they are the prototypes of the later Bagan period which can support the evolution of the temples in Bagan. Here, the main analysis is of the Bagan temples, therefore, some different plan shapes are chosen and analyzed for the comparison though there are a lot of temples in Bagan. Actually, the architecture of Mrauk-U is not well connected with the Pyu and Bagan, it can show the development and evolution of temples' composition after Bagan's development. Therefore, this analysis cannot be said to completely fulfill the needs of the temple composition; that might support the history of Mynamar architecture at least from one architectural point of view for further studies.

CHAPTER VI

Classification of Temples - Appreciation of Spatial Composition

CHAPTER VI

6. CLASSIFICATION OF TEMPLES – APPRECIATION OF SPATIAL COMPOSITION

In this section, the classification of temples, spatial composition will be emphasized by the architectural aspects of different formation of shrine and doorways. It will be classified by different periods and area locations in Myanmar such as the Part I-Pyu period, Part II-Bagan period and Part III-Mrauk-U period. Finally, the present temples in Yangon will be also classified and considered to show the historical architectural effects on them though there are few temples built later in the present periods. Based on this inventory list, the temples can be classified by the various approaches to size of structures and plan of structures with some selected examples. The general description of the selected temples will be shown in the table 6.1 with related interpretation, it is categorized based on the Inventory of Pierre Pichard. In the general description of the type of temples is as follows:

1) Construction period: it shows original dated and repaired date by the spot according to the century AD; a black spot means an epigraphically confirmed date and an open white spot mean an estimated or approximate date.

2) The size of a monument: it is classified according to the largest external dimension of the ground plan;

i) small - less than 12 meters (40 ft)
ii) medium - from 12 to 25 meters (82 ft)
iii) large - from 25 to 50 meters (164 ft)
iv) very large - more than 50 meters (164 ft).

3) The number of stories: some temples have an interior level accessible by one or more internal staircase and excluding tiered terraces.

4) Plan: the main features (shrines, solid core, corridor, entrance hall, forepart, etc.) of each story described with their principal dimensions. The temples have either a central shrine plan

(while central shrine structures may either be restricted to this shrine or have an additional corridor around the walls of the shrine) or solid core plan (which have an ambulatory corridor).

5) Upper Parts: it is the number and shape of the tiered terraces (from bottom to the top), type of crowning (tower, dome, spire, etc.). The distinction is between square tower (found in the temples) and circular bell shape (found in stupa type).In the column, the letter **M** indicates a pyramidal square tower with rectilinear edges, in remembrance of the *Mahabodi* temple of Bodhgaya (India). And the letter **P** refers to the tiered tower on a square plan called *Pyathat* whose shape is an imitation of the timber tower which was the specific feature of most Myanmar timber monasteries. The letter S means the Singhalease type in which the bell shape is crowned by a top masonry block, usually square in shape and often with mouldings. The letter **B** refers to the Belbous type.

6) Images: it shows the number and type of Principal Buddha images which plastered brick masonry ones.

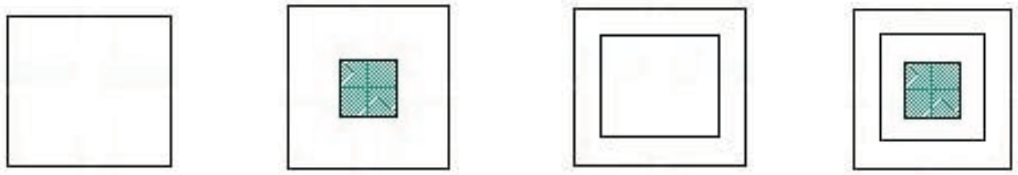
7) Decoration: it describes the stucco mouldings (mostly outside), mural paintings (inside) in which the main features and estimated percentage of original decoration remaining. It shows differently the original decoration and the late paintings over them and with glazing, in the form of these same illustrated plates, glazed bricks or elements set into the plaster.

8) Epigraphy: it is the references of stone inscriptions, note on ink captions and dates provided by epigraphy. It indicates a stone description, often giving the construction date of the buildings, which is attached to the monuments. The painted inscription refers to the inscriptions painted on the interior walls or captions pertaining to the mural paintings.

6.1. Classification of Types Based upon the Different Formation of Shrine

Here, the classification of the temples will be considered based on the analysis of the temples as mentioned above Chapter 5. By studying the formation of shrine, four groups of temples can be classified:

- Group A) Central shrine type
- Group B) Solid core type
- Group C) Central shrine plus corridor type
- Group D) Solid core plus corridor type.



Group A Group B Group C Group D

Fig 6.1: General classification of temples based on plan shape

Drawing Source: Author

6.1.1. Part I – Pyu

When classifying the types of temples in the Pyu period, this can only be made based upon the remaining structures at the present. But in the Pyu period, there are just a few temples to show in the examples remaining so this classification would be just a means to show the previous prototypes of the Bagan period. Based on the main four groups, the remaining temples found in Pyu can be classified in three groups:

A) central shrine type,

B) solid core type and

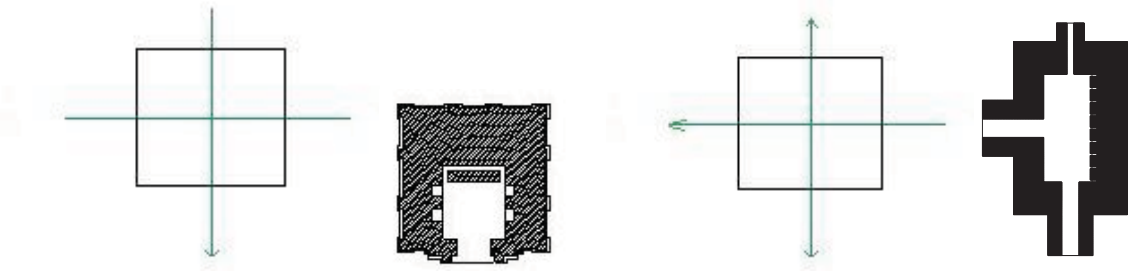
D) solid core plus corridor type.

But Group C) central shrine plus corridor type is not found in the Pyu period.

6.1.1.1. Central Shrine Type

Among the remaining temple structures, this type is found in two small temples in Sri-Khit-Tra. There is not much difference in the formation on the central shrine type R_2 as shown in Chapter 5 but they can be sub-divided into two groups: the creation of a simple single shrine with one entrance $R_{2\text{-}A}$ and then a central shrine with the formation of three narrow passages $R_{2\text{-}B}$. This type of formation seems the first creation of the shrine with passages to give the space of the entrance porches in the small temples. Mostly the temples are oriented to an

easterly direction but the entrance way in the following example temple in Sri-Khit-Tra was created in the westerly orientation. That is an exceptional plan shape in the Pyu period.



$R_{2\text{-}A}$ $R_{2\text{-}B}$

Fig 6.2: Organization of central shrine type - R_2 with selected examples

Drawing Source: Author

6.1.1.2. Solid Core Type

This solid core type can be classified by the solid pillar inside the temple R_3 – a solid pillar and vestibule. One temple type is found in the Pyu period. That plan shape is a central shrine type, though it can be called a solid pillar type because the Buddha image is enshrined at the solid center pillar. This type seems the first formation of entrance hall from the porch to form the vestibule and the longitudinal effect from north to south is emphasized. It might be developed from the simple central shrine to get more space in the shrine and also the sense of different lighting effect when entering into the temple and to be peaceful due to the low lighting inside the way to Buddha image. And that became the forerunner prototype of formation of shrine from the simple central shrine but well developed in the Bagan period later.

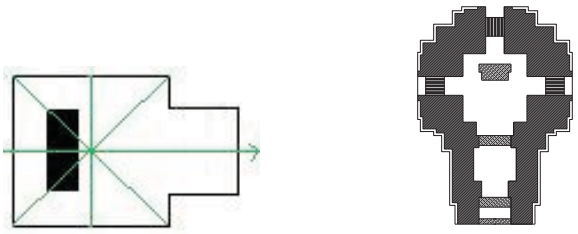
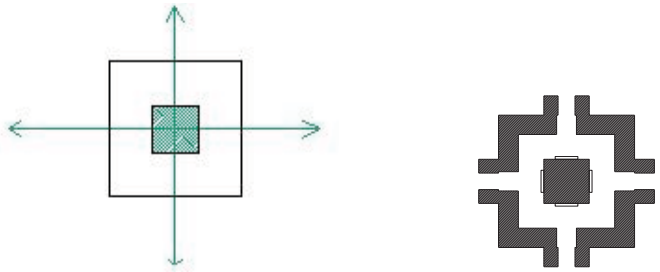


Fig 6.3: Organization of solid core type - R_3

Drawing Source: Author

6.1.1.3. Solid Core plus Corridor Type

This temple type is just found in one small temple in Sri-Khit-Tra. But the plan shape is the simple way around the solid core which centered and formed the creation of the corridor way from four cardinal points and placed the Buddha images at four sides of the solid core. The plan shape is not too much different from the creation of the central shrine type except for the solid core. However, this is the prototype of later temples in the Bagan and Mrauk-U period and is assumed to be the first attempt at a symmetrical "Greek Cross" in the history of Myanmar temples.



R_3

Fig 6.4: Organization of solid core plus corridor type - R_3

Drawing Source: Author

6.1.1.4. Findings and Conclusions

All temples found in the Pyu period, the central shrine type, solid core type and solid pillar type, were found though they could not be classified with the various categories. For being the former first attempt at constructing temples, they have not much creation and formation in design features and construction techniques though their architecture and structural systems were taken by later Bagan builders, which supported the Bagan builders in building a lot of temples. Here the temples in Pyu generally serve the same function but different activities are performed. Among the temple plan shapes, it can be concluded that the central shrine temple type is the common structure type in Pyu because this type is developed in quite a few temples here. Their design has no particular advantage from the aspects of building larger shrines compared with solid pillar temples. The solid core type is only one structure type

found in the Pyu period compared to the central shrine type; however, this is the well known basic prototype of Bagan's famous temples.

6.1.2. Part II – Bagan

Bagan is in the earthquake zone and suffered several times throughout history. There are records of Bagan earthquakes since about the end of the 14th century. The earthquake incidents of the past[1] happened again and again in Bagan: 1380 AD, 1550 AD (Shwe-Gu-Gyi temple damaged), 1580 AD, 1763 AD, 1776 AD, 1777 AD, 1838 AD, 1965 AD (the most serious earthquake recorded), most of the structures in Bagan suffered to a greater or lesser degree. Therefore, Bagan engineers constructed the buildings with thick load bearing elements because the steel frame or steel reinforced technologies were not discovered yet at the time they built a lot of temples in Bagan. That is assumed to be the main reason why Bagan buildings were constructed with thick walls, in normal circumstances, only to stand against the usual loads though these are not unnecessarily heavy. In the quantity of the remaining structures in Bagan, it is interesting to note that, out of over two thousand monuments in Bagan, half of the structures are temples. It also must be mentioned in this research that there were 151 mounds indicated to be 'unexcavated'. There was no attempt made to classify or determine in which category or in what type of structures they were contained. They have just turned into piles of ruinous mounds, not worth the effort to excavate and spend more time and money to classify them. At some scholar's suggestion and investigation[2], in most of these mounds it was found that these unexcavated mounds might be probably assumed to be monasteries, supporting by the following deductions:

1) The monastery type buildings are structurally weak, compared to stupas and temples, as the latter mentioned two types of structures could last a much longer duration than the monasteries. Monasteries contained much more timber components rather than studier building materials, and would have collapsed much earlier and finally decayed into earthen mounds.

[1] Kyaw Lat, 'Art and Architecture of Bagan and Historical background with Data of important Monuments', Yangon, 2010, P.88

[2] Sun Oo, 'The Architectural Aspects of the Monasteries of Bagan', PhD. Preliminary Research Report, Yangon, 2001, P 182

2) When careful investigation is made as to the location of these unexcavated mounds, they are generally found near to monastic complexes or generally found in the areas where most of the monasteries existed.
3) By studying the sizes of the mounds, it is not noticed that all of the earth mounds are found to be nearly in the same size as the monasteries.
4) Excavation had been made in some of the unexcavated mounds in 1988 (after Pierre Pichard's Inventory of monuments at Bagan), most of them are found to be monasteries.[3] If adding up of these facts and examples into the monastery type structures, the proportion of the monasteries can be increased into one-third of the whole population of the monuments and it will be more than the stupa type structures.

Here, Bagan temples will be classified based on the inventory made by the United Nations Development Program UNDP-UNESCO project on the conservation of the cultural heritage of Myanmar which was completed at the end of 1988. The first archaeological map of Bagan showing the exact locations of 2,230 ancient structures together with the result of inventory published in 1989 are as follows:[4]

Total number of monuments	2,230 nos.	
(Later period 15th to 20th centuries AD structures)	192 nos.	
Bagan Period Structures	2,038 nos.	
Typological classification of 2038 Bagan period monuments:		
Previously listed but now totally disappeared	6 nos.	
Unexcavated brick mounds	151 nos.	
Temples	911 nos.	(48%)
Stupas	524 nos.	(28%)
Monasteries	415 nos.	(22%)
Others	31 nos.	(2%)

[3] Sun Oo ,U, 2001, P.182
[4] The literature is based on the version of this group of scholars:
- UNDP/UNESCO, 'Inventory of Monuments at Bagan', Volume 1, P.1
- Sun Oo, 'The Architectural Aspects of the Monasteries of Bagan', PhD. Preliminary Research Report, Yangon, 2001, P 10

As mentioned above in Chapter 5, the temple plan shapes are classified basically four types; 1) circular type 'C', 2) rectangular type 'R', 3) pentagonal type 'P' and 4) octagonal type 'O'. Among them, the rectangular types were commonly found in Bagan. Based on the rectangular types, the temples can be classified into four groups:

A) central shrine type	56 nos.	(6 %)
B) central shrine plus corridor type	746 nos.	(82 %)
C) solid core type	31 nos.	(3 %)
D) solid core plus corridor type	78 nos.	(9%)
Total nos.	911 nos.	

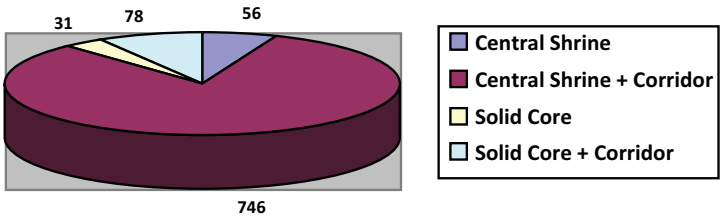
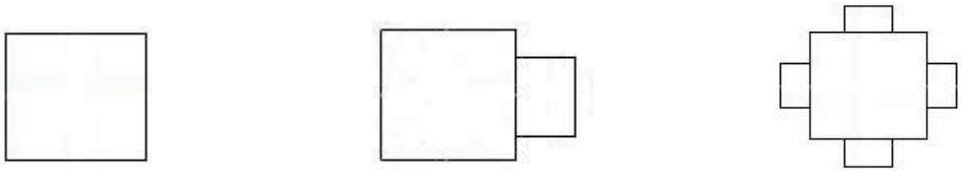


Fig 6.5: Inventory of temples in Bagan

6.1.2.1. Central Shrine Type

These temple types - Group A are a not very common group but very rare, comprising about 6% of all the temples in Bagan. It found in all temple sizes through the entire Bagan period (from 11th to 14th century AD). This type can also be classified into a temple with a central shrine - R_1; simple single central shrine $R_{1\text{-}A}$, central shrine with extended elongated vestibule $R_{1\text{-}B}$ and central shrine with multiple vestibules $R_{1\text{-}C}$.



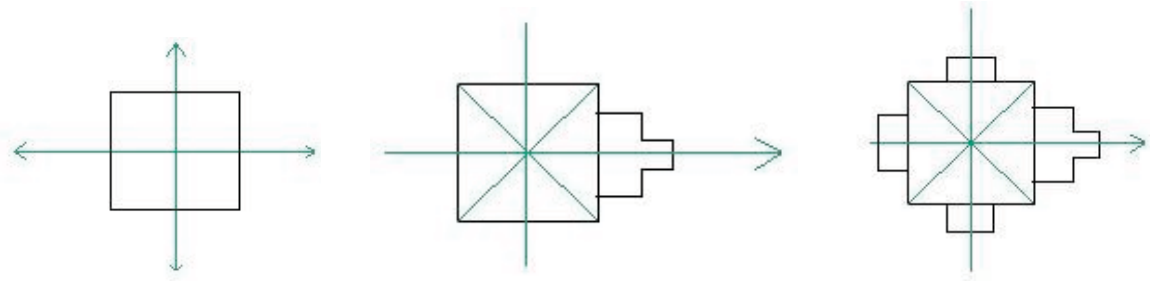
$R_{1\text{-}A}$ $R_{1\text{-}B}$ $R_{1\text{-}C}$

Fig 6.6: Organization of central shrine type - R_1

Drawing Source: Author

The single rectangular type $R_{1\text{-}A}$ can be sub-divided into two types: central shrine, vestibule and porch $R_{1\text{-}A1}$, central shrine with two or three foreparts, vestibule and porch $R_{1\text{-}A2}$. These

kinds of temples have been found with forms that are both functional and aesthetically satisfying and can be found in the middle period. In the type $R_{1\text{-}A1}$, with the complete elimination of a distinction between hall and shrine, there is an increase in the quantity of light permitted to enter the interior. Entering the interior one realizes that the brilliance of the temple lies in the unity held between the paintings and the architecture. The windows let in more light and the absence of a dividing wall and arch between hall and shrine allows further light to flood in form the porch. The hall units has no openings on its sides, the architect has given the large areas for the paintings on the wall without interrupting. The main image is placed against the freestanding set to the fore of the south wall with the south window concealed behind. In the type $R_{1\text{-}A2}$, the lateral entrances are created at each forepart but the porch's size is smaller than the main entrance porch. It can be seen in the medium size and one storey temples in Bagan though the inner stair from each side of the central shrine can access to the upper part of the temple but that is not totally created the upper shrine.



$R_{1\text{-}A}$ $R_{1\text{-}A1}$ $R_{1\text{-}A2}$

Fig 6.7: Subdivision of single rectangular type - $R_{1\text{-}A}$

Drawing Source: Author

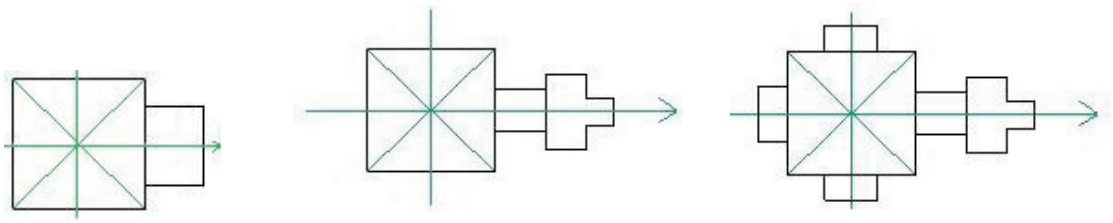
$R_{1\text{-}A1}$ $R_{1\text{-}A2}$

Law Ka Hteik Pan – 12th century AD Gu Pyauk Bo Cho Mi – 13th century AD

Fig 6.8: Subdivision of rectangular type $R_{1\text{-}A}$ with selected examples

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

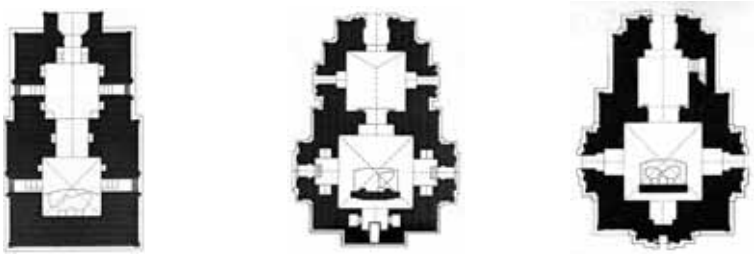
The central shrine with extended elongated vestibule $R_{1\text{-}B}$ can be sub-divided into two types; central shrine, vestibule and the passage between central shrine and vestibule $R_{1\text{-}B1}$, and central shrine with foreparts, vestibule and the passage between central shrine and vestibule $R_{1\text{-}B2}$. These types can be found in the medium size temples and one or two storey buildings.



$R_{1\text{-}B}$ $R_{1\text{-}B1}$ $R_{1\text{-}B2}$

Fig 6.9: Subdivision of central shrine with extended elongated vestibule - $R_{1\text{-}B}$

Drawing Source: Author



$R_{1\text{-}B1}$ $R_{1\text{-}B2}$ $R_{1\text{-}B2}$

Shwe Bon Tha Kyaung Gyi Nyi Ma (Ahma) Hpaya-Gyi

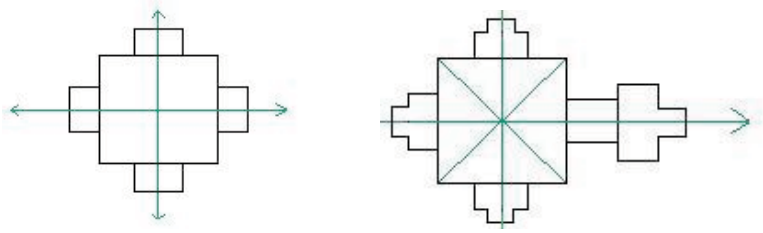
12^{th} century AD 13^{th} century AD 13^{th} century AD

Fig 6.10: Subdivision of central shrine with extended elongated vestibule - $R_{1\text{-}B}$ with selected examples

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

In these types, when one is entering, one can feel and see the paintings on the wall of the vestibule and then how the architect created things to get low lighting on the passage way. It seems to be dim light a while after the entrance hall before one arrives at the main Buddha image in the central shrine. The arch of the passage is created to be lower than the arch of the central shrine and cannot be seen to the whole main Buddha image from the entrance hall and the passage. Depending on the temple sizes, the windows are created in the entrance hall whereas there is no window and lighting is not allowed in the small sized temples, but small perforated windows allow lighting to enter the medium sized temples. In the central shrine,

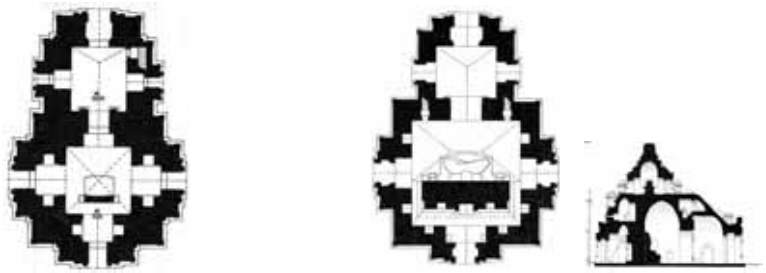
the lighting is let in through the windows from the foreparts and from the upper parts and the architect has created the lighting which can directly fall on the main Buddha image.



$R_{1\text{-}C}$ $R_{1\text{-}C1}$

Fig 6.11: Subdivision of central shrine with multiple vestibules $R_{1\text{-}C}$

Drawing Source: Author



$R_{1\text{-}C1}$ $R_{1\text{-}C1}$

Thin Kan Yone (13th century AD) Kya Sin (13th century AD)

Fig 6.12: Subdivision of central shrine with multiple vestibules $R_{1\text{-}C}$ with selected examples

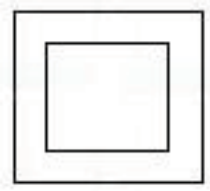
Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

The central shrine with multiple vestibules $R_{1\text{-}C}$ type can be sub-divided into a central shrine, multiple vestibules, porch and the passage between the central shrine and vestibules $R_{1\text{-}C1}$ type. This type is not so much different from the $R_{1\text{-}B2}$ type but the vestibules are created with the lateral porches and can access the central shrine from the other three sides though the main vestibule is extended at the east or sometimes north and larger than the other three sides though except some exceptions. This type of plan shape was found mostly in the two storey large temple sizes. The arrangement is emphasized by the steps that lead from the hall terraces up to the upper shrine and added to the effect of "climb". In this type, the main Buddha image is enshrined on the pedestal or in some case, that pedestal itself makes a form of inner wall partition as the form of central pillar, that central pillar is used in the later period temples to carry the super structure directly down through the outer walls. And the main Buddha image

but sometimes three Buddha images, though the middle is the largest, are seated upon a continuous pedestal that extends out from the wall towards the open space of the hall.

6.1.2.2. Central Shrine plus Corridor Type

This type is the most common group, comprising about 82% of all the temples in Bagan. Mostly found in the medium sized and large sized temples through the entire Bagan period (from the 11th to 14th century AD) though some temples show the massive single storey form. That formation of type is the ambulatory creation with the corridor ways inside the temples in Bagan, emphasized to form something similar to a gallery to see the mural interior paintings on the inner wall of the porch, vestibule and then the main shrine, one can pass along the ambulatory way seeing these mural arts though they are designed not to get lighting directly.



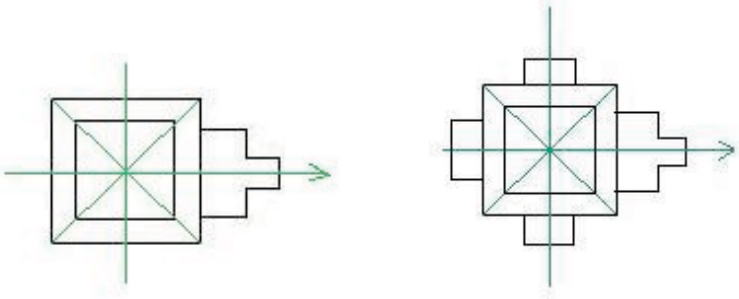
$R_{1\text{-}D}$

Fig 6.13: Organization of central shrine plus corridor type - $R_{1\text{-}D}$

Drawing Source: Author

Based on the plan shape, the central shrine plus corridor type $R_{1\text{-}D}$ can be sub-divided into two types; central shrine with corridor, one vestibule and porch $R_{1\text{-}D1}$ and central shrine with four vestibules and four porches $R_{1\text{-}D2}$. In $R_{1\text{-}D1}$ type, the medial projections of the temple base walls are dropped in favor of a longitudinal effect, however, the shrine is square in plan or no longer square in plan shape. The plan continues the distinction between the hall and shrine. This type is generally found in the early period small and medium sized temples. The niches with small Buddha images are lined up on both sides of inner ambulatory wall, the openings are created to get the lighting on those Buddha images in the niches. In this type of structure, the corridor might be dark because there is only one main entrance but one can pass that way well from the lighting of those small openings. And the ambulatory wall was covered with the mural paintings but lighting cannot effect that directly. In the $R_{1\text{-}D2}$ type, the temple usually oriented towards the east or in some case towards the north, the hall extends out in that

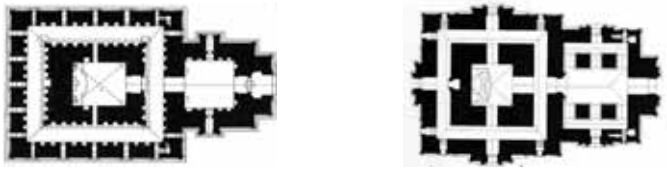
direction with three openings to side aisles in the hall. There is a tripartite division of the hall ground space and three arched openings from the hall into the shrine. There is an inner stair to reach the upper level though there is no creation of the upper shrine but the architects were able to raise the ground level vaults to new heights, thereby creating an awe-inspiring atmosphere.



$R_{1\text{-}D1}$ $R_{1\text{-}D2}$

Fig 6.14: Organization of central shrine plus corridor type - $R_{1\text{-}D}$

Drawing Source: Author



$R_{1\text{-}D1}$ $R_{1\text{-}D2}$

Naga-Yon Mie Nyein Kon

11^{th} century AD 13^{th} century AD

Fig 6.15: Organization of central shrine plus corridor type - $R_{1\text{-}D}$ with selected examples

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

6.1.2.3. Solid Core Type

This type of temples are the group found in the massive structures and not very common type, comprising about 3 % of all the temples in Bagan. Mostly found in the medium size and large size temples through the whole Bagan periods (from 11^{th} to 13^{th} century AD). As mentioned above in Chapter 5, this solid core type R_2 can be classified into two types; the solid core with niches along the corridor type $R_{2\text{-}A}$ and solid core with extended vestibule type $R_{2\text{-}B}$. Though of this type it can be said that it might be derived from the solid plan shape of Sri-Khit-Tra,

here, in Bagan, there are well developed examples with the various formations of plan shapes and structural systems to support the upper level and multistoried temples.

$R_{2\text{-}A}$ $R_{2\text{-}B}$

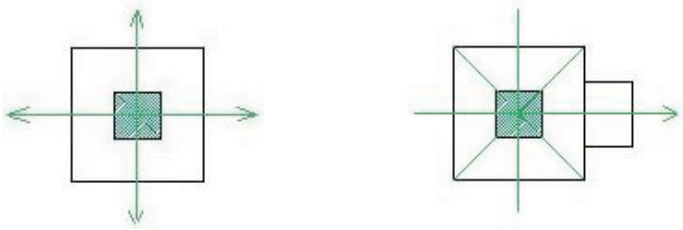
Fig 6.16: Organization of solid core type - R_2

Drawing Source: Author

The type $R_{2\text{-}A}$ is a simple solid core type found in the early and middle period small and medium sized temples in Bagan. That plan shape is square and was intended as a gallery for sculptures, which were placed in the niches around the inner ambulatory walls. And the Buddha image is placed to form the pedestal by cutting the main core from one side facing to the main entrance or at all four sides. Possibly the ambulatory was attached to the exterior wall running, forming a second corridor of the inner cella and acting as the gallery for the sculptures. The central solid core functions to support the structure and the space is mainly intended to form the gallery type. Mostly in Bagan temples, the inner wall is covered with the mural paintings, but here in some temples with this type, the sculptures, cutting the whole the inner walls, are mainly intended to be shown because the inner wall and outer walls are filled with the panels each containing a figure of Buddha image or some sculpture about Buddha lives.

In $R_{2\text{-}B}$ type, the medial projections of the temple base walls are dropped in favor of a longitudinal effect and orientated towards the east or north. In the construction system of this temple, the main structural elements are the pillar in the central shrine and the exterior walls, which resulted to a passage to go around, and the pillar has four niches at four cardinal points. And there are the steps at the passages leaded to the main shrine from the vestibule and also where to the vestibule from the porch. The interior is far lighter than the early period temples because the window openings are lined up at each side of the temples. And there is the inner stair to the upper level, but the dormer might be the first attempt of the Bagan builders to add

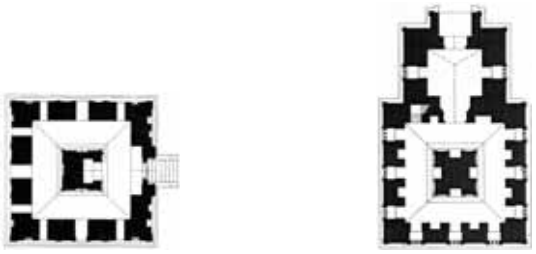
the upper level but it was later translated to the upper shrine. This is quite common type with many temples in Bagan.



$R_{2\text{-}A}$ $R_{2\text{-}B}$

Fig 6.17: Organization of solid core type - R_2

Drawing Source: Author



$R_{2\text{-}A}$ $R_{2\text{-}B}$

Nat Hlaung Kyaung Alo-Daw-Pyi

11^{th} century AD 12^{th} century AD

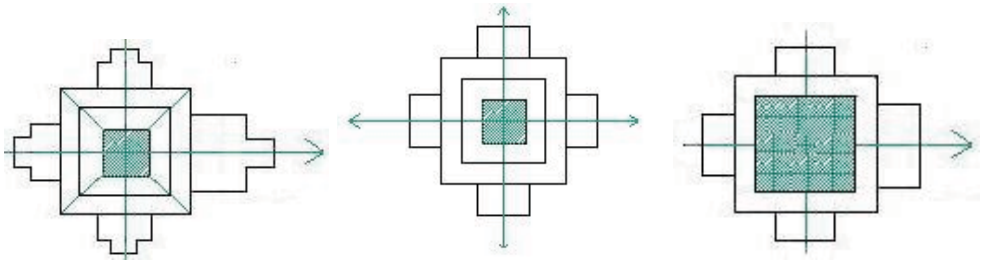
Fig 6.18: Organization of solid core $R_{2\text{-}A}$ and $R_{2\text{-}B}$ with selected examples

Drawing Source: Pichard, Pierre, 'Inventory of Monuments at Pagan', Paris: Unesco, 1992

6.1.2.4. Solid Core plus Corridor Type

This type of temple is also not common as it comprises about 9% of all the temples in Bagan but it was found in the large and very large temple sizes. A solid core plus corridor type can be classified into three types: a solid core with multiple vestibules $R_{2\text{-}C}$, solid core with multiple vestibules - symmetrically development $R_{2\text{-}D}$ type and large solid core type $R_{2\text{-}E}$. In $R_{2\text{-}C}$ type, the ambulatory opens out to face the projecting throne of the east shrine, at the colossal piers it breaks out into the ambulatory to form a recess for the image. It has square-based plan with a hall projecting to the east that is repeated on the upper level. Though the east hall on the ground level is recessed into the central block, the other three cardinal images are simply placed against the inner ambulatory wall or cut at the wall. In $R_{2\text{-}D}$ type, entering

the interior from the four, broad, spacious porches, one passes through the two ambulatories into the temple's core. The ground plan takes the shape of a Greek cross and there is a double ambulatory around the central mass. The outer ambulatory was conceived as a gallery for sculpture. The four shrines, medially placed, are opposite the halls and connect with them through tall pointed arches in the base and ambulatory walls. Within each of the four cells that recede into the great central mass is enshrined one of the last four Buddhas of this time period. Here, the exterior elevation is also that continuous the balance between horizontal and vertical forces and on the exterior, symmetry is the dominant force. Each face is a balanced composition of pediments ascending up through the terraces to meet the super structure and Sikhara. In the $R_{2\text{-}E}$ type, the plan is based on the square and the hall is extended towards the east from the base block. Though the east hall is recessed into the central block, the other three cardinal images are placed against the inner ambulatory wall. The large solid core is used to build the multi-storey temples in Bagan starting from the 12th and 13th century AD.



$R_{2\text{-}C}$ $R_{2\text{-}D}$ $R_{2\text{-}E}$

Fig 6.19: Organization of solid core plus corridor type

Drawing Source: Author

$R_{2\text{-}C}$	$R_{2\text{-}D}$	$R_{2\text{-}E}$
North-Guni	Ananda	Hti-Lo-Min-Lo
13th century AD	13th century AD	13th century AD

Fig 6.20: Organization of solid core plus corridor type with selected examples

Drawing Source: Pichard, Pierre, "Inventory of Monuments at Pagan", Paris: Unesco, 1992

<table>
<tr><th>Central shrine type ‘R’</th><th>Subdivisions of
Central shrine type ‘R’</th><th>Subdivisions of
Type ‘$R_{1\text{-}A}$’, ‘$R_{1\text{-}B}$’ and
‘$R_{1\text{-}C}$’</th></tr>
<tr><td rowspan="6">  </td><td rowspan="2"> 
$R_{1\text{-}A}$</td><td> 
$R_{1\text{-}A1}$</td></tr>
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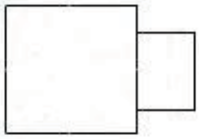
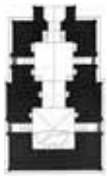
$R_{1\text{-}A2}$</td></tr>
<tr><td colspan="2">6 nos.</td></tr>
<tr><td rowspan="2"> 
$R_{1\text{-}B}$</td><td> 
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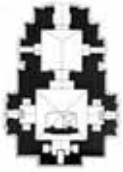
<tr><td> 
$R_{1\text{-}B2}$</td></tr>
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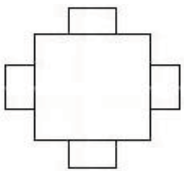
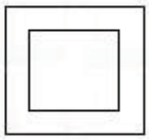
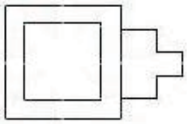
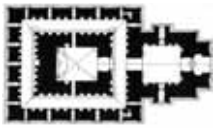
<tr><td> 
$R_{1\text{-}C}$</td><td> 
$R_{1\text{-}C1}$</td></tr>
<tr><td>56 nos. (6%)</td><td colspan="2">36 nos.</td></tr>
</table>

Table 6.1: Classification of central shrine type ‘R’ (according to the spatial organization)

<table>
<tr><td>Central shrine plus Corridor type ‘$R_{1\text{-}D}$’</td><td>Subdivisions of Central shrine plus Corridor type ‘$R_{1\text{-}D}$’</td><td>Subdivisions of Type ‘$R_{1\text{-}D1}$’ and ‘$R_{1\text{-}D2}$’</td></tr>
<tr><td rowspan="3"> 
$R_{1\text{-}D}$</td><td> 
$R_{1\text{-}D1}$</td><td> 
$R_{1\text{-}D1}$</td></tr>
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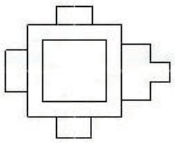
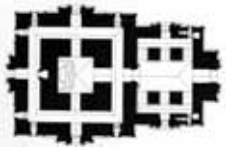
<tr><td> 
$R_{1\text{-}D2}$</td><td> 
$R_{1\text{-}D2}$</td></tr>
<tr><td>746 nos. (82 %)</td><td colspan="2">160 nos.</td></tr>
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Table 6.2: Classification of central shrine plus corridor type ‘$R_{1\text{-}D}$’

<table>
<tr><td>Solid Core type ‘R_2’</td><td>Subdivisions of Solid Core type ‘R_2’</td><td>Subdivisions of ‘$R_{2\text{-}D1}$ ‘and ‘$R_{2\text{-}D2}$’</td></tr>
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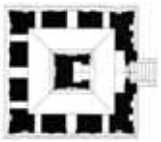
R_2</td><td> 
$R_{2\text{-}D1}$</td><td> 
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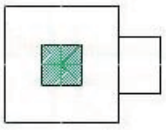
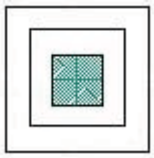
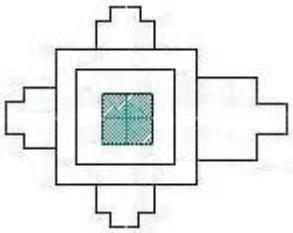
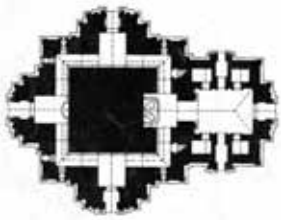
<tr><td> 
$R_{2\text{-}D2}$</td><td> 
$R_{2\text{-}D2}$</td></tr>
<tr><td>31 nos. (3 %)</td><td colspan="2">26 nos.</td></tr>
</table>

Table 6.3: Classification of solid core type ‘R_2’ (according to the spatial organization)

<table>
<tr><th>Solid Core plus Corridor type ‘R’</th><th>Subdivisions of Solid Core plus Corridor type ‘R’</th><th>Subdivisions of Type ‘$R_{2\text{-}C}$’, ‘$R_{2\text{-}D}$’ and ‘$R_{2\text{-}E}$’</th></tr>
<tr><td rowspan="6">  </td><td> 
$R_{2\text{-}C}$</td><td> 
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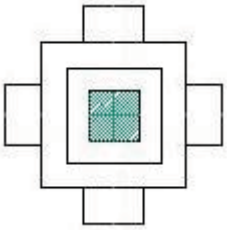
<tr><td> 
$R_{2\text{-}D}$</td><td> 
$R_{2\text{-}D}$</td></tr>
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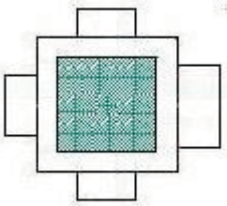
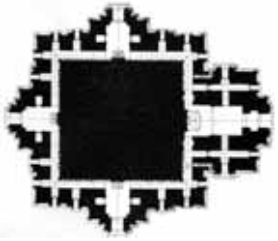
<tr><td> 
$R_{2\text{-}E}$</td><td> 
$R_{2\text{-}E}$</td></tr>
<tr><td colspan="2">12 nos.</td></tr>
<tr><td>78 nos. (9 %)</td><td colspan="2"></td></tr>
</table>

Table 6.4: Classification of solid core plus corridor type ‘R’ (according to the spatial organization)

6.1.2.5. Findings and Conclusions

The central shrine temple type is the most common structure type in Bagan. The conclusion can be drawn that the majority of the temples in Bagan were Central Shrine type temples and all sizes can be found of these types of temples. Their design has no particular advantage from the aspects of building having larger shrines compared with solid pillar temples, however, they generally serve the same function but different activities are performed. The following is the number of the central shrine temple types and central shrine plus corridor type found in Bagan.

Central Shrine Temples	Central Shrine plus Corridor Temples
56	746
6 %	82 %

The characteristics of the solid core and solid core plus corridor type have the same functions having niches along the corridor and their features are to perform the gallery type which seems to point to the main intention of these structures being educational, with the presentation of Jataka stories along the corridor, rather than providing the space for worship. Bagan's most famous monuments include in this type, and the following list shows the number of these temple types in Bagan.

Solid Core Temples	Solid Core plus Corridor Temples
31	78
3%	9%

Solid core type is a few structure types in Bagan compared to the central shrine type and these are the basically principle type to build the multi-storey temple types in Bagan because its solid core structure can support well the upper part of the temples. And the temples or other structures constructed in the late centuries applied the same technology and principles based from that system. Therefore, there are, however, a few temples with very interesting architectural designs in this type. It would be very interesting to continue a further research study on the evolution of design technology and principles in this solid core type.

6.1.3. Part III – Mrauk-U

In MraukU, there are a few temples but the architectural movement of Rakhine can be seen in those temples, though their architecture is influenced from India and Srilanka. The structures in Mrauk-U have a different architectural style and creation even though in materials usage, they mostly used stones in the buildings. According to the record from the Department of Archaeology (Mrauk-U), there are one hundred and sixty-three known religious structures and many more remaining unknown structures.[5]

Total number of monuments	**163 nos.**	
Temples	14 nos.	(9%)
Stupas	132 nos.	(81%)
Libraries	6 nos.	(4%)
Others	8 nos.	(6%)

Based on this inventory list, the temples can be classified by the various approaches; size of structures and plan of structures with some selected examples. Among them, the rectangular types and octagonal types were found in Mrauk-U. Based on these two types from the main four groups, the temples can be classified as four groups;

A) central shrine type	6 nos. (43 %)
B) central shrine plus corridor type	4 nos. (29 %)
C) solid core type	1 nos. (7 %)
D) solid core plus corridor type	3 nos. (21%)
Total nos.	14 nos.

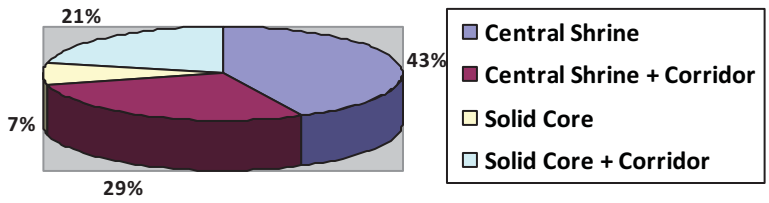
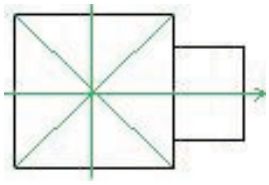


Fig 6.21: Inventory of temples in Mrauk-U

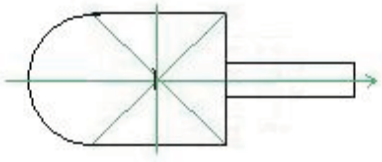
[5] Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Department of Architecture, Mandalay Technological University, 2008, P.20

6.1.3.1. Central Shrine Type

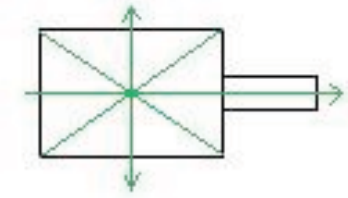
This temple types - Group A are the most common group, comprising about 43% of all the temples in Mrauk-U. These types can be classified into type R1 the simple single central shrine. In type R1-A, three types of central shrine can be found; the first type is the combination of rectangular and semi-circular central shrine type R1-A1, the second one is rectangular central shrine type R1-A2, the third one is circular central shrine type R1-A3. All these temple types are found in the small temples. The features of central shrine temples are to create the inner space for the Buddha statue with the rectangular shape and circular shape. The temples are based on square and rectangular plan and porch has on one side of the temples especially faced to east.



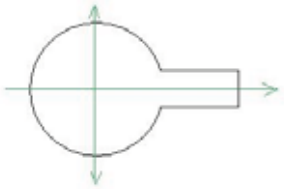
R1-A



R1-A1



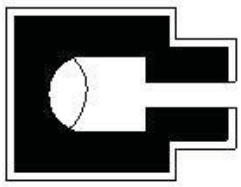
R1-A2



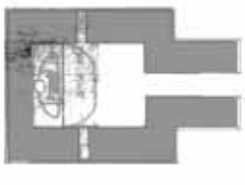
R1-A3

Fig 6.22: Organization of central shrine type - R1-A

Drawing Source: Author



That-Taw-Ya
AD 1525



Shwe-Gu-Gyi
AD 1531

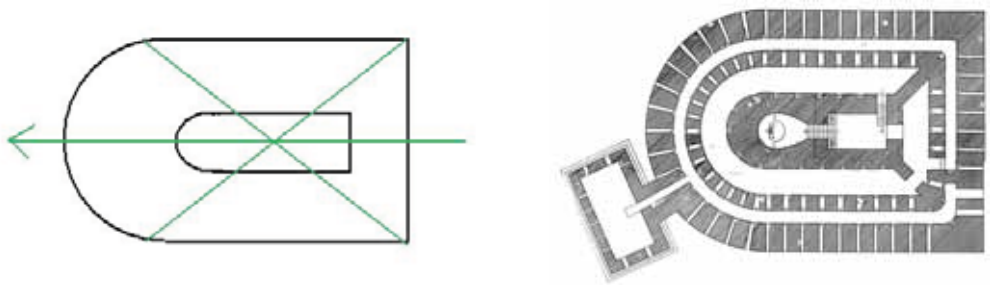
Lay-Kar-Htee-Phyu-Saung
AD 1531

Fig 6.23: Temple with central shrine type - R1-A with selected examples

Drawing Source: Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Department of Architecture, Mandalay Technological University, 2008

6.1.3.2. Central Shrine plus Corridor Type

This type of temples is the group; comprising about 29 % of all temples in Mrauk-U and found in the large size temples. It can be classified into; combination of rectangular and semi-circular shrine type $R_{1\text{-}B}$, and central shrine with vestibule $R_{1\text{-}C}$ type. The plan shape of the temple type $R_{1\text{-}B}$ is the combination of square and semi-circle and connected to the rectangular ordination hall, entered by a passage to the southwest, here in this temple, that hall may have been used for prayer and meditation or for royal ceremonial. The snail-shell shaped passage eventually reaches an elliptic chamber, the central shrine, its dome-shaped roof formed of stone laid in ellipsoid courses ending with a rounded stone at the apex. The main Buddha image is placed on a high altar. Along the corridor, there are 164 niches with Buddha image in sitting posture which placed on the interior wall. In each niche on the inner wall of the outer corridor, it has two Buddha images in back to back position facing to the corridors respectively. This function can be obtained the lighting and ventilation to the inner corridor. There is the step raised from the inner corridor to the central shrine. This temple type is well-known for the stone sculpture in the vaulted passages and like a gallery.



$R_{1\text{-}B}$

Htut-Kan-Thein temple - 1571 AD

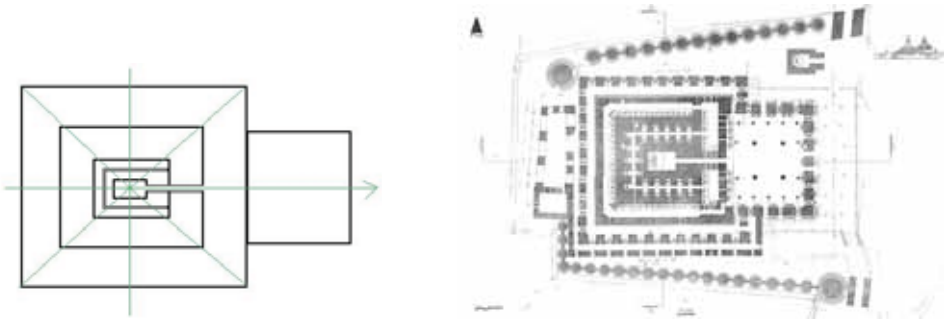
Fig 6.24: Organization of combination of rectangular and semi-circular shrine type - $R_{1\text{-}B}$ with selected temple

Drawing Source: 1) Author

2) Department of Architecture, Yangon Technological University

The central shrine with vestibule $R_{1\text{-}C}$ type is found in the large one temple with 84000 Buddha statues in Mrauk-U. The temple resembles the museum of arts and motifs Mrauk-U period. The temple plan is based on square form with central shrine and four corridors. The

shrine is approached through a flight of stairs from the south, leading to the main platform on which it stands. It is entered through a large hall on the eastern side. Three parallel vaulted passage ways extend from the southeast to the northeast around the central image, which is an inner shrine, facing east opposite a large entrance hall. From this hall, one can pass first to the outer passage, where the outer wall is interspersed with twenty-eight niches each with life-sized Buddha images of the seated Buddha placed back to back, one facing the outer platform and one the inner passage. The light from between these images falls on the inner wall, made from sculptured stones which form six tiers of bas-relief.



Shit-Thaung temple - 1531 AD

Fig 6.25: Organization of central shrine with vestibule type - $R_{1\text{-}C}$ with selected example

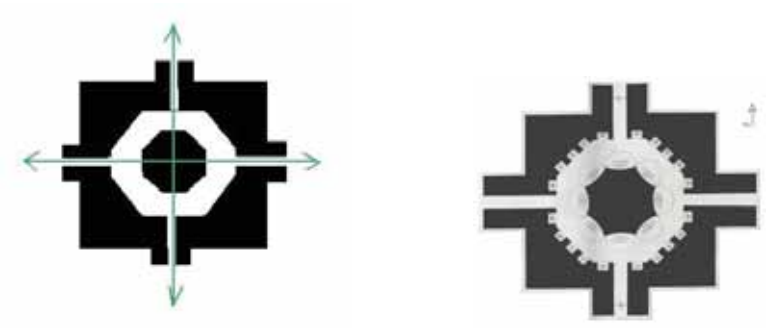
Drawing Source: 1) Author

2) Department of Architecture, Yangon Technological University

6.1.3.3. Solid Core Type

This type of temple is very rare group; comprising about 7% of all buildings, and found only one temple in Mrauk-U. It is square in plan with four projecting vaulted entrances, one to each cardinal point, with the main entrance at the east. Opposite these are twenty niches which originally held Buddha images, bringing the total number to twenty-eight. The central solid core is octagonal shape composed of octagonal solid core and octagonal corridor. The main body or shrine is a square, cubic base and the four porches are located at each cardinal point. The number of twenty-eight signifies the Buddhist belief, often illustrated at Bagan, that twenty-eight successive Buddhas have appeared over the successive cycles of time to guide mankind.[6]

[6] Pamela Gutman, 'Burma's Lost Kingdoms: Splendours of Arakan', Thailand, 2001, P.86-87



Lay-Myat-Hna temple - 1430 AD

Fig 6.26: Organization of solid core type - R_2 with selected example

Drawing Source: 1) Author

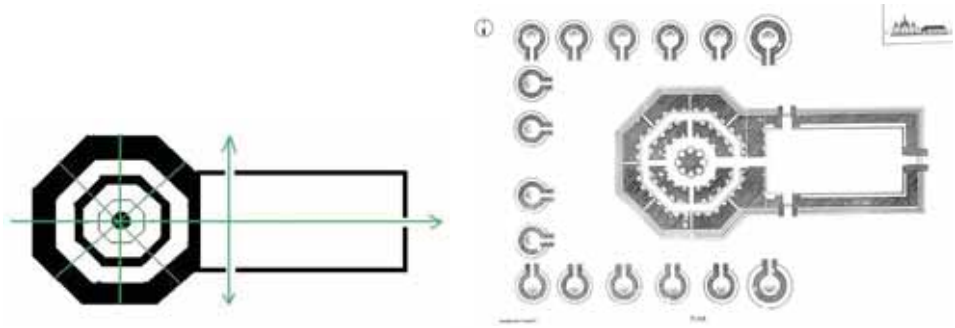
2) Yu Mon Myint, 'Rakhine Religious Architecture in Mrauk-U Period', Ph.D. Dissertation, Department of Architecture, Mandalay Technological University, 2008

6.1.3.4. Solid Core plus Corridor Type

This temple type is the group; comprising about 21 % and found in one large temple in Mrauk-U and other small temples. The temple is composed of octagonal central shrine with two concentric octagonal ambulatory passages around a solid core, and a large prayer hall has been added in front of the eastern entrance. Sixteen smaller shrines, each containing a Buddha image, are placed round the northwest and southwest corners. The two layers of inner corridors surrounded the central solid core by the octagonal shape. The temple was composed of two octagonal corridors with niches hold stone image of Buddha on both sides of the wall and four vaulted passage ways at each cardinal point. The first passage has thirty-two niches on the outer side containing Buddha images, apart from the five said to have come from Mon country at the end of the 12th century AD.[7] In the center is an eight-sided solid core, each side with an image enshrined in a niche. And along the two inner corridors, the niches with Buddha images are elaborately decorated on the interior wall. The four cardinal passage ways are created from the central solid core and crossed through the two corridors. That passage divided to the two corridors by the four narrow passages. The temple is octagonal in form from base to top. Pre-Mughal Bengal influence in construction, too, is perhaps apparent in the vaulting of the passages where half-capitals of western origin support the super-structure.[8]

[7] Pamela Gutman, 'Burma's Lost Kingdoms: Splendours of Arakan', 2001, P.114

[8] Pamela Gutman, 2001, P.114



Andaw-Thein temple - 1596 AD

Fig 6.27: Organization of solid pillar type - O_2 with selected example

Drawing Source: 1) Author

2) Department of Architecture, Yangon Technological University

6.1.3.5. Findings and Conclusions

From the first phase (1430-1531) of the Mrauk-U period, just a few monuments remain. They follow the Burmese tradition of circular bell-shaped stupas and have solid brick cores faced with stone slabs. Lay-Myet-Hna temple was built in that period, this too recalls architecture of Bagan: a temple in the enclosure of Lay-Myet-Hna temple has a similar cruciform plan, and four Buddhas seated back to back, whereas the Mrauk-U Lay-Myet-Hna has eight seated on thrones around an octagonal central column. But this is the only temple that might reflect the architecture of Bagan.

In the middle phase (1531-circa 1600), the first of great monuments of Mrauk-U were built. The remarkable architectural achievements of this time are Shit-Thaung, Koe-Thaung, Htuk-Kan-Thein and Andaw-Thein temples, and though these temples were built in that phase, their architecture organization is organized in different plan shapes. The architectural historian of Bagan, Pierre Pichard, has noted that, like Bagan, the architecture of Mrauk-U 'manifests an intensive formal research' in the cruciform, apsidal, octagonal, circular, or oval plans of its shrines[9]. Therefore, the conclusion can be drawn that the temples of Mrauk-U cannot be classified much, however, there can be remarkable difference in the architecture of Mrauk-U.

[9] Jos Gommans and Jacques Leider, 'The Maritine Frontier of Burma, Exploring Political, Cultural and Commercial Interaction in the Indian Ocean World, 1200-1800', 2002, Netherlands, P.166

6.2. Conclusion

As mentioned above, the functions and construction system of Buddhist temples has changed from the 2nd century BC in India to the present function in the Buddhist countries; the main change from architectural aspects was from the large halls to separate shrines and vestibules, and the technological change from spaces hewn into the hills. The first of these temples are small ones with a shrine in the room, and in later periods, the temples were enlarged and modified with multiple vestibules, inner passages and separate inner shrines. In Myanmar, there were hall type temples developed in Beikthano and Sri-Khit-Tra, starting from about the 6th or 7th centuries, designs also changed into small one-shrine types. Bagan builders adopted these types and changed and improved further from the basic type of the single shrine type to the pillars inside the shrine; to have separate extended vestibule, and then to have multiple vestibules and entrances. By basically these types, the different further types were well developed and systematically improved, also in the structural system. However, the temples in Sri-khit-Tra introduced the know-how technology to be used later in Bagan. And from the technological aspects, some temples in Sri-Khit-Tra with the simple shrine covered with vaults and with solid pillar inside the shrine forming the passage are the prototypes of Bagan temples.

As for the architectural aspects of temples, some spaces in the temples are given for worship and meditation and that space itself can assume strongly marked attributes; it was recognized by the builders of those periods as an important element in relation to art, architecture and religion. Architectural forms, textures, materials, color and modulation of light and shade all combine to inject a quality of sprit that articulate space, especially, Bagan architects appreciated both interior and exterior spaces by using and relating these elements. In considering the temples in the present period, they are not typically a different form though they took some concepts of Bagan temples but mostly the people had constructed Stupa type structures more than the temple types. In Bagan, the single shrine temples were built since the 9th century AD and even earlier. And the earliest surviving temples with inner shrines were built from the late of 10th century, or at least the buildings that survived to the present day are from around that period. The idea to have separate inner shrines may arise from the desire to pray in a dim space or may be influenced from the Indian examples, since such temples with

inner shrines were constructed in India since about the 7th century AD. That is also connected with the structural system, in the case of Indian examples using natural stones, it is easy to construct inner cells using ston beams, whereas in Bagan, the people used bricks and therefore they must master the vaulting technology properly. And the inner shrine temples were constructed, one important requirement was to provide lighting for the inner shrines; the inner shrines should be dim but not dark and there should be enough light to see the images and to move around in the shrine. The design idea of inner shrines with light-wells achieved vibrancy with contrasts in the inner spaces, the changing effects between darkness and brightness through skylights; such designs are seen at a number of temples constructed at the end of 10th century until the end of 11th century. The design of temples with solid pillars inside the inner spaces, applied since about 7th or 8th century AD in Sri-khit-tra, is the invention of Myanmar architects. After vaulting principles such designs were applied with the aim to achieve larger inner spaces using brick vaults. To achieve the higher density and strength than was possible with the bricks, the stones were cut into large elements and the large inner spaces are achieved with wide spans using stone beams and additionally applying intermediate columns to inner walls to increase the size of inner spaces.

The temples in Mrauk-U period have the different forms and shapes. However, it can reflect the 16th century architecture in Mrauk-U, though the plan shapes are like the composition and with large area and gives the horizontal effect by constructing the large temple emphasizing the horizontal effect than the vertical effect. As the material usage, stones were mostly used though brick structures were built in the later Mrauk-U period. Lighting and ventilation systems are not sufficient for the whole inner space of stupa or temple and cannot be created technically like Bagan.

In this chapter, the main intention is to classify Bagan temples, however, the temples in Sri-Khit-Tra and Mrauk-U were considered and classified, it cannot be said which categories are included in the same group because only a small number of temples are found there and they are not much like Bagan temples. Nevertheless, their architectural aspects and structural system development and changing from period to period can be compared. Here, it is primarily the plan shape changes which can be shown and classified, but it will be interesting further to study the architectural aspects of their form, decoration and construction techniques.

CHAPTER VII

Findings and Conclusions

CHAPTER VII

7. Findings and Conclusions

Art and architecture pass through a variety of phases in geographical or political considerations, whilst their origin remains unclear and their ends uncertain. In an attempt to follow such movements and evolution, the history of the era studied in this dissertation are divided into three parts; Pyu, Bagan and Mrauk-U. Among them, the three capitals of Pyu cities – Beikthano, Halin and Sri-Khit-Tra - represent the different stages in a continuous process of Pyu economic and social development over a period of some thousand years, from approximately the second to first century BC to the ninth century AD. The Burmese were the heirs to the Pyu civilization. The connections are most explicit, numerous and conscious between Sri-Khit-Tra – the last and greatest of the Pyu capitals – and Bagan. Although certain cultural attributes will be seen to disappear with the Pyu, others survived to play a very real part in shaping the Burmese culture of the Bagan and later periods. And they have for the first time yielded evidence of the existence in that country of an urbanized society, carrying out this major monumental undertaking long before the penetration of Indian culture.[1]

Bagan stood midway between the delta trading ports of the Mons and the China road, between the river and overland routes to India; thus, Bagan received not only a direct input of Indian artistic forms, from the mid-11th century onwards, but also an adapted version from the hands of the pre-Bagan, Mon and Pyu kingdoms, whose cultural life had been incorporated into that of Bagan, before the rise of the city to statehood.[2] Bagan art grew gradually from its Pyu foundations because the first stupa monuments are those of the Pyu period and foundation. But past historians have tended to categorize the early Bagan period as a 'Mon Sub-Period'; however, the examination of the visual evidence that follows disclaims any such suggestions; firstly, and most obviously, because there are no Mon temples with which to compare the Early Bagan temples, secondly, because the early period temples and stupas seem to clearly follow from a prototype, originally from Gupta Indian models, that had evolved over the past

[1]Janice Stargardt, 'The Ancient Pyu of Burma', Volume one, Early Pyu Cities in A Man-Made Landscape, Cambridge, 1990, P.146-147

[2] Paul Strachan, 'Pagan: Art and Architecture of old Burma', 1989, P.8

three or four centuries under the tutelage of the Pyu, at their old capital city of Sri-Khit-Tra, where a variety of brick temples, dating to before the rise of the Bagan dynasty to political predominance in the region, attest to the direct architectural connection between these two civilizations.[3]

By the end of the first decade of the 12th century, the middle phase of Bagan's creative moment, a transitional style is discernible in the temple architecture of Bagan. In this phase, the architects commenced an investigation into the possibilities of a temple's upper reaches and eliminated these in favour of an upper level sanctum: the distinction between the hall and shrine is reduced, the ambulatory merges with the shrine and the Sikhara elevation becomes more dramatically inclined. The art and architecture of Middle period reflects the religious aspirations that are combined with a cultural process that may be termed 'Burmanisation'; this desire for escape from worldly shackles that is most perfectly expressed in an architecture that is a projection of structure into space.[4] This was a transitional moment in Bagan's architectural history. The late period introduced the five-faced ground plan type onto the Bagan: the advent of this type of scheme represented a radical departure from all Buddhist architectural traditions. Though the great temples had their main shrine on the upper level, single ground-level shrines on both a lesser and greater scale continued to be built in ever increasing numbers. This tendency, where the distinction between shrine and hall was gradually becoming eliminated, becomes more apparent in the Late Period. This 'open space' was, though, not always the rule, and in a number of significant monuments the architects chose to differentiate between the two units. The window openings of the Early Period shrine base are expanded into entrances often with a slight porch and a grand arrangement of pilasters and pediments about it forming a forepart. Light is less inhibited in its penetration of the interior and the shrine images are usually set to the force of the central mass rather than being receded within it. In the early 19th century, an artistic movement grew up in Myanmar that marked a conscious attempt to revive the styles and forms that were current during the Bagan periods. Numerous Bagan types of 'gu' in the Mandalay, with a square base and flat-paneled Sikhara, testify to this.[5]

[3] Paul Strachan, 'Pagan: Art and Architecture of old Burma', 1989, P.37
[4] Paul Strachan, 1989, P.79
[5] Paul Strachan, 1989, P.93-95

Mrauk-U was the capital of Arakan from 1430 until the British moved the administrative center to Akyab (Sittwe). Arakan's religious monuments are mostly Buddhist pagodas that have until now been overlooked by Southeast Asian art historians. They bear testimony to the country's alternately receptive attitude towards the Muslim art of the Bengal sultanate and the Buddhist architecture of the Ayeyarwaddy valley, but they do also display original features that were locally inspired. Pamela Gutman's paper is the first attempt at a chronology of Mrauk-U's Buddhist architecture from the 15th to the 17th century and it highlights several prominent stupas. In that paper, it looked at a few examples illustrating the typical of each period, with a view to identify stylistic changes with reference to the political and religious history from the founding of Mrauk-U until the Burmese conquest in 1784. Since Forchhammer's work in 1885, little attention has been paid to the seventy-odd shrines and other monuments at Mrauk-U, although the department of architecture at the Rangoon (Yangon) Institute of Technology produced an excellent series of plans and elevations in the 1970s.[6] After that, the study of Mrauk-U architecture has become an urgent concern amongst scholars and many of the Arakanese people themselves.

Here, three periods can be defined. The early period, from the foundation of Mrauk-U in 1430 to the mid-sixteenth century, shows the influence of the late Bagan and the Mon and, possibly, Sukhothai kingdoms in its stone-faced cae-shrines, square or circular in plan. The middle period, from the 1530 to circa 1600, was the most dynamic and innovative period in Mrauk-U architecture. The influence of Bengal is apparent in features such as the arched stone screen bordering the western platform of the Shit-Thaung temple and the arrangement of stupas on its roof, recalling the domes of Bengal. Tiles glazed using a technology ultimately derived from the Middle East are decorated with both Sassanid and Hindu-Buddhist motifs. The Bengali practice of decorating a building with carved brick is translated to Mrauk-U into the carved stone, especially in the beautiful thrones for Buddha images on which the decorative motifs show an amalgamation of Burmese and Bengali forms. The Buddhist architecture of Srilanka was equally important in other shrines, such as Koe-Thaung, which was once surmounted by a terracotta-tiled roof. In the late period, from circa 1600 to the fall of Mrauk-U in 1784, the architecture again became closer to that of Burman and Mon

[6] Jos Gommans and Jacques Leider, 'The Maritine Frontier of Burma, Exploring Political, Cultural and Commercial Interaction in the Indian Ocean World, 1200-1800', 2002, Netherlands, P.163

kingdoms, with spire-shaped pagodas rising from circular, square, or octagonal bases in a succession of receding tiers or bands, tapering to a point at a height usually one and a half times or twice the width of the base. And Arakan architects were able to conceive massive hollow temples surmounted by domes, of which the central shrines were entered through long vaulted passages, by combining the construction techniques learnt at Bagan. Though the main materials used are bricks at Pyu and Bagan, all ornamental designs are wrought on the unplastered stone, as with the stones at Mrauk-U, the decoration is executed on the plaster-costing of the bricks while it is still soft.

The three periods of Mrauk-U architecture can be seen to reflect the history of the place of Arakan in the Bay of Bengal. As contacts with its western neighbours increased, the influence of India increased. The middle period was a time of outstanding originality and saw Mrauk-U take on a new and original dimension. More use was made of building, and fortification techniques learnt in India and beyond, and the resulting massive shrines with their mysterious inner ambulatories are unique in the history of Indian and Southeast Asian architecture. The increased frequency of contacts with Srilanka brought not only copies of sacred reliefs but also perhaps doctrinal changes as seen in the introduction of assembly hall as an integral part of the main shrine. The third and final period saw an increased interest in the Mon country to the south. Throughout its history, however, the architecture of Mrauk-U, set within its singular physical and political context, and retained an integrity of its own in its use of materials and in the originality of its decorative elements.[7]

The features of late Burmese architecture at the present time is that the pagodas (temples or stupas) are surmounted by a metal (often copper) hit, or tiered umbrella, sometimes gilded, consisting of a number of concentric rings rising in ever-narrowing circles, finishing off with a long rod, its sides ornamented with barbs. The present temples in Yangon after independence in 1948 cannot be seen as temples, and some scholars called them hollowed space stupas: it is combination of stupa types and temple types. To see one example, Kabaraye temple was built in 1952, with a circular platform around the main stupa enclosed in the manner of a cave-temple, and there are five porches decorated in the traditional style of

[7] Jos Gommans and Jacques Leider, 'The Maritine Frontier of Burma, Exploring Political, Cultural and Commercial Interaction in the Indian Ocean World, 1200-1800', 2002, Netherlands, P.163-175

flamboyant arched pediments. The main stupa is 117 feet 6 inches (35.82m) high. In the early period, the whole upper part of the stupa from the hemispherical dome or bell shaped dome is generally massive. In the present day, the people created means to reduce the weight of the structure with technological developments, and the brick masonry and reinforced concrete structure were used. Therefore, not only can the cost of the structure be saved but the structure is also stronger and firmer. Because of the development of construction materials and structural system, the reinforcing concrete structure is mostly used nowadays.

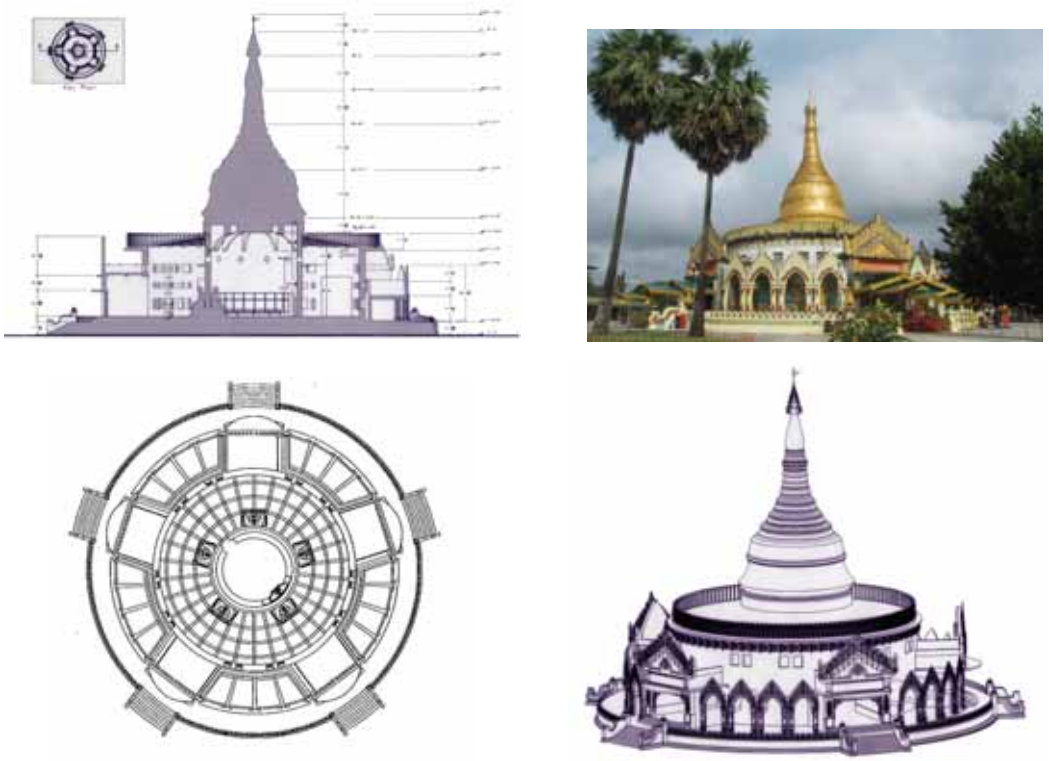


Fig 7.1: Kabaraye temple in Yangon - 1952

Drawing Source: Department of Architecture, Yangon Technological University

The next example is Mahawizaya temple, built in 1980. The temple is octagonal in plan with the stairways at the five cardinal points, in the same way, there are octagonal terraces and a bell shaped domed stupa, which retains its shape as it tapers to the spire. The bell shape gives vertical rhythm between horizontal rhythms that are given by octagonal terraces and the oval mouldings. From the footprint, pada, bell and inverted bowl, lotus petals, bulb to vane step by step rising constructed like the Nirvana that is the destruction of lust, hatred and ignorance. The Buddha images are enshrined at the center of the central shrine; each Buddha image is

faced to the porches and upon all Buddha images, and one Buddha image is enshrined again as a stupa shape.

Square shape Octagonal terrace Circular terrace & bell shape

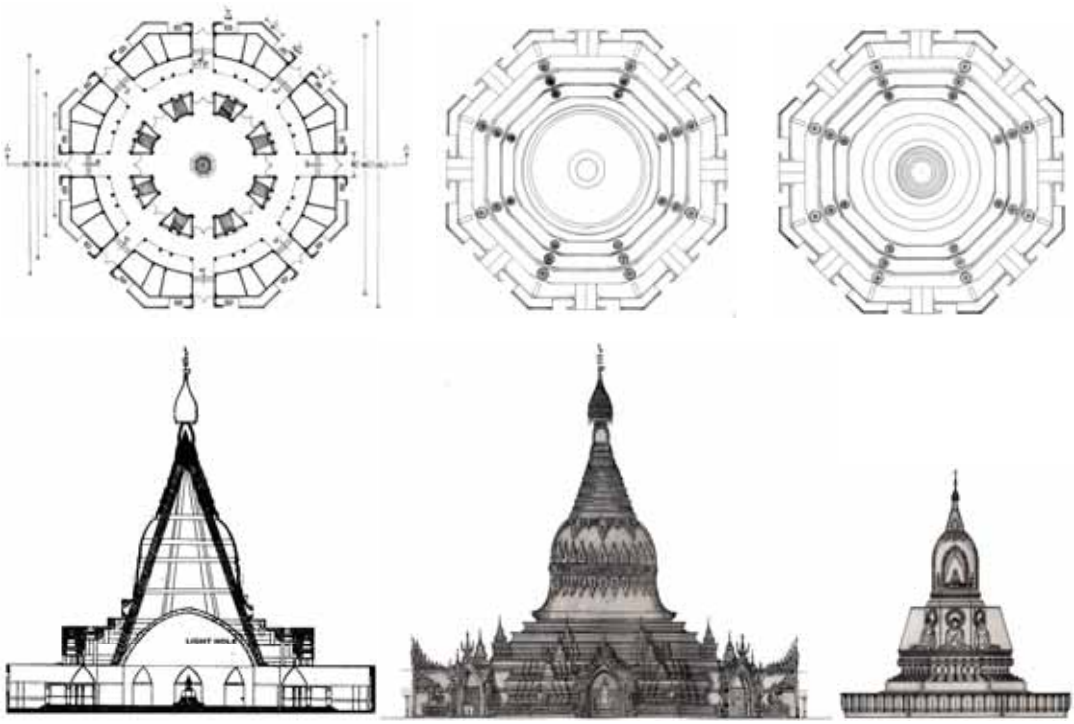


Fig 7.2: Ground plan shape, section and elevation of Maharwizaya temple in Yangon - 1980

Drawing Source: Department of Architecture, Yangon Technological University

The next example is Swe-Taw-Myet temple, which was built in 1996, and it enshrined one of the two Replica Tooth Relics. In that temple, the 9 sided polygonal plan shape is used and this is the first attempt to use the plan shape in a temple though they are found in the stupa plan shape. Actually this is a mixture of stupa and temple. It is built on a high platform and on the first platform, a temple is created. In the form, there are five terraces and a upper square tower which is built in the form of Bagan temples and a lighting system is also created as in Bagan

temples, here, from the openings of the tiered terraces. For the entrances access, there are nine porches decorated in the traditional style of flame arched pediments. The main shrine is at the center and the nine Buddha images on each pedestal around the Buddha tooth relics are enshrined at each side of porches, here, the styles of placing Buddha images is the same with the Mahawizaya temple, but there they are enshrined on the one pedestal at the central core together.

Fig 7.3: Swe-Taw-Myet temple in Yangon - 1996

Photo Source: 1) http://wikimapia.org/2306548/Swe-Taw-Myat-Zedi

2) Author

There are also differences of opinion relating to the subject of architecture in Myanmar: many disagreements still exist, showing that research is still needed about the facts on the Pyu, Bagan and Mrauk-U sites. As to the chronological date, the builders of later periods may imitate the older temple types; sticking strictly to such concepts can lead to errors. Some

scholars identify the construction periods of temples based on paintings and on other interior decorations; this approach is also not entirely reliable, since there are numerous examples where later renovations replaced the ornaments and interior decorations and these have not recorded, and in some cases even the time and names of the donors were changed as the renovation was done, so the works and the construction period and the names of original donors disappeared. Here the author's research preview is "what is the significant spatial composition of temples in Myanmar?" And it is also important "How to approach the method to study the changes in design and technology applied at buildings and to establish the line of evolution". Here, some facts are found of these approaches and construction systems, by analyzing their certain functions and evaluating the temples, and classifying their different types based upon the development and evolution. Nevertheless, further research is still needed and it cannot be said to be complete; it can support the history of Myanmar Architecture for the new temple in the present and can get a better understanding of the various influences and evolutions within the historic setting and try to rediscover the historical architectural aspects in their form and spatial composition. However, further study is still needed on the temples in Myanmar concentrating from the aspects of architecture and the structural systems in the specialised the form composition and ornamentation. In these contemporary buildings, the architects try to use traditional ornamentation. About the utilization ornamentation, there has been no attempt to dictate a style of decoration and proper theories of modernizing traditional ornamentation. Such matters are questions only for the individual. Principles have been put forward for understanding the rational location and abstract contents of our traditional architectural elements, the principle, however, which are flexible enough to permit creative interpretation. And the further studies will be needed to do some recommendations and suggestions for developing conservation strategies, which can be implemented all in the selected case study cities. These forces are creating tension in such areas and thus are among other current important tasks of the study of the architecture of the temples today. This study tried to observe the ancient monuments in the architectural aspects based on the historical background, geographical, social, economic, religious and climatic influences and seek the existing values in the temples in Pyu, Bagan and Mrauk-U in terms of architecture in order to understand how they became the identity of and the built image in such a constructed environment.

Glossary

A

Ananda - the infinite, the endlessness.

anda - literally an egg, either the concave or convex part of a stupa.

Arimetteyya - the future, the 5th and the last Buddha of this earth: but sometimes spelled as Mettaya or Maitreya.

B

Bamar - the name of major ethnic group in Myanmar, formally known as Burman.

bhadrakalpa - the present of a series of time units.

bodawin - the life story of the Buddha.

buddha, The Buddha - literally means the 'enlightened one', it is conceived as there shall be 5 Buddhas on this planet, the past 4 being Kaku-Sanda, Kona-Gamana, Kassapa and the immediate past was Gotama; and the 5th and future Buddha shall be Mettaya. 'The Buddha' usually refers to Gotama, the Sakyamuni ('Light of the Sakya'), the third 'teaching Buddha' of the *bhadrakalpa*, a historic figure who lived and taught in North India in the 5th century B.C.

C, D

chattravali - the top portion above the *Hamika* in *Sikhara*.

dhamma - the ideal truth, being the teaching of the Buddha, literally 'the Doctrine'.

G

gu - literally a cave, derived from the Pali *guha*, at Bagan it becomes the generic term for a temple that may be centered and has an interior. In Myanmar written form '*Gu*' is the correct pronunciation, but the publication from UNESCO by Pierre Pichard adopted using '*Ku*' in English or French.

H

harmika - the box-like component that acted as a reliquary casket and was placed between the *anda* and the *chattravali*.

hpaya - 'Lord', derived from the Pali purha, it may be applied to any part of the *triratana*, and is the generic term for most Buddhist edifices.
hpaya-thon-zu - 'Three sacred Lords, a triad of three buddhas, usually Gotama in the different mudra. In the late period, this theme became manifest in architecture.
hti - sacred parasol fixed onto the upper portion of a finial, literally means umbrella.

J

Jataka - the birth stories of the Buddha; normally numbering 547, though an additional 3 were added in Burma for reasons of symmetry in mural painting and sculpture (commonly understood as 550 in numbers).

K, L

Kachin - the name of state in the northern Myanmar, the name of the ethnic group.
kala-kyaung - 'Indian Monastery', brick buildings either built by Indian immigrant craftsmen or housing Indian *bhikkhu*.
kalasa - the sacred decorative pot from which temple plinths at Bagan often take their profile; *kalasa* also appear in their pot form as obelisks on temple terraces and more rarely in reliefs as part of a temple's exterior ornament.
lay-myet-hna - 'four face', a monument built on a square ground plan and term for pagodas with four etrnaces.

M

Mahayana - 'the Great Vehicle', in which *bodhisattva* assist the devotee towards salvation.
makara - sea monster, a common pictorial motif.
mandapa - the plinth that projects from the porch temple (there is only one *mandapa* proper at Bagan: the Nat-Hlaung-Kyaung temple.
Mettya - the fifth and lat buddha of this *bhadrakhalpa* and the twenty eight buddha of all times.
Mon - the name of the state in the southeast of Myanmar, the name of the ethnic group.
mudra - a hand gesture or position that indicates the activity of a buddha. In the case of Gotama it illustrates a historic moment in his life.

N

nga-myet-hna - 'five faces': a temple built on a pentagonal platform.

naga - a serpent god.

nibbana - 'extinction', the ultimate goal of Theravada Buddhist when the cycle of their rebirths will cease, sometimes spelled as '*Nirvana*'.

P

Pagan - another way of spelling for Bagan.

pagoda - place of worship, in Myanmar this western term has evolved to describe a stupa or *zedi* in contrast to a temple or *gu*.

pahto - Myanmar word for pagodas with inner space, translated as temple.

Pali - the sacred language of Theravada Buddhism, originally an early Indian dialet of the Prakrit area in which the teachings of Gotama were spread first orally and then as a literature.

pitaka - literally 'basket', of which there are three (*tipitaka*), each of the baskets containing a portion of the scriptures.

pitaka-taik - scripture house.

R

Rakihne - the name of state in southwest of Myanmar, the name of the ethnic group.

Ramannadesa - the actual implication is the area in southeast of Myanmar, '*Desa*' means place or location.

S

sangha - 'community': the Buddhist order of monks.

Shan - the name of state in northeast of Myanmar, the name of the ethnic group.

sima - ordination hall; in Pali *thein*, also used as assembly hall for Buddhist monks.

Sikhara - spire or tower on the top of the temples.

stupa - the primary Buddhist monument with hemispheric form to enshrine relics, originally in India, a tumulus or cairn and then the funeral monument of a *cakkavatti*, the stupa may be seen in addition to being a giant reliquary as a cosmic symbol of buddhahood. In Myanmar, the European term 'pagoda' describes this type of monument, in Burmese *zedi* is more commonly used.

T, Z

temple - the root is from ‘Greek’, a building for worship, in Myanmar, pagoda with inner space for worship.

Theravada - an early Buddhist school that spread to Srilanka in the 3rd century B.C. where the scriptures were written down in Pali. From Srilanka this school spread to South East Asia; Myanmar, Thailand, Laos and Cambodia.

thein - Burmese for a *sima* or ordination hall.

zedi - Burmese term for a stupa.

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APPENDIX I

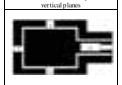
List of the Selected Temples in Bagan

No.	Name	Construction period (century AD)									Size				Story		Ground Plan					Upper Parts			Décor.				Epig.	
		11	12	13	14	15	16	17	18	19	small	medium	large	very large	1	2 or more	central shrine	solid core	corridor	entrance hall	porch	square tower	bell shape	other	stucco mouldin	mural painting	illustrated plates	glazing	stone inscription	painted inscription
1239	Nan-Hpaya	o										•			•		•		•	E	E	•		•						
1600	Nat-Hlaung-Kyaung	o										•			•			•	2		E			•		•				
1202	Abe-Ya-Dana	o											•		•		•		•	N	N		•		•	•				•
1192	Naga-Yon	o											•		•		•		•	N	N	•			•	•		•		•
1605	Patho-Hta-Mya	o											•			2	•		•	E	E		•	B	•	•				
374	Alo-Pyi-Gu-Hpaya		o									•			•			•		o	E		•		•	•				•
316	Shwe-Bon-Tha		o									•			•		•			N	N		•		•	•				
1580	Loka-Hteik-Pan		o									•			•		•				N	•			•	•				o
1249	Phya-Sa-Shwe-Gu		o									•			•			•	•	E	E	•			•	•				o
1085	Sein-Nyet-Ama		o										•		•			•	•	E	4	•			•	•				•
1620	Kyan-Ma-Ba		o										•		•		•			E	4	•			•	•				
1391	Gubyauk-Nge		•										•		•			•	•	E W	4	•			•	•			•	•
1589	Shwe-Gu-Gyi		•										•		•			•	•	N	4		•		•				•	•
285	Gubyauk-Nge		o										•			2	•		•	E	E	•			•	•			•	•
1323	Gubyauk-Gyi		•										•			2	•		•	E	E	•			•	•				
315	Taung-Pon-Laka-Na-Hta		o										•			2		•		E	E	•			•	•				
1471	Thein-Mazi		o										•			2		•	•	E	4	•			•	•				•
1478	Ya-Da-Na-Zedi-Hsin-Pya-Gu		o										•			2		•	•	W	4	•			•	•		•		
765	Gu-Ni (South)		•										•			2		•	•	E	4	•			•	o			•	
1512	Mye-Bon-Tha-Hpaya-Hla		o										•			2		•	•	E	E	•			•	•				
744	Ta-Peik-Hmauk		o										•			3		•	•	E	4		•		•	•				
771	Dhamma-Yan-Gyi		o											•	•			•				•			•	o			•	
2171	Ananda		o											•	•			•	2	4	4	•			•	o	•	•		
803	Pya-Tha-Da-Gyi		o											•		2		•	•		4									
1622	Gawdaw-Palin		o											•		2		•	•	E	4	•			•	o				
748	Sula-Mani		•											•		2		•	•			•			•	•			•	•
1597	That-Byin-Nyu		o											•		4		•	•	E	4	•			•	o				
1684	Wa-Kyin_Hpaya			o							•				•		•			N	N	•			•	o				
558	Zan-Thi (East)			•							•				•		•				4		•		•	•			•	
290	Le-Myet-Hna			o								•			•			•			4		•		•	•				o
259	Shwe-Leik-Too			o								•			•			•	•	E	4	•			•	•				•
730	Nga-Myet-Hna			o								•			•			•	•		5		•		•	•				
233	Hpaya-Ni			o								•			•					E	4	•			o	•			o	o
659	Winido			o								•			•					E	E	•			•	•			o	•
1668	Shwe-Hti-Saung			o								•			•		•			E W	E W	•			•	o				
997	Kyaung-Gyi-Nyima (Ama)			o								•			•		•			E	E	•			•	•				•
998	Kyaung-Gyi-Nyima (Nyima)			o								•			•			•	•		4		•		•	•				
712	Thin-Kan-Yon			•								•			•		•					•			•	•			•	
711	Let-Put-Kan			•								•			•			•	•		4		•		•	•			•	•
676	So-Hka-Wun			•								•			•			•	•	E	4	•			•	•			•	
557	Zan-Thi (West)			•								•			•			•	•		4		•		•	•			•	
1486	Gu-Taw-Thit			o								•				2		•	•	E	4	•			•	•				
197	Hpaya-Gyi			o								•				2	•			W	W NS				o	•				o
298	Ku-Byauk-Kyi			o								•				2		•	•	E	4	•			•	•				o
995	KU-Byauk (Bo-Cho-MI)											•				2	•		•	E	E	•		M	•	•				
1219	Kya-Sin			o								•				3	•		•	E	4	•			o	o				•
766	Guni (North)			•									•			2		•	•	E	4	•			•	•			•	
477	Hpaya-Thon-Zu (East)			o									•		•		•				N E	•			•	•				•
478	Hpaya-Thon-Zu (Center)			o									•		•		•				N	•			•	•				•
479	Hpaya-Thon-Zu (West)			o									•		•		•				N W	•			•					o
1499	Mi-Nyein-Kon			o									•		•		•		•	E	4	•			•	•				o
482	Thambula			•									•		•			•	•	E	4	•			•	•			•	•
249	Thakya-Hi			o									•			2		•	•	E	4	•			•	•				o
539	Tayok-Pyi			o									•					•	•	E	4	o			•	•		•		•
1791	Laka-Hman-Kin-Ywa-Haung-Gyi			o									•			2		•	•	E	4	•			o	•				•
1812	Hti-Lo-Min-Lo			o										•		3		•	•	E	4		•		•	•		•		•
697	Hsin-Phyu-Shin				•								•			2		•	•	E	4	•			•	o			•	
778	Kazun-O-Hpaya-Hla								o			•			•		•			E			•		•				•	
17	Tha-Din-Nge									o	•				•			•			E		•	R	•					

APPENDIX II

Inventory of Selected Temples in Bagan

Temple	Date	Reign	characteristics of the plan shape	organization	Space utilization	Spatial composition	lighting	Ventalation	Height	Size	openings	doors	Materials	Structural system (Arch and vault system)	nos of entries	nos of Statues	orientation	Exterior Decorataion	Interior Decorataion	consideration	
Bebe temple	11 Century	King Anaawrahta	space at the central core	U' shape	A: Central shrine				one story	small (under 40 ft)	x	entrance with radiating arch	systematically framed outer wall of brick, strengthened with sandstone at intervals, and a central hard core consolidated with brickbats and earth. The exterior is plastered for waterproofing and decorated with plaster mouldings	the cloister vault and the arch at the entrance	1	1	East	Stucco mouldings are decorated at the base with recess and dados , pilasters, pediments and cornices	stucco mouldings and mural paintings	this plan forms as an introverted organization and terminates an axial condition	
East Zegu temple	11 Century	King Anaawrahta	space at the central core	The combination of U & parallel vertical planes	A: Central shrine C: Porch				one story	small (under 40 ft)	The forepart with window	entrance with radiating arch	bricks, stone reinforcements and masonry	The voussoired arches are used at the east entrance and interior niches, and the cloister vault is used above the central shrine	1	1	East	Stucco mouldings are decorated at the base with recess and dados , pilasters, pediments and cornices	stucco mouldings and mural paintings	develops by interlocking with the space between parallel vertical planes. The shrine space inside the 'U' shaped plane is emphasized by approaching with parallel vertical planes. The space between the two parallel planes becomes vestibule	
Yahanhda Temple	11 Century	King Anaawrahta	space at the central core	L-shaped vertical planes	A: Central shrine C: Porch				one story	small (under 40 ft)	x	entrance with corbelled arch	bricks, stone reinforcements and masonry	The corbelled arch is used at three entrances and corbelled vault is used inside temple	3	1	west	Stucco mouldings are decorated at the base with recess and dados , pilasters, pediments and cornices	stucco mouldings and mural paintings	The shrine space is created inside 'U' and 'L' shaped configuration. The voids between these planes become openings	
Lemyethna Temple	11 Century	King Anaawrahta	central shrine	square plane and 'L' shaped plans	A: Central shrine C: Porch				one story	small (under 40 ft)	x	entrance with radiating arch	masonry structure and average brick size is 15.7 in × 7.9 in × 2.2 in	the barrel vault of corridor	4	1	-	Stucco mouldings are decorated at the base with recess and dados , pilasters, pediments and cornices	stucco mouldings and mural paintings	the central square plane is surrounded by L shaped vertical planes to define the corridor space. The voids between 'L' and 'U' shaped plans perform as openings	
East Hpet –Leik Temples	11 Century	King Anaawrahta	solid mass at the central core	square plane and 'U' shaped planes	A: Central shrine B: Vestibule C: Porch				one story	small (under 40 ft)			bricks, stone reinforcements and masonry	the corridor space is roofed with ¾ barrel vault	1	1	south	Stucco mouldings are decorated at the base with recess and dados , pilasters, pediments and cornices	stucco mouldings and mural paintings	the organization of plans of temples, based on the type which composed with central solid pillar and corridor. The central solid pillar is inside the 'U' shaped vertical plane to define the corridor space. The volumes are subtracted from the solid mass	
Nathlaung Kyaung	11 Century	King Anaawrahta	central shrine	square plane and U-shaped planes	A: Central shrine B: Vestibule				one story	small (under 40 ft)			brick structure and average brick size is 17 in × 8.3 in × 3.2 in	The ½ barrel vault is used over along the corridor space	1	1	East	Stucco mouldings are decorated at the base with recess and dados , pilasters, pediments and cornices	stucco mouldings and mural paintings	the niches are conspicuously subtracted from central pillar	
Shwe Gu Gyi Temple	11 Century	King Alungsithu	central shrine	square plane and combination of U-shaped and L-shaped	A : Central shrine B: Vestibule				one story	medium (between 40 ft and 80 ft)			bricks, stone reinforcements and masonry	high barrel vault over internal corridors and also used barrel vault hipped at east end over entrance hall	1	4	North	stucco mouldings at flaming arch pediments, corner pilasters, dados, ornate cornices, frieze with pointed obovals on circular bell-shaped dome	stucco mouldings , mural paintings and glazed decorations	central solid mass system is surrounded by U-shaped vertical plane and extended L-shaped vertical plane to create main porh	
PahtothamyaTemple	11 Century	King Sawlu	central shrine and corridor	square plane and combination of U-shaped and L-shaped	A: Central shrine B: Vestibule C: Porch				one story	large (between 80 ft and 160 ft)			bricks, stone reinforcements and masonry	barrel vault hipped at east end over entrance hall	1	1	East	stucco mouldings at pediments with ornates , terraces, cornices, corner pilasters, dados	decorated throne shape with mirror at central shrine and mural paintings	space center system is surrounded by U-shaped vertical planes which form corridor space around the central shrine and extended L-shaped vertical plane to create main porh	
AnandaTemple	11 Century	King Kyansitthar	central shrine and corridor	square plane and combination of L-shaped planes	A: Central shrine B: Vestibule C: Porch				one story	very large (above 160 ft)			bricks, stone reinforcements and masonry	barrel vault hipped at east end and also used corbelled arches at side niches of central shrine	4	4	-	stucco mouldings at passage porch, throne shape with Buddha image and niches with pediments and crowning of stupa form, and crowning of tiers tower	decorated tangent circle patterns under corridor vaults and Bodhi tree and floral patterns with attendants at the back of image on east side of core	central soild mass system is surrounded by L-shaped vertical planes to create the double corridor space around the central shrine and then symmetrically formed square plan shape. Then interlocking L-shaped vertical planes to create the main porches on 4 s	
Winido Temple	12 Century	King Kyaswa	space at the central core	combination of L-shaped planes	A: Central shrine B: Vestibule C: Porch				one story	small (under 40 ft)	x		bricks, stone reinforcements and masonry	cloister vault and barrel vaults in the temple	3	1	East	stucco mouldings at flaming arch pediments, square tower, axial gateways with pediments	stucco mouldings at flaming arch pediments of vestibules and porches	space center system is surrounded by L-shaped vertical planes and also connected with L-shaped vertical planes to form the main porch on one side	
Nanpaya Temple	12 Century	King Anaawrahta	central shrine	combination of U-shaped and L-shaped planes	A: Central shrine C: Porch				one story	small (under 40 ft)			bricks, stone reinforcements and masonry	used barrel vault hipped at east end over shrine room and over west entrance hall	1	1	East	Stucco mouldings are decorated at the base with recess, pilaster with figures and frieze with pointed obovals	dummy corner pilasters, temples and trees around niches on the walls	solid central pillars are surrounded by L-shaped vertical planes and then combination with the L-shaped planes to create the main porh on one side of the temple	
Ahlodawpyae Temple	12 Century	King Kyansitthar	central shrine	combination of U-shaped and L-shaped planes	A: Central shrine B: Vestibule C: Porch				one story	small (under 40 ft)	Perforated stone windows		bricks, stone reinforcements and masonry	high ½ barrel vault over corridors and barrel vault hipped at east end over entrance hall	1	4	East	stucco mouldings at flaming arch pediments and crowning with many tiered, pediments and crowing of temple above windows, corner pilasters, lotus flowers, frieze with ogre heads, ornate cornices, urn-profiled base with dados, crenellations, tiers of small	stucco mouldings at flaming arch pediments, niches, Brahma figures on core base and pedestal of Buddha images. Mural paintings	central solid mass system is surrounded by U-shaped vertical plane and combined with L-shaped vertical plane to create the main porh	
GubyaukgyiTemple (Myinkaba)	12 Century	King Narapatisithu	central shrine	combination of U-shaped and L-shaped planes	A: Central shrine B: Vestibule C: Porch				one story	medium (between 40 ft and 80 ft)			bricks, stone reinforcements and masonry	barrel vaults and barrel vaults hipped at one end in the temple	4	4	East	Stucco mouldings are decorated at the base with recess and dados, pilasters, pediments and cornices	mural paintings and frieze and rows of figures on the walls	space cemter system is surrounded by U-shaped vertical plane to create the double corridor space around the central shrine and combined with L-shaped vertical plane to create the main porh	
Nagayon Temple	12 Century	King Kyansitthar	central shrine and corridor	combination of U-shaped and L-shaped planes	A: Central shrine B: Vestibule C: Porch				one story	medium (between 40 ft and 80 ft)			bricks, stone reinforcements and masonry	ntral shrine and barrel vaults over corrido	1	1	East	stucco mouldings at pediments, crowning of temple above windows, niches, reinforcement on base with ogre heads, corner pilasters, frieze with ogre heads, ornate cornice , dados, base with recess, and crenellations	stucco moludings at flaming arch pediments and niches	space cemter system is surrounded by U-shaped vertical plane to create the double corridor space around the central shrine and combined with L-shaped vertical plane to create the main porh	

Temple	Date	Reign	characteristics of the plan shape	organization	Space utilization	Spatial composition	lighting	Ventalation	Height	Size	openings	doors	Materials	Structural system (Arch and vault system)	nos of entries	nos of Statues	orientation	Exterior Decoration	Interior Decoration	consideration	
Sulamani Temple (Ground floor plan) 	12 Century	King Narapatisithu	central shrine and corridor	solid square plane and L-shaped planes 	A: Central shrine B: Vestibule C: Porch				two storey	very large (above 140 ft)			bricks, stone reinforcements and masonry	with high barrel vault over shrine and barrel vault with diaphragm vaults over corridors , low barrel vault over passages and porches	4	4	East	glazed elements at base with recess, cornices and crenellations and stucco mouldings at between glazed elements, reinforcement on base with ogre heads, corner pilasters, ogre heads at cornices, dados, ornate mouldings and niches at each side of pediments	decorated stucco mouldings at flaming arch pediments and was used throne shape at the back of main shrine image. Mural paintings	solid mass system is surrounded by L-shaped vertical planes and combined L-shaped planes to create the main porch	
Sulamani Temple (upper plan) 	12 Century	King Narapatisithu	central shrine and corridor	solid square plane and L-shaped planes 	A: Central shrine B: Vestibule C: Porch				two storey	very large (above 140 ft)			bricks, stone reinforcements and masonry	barrel vault hipped at east end over shrine and entrance hall, and low barrel vault at east corridor, over passages, vestibules and porches, and high barrel vault over south , north and west corridors	1	4	East	plain stucco mouldings at the main body and pediments and was also decorated gold at slightly domed roof and circular bell-shaped dome, conical spires and umbrella	gilded with mirrors at throne shape	solid mass system (which substracted to create the niches in the central shrine) is surrounded by L-shaped vertical planes and combined L-shaped planes to create the main porch.	
Thandawgya Temple 	13 Century	King Narathihapati	solid core	U-shaped planes 	A: Central shrine B: Vestibule C: Porch				one story	small (under 40 ft)	x		bricks, stone reinforcements and masonry	with cloister vault over central shrine and also used barrel vault over vestibules and porches	1	1	West	stucco mouldings	stucco mouldings and mural paintings	space center system is surrounded by U-shaped vertical planes. So form is totally square plan shape	
Gawdawpalin Temple (upper floor plan) 	13 Century	King Narapatisithu	central shrine and corridor	combination of U-shaped and L-shaped planes 	A: Central shrine B: Vestibule C: Porch				four storey	very large (above 140 ft)			bricks, stone reinforcements and masonry	low barrel vault over porches, high barrel vault over shrines and vestibules	4	10	East	Stucco mouldings are decorated at the base with recess and dados, pilasters, frieze with ogre heads, pediments and cornices	stucco mouldings , mural paintings and glazed decorations	solid mass system is surrounded by U-shaped vertical planes to define the corridor space and then created with L-shaped planes to form the porch	
Gawdawpalin Temple (ground plan) 	13 Century	King Narapatisithu	central shrine and corridor	The combination of U & parallel vertical planes 	A: Central shrine B: Vestibule C: Porch				four storey	very large (above 140 ft)			bricks, stone reinforcements and masonry	low barrel vault over porches and vestibules, barrel vault hipped at east end over main shrine and high barrel vault over corridors	1	4	East	Stucco mouldings are decorated at the base with recess and dados, pilasters, frieze with ogre heads, pediments and cornices	stucco mouldings , mural paintings and glazed decorations	solid mass system is surrounded by L-shaped vertical planes to define the corridor space and then the space between the two parallel planes becomes vestibule	

APPENDIX III

Important Ancient Monuments of Mrauk-U

Sr No.	Name	Type	Donar	Period of Constrcution
1.	Mingaladatt Shwegu	T	Khittathin	818 AD
2.	Konawang Pagoda	T	Khittathin	Lemyo Period
3.	Pizi Phara	Image	Kawliya	1123 AD
4.	Palace		Min Saw Mon	P1
5.	Laymyathna	T	Min Saw Mon	P1
6.	Wizaya Ranthi	S	Min Saw Mon	P1
7.	Mukseitdaw Pagoda	S	Min Saw Mon	P1
8.	East and West Appendage Pagodas	T	Min Saw Mon	P1
9.	Sadarama Monastery		Min Saw Mon	P1
10.	Shwekyathein	T	Min Saw Mon	P1
11.	Shwegutaung Pagoda	T	Min Saw Mon	P1
12.	Nyidaw Zedi		Min Khari	P1
13.	Ratanasanrway Pagoda	T	Ba Saw Phyu	P1
14.	Ratanamhankin Pagoda	T	Ba Saw Phyu	P1
15.	Mahabodishwegu Pagoda		Ba Saw Phyu	P1
16.	Naratsa Phara		Mayor of Naratsa	P1
17.	Texilla Pagoda		Ba Saw Phyu	P1
18.	Thonegyaiktasu		King Dawlya	P1
19.	Nyimadaw Phara	T	Princess Saw Thu	P1
20.	Htuparyon Pagoda		Minranaung	P1
21.	Tezarama Pagoda	T	King Salingathu	P1
22.	Anawma Image		King Salingathu	P1
23.	Phara Nyinaung Pagodas		King Saw Oo	P2
24.	Wuthay Image		King Thazata	P2
25.	Nibbuza Pagodas	T	King Thazata	P2
26.	Laungbwannbrauk Pagoda	S	Ming Khaung Raza	P2
27.	Thuttawrhay and Thuttawra		Ming Khaung Raza	P2
28.	Andaw-Thein	T	Minbargyi	P2
29.	Shwetaung Pagoda	T	Minbargyi	P2

Sr No.	Name	Type	Donar	Period of Constrcution
30.	Theingrishwegu Pagoda	S	Minbargyi	P2
31.	Shwegugyi	S	Minbargyi	P2
32.	Kalamro Pagoda	T	Minbargyi	P2
33.	Shit-Thaung Temple	T	Minbargyi	P2
34.	U Mya Wa Pagoda	S	Minbargyi	P2
35.	Minpharagyigu		Queen Saw Thandar	P2
36.	Koe-Thaung Temple	T	Mintikka	P2
37.	Minkhamaung	T	Minphalaung	P2
38.	Pitakataik		Minphalaung	P2
39.	Kyauk Ouk Phara		Minphalaung	P2
40.	Ouk Taw Phara		Minphalaung	P2
41.	Htuk-Kann-Thein	T	Minphalaung	P2
42.	Phara Ouk Temple	T	Minphalaung	P2
43.	Pakhan Thein		Min Razagyi	P2
44.	Pharabaw Pagoda		Min Razagyi	P2
45.	Minpaungshwegu		Queen Shin Htwe	P2
46.	Ratanabon Pagoda	T	Minkhamaung	P2
47.	Ratanaprathatt Pagoda	T	Minkhamaung	P2
48.	Sakyamanaung Pagoda	T	Thirithudamaraza	P2
49.	Minkhaungshwegu	T	Queen Nattshinmay	P2
50.	Mrangdawmu		Narapadigri	P3
51.	Htundawmu		Narapadigri	P3
52.	Radana Manaung Pagoda		Sandathudhamaraza	P3
53.	Zina Manaung Pagoda		Sandathudhamaraza	P3
54.	Loka Manaung Pagoda		Sandathudhamaraza	P3
55.	Mungala Manaung Pagoda		Oggabala	P3
56.	Haridaung		Nara Abhaya Raza	P3

P1 = the early period (1430 AD – 1513 AD)

P2 = the middle period (1513 AD – 1638 AD)

P3 = the late period (1638 AD – 1738 AD)