“A TROPICAL HOME”: MYANMAR AND REINTERPRETATION OF TRADITIONAL ARCHITECTURE TO CONTEMPORARY CULTURAL CENTER IN BAGAN

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A Thesis Submitted in Partial Fulfillment of the Requirements

for the Degree of Master of Architecture in Architectural Design

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Field of Study	Architectural Design
Thesis Advisor	Associate Professor M.L. CHITTAWADI CHITRABONGS, Ph.D.

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งานวิจัยเพื่อการออกแบบฉบับนี้เกี่ยวข้องกับการทำความเข้าใจวัฒนธรรมแห่งสถาปัตยกรรม โดยอาศัยวิธีเลือกเส้นร่างโครงสร้างทางเรขาคณิต หรือ ‘ทาซิส’ ในภาษากรีก การเรียบเรียงที่ว่าง ประสบการณ์แห่งความปิติ วัสดุและกลวิธีการก่อสร้างพื้นถิ่น วัตถุประสงค์คือการมองเห็นความเป็นไปได้ในการย้อนตีความแบบวิเคราะห์ของวัดอนันดา วัดทัทบี้อินยู และบ้านพม่าดั้งเดิม เพื่อสังเคราะห์บทวิเคราะห์ดังกล่าวสู่กระบวนการออกแบบสถาปัตยกรรมร่วมสมัย การทบทวนวรรณกรรมและกรณีศึกษาถูกเรียบเรียงผ่านทฤษฎี การปฏิบัติงานออกแบบ และปรัชญา ของสถาปนิกร่วมสมัยผู้มีกระบวนการออกแบบที่สะท้อนประวัติศาสตร์ ประสบการณ์ของมนุษย์ และความทรงจำแห่งที่ตั้ง ที่ตั้งล้อมรอบไปด้วยภูมิทัศน์ทางประวัติศาสตร์ในเขตอนุรักษ์ของพุกาม การเลือกที่ตั้งนี้มีพื้นฐานบนการทดสอบในด้านการตีความหมายใหม่ของกระบวนการออกแบบศูนย์วัฒนธรรมพุกาม

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Hein Min Thaung : “A TROPICAL HOME”: MYANMAR AND REINTERPRETATION OF TRADITIONAL ARCHITECTURE TO CONTEMPORARY CULTURAL CENTER IN BAGAN. Advisor: Assoc. Prof. M.L. CHITTAWADI CHITRABONGS, Ph.D.

This architectural design research study is about the understanding of the architectural tradition by means of chosen geometrical framework, or ‘Taxis’ in the Greek language, spatial compositions, sensuality experiences, local materials and construction techniques. The objective is to see the possibilities of reinterpreting analytical drawings of Ananda Temple, Thatbyinyu Temple and a Burmese traditional house in order to synthesis the analyses upon the contemporary architectural design process. Literature Reviews and Case Studies have been done upon the theory, practice, and philosophy of contemporary architects whose design processes are reflected on the history, human experience, and memory of the site. The site, surrounded by the historical landscape of Bagan heritage zone, is chosen to be a testing ground for the reinterpretation design process for the Bagan Cultural Center.

Field of Study:	Architectural Design	Student's Signature
		.....
Academic Year:	2020	Advisor's Signature
		.....

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Hein Min Thaung

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Chapter 1 Introduction

What is home, အိမ်?

It is a house sheltering a family which is consisted of love, diverse opinions in solidarity, relaxation of mind and body, social reproduction embedding with identities. The traditional house of the common people is the most basic architectural built form to investigate the socio-cultural identity of a country, or a region and the religion of faith is one of the influencing factors on the socio-cultural movement in human history. My home, Myanmar, has diverse culture and traditions in closely relate to South East Asian neighbors and has experienced up and down in social, cultural, and political situations along with the global phenomena. Following British colonization in 1886, the modernism was imported that lead to the collision and integration with local architectural identities and some native architects initiated to rebuild traditional characteristics and ornaments into the modern built form to be appropriate with the modern social style. Hence, what will be Myanmar architectural typology in socio-culture, environmental problems, materials, and construction methods available in contemporary time or today? How can the traditional architecture from ancestors be a tool for the architectural design of present and for the future of generations?

The tradition of architecture design is a complete set of expression symbol formed within a specific region, with the edification of the region's unique culture and after a long time of precipitation. (Ouyang, 2016) Along with the development of society and economy, people's living demands are also changing, which means blindly following regional architectural tradition cannot meet the requirements of contemporary people. The appropriated solution is to integrate the external resources of contemporary knowledge and technique with the essence of the tradition of the local characteristics of a region to be adaptable for the today social and cultural requirements of people. The interpretation and integration of traditional essence into contemporary in architectural

design process is always occurred through the history of human. History is a bridge connecting past with future and holding them together. Additionally, innovation will be impossible without knowing your history that an innovation independent from history will be incompatible with the present time. (Ulusoy & Kuyrukcu, 2012)So, the study of history and precedents in architecture with the innovative perspective will provide adaptable connection between past and present to reinterpret into today architecture.

Walter Benjamin argued that in order to understand any form of paradigm shifts, it is necessary, in a sense to reawaken history to awaken a historical period that shared certain conditions with the present. (Pusca, 2010) According to the Burmese chronicles, Bagan was the capital of Bagan Kingdom, the first kingdom that unified the regions that would later constitute modern Myanmar. The artistry of the architecture of pagodas in Bagan proves the achievement of Myanmar craftsmen in handicrafts and the peak point in the history of Myanmar architecture advancement and innovation. To understand the cultural behaviors of a community, it is the best way to investigate the house forms of ordinary people. House form is not only simply the result of physical forces or any single casual factor but is the consequences of a whole range of socio-cultural factors seen in their broadest terms.(Rapoport, 1969)The traditional houses located in central part of Myanmar around the area of Bagan from late Kon-Baung period of 18th century before the British colonization and the integration of Western building typology, are worthy to examine part of the cultural behaviors of ordinary Myanmar people and how they responded the climate, available materials, and construction methods during their period. The study of spatial composition, ratio, materials the architectural typology of the temples from Bagan period and traditional houses from late 18th century will provide partially the essence of Myanmar architecture to understand and apply in socio-culture, environmental problems, materials, and construction methods available in contemporary time or today. So many scholars from Myanmar have done the study of existing conditions and historical background of traditional buildings but there is lacked to

analyze the data and reinterpretation into architectural design process, and my research might be useful partly for the contemporary architectural practice in Myanmar.

Figure 1: Integration of traditional ornaments and modern built form, Yangon City Hall

1.1. Problem Statement

Globalization has revolted the socio-cultural factors and emerged new theories for that factors. It also opens up a wider critical perspective on architectural history across the entire region of South and Southeast Asia. (Arnold, September 1996)The injection of international style also prolonged the oppression of the rich local culture since the beginning of the British's colonization in Myanmar. Most of Myanmar architectural identities are embedded in the humble traditional housing and Buddhist religious buildings typology as the Theravada Buddhism is the major practice in Myanmar population along the history, it also has the great influence on the development of Myanmar architecture development and to reconstruct that typology in the contemporary standard cannot be achieved by investigating only at physical factors like materials and construction technique but also require to study the intangible mental experience on architectural tectonic that is attached to the human multi-sensory experience of hearing, seeing, touching, smelling and tasting. The good architecture can stimulate the physical and emotional well-being and so I want to resurface the Myanmar architectural typology from traditional language. How can I reinterpret it in tackling of today local circumstances concerned with architectural built form in Bagan?

1.2. Proposed Research Questions

1.2.1. What are traditional architectural languages: formal system, materials, and construction technique of Myanmar traditional House for common people, religious buildings from Bagan and what are the enhancing factors for sensuality experiences of Bagan temples' space?

The family is the basic building block of our society whilst house, resident supplies shelter, social, cultural accommodation to the family. With the unification of different houses create the nation and the area which is formed from the combination of nations is the region. The term "regionalism" means both the character of the region and development of the region as socio-cultural identities which affect cultural behaviors influencing the residential architectural forms in that region. The tropical belt where large areas of Southeast Asia, Africa, India, and parts of both South and North America are located and form the biggest landmass in the world and has one of the highest numbers of rapidly developing cities. Architectural identity is causally related to the socio-cultural, geographical, ritual, and cultural aspects of a region and the examination of those characteristics can aid to understand and evaluation of built form which is adaptable and harmony to the region. The countries of South-east Asia have culturally owned diversity of many things in common. Majority population from the region own primitive believe in religion, animism and spiritism with similar rituals to residential space and hierarchical accommodation. (Rapoport, 1969)My research can explore similar identities for architectural built forms between Myanmar and its neighbor countries, Thai, Laos, and Cambodia which share religiously, culturally, and social behavior factors and identities. I will emphasize on the socio-cultural backgrounds for architectural languages like formal system, materials, and construction technique.

Every touching experience of architecture is multi-sensory; quality of space, matter and scale are measured equally by the eyes, ear, nose, skin, tongue, skeleton and muscle.(Pallasmaa, 2012) In Bagan period, the architectural advancement was the peak point in Myanmar History and many Buddhist religious buildings were built during this period. The spatial layout, utilizing natural light to create shade and shadow are

impressive features to enhance the human senses when a person enters the temple's interior space from outside. Brick as preferred choice of construction material was popular all-over southeast Asia, but it is dominated the construction of religious monuments in Bagan.(Lall, 2014) The brick is one the dominant qualities of material in most of Bagan temples and how it can partly stimulate the human sense along with mural painting on the plastered wall is also worthy to examine.

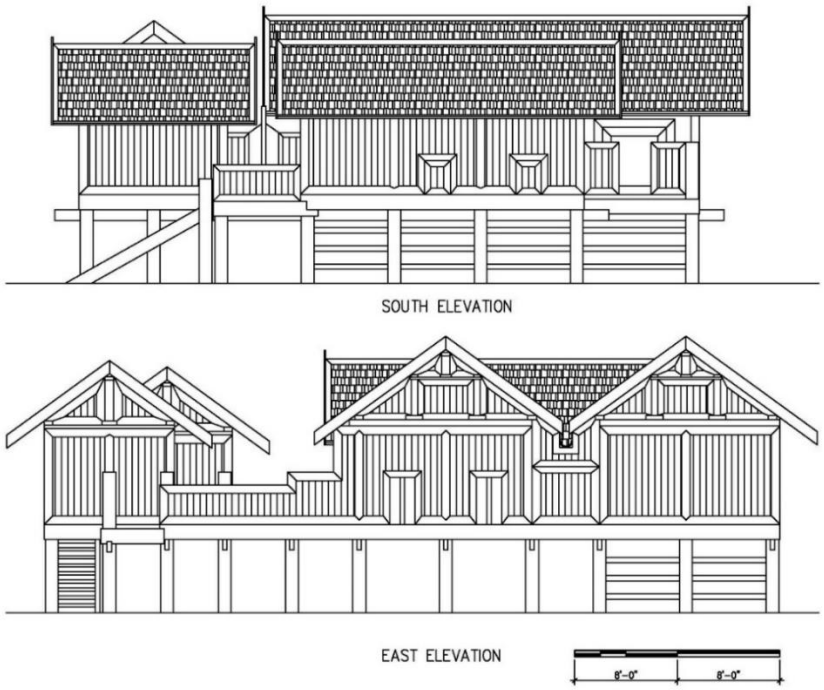


Figure 2: Elevation drawings of U Kyin Oo House, drawings from U Myo Myint Sein and Team(Team, 1970)

Figure 3: Spatial, light and darkness of Bagan Temples interiore (Source-www.500px.com)

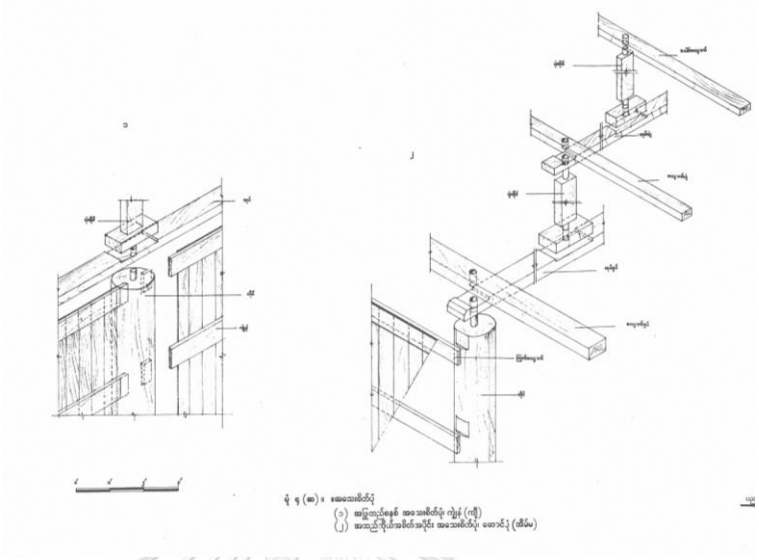


Figure 4: Detail construction method of U Kyin Oo house (source- YTU archives, U Myo Myint Sein and Team)(Team, 1970)

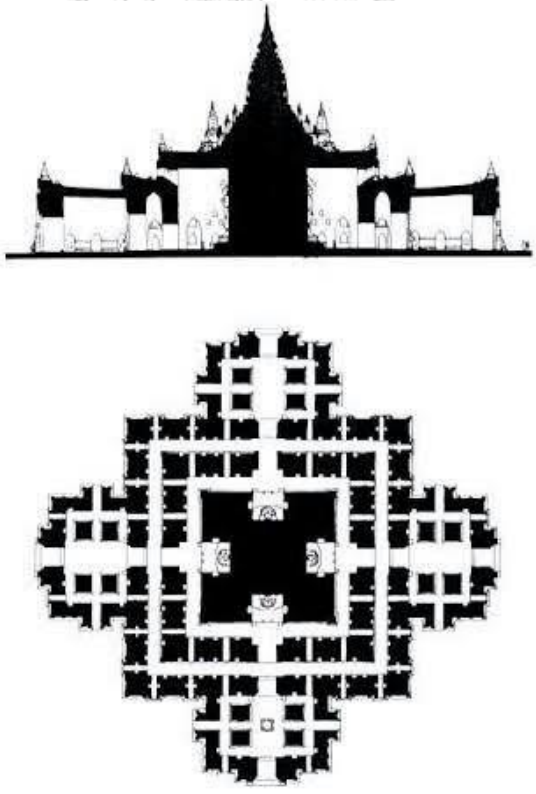


Figure 5: Measured Drawing of Ananda Temple (Source- YTU archive)(M. o. E. Department of Higher Education, Rangoon, 1989)

1.2.2. How can I reinterpret the findings from the typology study of traditional house and religious buildings to a contemporary architecture language in Bagan, Myanmar?

For an architect, it is important to express the cultural identities of a place and adaptably reinterpret into the contemporary language. The founding father of 'tropical modernism', Geoffery Bawa, has successfully integrated the tropical characteristics into the modern characteristics and buildings like hotels, schools, clubs, offices, and government buildings. Today, many Asian architects have done similar integration with contemporary materials, construction, and socio-culture issues. The architectural language which based upon the findings from the previous research question, will be reinterpreted into the contemporary building typology that can express the cultural significant of Bagan area.

1.3. Proposed Scope of Study and Research Methodology

For my research, I conduct literature reviews, analyses and field observation on the Myanmar traditional house and religious buildings from Bagan in middle part of Myanmar. I choose the case study on traditional house and temples according to historical, the architecturally significance and importance. I will apply the methods from three main literature study to analyze the formal study, composition of space and human senses in response to architecture typology:

1. ***Classical Architecture: The Poetics of*** Order by Alexander Tzonis and Liane Lefaivre, to conduct formal analysis and study.
2. ***Palladio Virtuel*** by Peter Eisenman, to understand the reinterpretation of classical architecture into renaissance by Palladio.
3. ***The Eyes of The Skin*** by Juhani Pallasmaa, to examine senses of architecture.

1.3.2. Literature Study on Theory and Philosophy for Formal Analysis and Human Sensuality in Architecture

In the book written by Christopher Alexander, ***The Timeless Way of Building,*** classified timeless quality of building or landscape as being originated from us, the people, yet he did not refer it simply with terms or words instead explain with our human body and

mind experience relate to activities, events, forces, situations of places are centered. Alexander also described that those factors as quality that could not be precisely described with a name or simply with one word, he distinguished that it existed and it was an essence of architecture which would surpass time, thus explaining this quality referred to earlier as timeless. (Alexander, 1979) In buildings and in towns, the character of place is given its character by certain patterns of events that keep on happening there which are the result from socio-culture. It is sufficient that our human's tangible body and intangible mind or sensuality are the fundamental quality to study the timelessness in architecture.

In ***The Eyes of the Skin*** by Juhani Pallasmaa, described the human experience or the significance of tactile sense of human in architecture. Life enhancing architecture is to agitate all the five senses simultaneously and assist to dissolve ourselves with the experience of the world. He subscribed the philosophy of multi-sensory experience of architecture related to qualities of space, materials, and scale. One of the fundamental qualities of great architecture is the mingling of shadow and light. Shadows inhales and illumination exhales light. Hearing and smell of a space are also unneglectable factors. Every building or space has its characteristics sound of intimacy or monumentality, invitation or rejection, hospitality, or hostility. The echoes of sound measure space and make its scale and volume comprehensible. We behold, touch, listen and measure the world with our body existence and the experimental world becomes organized and articulated around our body. Our domicile is the refuge of our body, memory, and identity. The timeless task of architecture is to create buildings and towns that help us to structure, understand and percept the shapeless flow of reality and ultimately, to recognize and remember who we are. Architecture empower people to recognize and understand the dialectics of permanence and change to inhabit ourselves in the world and to assign ourselves in the evolution of culture and time.(Pallasmaa, 2012) A culture always delineates its pattern of events by relating to the names of the physical elements of space which are "standard" in the culture. The intangible patterns of events influencing on the tangible buildings, town and landscape cannot be freestanding from

the space where they occur.(Alexander, 1979) In relation with Alexander's theory on the patterns of events which are always interconnected with certain geometric patterns in space, to Pallasma's sensuality in architecture, the study on formal basis can explain some aspect of timeless quality in architecture.

To conduct analysis on the formal basis of Ananda temple, the method and approach to the classical and renaissance architecture from two books ***Classical Architecture: The Poetics of Order*** by Alexander Tzonis and Liane Lefaivre who have tried to understand the secret of classical architecture's eternal youth, a quality that shares with classical music, literature and paintings and ***Palladio Virtuel*** by Peter Eisenman has done a challenging reinterpretation of Andrea Palladio's interpretation of classical order that has as much to say about the present predicament of architectural practice as it does about the sixteenth century Veneto in which the celebrated Renaissance architect lived and worked, have been referenced.

In the first book by Alexander Tzonis and Liane Lefaivre, expressions of classical architecture might be in communicating metaphorically what a viewer might feel about an architectural work, they yield next to nothing about the nature of classical architecture as a formal system. These concepts refer to the psychological, emotional states that result from the forms, but they hardly describe the forms themselves. It is easy to demonstrate not only historically but also experimentally how different forms stimulate the same psychological effect and, on the contrary, how the same forms tend to provoke different psychological effects.

The canonic system of a classical building can be divided into three levels of formal system: 1. **Taxis**, which divides architectural works into parts; 2. **Genera**, the individual elements that populate the parts as divided by taxis and 3. **Symmetry**, the relations between individual elements and balance system of the classical buildings. All of these are the poetics order of classical architecture and rules of composition.(Tzonis & Lefaivre, 1986)

The term Taxis is derived from the Greek origin, ***Classical Architecture: The Poetics of Order***, it is defined as the framework that govern the whole arrangement of

the classical building. From this point, I will start using the term **Taxis** to describe the formal system or arrangement system of building for further analysis on ancient temples, houses and more on the design process of cultural center in Bagan. The Taxis can be divided further into two sublevels: **the grid schema**, division of the building often equally into parts through sets of lines, vertical and horizontal straight lines or in polar grid pattern and the tripartite schema, the relation between façade, plan and section of a building.(see figure 2.a and 2.c) Taxis is the basic formative grammar for classic architecture, in fundamental textual representation or annotation system in which start can be read as end vice versa, end can be read as start, ABCBA, from which more segments of plans can be generated such as ABCDCBA, ABCBBCBA (see figure 2.b).

The Genera, the important aspect of classical architecture is every elements of the buildings have been appeared from well-determined sets, rules of composition based on simple geometric pattern square or rectangular. There is always a relation between architectural elements: columns to beams sizes and ceiling height, proportions of different decorative elements. One element like column can be a formal generative system for the whole building (see figure 2.d and 2.e).

Symmetry or balance system is applicable to almost all classic architectural buildings and is used for all universal constraints of architectural composition which refers to how elements are chosen and placed in relation both to one another and to the overall structure of taxis.(Tzonis & Lefaivre, 1986) Such symmetrical quality is the result from the taxis, textual annotation system of ABCBA, such power of symmetrical system can also be found in Bagan temple.

The study on the Taxis, Genera and Symmetry quality from western classical architecture is also applicable on the temples from Bagan that will be examined in the following chapter.

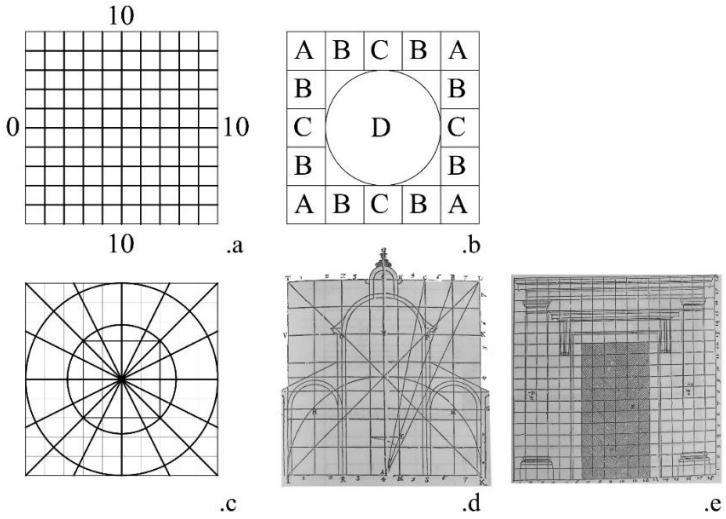


Figure 6: Taxis, Genera and Symmetry of classical architecture (source- the poetics of order)

In ***Palladio Virtuel*** by Peter Eisenmen, Palladio's works have been exemplified into a set of compositional rules, mainly derived from Greek and Roman architectural theories of proportion and symmetry, he examined these norms in enthusiastically inventive ways, and in Eisenman's intelligent reading it is this virtue that renders Palladio so startlingly contemporary. Eisenman carefully arranged a series of analytic drawings and diagrams to find out processes of spatial dislocation in Palladio's villas.

Eisenman examined the Palladio's works of drawing in two parts: **the real**: the physical building as it exists on the ground and **the ideal**: the proportional and harmonic systems, that regulate its composition through drawing. He extracted the abstract three-dimensional analytical drawing to understand the main and the servant space of different villas. But Eisenman did not explain how those analysis methods can be applied in today's architecture. (Peter & Matt, 2015) Eisenman also did the volumetric study of internal spatial composition by demonstrating that none of the villas of Palladio, however pure they seem at first glance, has any formal consistency and formal typological consistency in relation to one another, each building has their own spatial composition and system.(Vidler, 2012) Eisenman's approach to the formal analysis can express the hierarchy of the interior space and volume which stimulate the intangible or hidden idea for human perception or naked eye to the built environment.

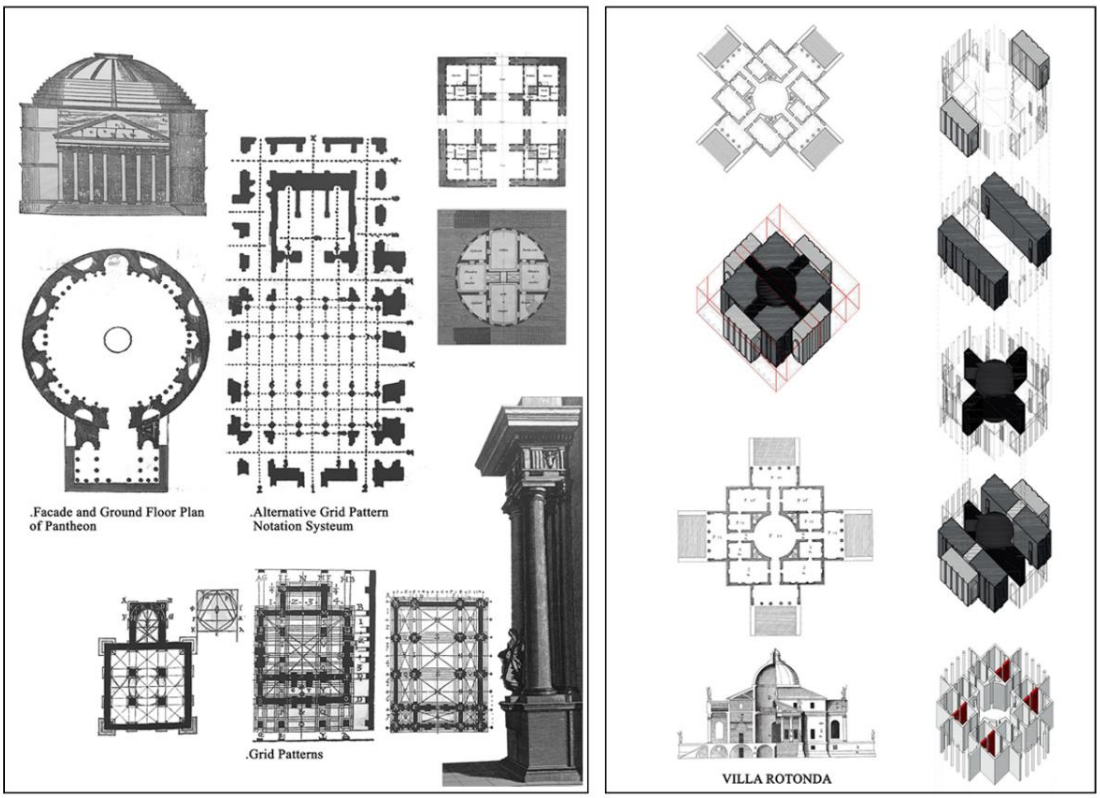
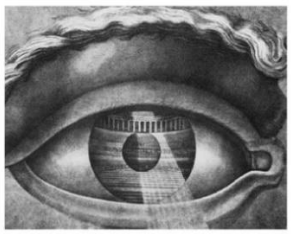
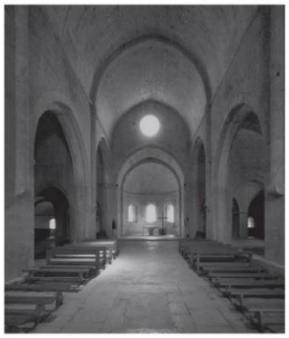


Figure 7: Left image group shows the formal system of classical architecture and right image group show the formal analysis method of Peter Eisenman (source: The Classical Architecture: the Poetics of Order and Palladio Virtuel)



Architecture has been regarded as the art form of the eye.
But man has not been always dominated by vision.

Vision and the tactile sense are fused in actual lived experience.



ARCHITECTURE OF HEARING AND SMELL

In historical towns and spaces acoustic experiences reinforce and enrich visual expriences. In rich adn invigorating experiences of places, all sensory realms interact and fuse into the memorable image of the place.

THE SIGNIFICANCE OF SHADOW AND DARKNESS

The darkness and shadows of the Finnish peasant's house create a sense of intimacy and silence; light turns into a precious gift.

LIFE-ENHANCING ARCHITECTURE OF THE SENSES

An architecture of formal restraint with a rare sensous richness addressing all the senses simutaneously. An archiecture that address our sense of movement and touch as much as the eye, and creates an ambience of domesticity and welcome..

Figure 8: The eyes of the skin-PALLASMA, images from the book(Pallasmaa, 2012)

1.4. Research Methodology

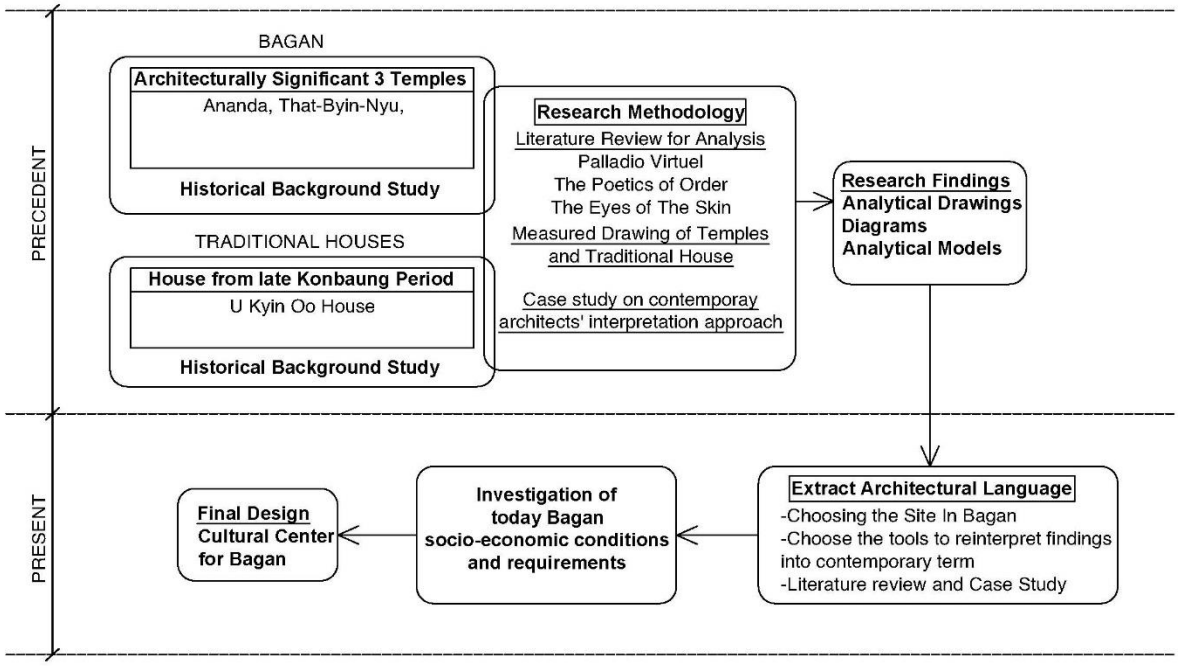


Figure 9: Research Methodology

Figure 10: Bagan Map (Recomposed by Author)

Chapter-2 Historical Background Study

2.1. Reasons to Choose the Bagan as Case Study and Proposed Design Site

Bagan is one of the most important architectural heritage zones in Myanmar. It is here in Bagan that Theravada Buddhism took deep root, strengthening and broadening the outlook of the whole of Burmese society. The art and architecture attained a peak of achievement, creating a treasured and enduring heritage for the people. Architectural concept as organic architecture, the articulation of components, balancing of horizontality and verticality, the massing of structures, the dramatizing of lighting effects, the creation of monumental and intimate spaces, the enhancement of space with decorative motifs can be seen and where honesty of structural expression has unsurpassed definition.(M. o. E. Department of Higher Education, 1989) Many scholars and researchers have done the study, measured drawings and multi-media records of historical and physical conditions of the site and buildings. But there is lack in the critical and the systematic analysis from architectural perspective. The Bagan has deeper meanings in the cultural development of Myanmar, and it also has the associated cultural values with its neighbor like India. Thousands of tourists have visited Bagan every year and the topography of Bagan is not a place with amusements or sea beaches, the intention of the visitors must be 'cultural' to observe and experience the ancient city that once flourished in the history.(Lat, 2010a)

2.2. Historical Background of Bagan Periods

"Landscape and places store memories, they save traces of lives long ago. What fascinate me about traces is that they are real, they are unique, they are always authentic. To me landscape are historical documents; I can try to read and interpret the place where I have to act as an architect."- Peter Zumthor.(Zumthor & Lending, 2018)

History is the collection of human centered experience, memories, skill, events, belief and knowledge which are intangible and are mingling with tangible aspect of

buildings and landscape. So, the study of history in architecture is to understand the past to interact with the present to future.

Bagan had laid foundation in the 7th AD and had reached to the full character as a center of a kingdom with permanent city wall and structure in 9th AD. That area at the time of Bagan kingdom in the 9th century may not be very large, most likely covered only the areas along the Ayeyarwady and Chindwin river basins. At the 11th century, King Anawrahta period, the kingdom's territory reached to northern and north-eastern area in the present Kaya, Shan, Mon, and Kachin States. The cultural revolution and evolution in Myanmar architecture had reached to the peak point by integrating the knowledge and construction technology from India and Mon. The Kings from Bagan period built the thousands of religious buildings, monasteries, stupas, ordination hall or Sima which is boundary, building or territory within which the monastic monk's activity has been done, Tipitaka Libraries, Rock-cut caves for meditation and temples. Among those religious buildings, the temples are the architecturally most significant and advanced structure and aesthetic. (Lat, 2010b) Among those temples, Ananda temple is the architecturally significant one. It was built in 1086AD.

2.3. Spread of Buddhism outside India

In about the 3rd and 4th centuries traders, missionaries and political refugees went to various parts of Asia outside India in about 3rd and 4th AD. In addition to Buddhism, they brought with them the art and architecture of India. The Pyu in central Myanmar and the Mon in southern Myanmar were among the happy receivers of this Indian culture. The Source was either Magadha or Amaravati or both. In late AD 600, artists of Pala and Pallava Kingdoms came to Southeast Asia. They taught the natives all they knew so that the natives became experts in various form of art. Bagan, Myanmar, already in touch with the Indian art and architecture for two centuries, were building up a dynasty in the 11th century AD.(Than Tun, 2005,December) It is the cultural integration and evolution of Buddha philosophy, art and architecture in central Myanmar area and the start of magnificent pagodas and shrines in Bagan area which is roughly a 5 square-mile and this area alone has more than 1200 pagodas.

The buildings type from Bagan period can be divided into two categories, 1.Secular and 2. Religious

2.4. Socio-economic Conditions during Bagan Period

The peace and stability and prosperity through agricultural production supported by Ayeyarwady and Chindwin rivers as major lines of communication also gave rise to one another social strata, “the traders and merchants”, this is also one of the main reasons that some thousands of religious structures could be built within a few centuries of Bagan’s blooming period. These pagodas were constructed not only by royalty and their entourage, but the rich also participated, there are inscriptional evidence that several religious structures were built by such rich people. Based on the socio-economic conditions, social strata in Bagan can be divided into 4 groups-

1. The royalty and the entourage of the royalty
2. The rich
3. Ordinary people
4. The slaves or serfs (Lat, 2010a)

The temples were served as not only for religious activities but also for the community space for the public. Buddhism has influenced on the evolution of art and architecture in Bagan period. The merchants, artists and technicians from India had brought the knowledge and construction techniques to Bagan and the local society adapted and integrated.

2.5. Materials and Construction Methods of Bagan Period

The sensuality enhancing factors of Bagan temples are integrated with the structural massiveness and interior spatial volume which have been fabricated with ornaments and patterns of paintings. The evolution of architecture in every today society has been based upon the historical and cultural factors of the past, are either intangible or tangible. The study on the precedent materials and construction method can assist in the apprehension and interpretation design process to be done in present Bagan area.

2.5.1 Architectural Ornament and Radiating Arch Technology

A notable feature Strachan draws to attention on the Nat-Hlaung-Kyaung is the inclusion of the first cinquefoil arched torana to be used as a decorative feature on any temple in Bagan (Morris) The above image is of a Cinquefoil torana belonging to a later built Bagan temple, this represents more clearly the detail of the flame pediment (which is seen often on many temples photographed by Pichard in his Inventory), it is most unfortunate that the torana above the entry to the Nat-Hlaung-Kyaung temple, although it has been restored, like most restored temples in Bagan it does not show the previous stucco coating, which is where the majority of temple decoration is present. In the below image, the detail of the flame pediment is still visible, and thus shows a more accurate representation of how the original torana on Nat-Hlaung-Kyaung may have appeared). As Thaw Tar Aung explains in her paper *Architectural Aspects of Temples in Myanmar: an appreciation of spatial composition,* the flame pediment is believed by some historians to resemble a mark found on Pyu coins which is called a 'Srivatsa' or 'holy house' which closely resembles the shape and profile of the flame pediment. Aung also continues to explain in his paper that the flame pediment is also believed by some other historians to be 'derived from the palm leaf convention in a timber bargeboard and the scroll ornament below the palm leaf'. Another explanation also is given suggesting that the flame is influenced by symbology found in Buddhism and forms 'the shield of the trident'. (Thaw, 2012)

Figure 11: A Cinquefoil Torana (Flame Pediment) above the entrance, source-www.gettyimages.com(Pilesasmile)

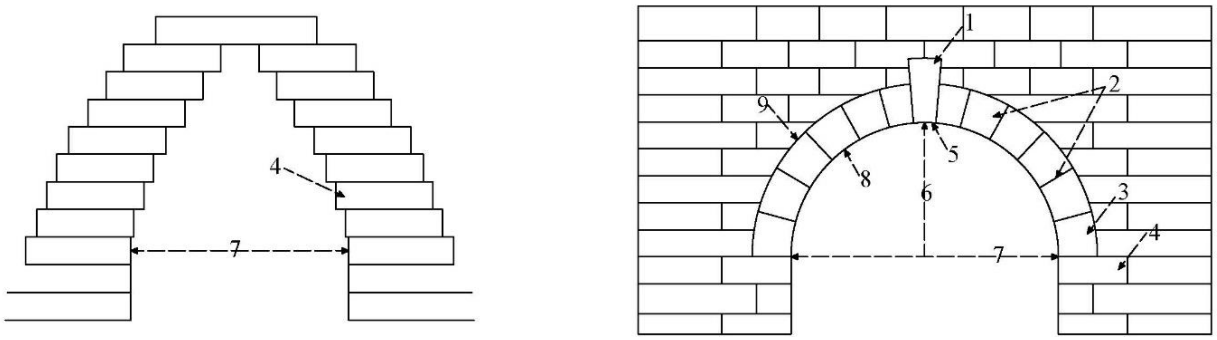


Figure 12: Corbelled Arch vs Radiating Arch (Redrawn by Author)

Corbel Arch			Radiating Arch	
1.Keystone	2.Voussoirs	3. Springer	4.Impost	5. Crown
6.Rise	7.Span	8.Intrados	9.Extrados	

2.6 Dominant Architectural Materials and Elements of Bagan Monuments

At a first glance to the monuments of Bagan, it can be clearly seen that the brick is widely utilized material for both main structure and fabrication or ornaments of temples. The other unique elements along with the volumetric interior space and mass of the temple stimulating the human experience are-

1. Terracotta slabs attached to the walls to present the Buddha Jataka stories
2. Mural Paintings on surface of wall and ceiling to depict the episodes of Jataka.
3. Sculptures like Buddha images, donor King's image and other spiritual guard images
4. Plaster motifs on the entrance, wall, at the corner
5. Opening to induce natural light into interior space and flush upon the image of Buddha.

Followings photos have been retrieved from U Myo Swe Thant's Facebook account and BAGAN IN OUR HEART online photo exhibition.("Bagan in our heart," 2018; "Myo Swe Than,")

Brick making and laying technique in Bagan period has been most advanced to construct the high and massive structural monuments in large numbers. People from Bagan period had applied different sizes of bricks to arrange according to the strength of material. Somtimes, sand stone has been applied at the corner as the structrual key stone.

1. Mural Painting
2. Terracotta Slabs
3. Sculptures
4. Plaster Motiffs
5. Light wells and Openings

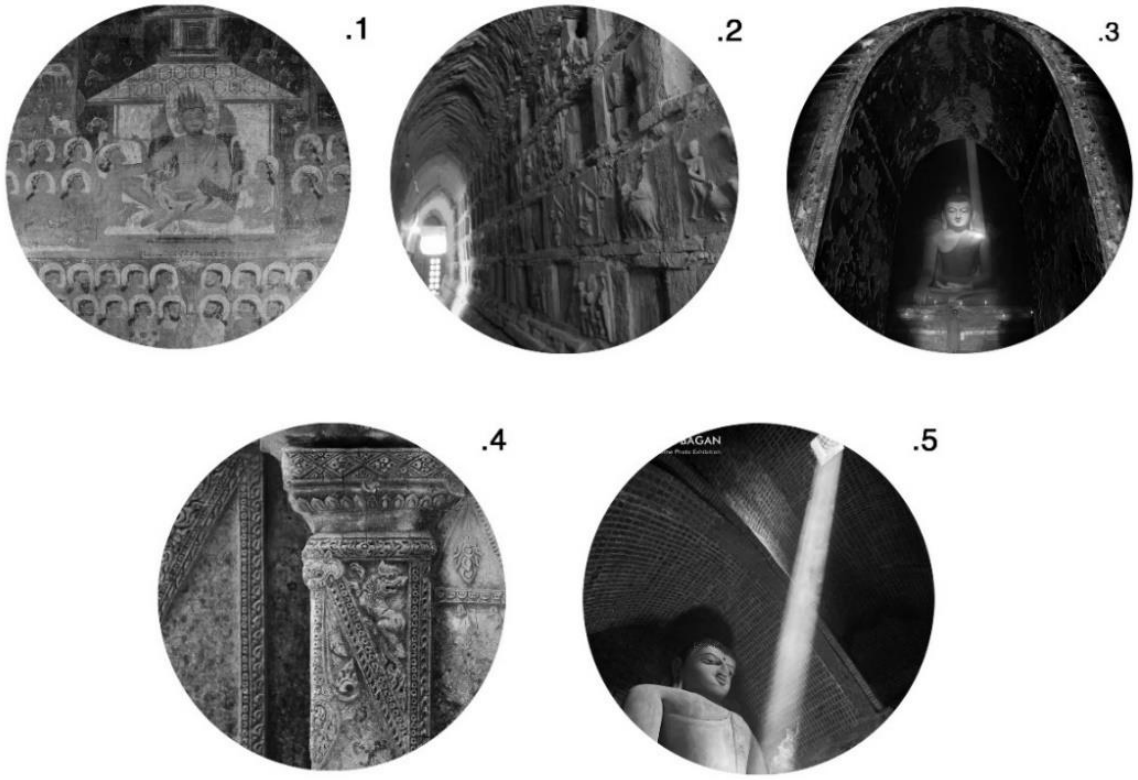


Figure 13: Architectural Elements of Bagan Temples (Recomposed by Author)

Summary

The socio-cultural precedents and historical study from Bagan period explain how people inhabited and laid foundation to the development of architectural tectonic, monuments on Bagan landscape. The study on precedents of architecture will provide the clues to the interpretation process for today architecture of Bagan which maintain the tradition along with the evolution to create the design for cultural center Bagan to showcase and enhance present socio-cultural landscape.

Chapter-3 Case Studies

In this chapter, the analysis on the diagrams of That-Byi-Nyu temple, Ananda temple, Dhamayangyi temple and one house from late Konbaung period will be carried out. As mentioned in previous chapter, the Bagan architecture had reached to the peak point in ancient time. Among the thousands of Bagan monument architecture, That-Byi-Nyu temple is the highest and structurally most advanced, while Anand temple's layout, spatial composition, architectural elements and balance of light and darkness are unique. All those temples are the iconic buildings of Bagan area and so it is worthy to examine. To understand the construction methods and materials of ordinary people from the past before the colonization which bring the modern building typology, the study on the houses before the colonization will provide the clues for the interpretation of traditional architecture for design process. But there is no data is available on the houses from Bagan period as the houses for ordinary people were built by using wood that cannot withstand the erosion of weather if the massive structure of temples mainly builds with brick, the highly efficient to the time and weather. The wooden house from late Konbaung period, late 18th century, is the nearest records can be investigated. The case study on massive temple and humble wooden house of ordinary people will present some part of the Myanmar tradition in architecture. I will apply some part of formal analysis technique from the literature reviews of Peter Eisenmen's ***Palladio Virtuel*** and ***Classical Architecture: The Poetics of Order*** by Alexander Tzonis and Liane Lefaivre.

3.1. Thatbyinyu Temple

3.1.1. History and Background, Significant Factors

The name Thatbyinyu was derived from *Sabbannutanana* in Pali, meaning omniscience and further explanation was given in the inscription as "knowing thoroughly and seeing widely", the main virtue of Buddha; the temple was constructed by King Alaung-Sithu in 1144AD. It is traditionally said that this temple was based on the design of one monastery by the name Bu-Va, supposedly a monastery built by Lady Viskha for Buddha during Buddha's period of 5th century BC, the design of this temple was entirely

the result of evolutionary development of temples built in Bagan and Sri-Khit-Tra before, the culmination of in the previous centuries. This temple is considered as belonging to 3 masterpieces of Bagan, which are Shwe-Zigon Stupa, Ananda and That-Byi-Nyu, is the largest one and the advanced construction technology of Bagan period.(Lat, 2010a)

The significant factors which make this temple "one of the masterpieces of Bagan monuments" are-

1. The design to construct four stories and all stories are accessible to public and achieved the rank of highest structure in Bagan and in the environment. The largest building in Bagan area.
2. The changed idea or the turning point to design as a temple with ample daylight and ventilation, a turning point from dark shrines or sanctums
3. The application of structural system with exceptionally large solid core, utilizing it as the main load bearing element and to prevent soil subsidence.

Analysis of Thatbyinyu Temple Drawings

The measured drawings of Thatbyinyu temple had done by Department of Architecture, Yangon Technological University in 1976. I redraw some drawing on AutoCAD to analyze based upon the techniques from the book, ***Classical Architecture: The Poetics of Order*** and Peter Eisenman's book ***Palladio Virtuel*** to understand the spatial composition, layout and how it works as formal system.

The investigation of the general basic mechanism through which formal composition carries meanings and acquires a social use, what we refer to as the critical use of classical critical architecture.(Lefaivre, 1986) Based upon the formal study of this temple can describe the social phenomena of Bagan period.

The isolation of formal aspects and their independent analysis is necessary, however, if one is interested in understanding classical architecture as a coherent system rather than a haphazard collection of shapes and details. It offers a deep comprehension of how a building is made, which is different from how it is used, and what impact it has.(Lefaivre, 1986) The physical objects of a building is attached to the soul and memories of people, the sense of space can stimulate the psychological and

emotional states of a person which derives from the forms of building. It is easy to demonstrate not only historically but also experimentally how different forms elicit the same psychological effect and, conversely, how the same forms tend to elicit different psychological effects.(Lefaivre, 1986)

'The Plan is the generator.'- Le Corbusier. (Corbusier, 1985)

From the analysis and formal study of Thatbyinyu Temple, the forms, and rules of composition language of Bagan temples are quite similar with the classical language from the Western world. The taxis, framework of Thatbyinyu Temple can clearly illustrate the similarity of formal language between classical architecture and Buddhist religious building from Bagan period. See figure. The direction of the two spatial axes is focused mainly on the images of the Buddha at 4 entrances, main entrance at East and other secondary entrances at North, South and West. See figure. This spatial axis relates to the socio-cultural factor of Buddhism, unlike the temples from Greek which intend to different gods, in Buddhism temples, all of which are only intend to Buddha and his teaching.

The function of the temple from one thousand years ago was not changed since than it is still the worship place to Buddha. The timeless way of the temple which can be interpreted is the formal language like taxis, transition between spaces, hierarchy of the volume and height of interior ceiling where is mingling with light and dark to seduce the mood of human mind along with change in temperature between inside and outside space of temples.

Figure 14: Thatbyinyu Temple, source- (Saetre, 2013)

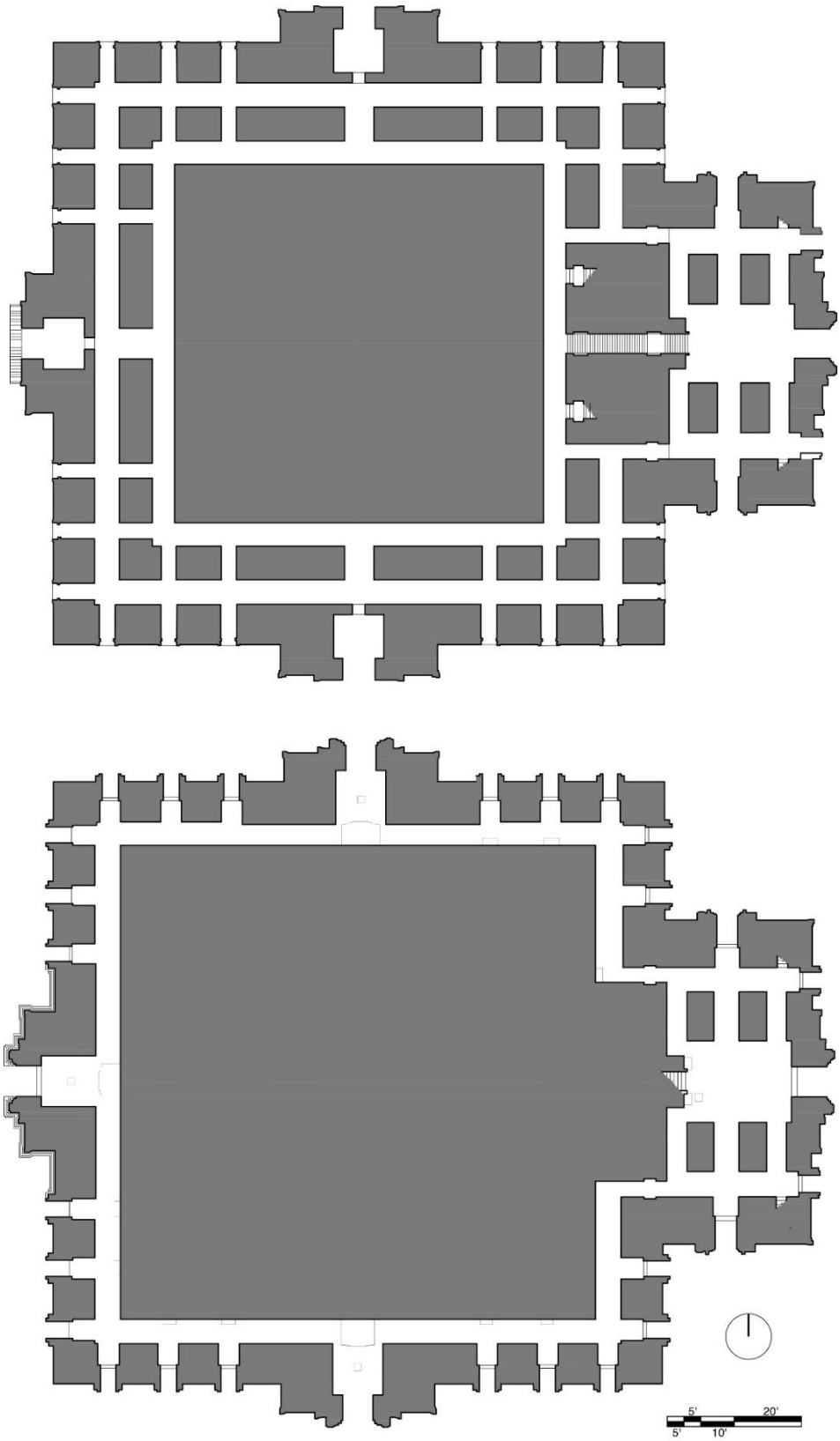


Figure 15: First and Second Floor Plan (Redrawn by Author)

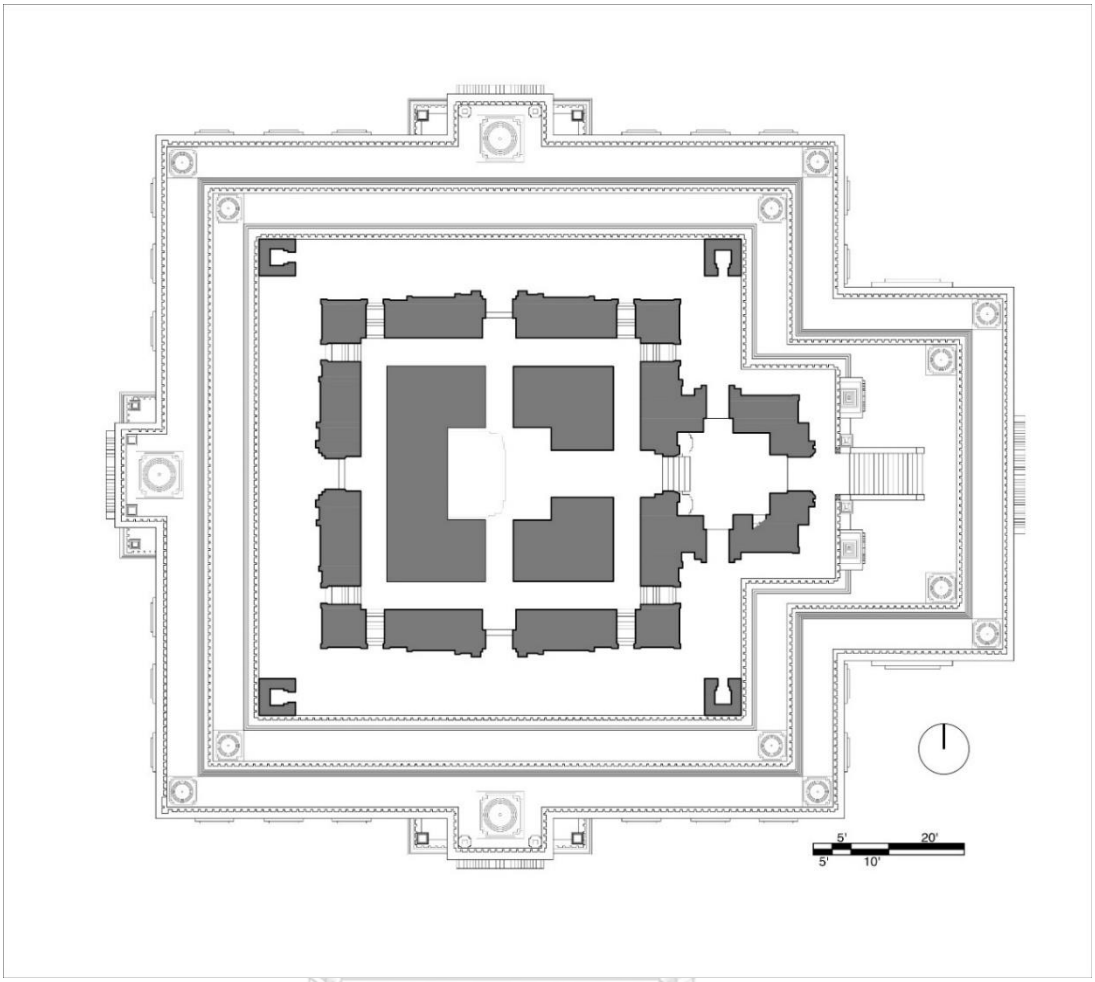


Figure 16: Third Floor Plan (Redrawn by Author)

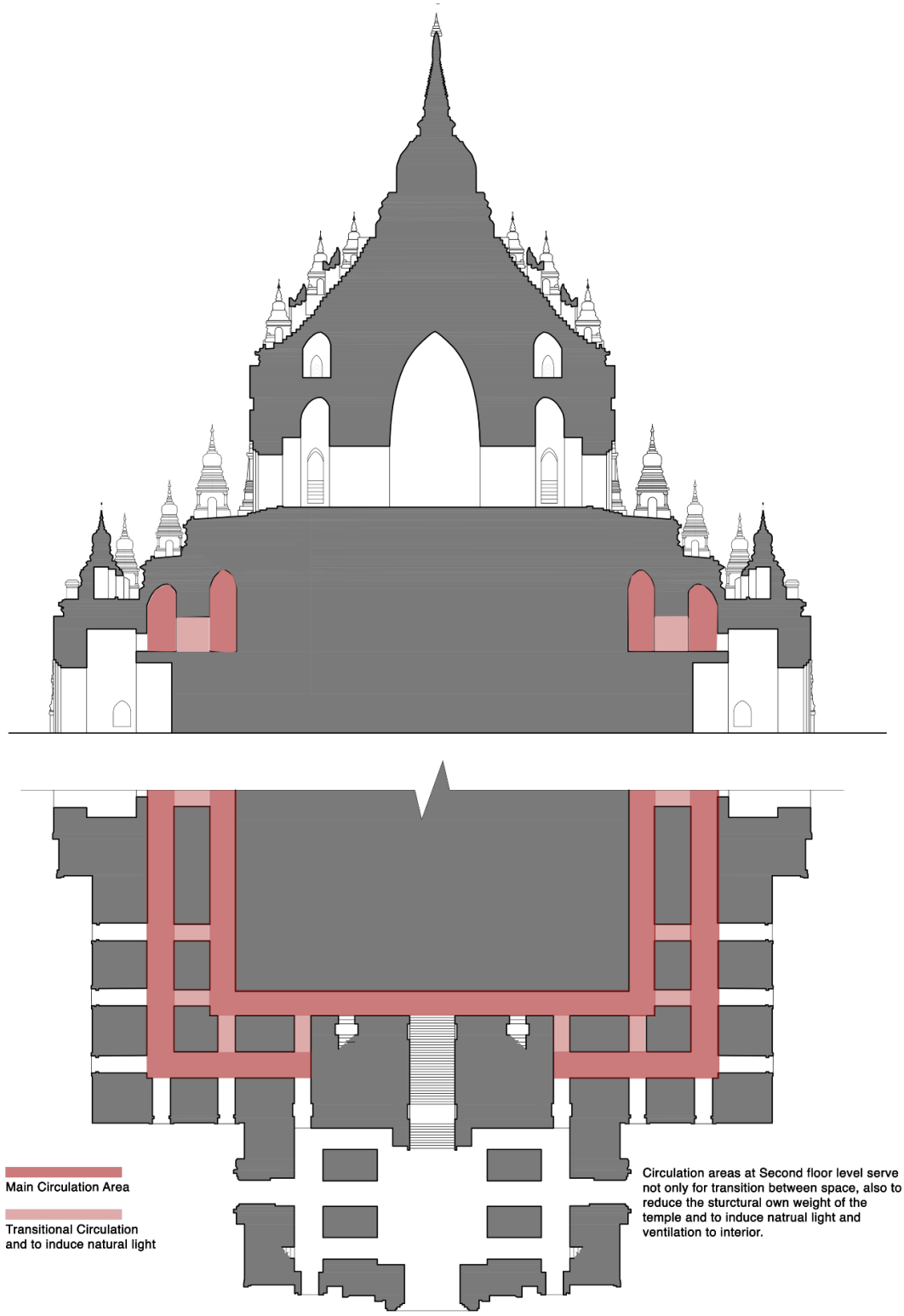


Figure 17: Redrew Plan to Section Drawing of Thatbyinyu Temple (Redrawn by Author)

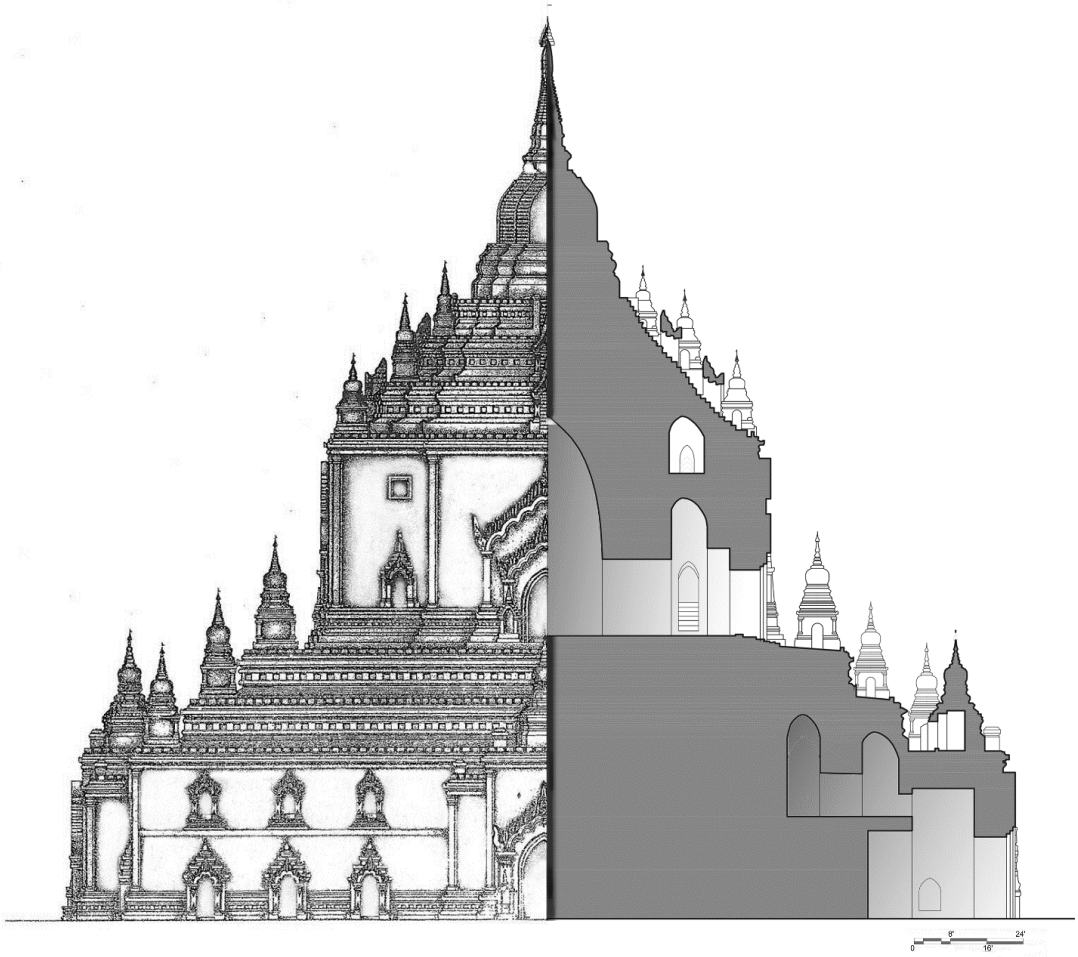


Figure 18: Elevation to Section, collage with image from original source and drawing (Redrawn by Author)

Following drawings have been done based upon the taxis of the Thatbyinyu Temple by reduction to the structural elements and rearranging the taxis to test the spatial composition without considering the functional requirements. From those drawings, the changing of the elements results the different formal compositional plan but still maintaining its original system of formal language.

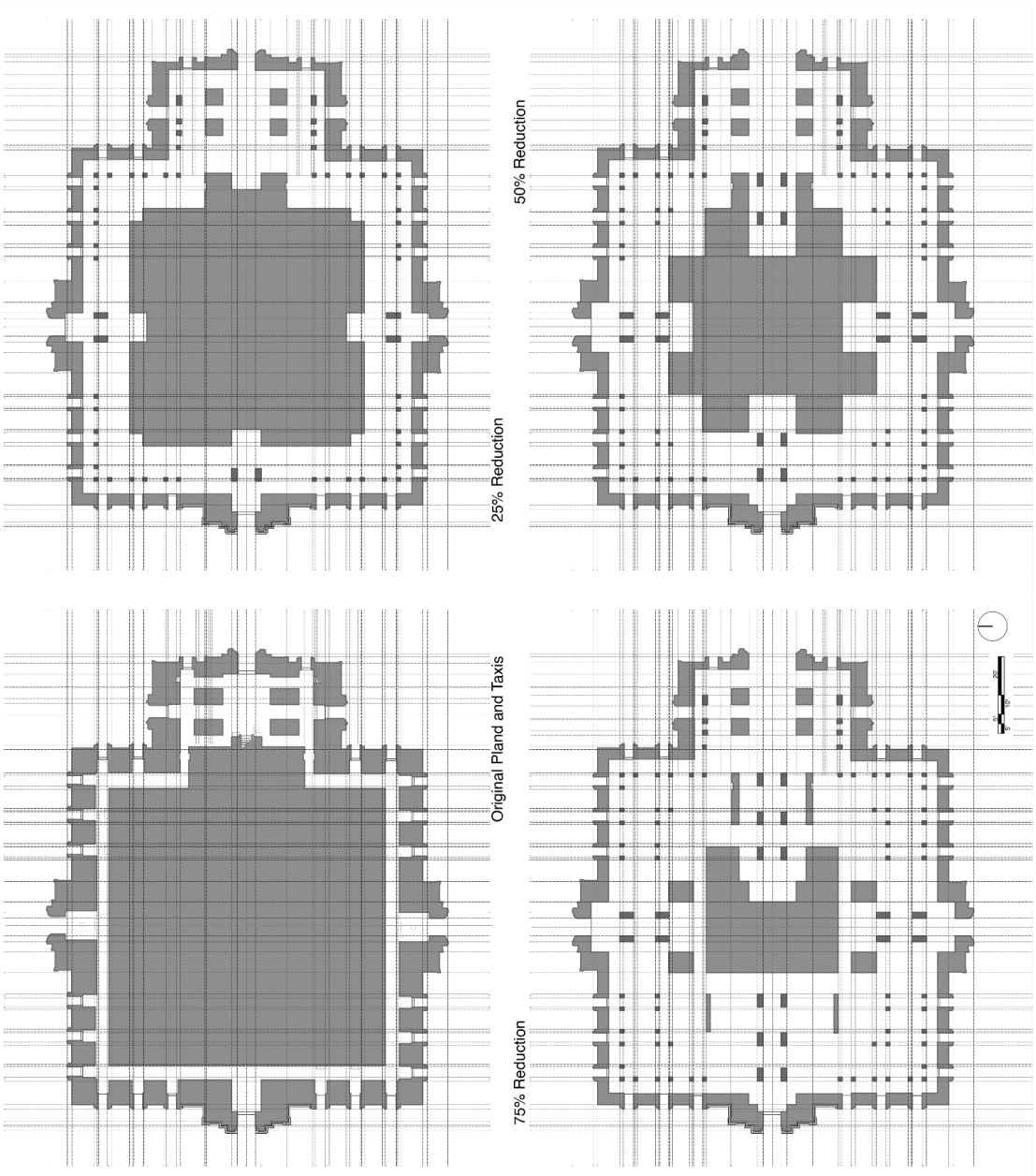


Figure 19: Space Experiment Plan (Drawn by author)

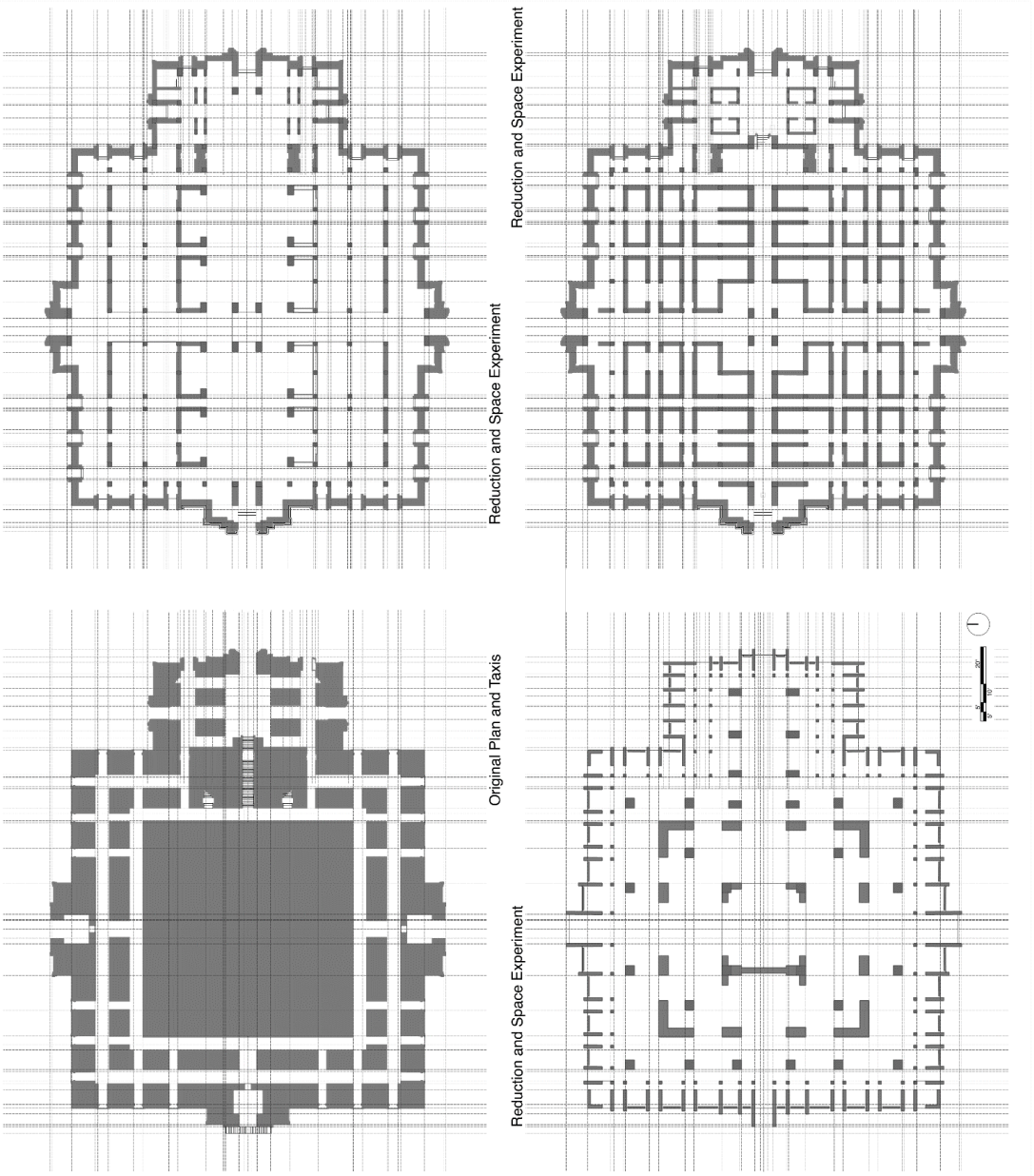


Figure 20: Space Experiment Plans (Drawn by Author)

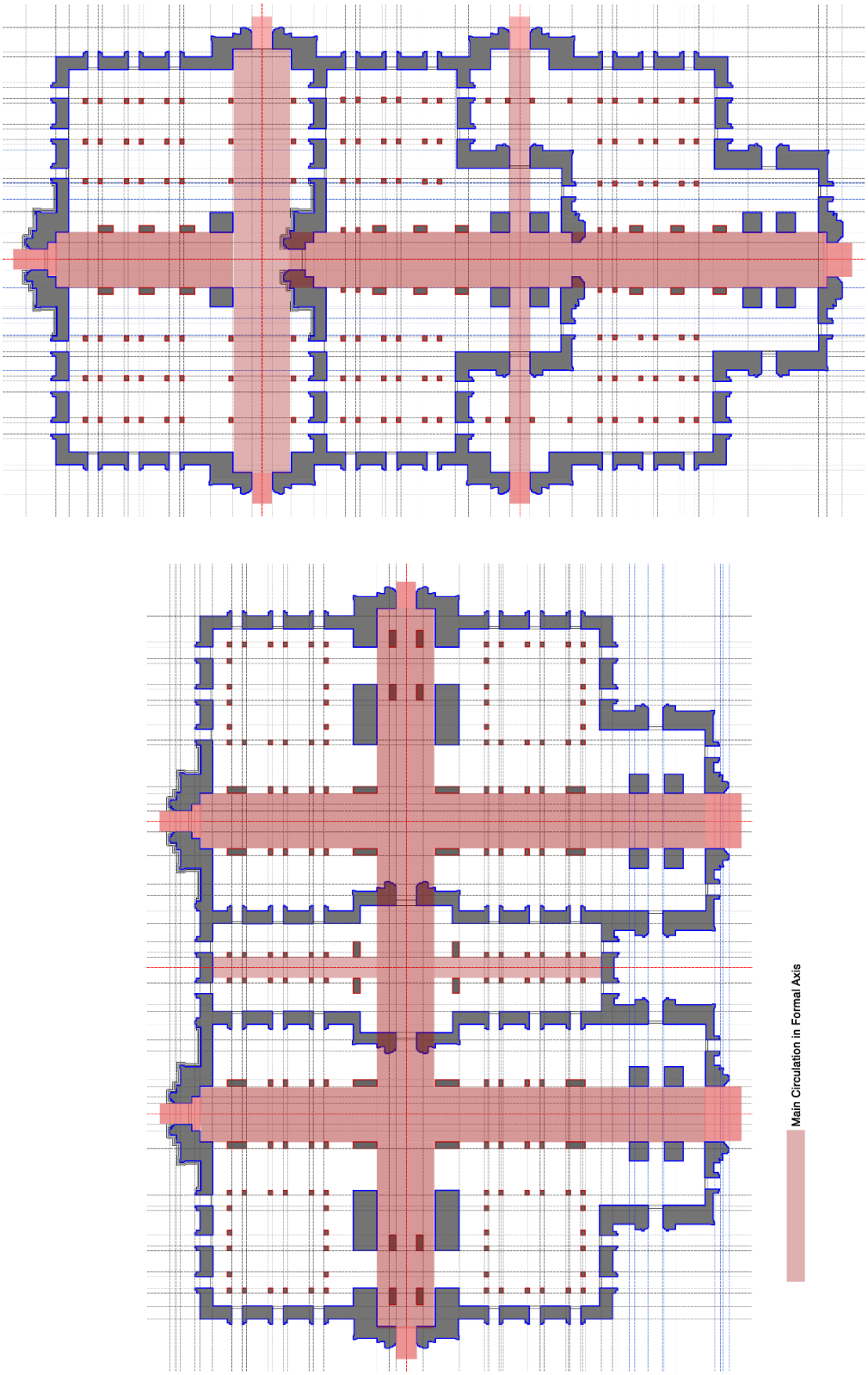


Figure 21: Space Experiment Plans (Drawn by author)

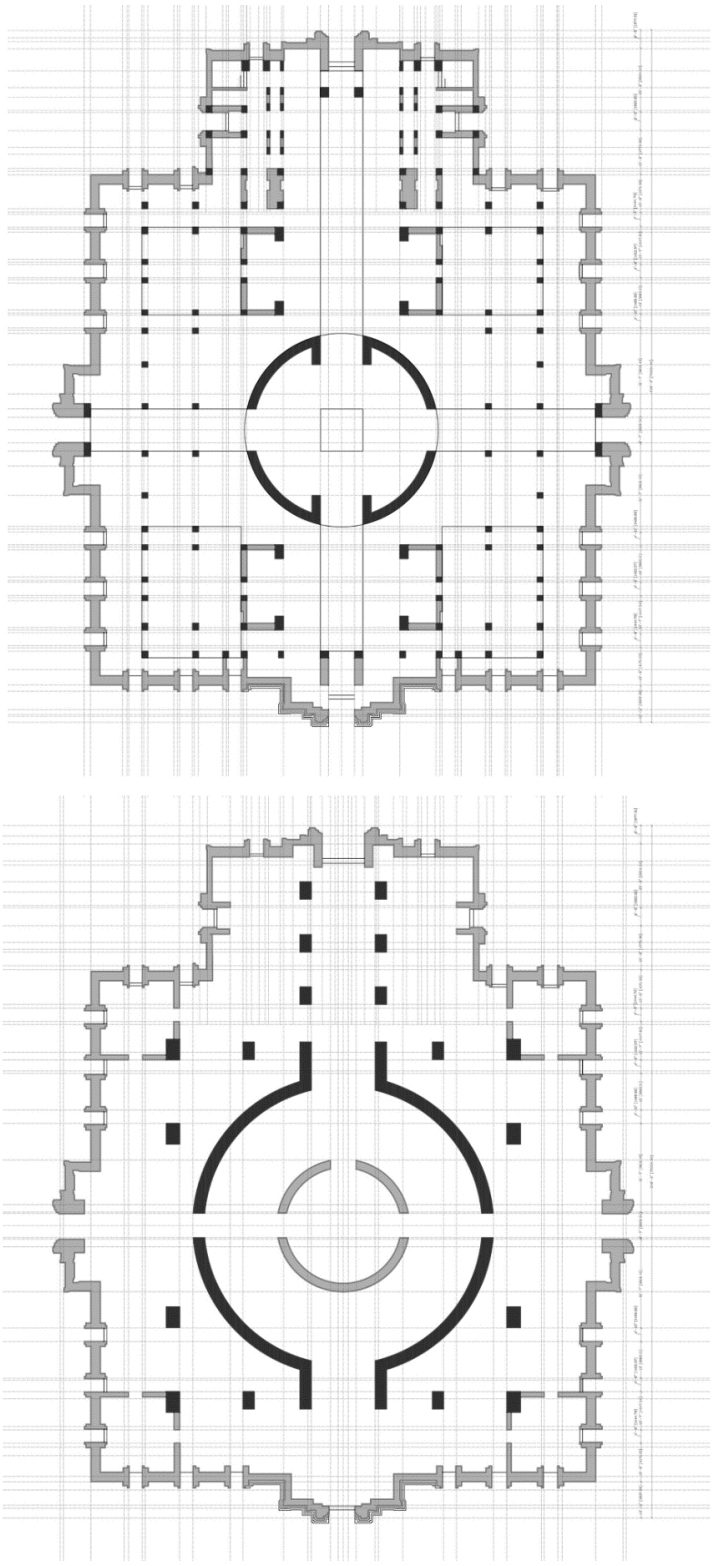
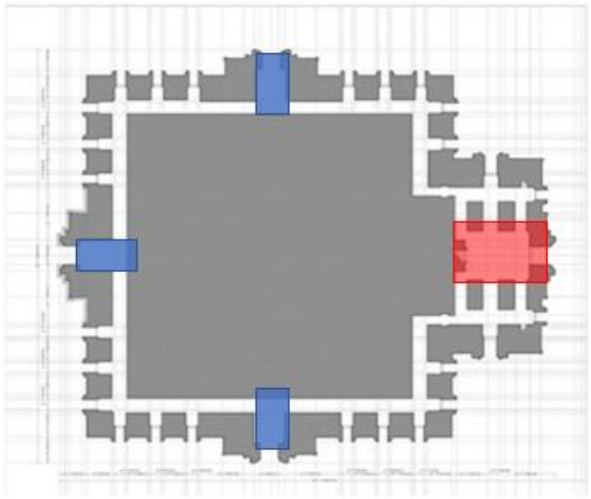
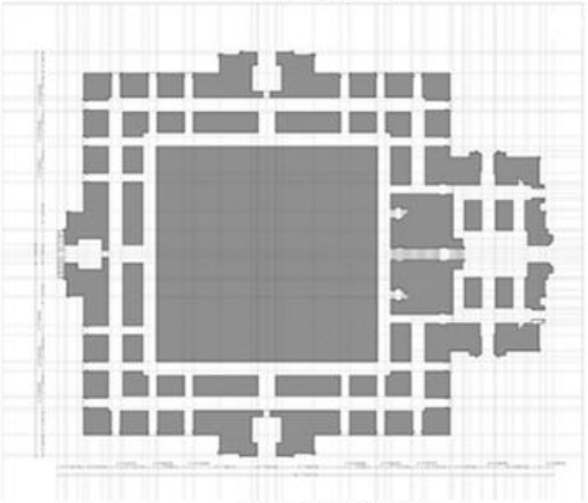


Figure 22: Space Experiment based on Taxis (Drawn by Author)



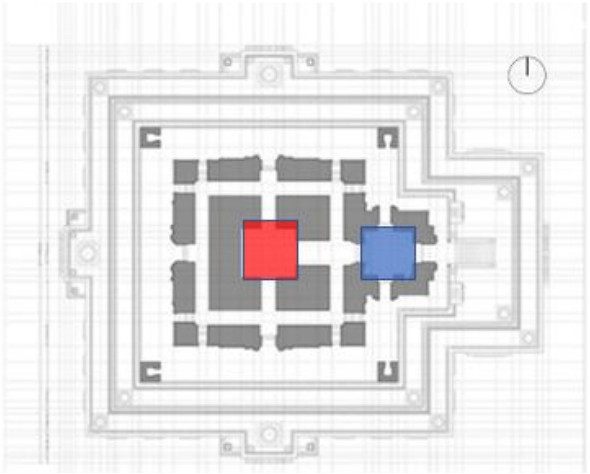
FIRST FLOOR PLAN

The main entrance of the temple which lead to the main stair to second floor, is at east side and other secondary entrances are at other sides which leads to the images of buddha. Visual Axis in relate to formal axis.



SECOND FLOOR PLAN

The double passage rings at the second floor not only serve as transition and circulation space but also to induce the ventilation and natural light into the interior space of temple.



The main shrine for the main buddha image of the temple is located at the third floor level, before the space of main shrine, the pre chamber is located.

Figure 23: Spatial Layout Plan of Thatbyinyu Temple (Redrawn by Author)

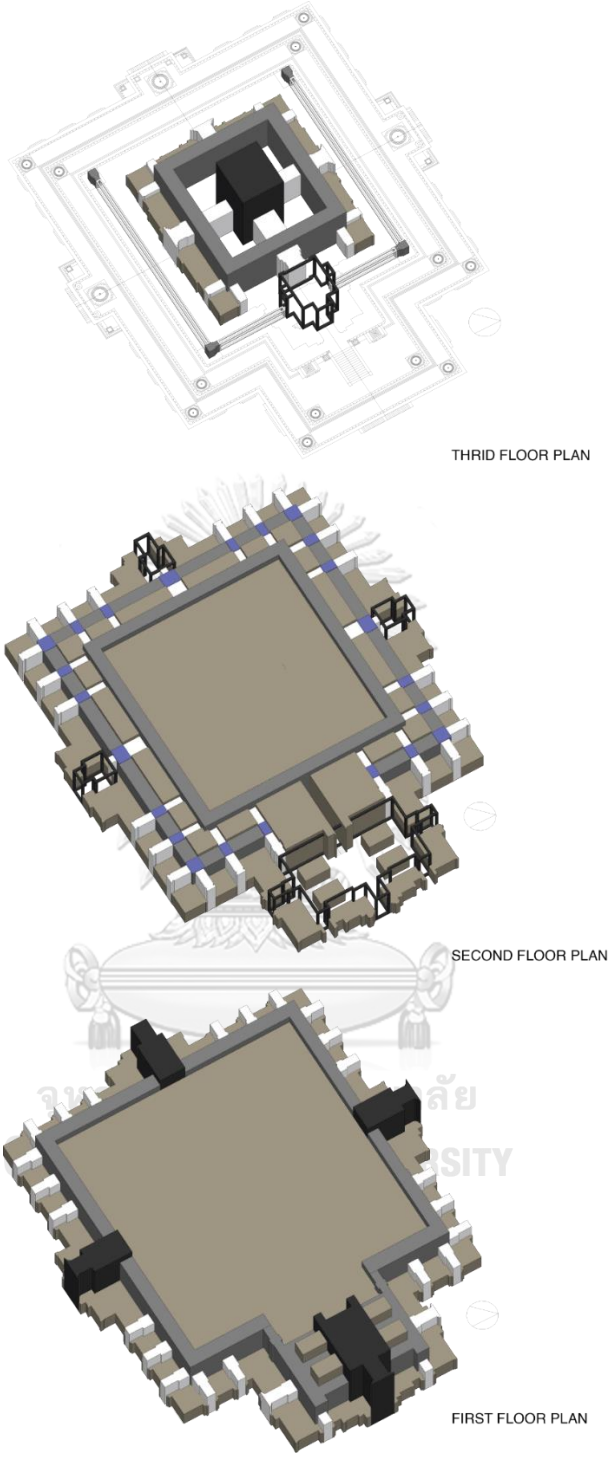


Figure 24: Three-dimensional space analytic drawings (Drawn by Author)

Black color- the primary space or dominant space

Grey color - the circulation space or serviced space

White color- the transitional space

Blue color - the intersection space of previous spaces

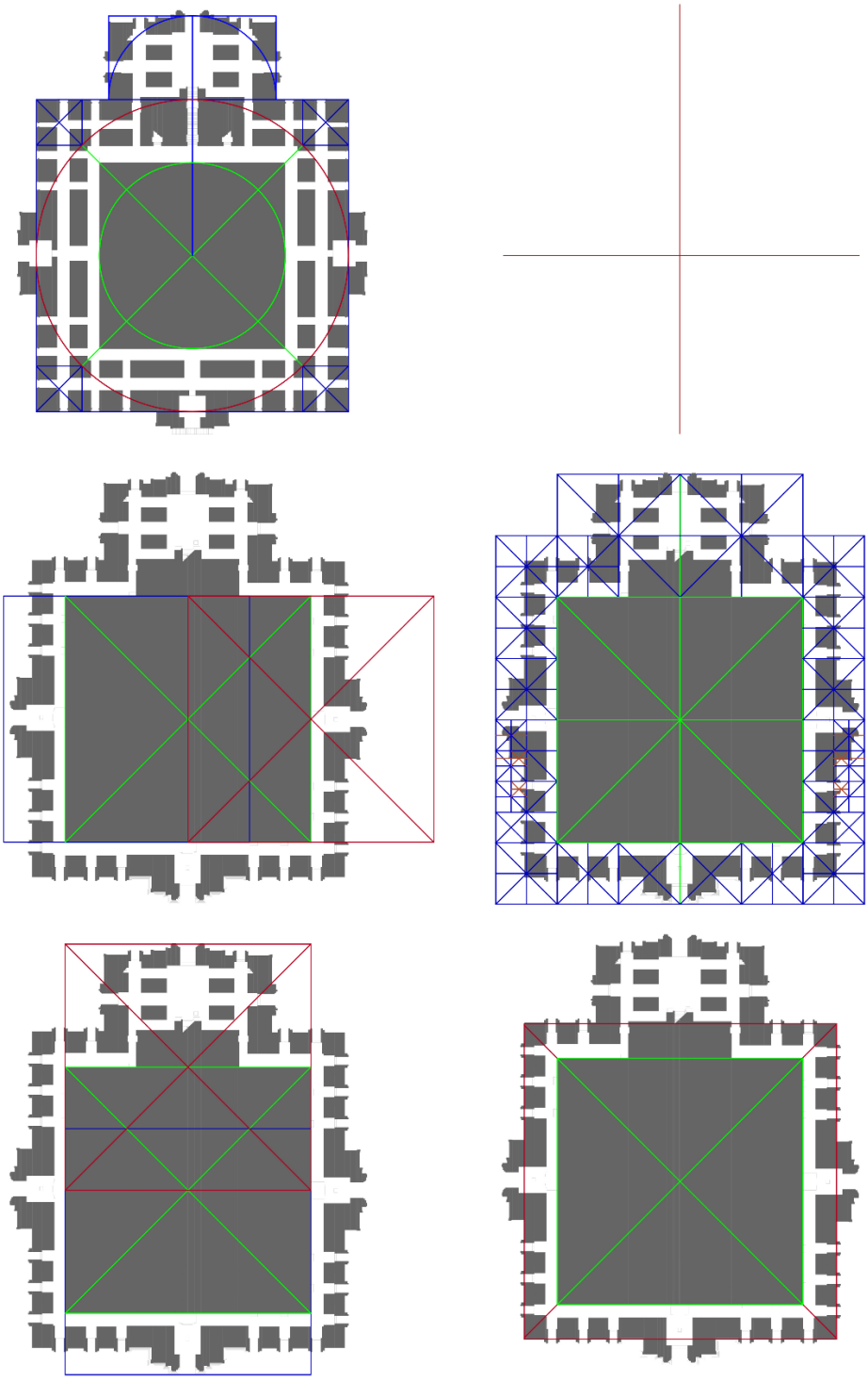


Figure 25: Taxis of Thatbyinyu Temple (Drawn by Author)

3.2. Ananda Temple

Ananda temple's layout, spatial composition, architectural elements, hierarchy of interior space, volume and balance of light and darkness are unique among Bagan temples. These architectural phenomena stimulate one of the intangible architectural qualities, human experience, sensuality of the space which is one of the timeless ways of architecture through history. The Bagan area where Ananda temple locates, has the utopia landscape with Ayeyarwady river, Mountainous landscape at East and the West bank of river, hazy atmosphere at sunrise and sunset time, have been situated there for thousands of years are timelessness. This article will discuss the timelessness of Ananda temple along with its environment and the formal basis.

Figure 26: Bagan Landscape Painting and Ananda Temple (source: Min Min Thida Digital Illustration, Photo by whereongoogleearth.net)

3.2.1. Study on the Formal Basis of Ananda Temple

"The Plan is the generator"- Le Corbusier (Corbusier, 1985)

The physical objects of a building is attached to the soul and memories of people, the sense of space can stimulate the psychological and emotional states of a person which derives from the forms of building. It is easy to demonstrate not only historically but also experimentally how different forms ignite the same psychological effect and, conversely, how the same forms tend to elicit different psychological effects. (Tzonis & Lefaivre, 1986) The measured drawings of Ananda temple had done by Department of Architecture, Yangon Technological University in 1979. (M. o. E. Department of Higher Education, Rangoon, 1989)Based upon the plans and sections

drawings, extraction and analysis on formal taxis, the volumetric interior spatial study, part to whole or other parts relation in terms of symmetry and proportion and inner spatial hierarchy of the temple are studied in relation with socio-cultural background and sensuality.

Taxis, the orderly arrangement of parts, constrains the placing of the architectural elements that populate a building by establishing succession of logically organized divisions of space and taxis is the adjustment in balance of the details of a work separately, and as to the whole, the arrangement of the proportion with a view to a symmetrical result. (Alexander, 1979) The basic formal idea is the symmetry with two main axes of cross with secondary axes at side entrance which are parallel to another main axis. (see in figure 27.g). The directions of the two spatial axes are focused on the four images of the Buddha at the central core of temple. These formal spatial axes relate to the socio-cultural factor of Buddhism, unlike the temples from Greek which intend to different gods, in Buddhism temples, all of which are only intend to Buddha and his teaching. Theravada Buddhism, the major religion in Myanmar, is to practice the guidance of Buddha and to reach the final goal of Nirvana, the end of all suffering. Mediation, the mental practice requires the silent atmosphere. The layout plan of Ananda temple has openings between main two main passage ways.

Those openings serve as not only to reduce the structural load but also the place to sit meditation. In Ananda temple, the geometry of large square solid core at the center where four buddha images are situated, is the main formative factor and based upon that central square schema, other parts and whole of the temple composition have been generated by the rule of geometric 3 squares which is commonly used in classical architecture (see figure 27). The four images of Buddha at the central core represent the Buddha mythology, there are four Buddha: Gautama, Kassapa, Konagamana and Kakusandha who had already got enlightened to end of Karma and escaped the cycle of birth and rebirth.

The four-square diagram, the center is a point from the crossing of perpendicular axes rather than a space, can represent the abstract formula for the

spatial layout system, symmetrical plan of Ananda (see figure 28). In classical architecture, the start and the end can be equal, bilaterally symmetrical. One can look at the end part of a building and make it read as the start: one looks at a building from right to left and vice versa. However, that method cannot apply to the top and bottom parts, which are not accepted as equivalent, their arrangement is not reversible. (Alexander, 1979)

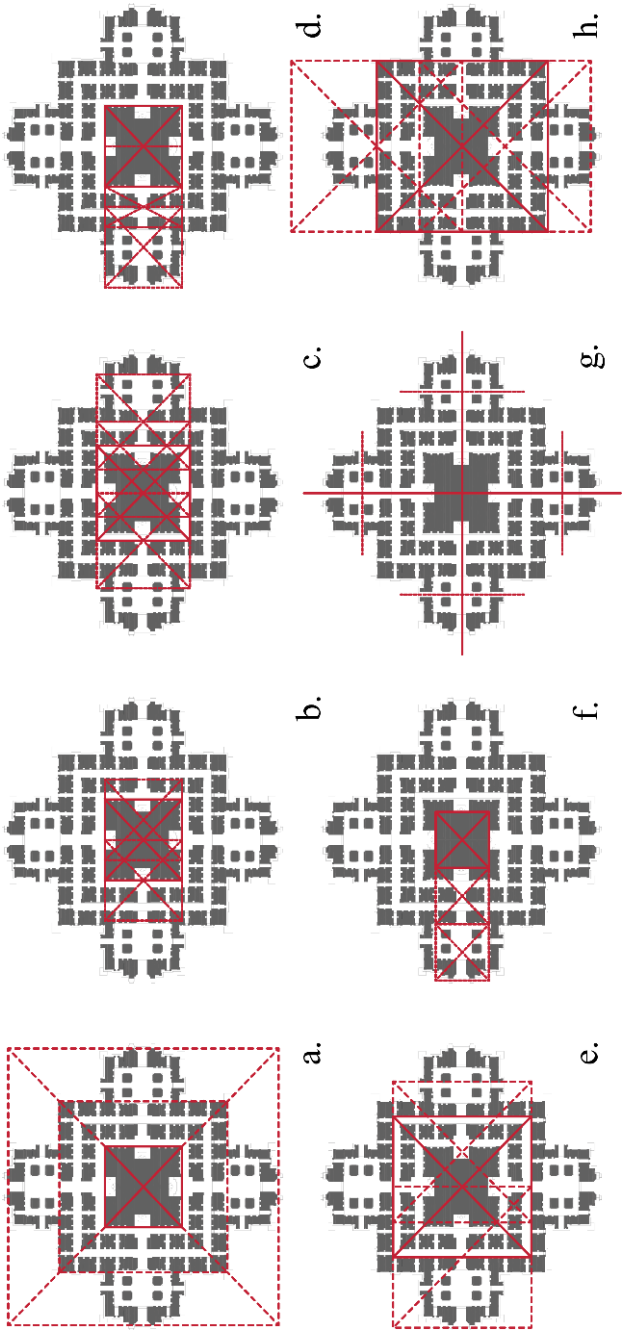


Figure 27: Geometrical taxis diagrams of Ananda Temple (Drawn by Author)

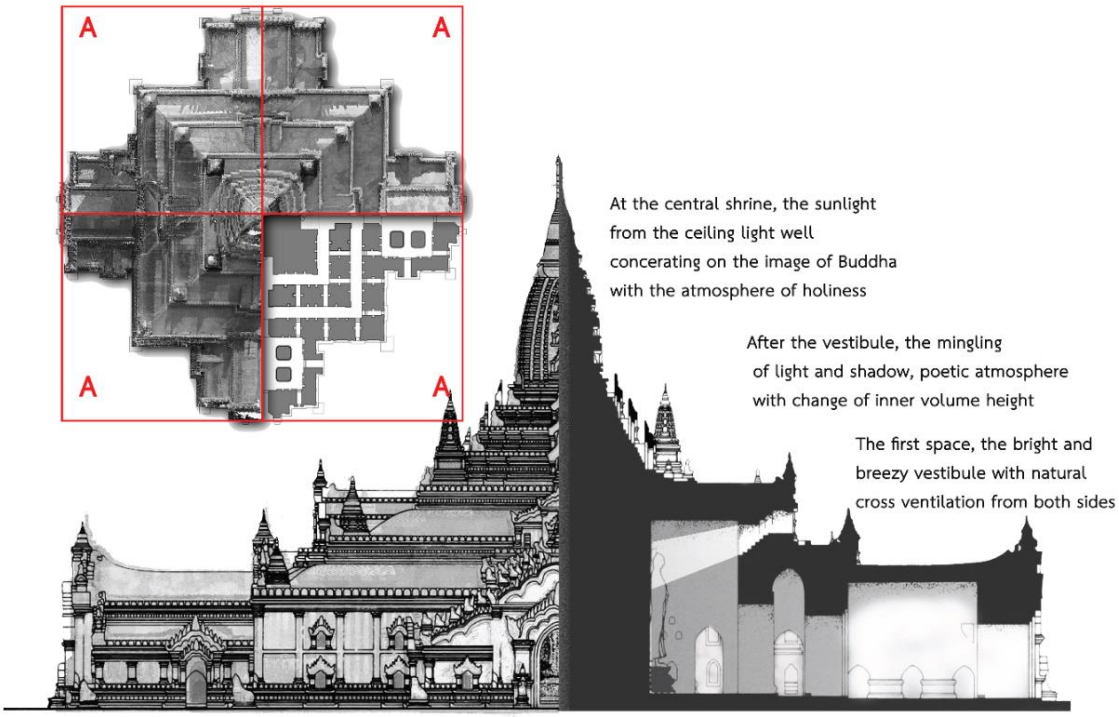


Figure 28: Four-square plan diagram and spatial quality of Ananda (Recomposed and redrawn by author)

Figure 29: Architectural atmosphere of Ananda (source- hiddenarchitecture.net)

The shadow provides shape and life to the object in light. It also supports the realm from which fantasies and dreams arise. In great architectural space, there is a constant deep breathing of shadow and light; shadow inhales and illumination exhales light. (Pallasmaa, 2012) Along with the change of inner volume height, the mingling of light and shadow is happening at the atmosphere of Ananda temple. By concentrating the sunlight from the ceiling light well to the face of buddha image at the central shrine, which is the highest spatial hierarchy of temple, the two layers of passageways connecting to the main vestibule have also the poetic atmosphere resulting from the significance of shadow and light, change of inner volume height, frame shape of arches, the sequent of movement in passage way experiencing different volume height with the mural paintings and statue chambers on the wall are the sensuality enhancing factors to the human experience. This unique architectural atmosphere and experience have been also the timeless quality of Ananda in response to the patterns of events, belief and practice of Buddhism, the movement, and activities of people inside and around the temple.

Three square geometrical formative rules can apply not only on the plan but also on the section and elevation of the temple (see figure 30). In Ananda temple, the central core square is more than structural element, it is also the factor for formal generative system. Other part of the temple can be generated from the central core dimension. In architectural situation, the emergence of generic form always follows from a consideration of the stated conditions. A building does not develop initially from a platonic notion of form, but rather from consideration of intent and function. (Eisenman, 1963) The utilization of a Buddhist temple is a place for paying respect to Buddha, sitting meditation, gathering place or community space for groups of people doing good deeds in special religious occasion. Apart from utilitarian sense of function for temple, in reference to Eisenmen's meaning on temple, it is to serve as 'focal point of the worship of the community', a symbolic function is applied and in response to this symbolic requirement a specific form cannot be just 'a space with a roof over it'.(Eisenman, 1963) Ananda temple's formal basis is not only derived from the symbolic function, to be a

focal point for Buddhists from its surrounding, but also on the utilitarian requirements of the people to sit mediation, praying Buddha quotes or Ghada.

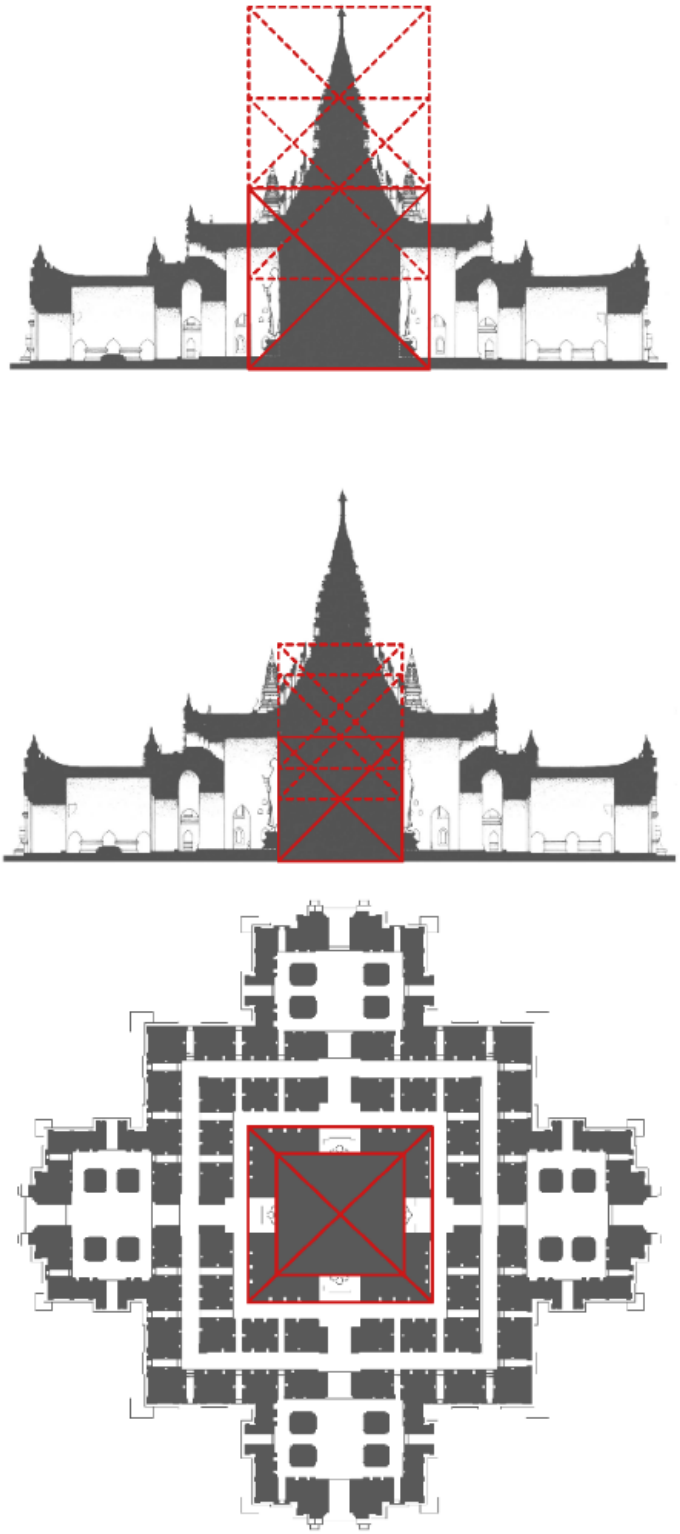


Figure 30: Three square Diagram of Ananda Temple (Redrawn by Author)

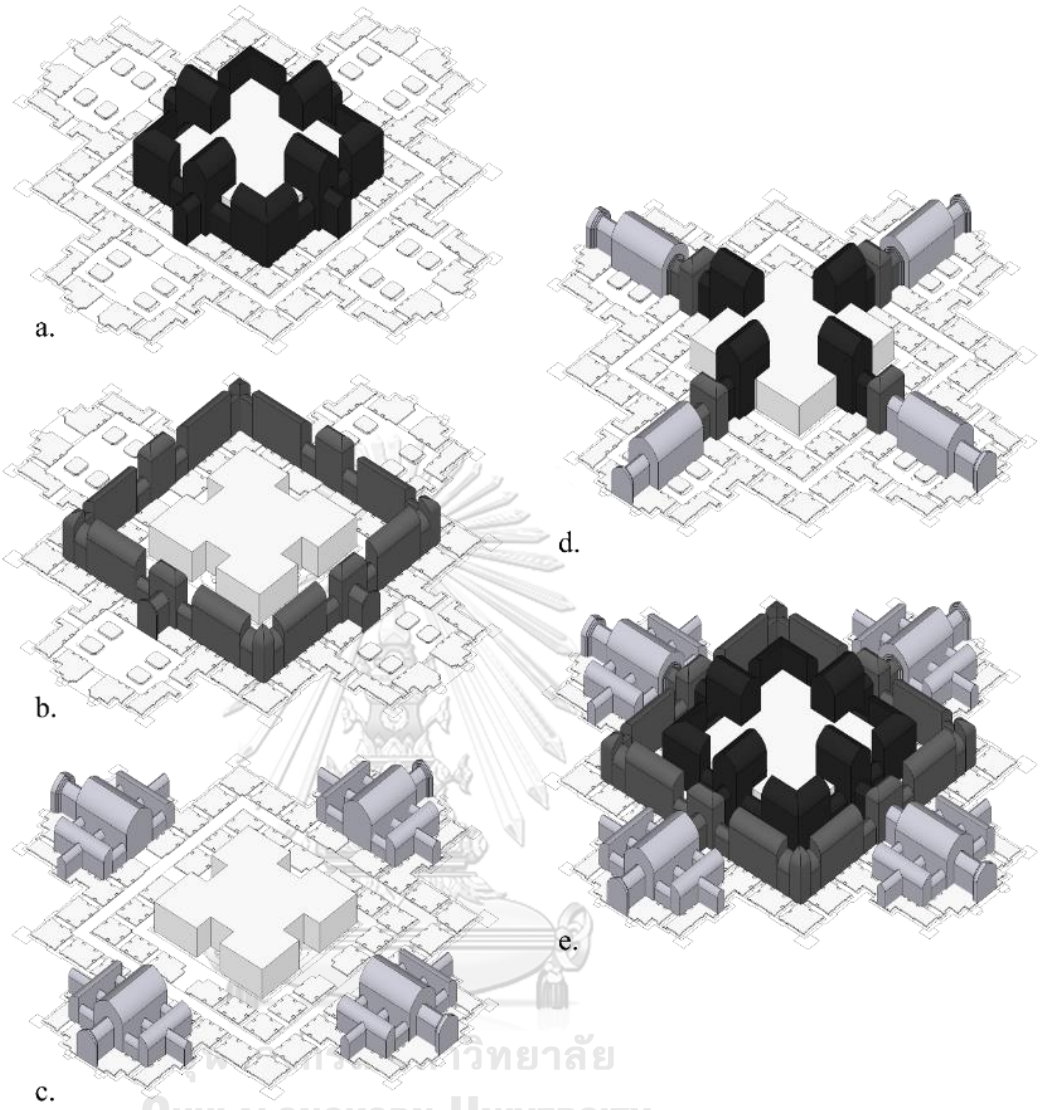


Figure 31: Diagrammatic inner volumetric models of Ananda Temple (Drawn by Author)

Scale and Volume of space are another important factor affecting the way of human sensuality. To understand the inner spatial hierarchy and composition, the extraction of diagrammatic volumetric models has been done referencing the color-coding and letter annotation system of Eisenmen's analysis method on Pallaido's works, C, black, central volumes, B, 2nd grey color, transition space and A, 3rd grey color, entrance space. In figure 31.a, the central core area areas are the highest and most influential space, among that area, four Buddha image shrines are considered as the main space or being served space.

In figure 31.b, transition space, B, 2nd grey color, 2nd highest hierarchy after the central space, has varied in the height of volume of passage. Among the variation of volume height, central transition space at the axis of shrine is the highest (see figure 31.a). The entrance space, A, 3rd grey color, is the lowest hierarchy, among this entrance space, the main vestibule at the main axis direction to shrine is the highest. (see figure 31.c).

The two main diagonal axes are the key formal system of the temple with giving the visual axis to the four Buddha images at the central space which is the main influential hierarchy. (see figure 31.d and 31.e). The basic formal system of Ananda temple can be annotated in letter with ABCBA, symmetrical system which has been also applied in classical architecture (see figure 32). The intent and function of Ananda temple are the reaction to socio-cultural factor of people, to create a visual and mental concentration of people to the Buddha who is the highest position in the practice of Buddhism. “The mind is everything. What you think you become”- Buddha.

3.3. Timelessness of Bagan

Bagan has been more than the monumental buildings, stupas and temples, there have intangible social and cultural events for thousands of years since Bagan period. Culture embodies the complexity of distinctive spiritual, material, intellectual and emotional features that characterize a society or social group. It includes not only arts and letters, but also modes of life, the fundamental rights of people, their value systems, traditions, and beliefs.(UNESCO, 1982) The tradition is the intangible item which has been passed on from one generation to another and memories embedded in a society. (Rellensmann et al., 2018) The timelessness of building or a town has been derived from the result from the mind and body of us, the users, it is in response to the activities, events, rituals, and belief that are being still practiced and continued. Nyaung-Oo township and 10 villages around Bagan area have living cultural heritage since ancient time before the colonization and modern period in Myanmar. The festivals which have been celebrated

in relation to temple, like Ananda Festival in Buddhist Holidays, daily life of local community, traditional craftmanship of Bagan, mainly famous for lacquer ware, sculpture, paintings and artists community of Bagan and cultivation of plants by villagers among temples, are the emotions, images and memories embedded and practiced by people since Bagan period. There is a complex psychology has participated in the relationship of a place, building and function in the eyes of their users. (Zumthor & Lending, 2018) Such quality of timelessness of Bagan has created a variety of unique religious buildings for the practice of Buddhism which has been continued in that area, and new buildings which will be built in Bagan, must relate the connection to the historical value, people memories and experiences of the site.

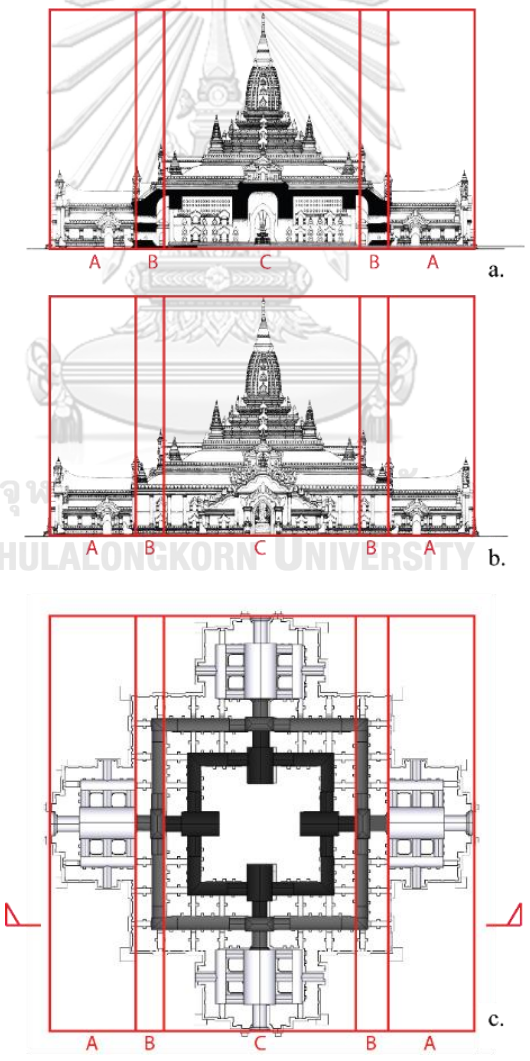


Figure 32: Letter annotated analysis diagrams (Recomposed by Author)

Conclusion for the Study and Analysis of Temples

The formal basis of Ananda temple is not just blindly based on the geometrical layout system, it is the result from the intangible pattern of events: people's memory, experience, culture, and belief of the site. That patterns of events always link to the tangible patterns of space like buildings, landscape, villages, towns, and area. For the designers and architects who will create the new buildings in the context of Bagan area, must understand the tangible and intangible values of the site in relation to people memories and experience which are timelessness of architecture. They should try to achieve those physical and mental experience with the approach of regenerations, evolution, and interpretation on those values in their design which must not create any negative value to the historical value of Bagan area.

3.3. U Kyin Oo House, ဦးကြင်ဥအိမ်

Overview

According to the description from the U Myo Myint Sein and Team's research on ancient Myanmar traditional houses, it is in the middle part of Myanmar, Oak Shit Kone, Monywae မုံဇွန်း village, Monywa Division, Sagaing State, 22°2'04.55" N, 95°14'06.67" E. It was built in late 19th century, at the end of Konbaung Dynasty.The house was named according to the house owner who was the ordinary people, a merchant. In ancient Myanmar customs for house building, the ornament, roof form and the layout of stair's direction can only be done according to the social statue of the owner. So, in this house, the direction of the staircase is not oriented directly to the home and no ornament as the homeowner is a merchant, ordinary social class. Burmese Teak timber from neighbor area is the main construction material for both structural members like column, beam, and fabrication of the house like wall cladding, doors, and windows. The wooden joinery, wooden gutter and wooden roof structure frames have been done by craftmanship of the carpenters. The clay tiles have been used as roofing material. (Team, 1970)

3.3.1. Analysis of U Kyin Oo House

The influence of weather is significant on the formal system of the house. The projected eave has been projected to prevent the direct sunlight to interior of the house. The decking or Ka-Byin serves as both circulation and living space for family members and guests. The space utilization is 60 per cent for living and 40 per cent for the service area. It has been mainly used the local materials and the layout pattern is in cluster form. The structural grid in rectangular pattern influences the formal language of the house and the dimension for the grid span along with the taxis of the plan and the section, all of which have been related with the influence from the strength of timber which has been widely used in both structural and fabrication of the house. Following drawings and diagrams show the geometrical analysis, spatial composition, and taxis system of the house.

In figure 33, the layout of the roof plan is based upon the square and the two lapping golden ratio rectangles have been derived from that geometrical square. In figure 36, the dominant spatial hierarchy is the central living area in square shape which has been based upon the structural grid layout pattern of columnar in taxis of square grid. See figure 37. There is also a relation between plan and section, in figure 37, the proportion of the rectangular from floor plan can also be found in the section of the house.

The taxis and square rule are the formal system of the house. The spatial layout of the house is based upon the system which is like the temple formal system which has been studied in previous section. From figure ground diagram from figure 36, the main living space is the main formal factor for the whole building and other serving space and is also the part to the whole relation system.

Conclusion

The formal system of the U Kyin Oo house derived from the socio-functional requirement of the people, building material and weather conditions of the site, above all those factors, the formal taxis system, square principle, which is also found in Bagan temples, has been dominant formal system.

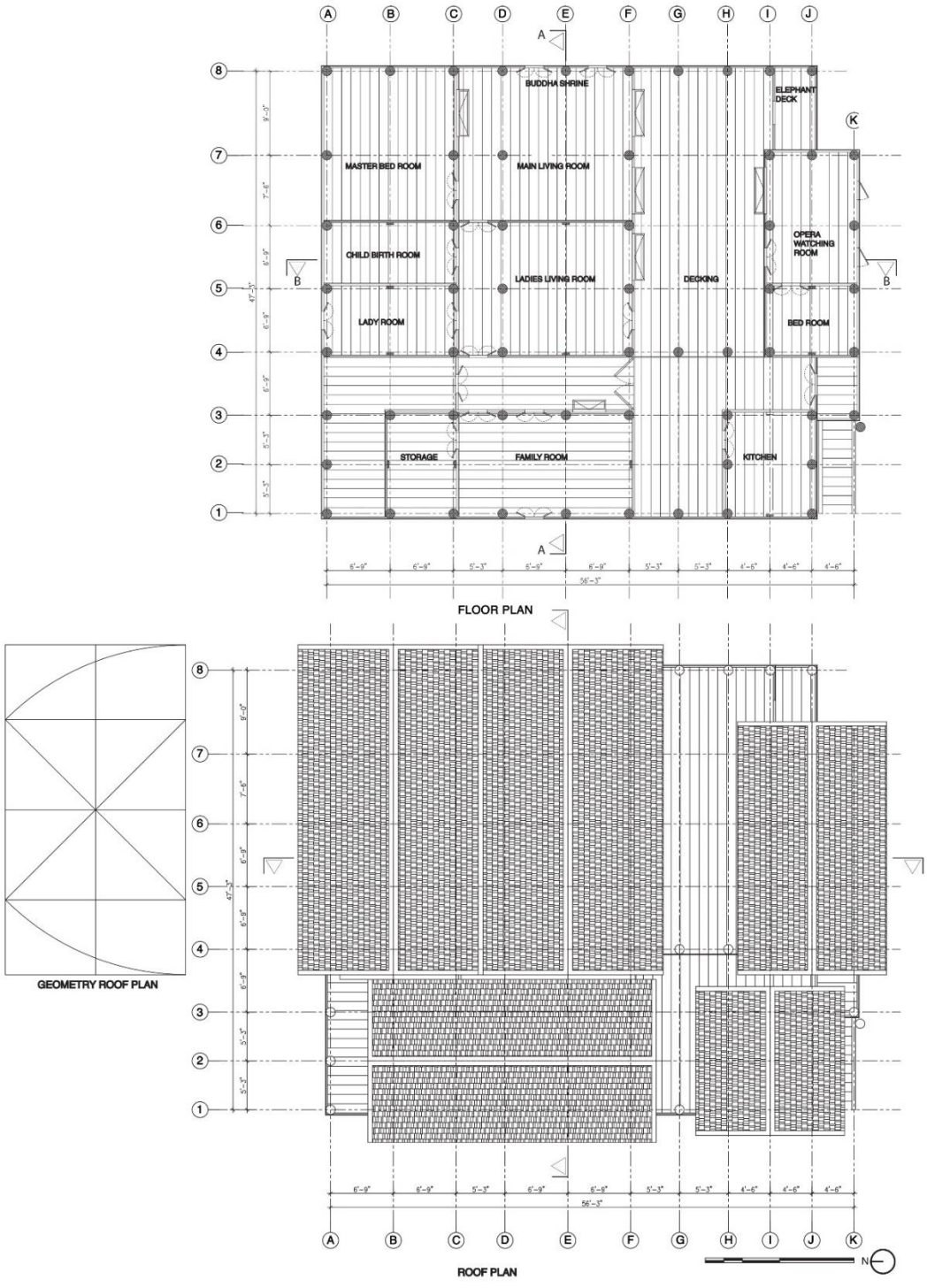


Figure 33: U Kyin Oo House, source- retrieved and edited the drawings from Okkar Thein's personal data collections (Thein, 2017)

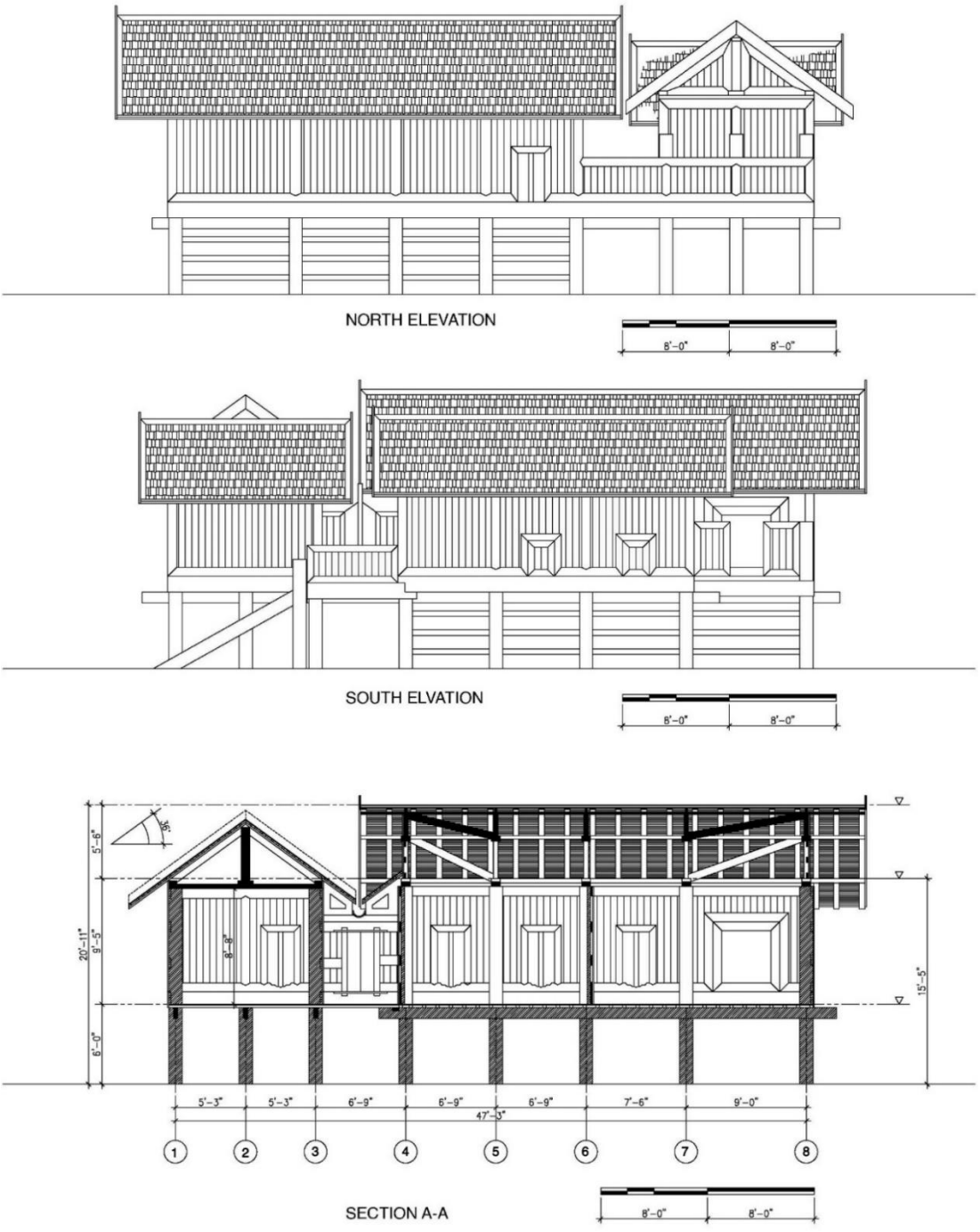


Figure 34: U Kyin Oo House, source- retrieved and edited the drawings from Okkar Thein's personal data collection (Thein, 2017)

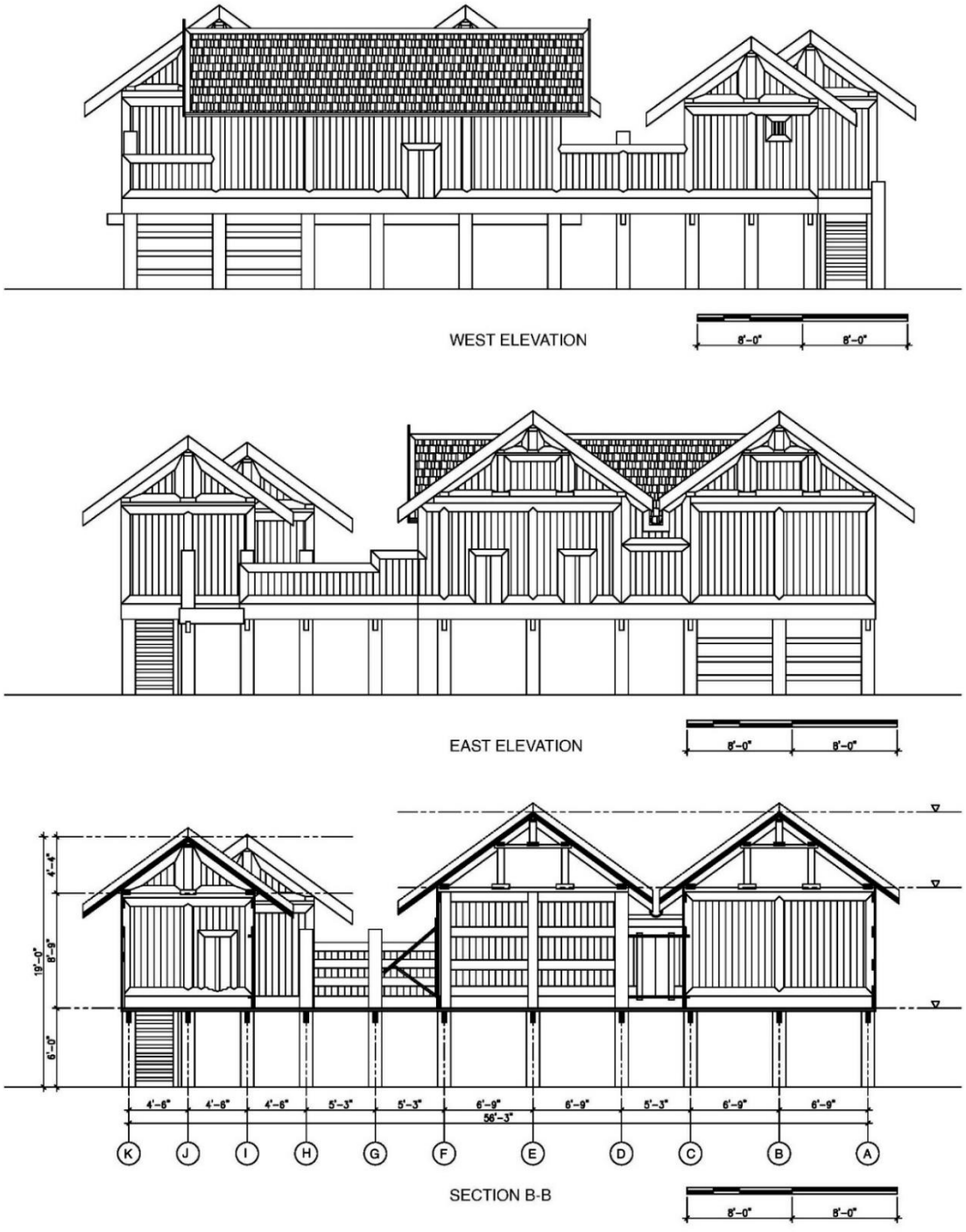


Figure 35: U Kyin Oo House, source- retrieved and edited the drawings from Okkar Thein's personal data collection (Thein, 2017)

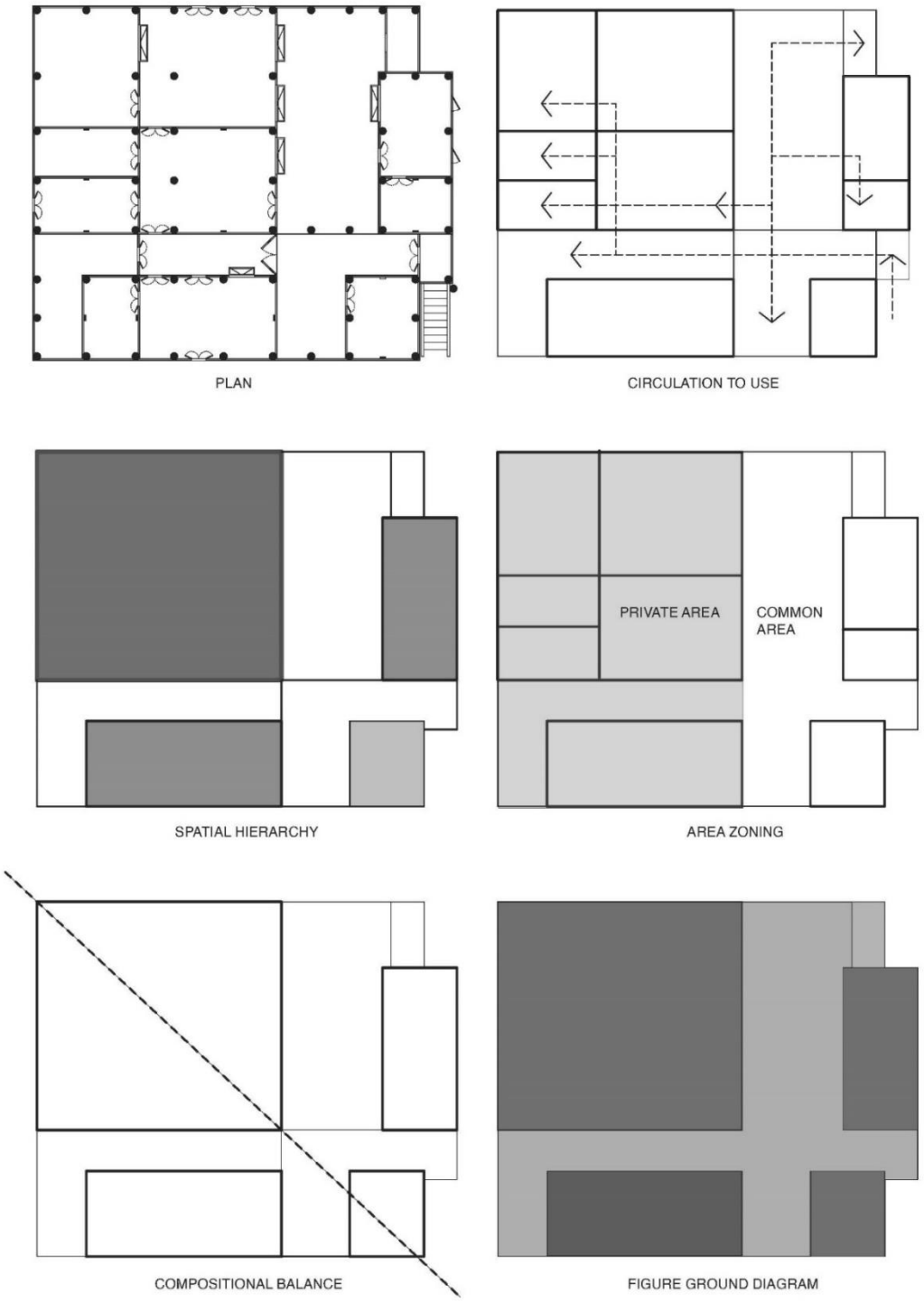


Figure 36: Analytical Drawings (Drawn by Author)

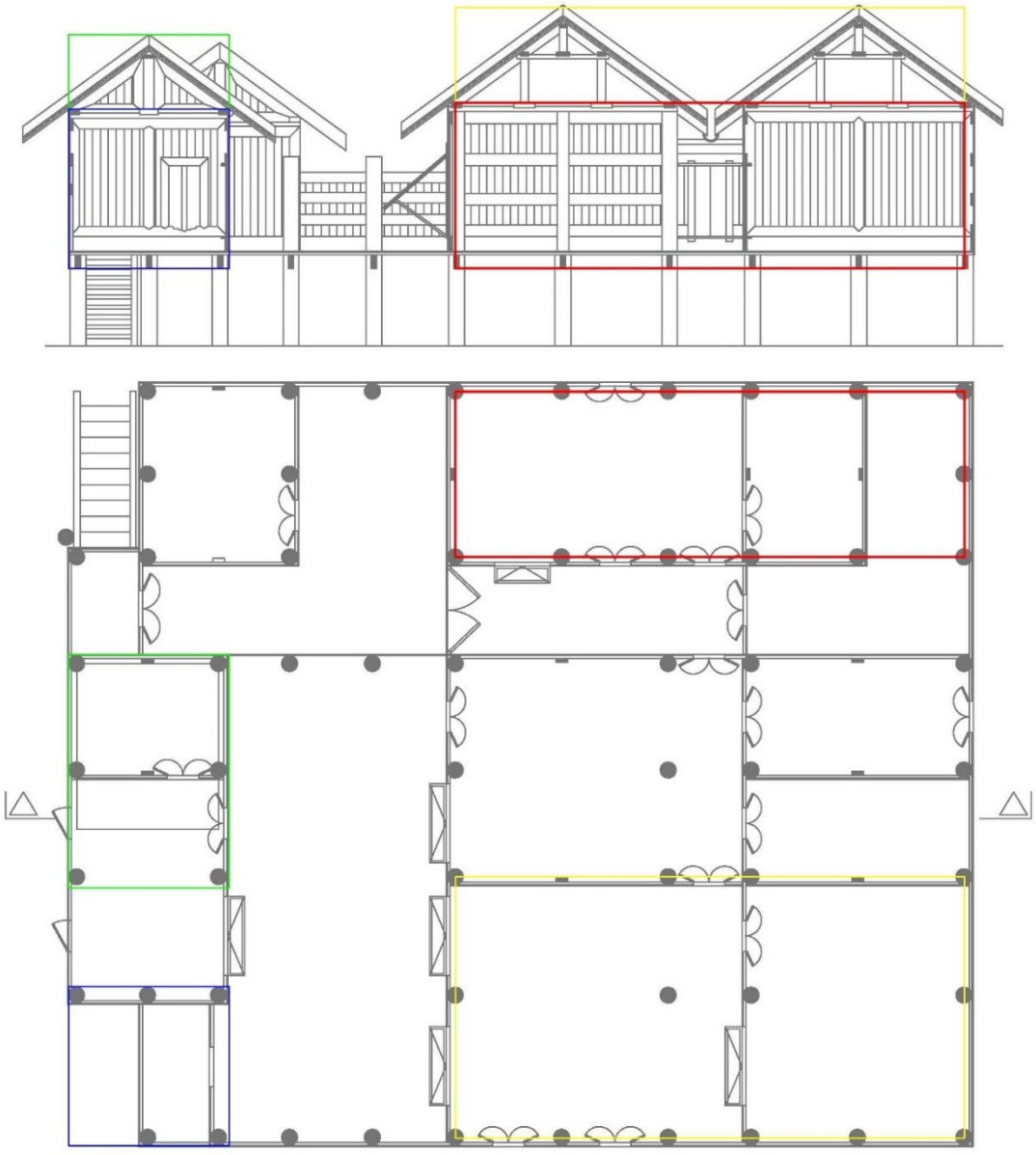


Figure 37: Plan to Section Relation, source- retrieved and edited the drawings from Okkar Thein's personal data collection (Thein, 2017)

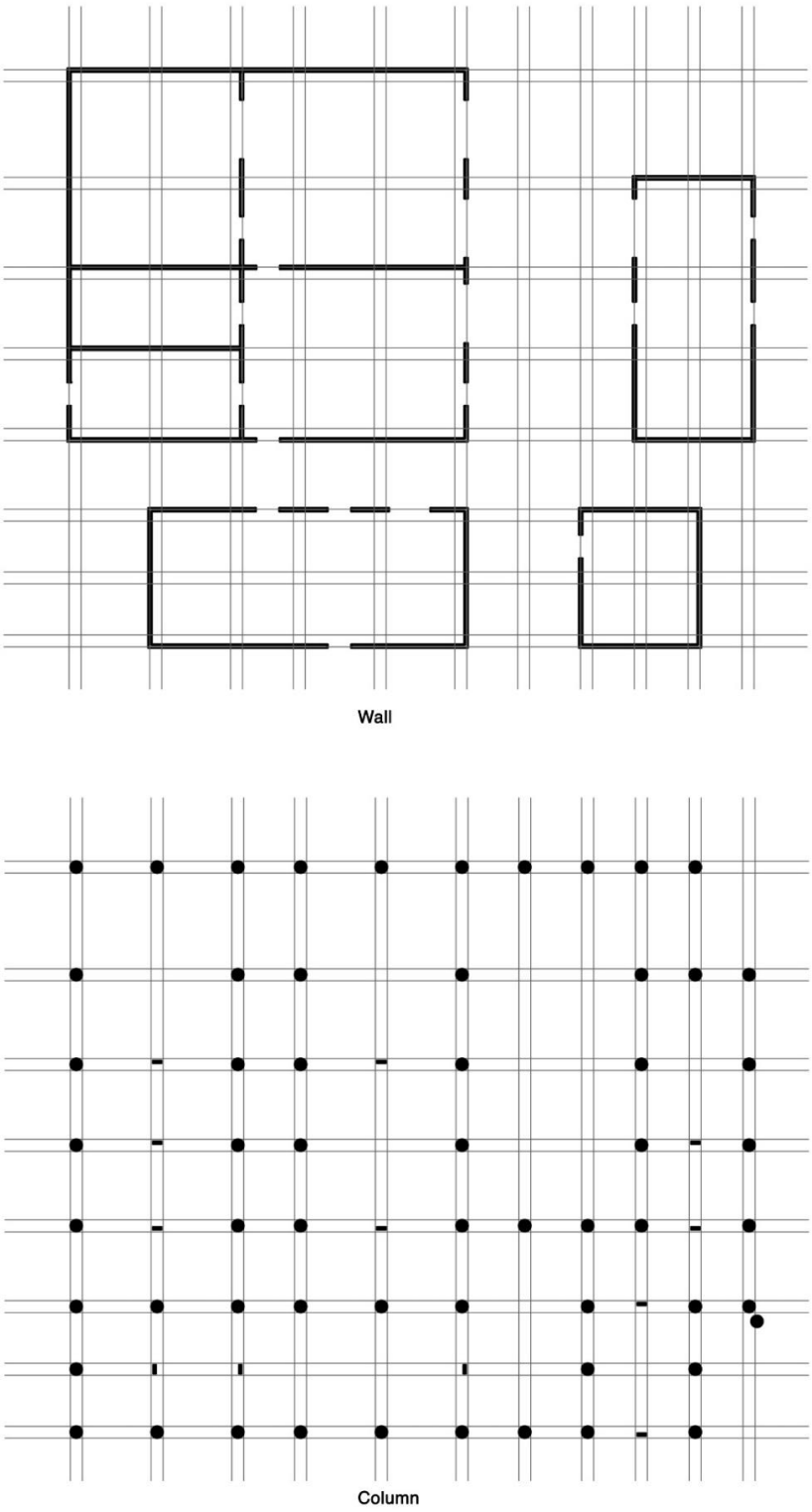


Figure 38: Elements of U Kyin Oo House, source- retrieved and edited the drawings from Okkar Thein's personal data collection(Thein, 2017)

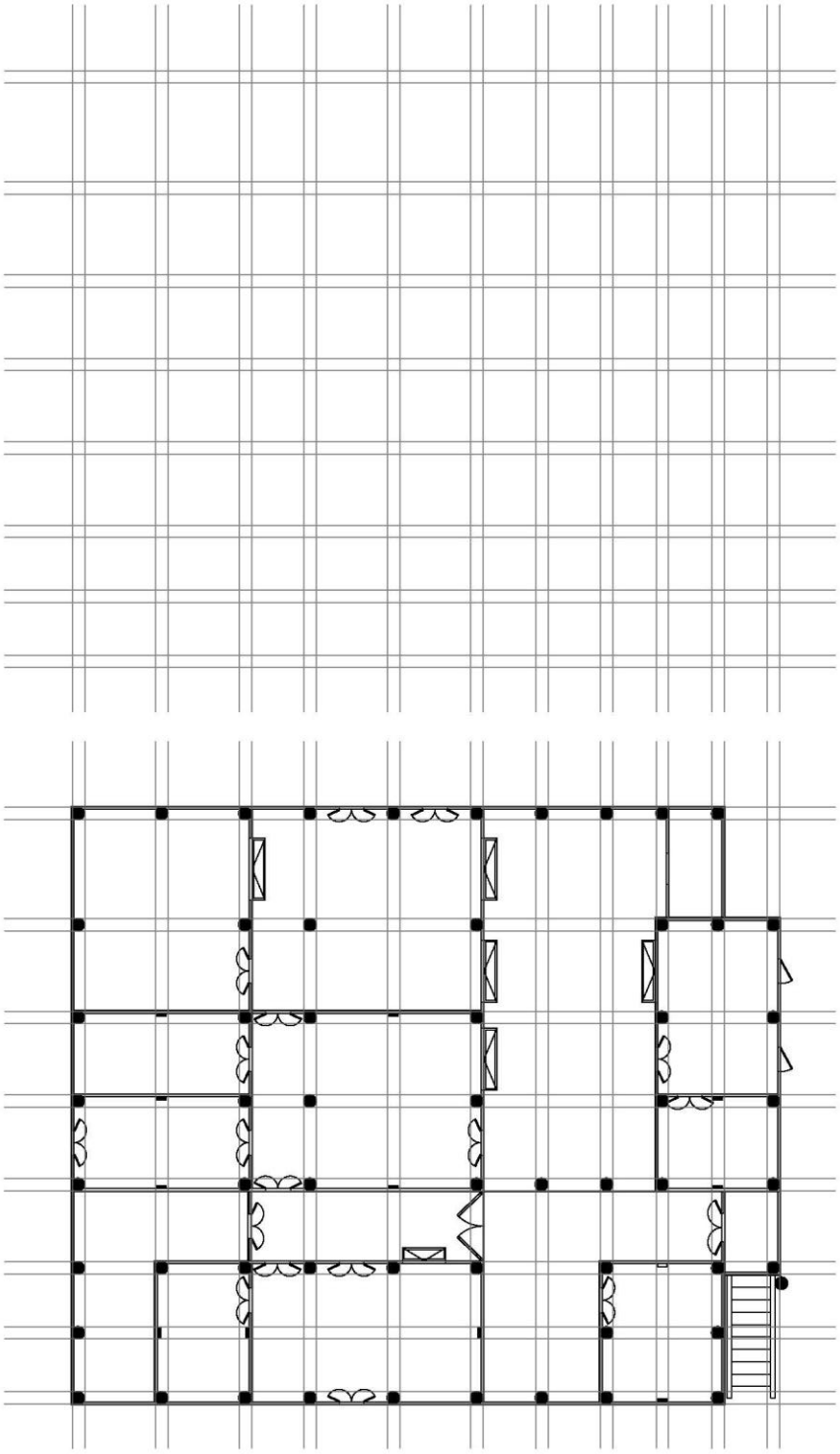


Figure 39: Plan and Taxis, source- retrieved and edited the drawings from Okkar Thein's personal data collection(Thein, 2017)

3.4. Reinterpretation on the Analysis of the Case Studies on Temples and Traditional House

From the previous analyses and studies on formal system, taxis, genera and symmetry or balance are the influencing factor on the spatial composition and layout of temples and traditional house. Although there is difference in scale and dimension between temples and house for ordinary people, it has the similar formal system which derived from the square rule and square grid system or taxis. See the following figure 40. Square grid order and axis of balance for symmetry are manipulating factor to create spatial composition and layout system. By utilizing those system, the reinterpretation on the new formal system and spatial composition have been tested on the proposed building site for without considering the functional requirements just only to see the 'poetic of orders', in Lefiver's terms, by means of moving, rotating and offset the axis and taxis of the temples and house. In following spatial experiment figures, only the axis of symmetry is described, and taxis have been hidden to see clearly the new poetic space derived from original taxis and axis of temples.

Conclusion

Taxis and axis for symmetry from ancient temples and a traditional house can be the formal generative tools for poetic of space and has reproductive quality of new spatial layout system in contemporary architectural context. It can be clearly seen in the spatial experiment or reinterpretation figures of this chapter without functional consideration. In the following chapter for design process, functional requirements in relate to today socio-cultural factors of Bagan area will be applied to the reinterpretation of tradition to contemporary architecture.

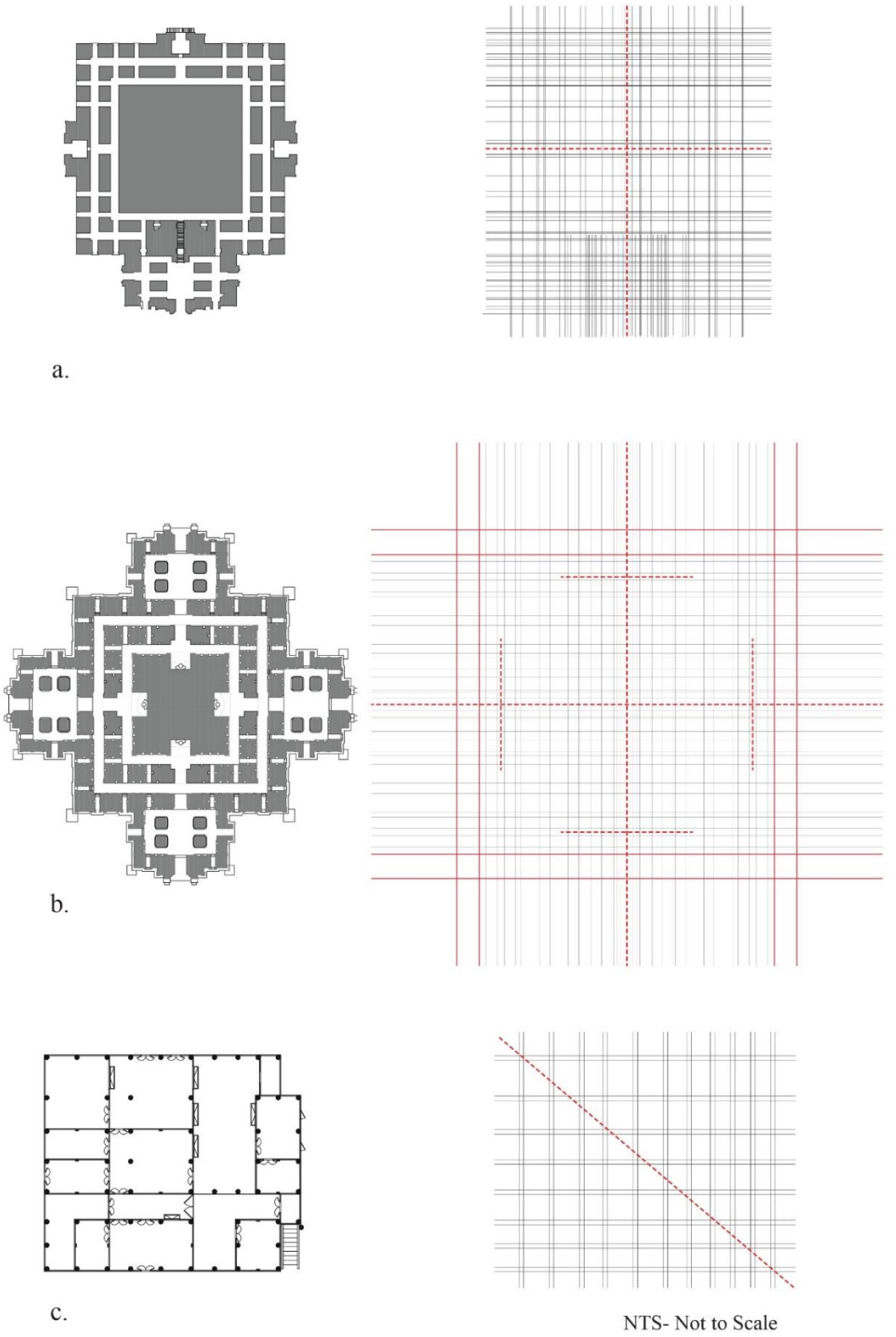


Figure 40: Similarity between Taxis system of temples and traditional house (Drawn by Author)

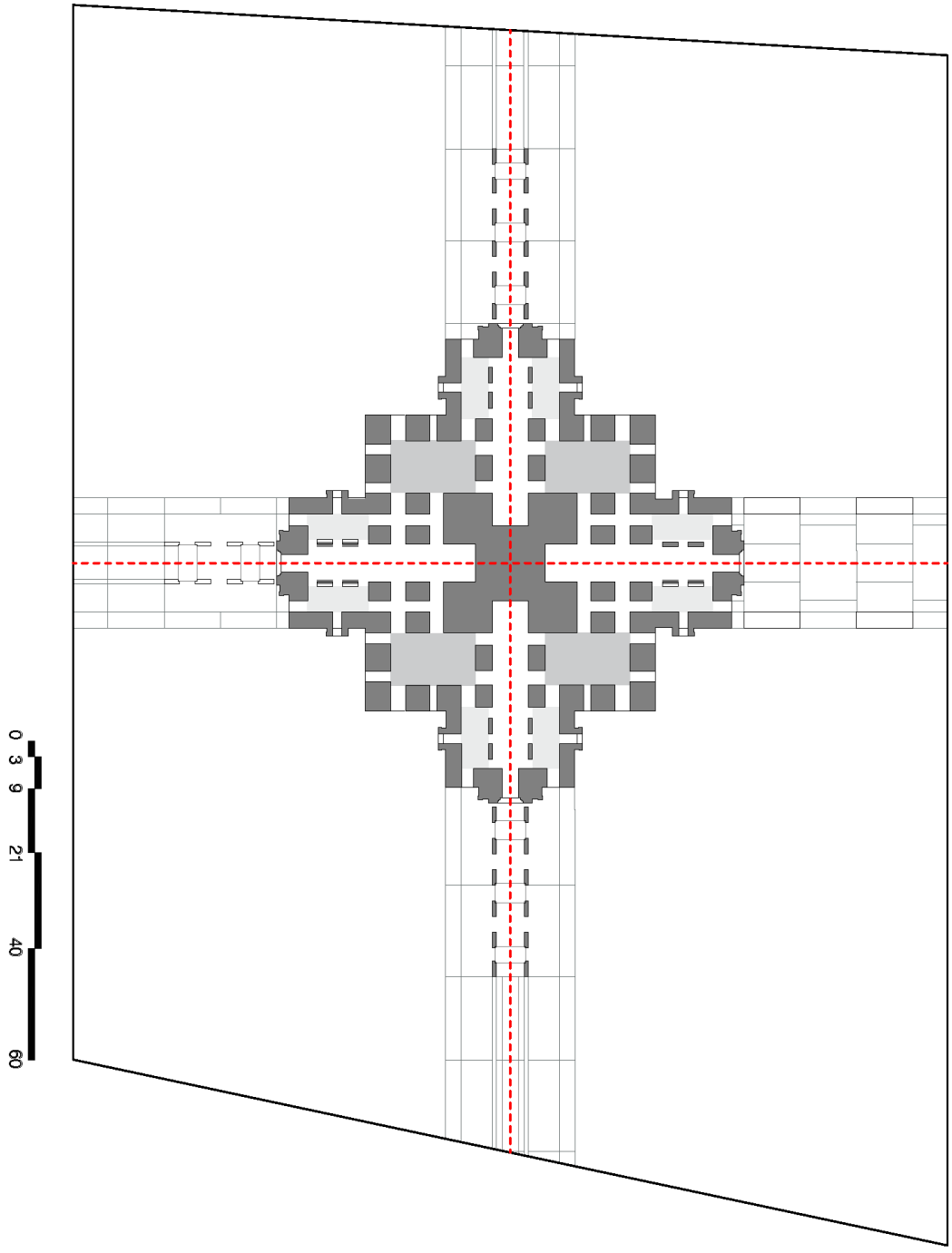


Figure 41: Reduction to wall dimension of Ananda temple.

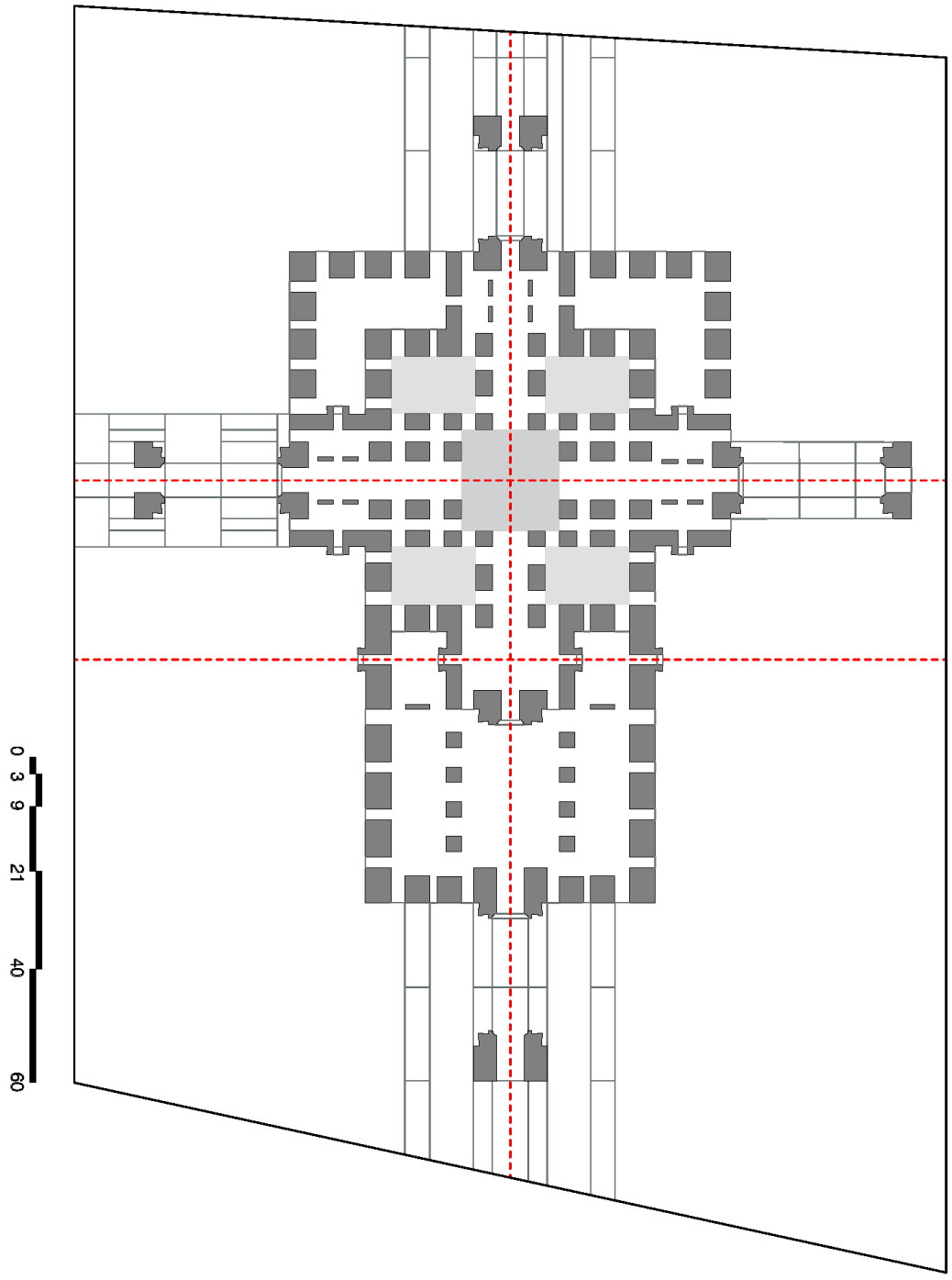


Figure 42: Doubling the number of horizontal axis of Ananda temple.

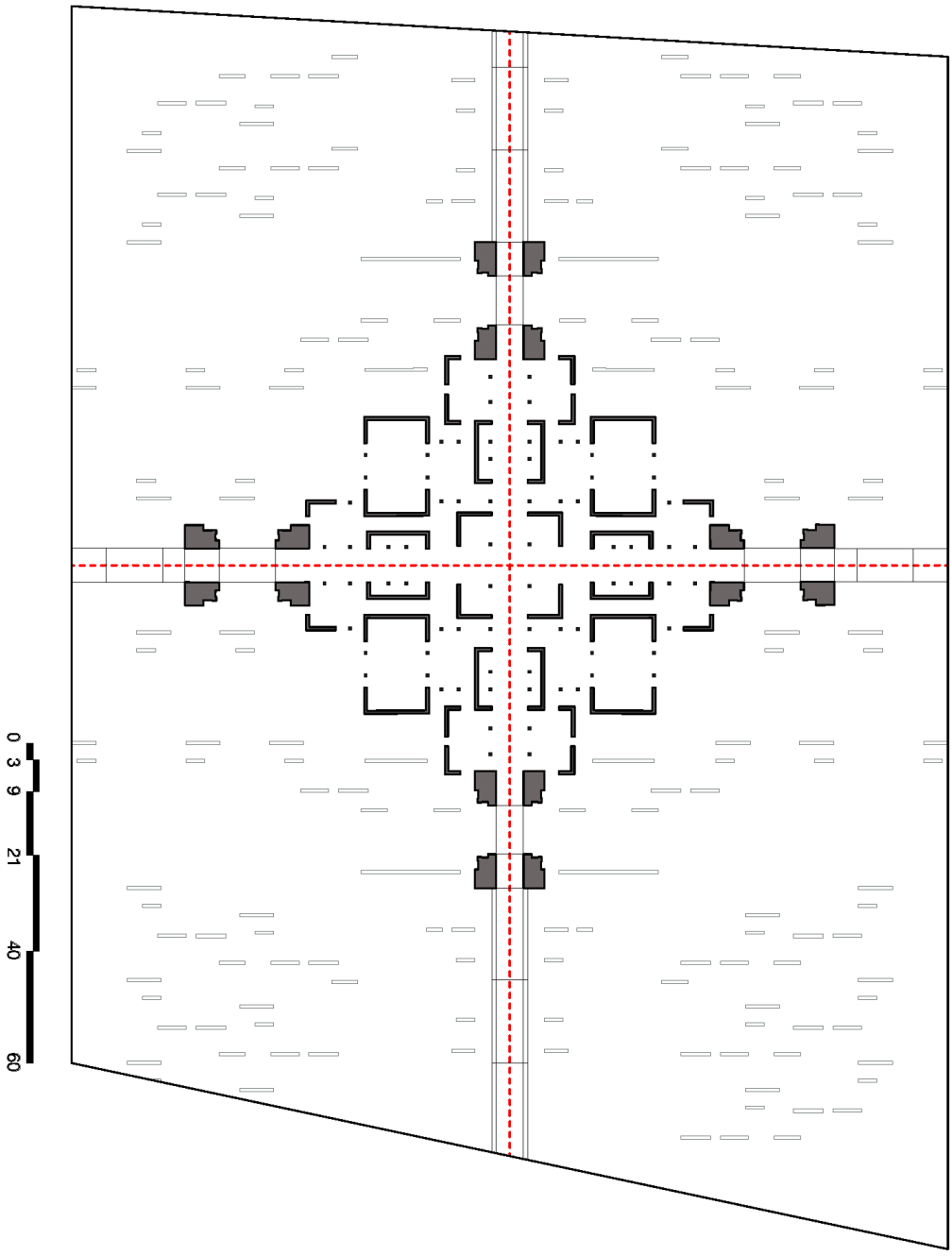


Figure 43: Reduction to the wall thickness of Ananda temple.

Figure 44: Rotating and doubling the axis of Ananda temple square plan.

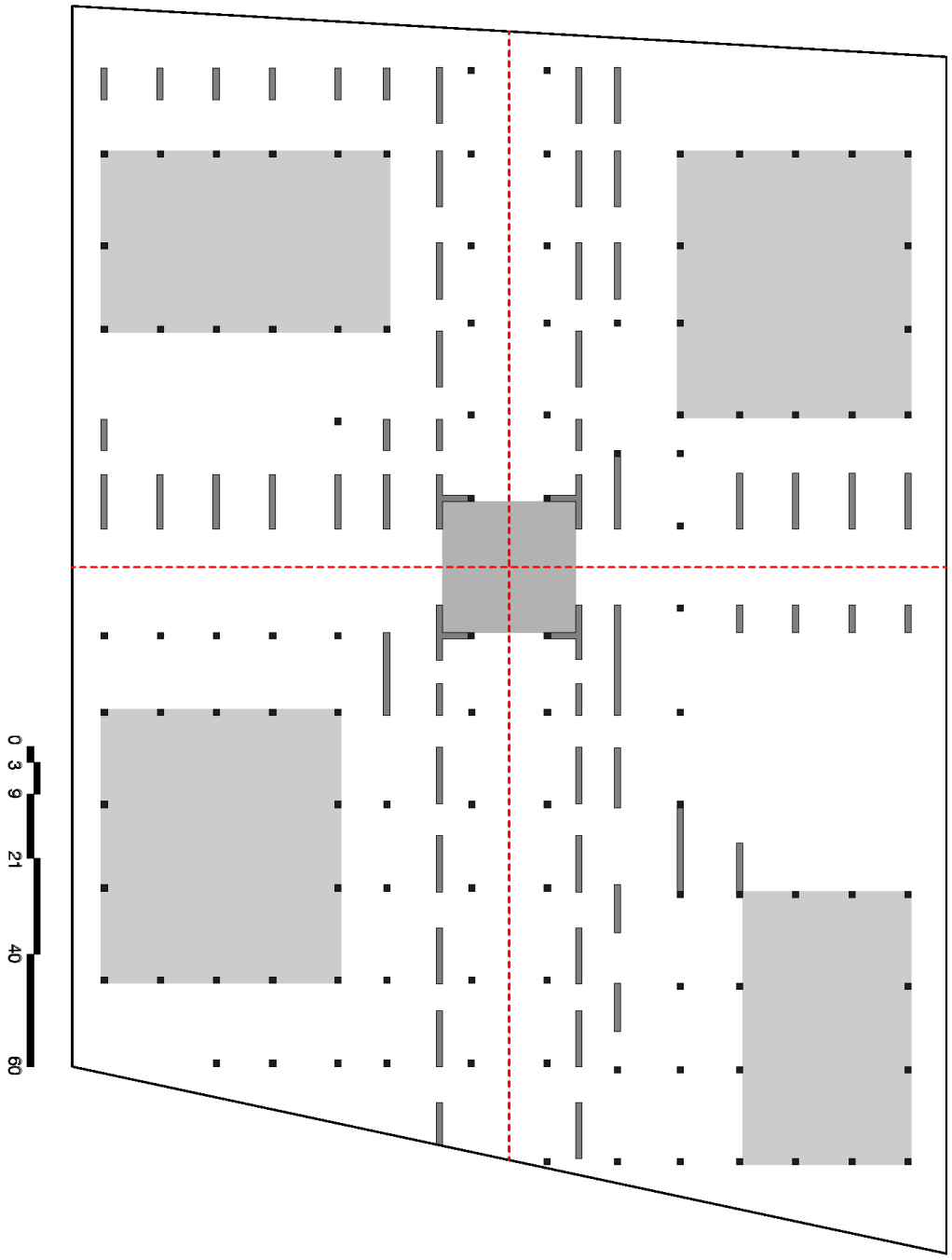


Figure 45: Expansion of spatial layout based on central axis of Ananda temple.

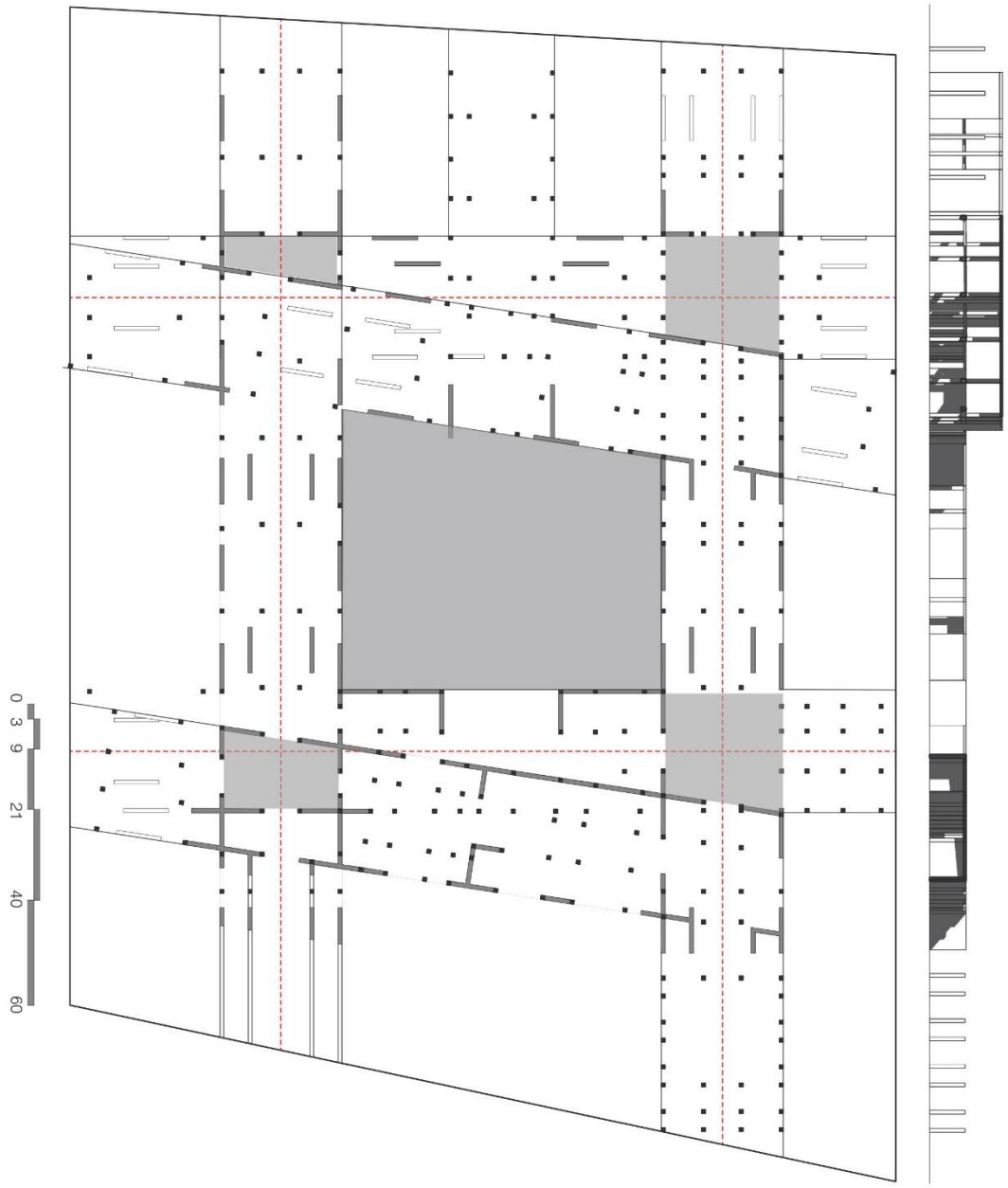


Figure 46: Plan and section to see the poetic space derived from mixing the taxis of two temple.

Figure 47: Plan and section to see the poetic space derived from increasing the number of axis of temples.

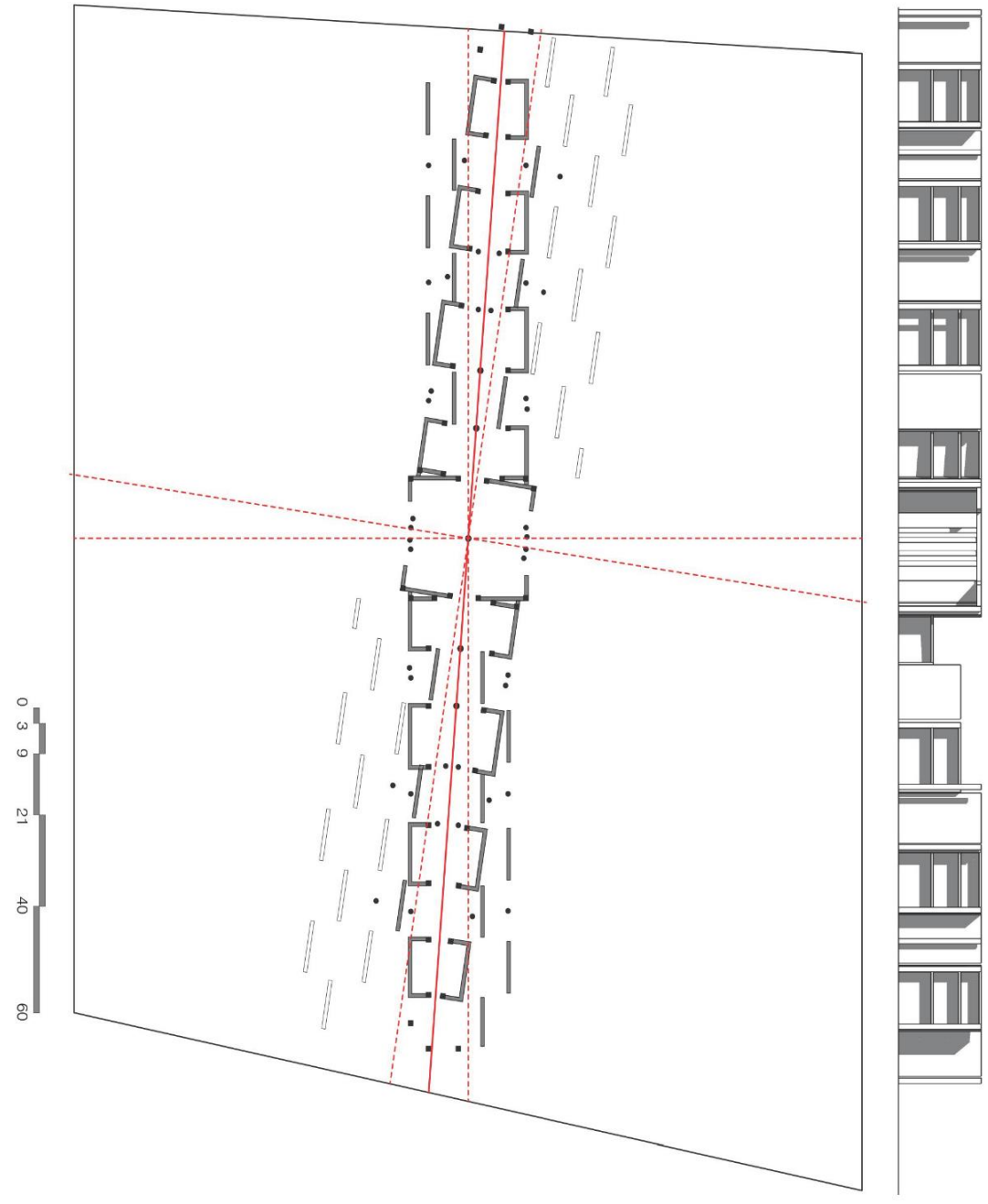


Figure 48: Doubling and rotating the axis of Ananda temple by expending the layout.

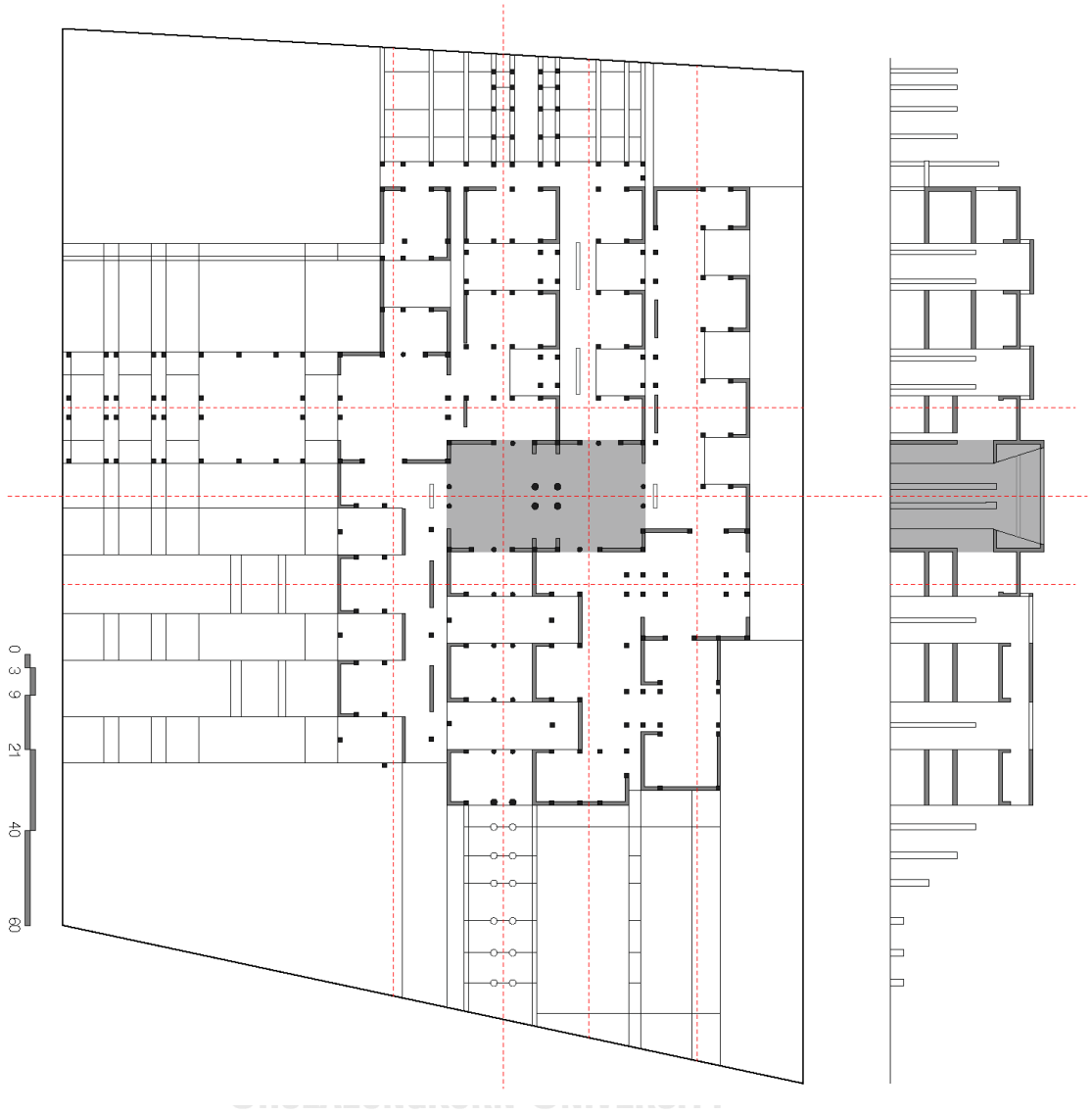


Figure 49: Doubling and shifting the horizontal and vertical axis of Ananda temple.

Chapter 4 Case Studies on Interpretation of Today Architects

Culture embodies the complexity of distinctive spiritual, material, intellectual and emotional features that characterize a society or social group. It includes not only arts and letters, but also modes of life, the fundamental rights of people, their value systems, traditions, and beliefs.(*World conference of Culture Policies*, 1982) “The tradition is the intangible item which has been passed on from one generation to another and memories embedded in a society. Memories like these contain the deepest architectural experience that I know. They the reservoirs of the architectural atmosphere and images that I explore in my works as an architect."- Peter Zumthor.(Zumthor & Lending, 2018)

So, the reinterpretation process of tradition in architecture means to reutilize the physical and mental components from the past, but it must maintain and evolve the sensual experiences of the space. The survival of traditional language in architecture has been challenged by socio-economic and architectural homogenization, e.g., Mass production of industrialized materials and building forms to be more economically feasible and time efficient in a project than getting skilled craftsman to work on detail. Materials, construction methods, rituals, natural topography, and landscape form are also part of tradition term.

According to the Juhani Pallasma book, the psychological, emotional states that results from the forms, but they hardly describe the forms themselves. (Pallasmaa, 1996) It is easy to demonstrate not only historically but also experimentally how different forms elicit the same psychological effect and, conversely, how the same forms tend to elicit different psychological effects.(Lefaivre, 1986)

Following three case studies of Wang Shu and Kengo Kuma from China and Japan, from distant traditional and cultural background, have been chosen based upon how the architects try to stimulate the experience of the space in relate to establishment of emotional experience from tradition to reapply in the contemporary language, how they select the materials and construction methods from tradition of local to fit in today requirements of building typology and circumstances of local society.

4.1. Ningbo Historic Museum by Wang Shu

Overview

The Ningbo Historic Museum is in the Yinzhou District of Zhejiang, a district of administrative and commercial land use. The environment of the site is occupied with buildings tall, boxy, and symmetrical in typical style of municipal architecture in China. Wang Shu, the Pritzker Architecture prize winner 2012, designed and for his 'exemplary cultural continuity and the vigor with which he has recovered the tradition' in the words of Qian Lu, director of the museum. The Museum is the symbol of the culture of Ningbo. It is a comprehensive museum with geographic, showing the history and the arts. It is an asymmetrical construction, measured at 144m long, 65m wide and 24m high. The museum's main facade is composed of various traditional historical customs of Ningbo, as Wang Shu has sought to continue and recover the tradition of old Chinese village construction techniques.(Shu, 2007)

Figure 50: Ningbo Historic Museum, source- www.archdaily.com

4.1.1. Design Concept and Approach

According to the architect description, he tried to search for an authentic and modern Chinese regional architecture takes an encouraging turn with the Ningbo Museum. Resurface the soul of the space from the past, tangible and intangible identity

of the place, are Wang Shu's approach to the design with the awareness of hard mountain landscape with the softness of the water and the ocean, watching the important role the East China Sea has played in the history of Ningbo and integrating housing characteristics of Jiangnan with tiles and bamboo decorations. (Shu, 2007) Vernacular architecture has been the source of inspiration for the architect and how to be modern to link with tradition. "Wapan" construction technique which is the traditional construction method of local people's vernacular construction method, it is to reutilize the materials like bricks and tiles from the demolished or destroyed building in consequence of natural disaster. Wang Shu applied this traditional method in building facade with modern structure and functional requirement of a museum in the Yinzhou District of Zhejiang, a district of administrative and commercial land use. Bamboo is the most fundamental construction material in most of Asia region. Wang Shu devised a new creation of *Wapan* technique for the Ningbo Historic Museum, calling it "bamboo cane molded concrete'. Bamboo was used due to it being a characteristic local plant in the Ningbo region. The nature of bamboos' random cracking can be clearly seen through its texture on the concrete.(Students, 2016)

"A mountain represents the place for Chinese people to find their lost and hidden culture." Wang claims. Historic Chinese ink-and-wash landscape paintings seem to support his hypothesis and responding to Yinzhou's natural landscape, a mountain is an appropriate leitmotif. But Wang's notion of the mountain also responds to Ningbo's old city code with its maximum eave's height of 24m, so the building extends horizontally. Wang guided craftsmen on how to apply these traditional construction techniques but was not allowed to control the entire process. And although the architect drew colorful working drawings for every wall, in practice, the craftsmen were unable to control the materials. For example, where there was supposed to be a straight line, there was a curved one. (WÖhler, 2010)

4.1.2. Culture and Historical Background of Wapan Technique

The *Wapan* tiling technique is local construction method of ordinary people to create building through its use of recycled materials. Clay tiles are tied to the earth and

tend to evoke designs of ancient Chinese structures. The use of *Wapan* wall was initially developed to cope with natural disasters in the region reusing materials such as bricks and tiles.

The emergence of *Wapan* tiling is a demonstration of skills owned by the artisans to create strong yet aesthetic walls. It is a symbol of social status as it requires patience and a special skillset, and it involves a large amount of time to produce. The construction of the outer wall starts from a strip of stones at the base of the wall to be built. The dirt on the base is removed and replaced with stones arranged neatly and flat below a layer of crushed tiles that serves as fillers. The wall is then built by layering broken tiles and bricks that are reinforced by a thin layer of lime. The gaps between the tiles allow better ventilation. The inner wall is further reinforced with the application of a full layer of husk or gluten mixed with mud. Upon drying, another layer of hempcrete and lime is applied to give the wall a whitewash.(Students, 2016)

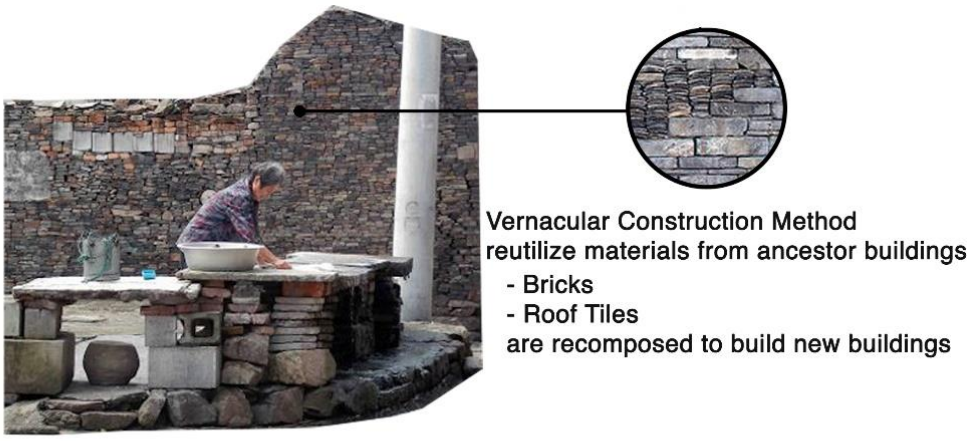
Figure 51: Traditional Wapan Construction Technique(source-http://www.zhxww.net)

In places that are prone to typhoons, such as Ningbo, the *Wapan* tiling is implemented in villages as an instant restoration method after the destruction. *Wapan* tiling technique is used in small areas of the walls and roofs that are broken during the typhoon using the broken tiles that were blown away. Due to the speed of reconstruction, the tiling is less reinforced and are prone to be broken again.(Students, 2016)

4.1.3. Modification of Wapan Technique in Ningbo Museum

In vernacular architecture of Ningbo local people, recycling of bricks and tiles to be utilized as construction materials of main structural elements like load bearing wall in houses, the scale and functions of such buildings are different from museum. In the context of Ningbo Museum, the Wapan construction was shifted from structural purpose to the skin of museum façade with the hints to express the memories of villager society which has been forgotten by urbanization.

The *Wapan* wall is a thin facade layer of approximately 240mm. Functionally, it is designed as a form of wall cladding rather than a structural wall due to its poor compressive strength. Its reduced thickness accommodates building systems such as insulation layer, air conditioning and piping systems. Another major factor that caused the modification of the *Wapan* masonry in the Ningbo Historic Museum was the height vs the compressive strength of the *Wapan* wall. Another major factor that caused the modification of the *Wapan* masonry in the Ningbo Historic Museum was the height vs the compressive strength of the *Wapan* wall.The facade of the Ningbo Historic Museum reaches a height of 24 meter, exceeding the height of *Wapan* walls constructed in traditional dwellings.(Students, 2016)



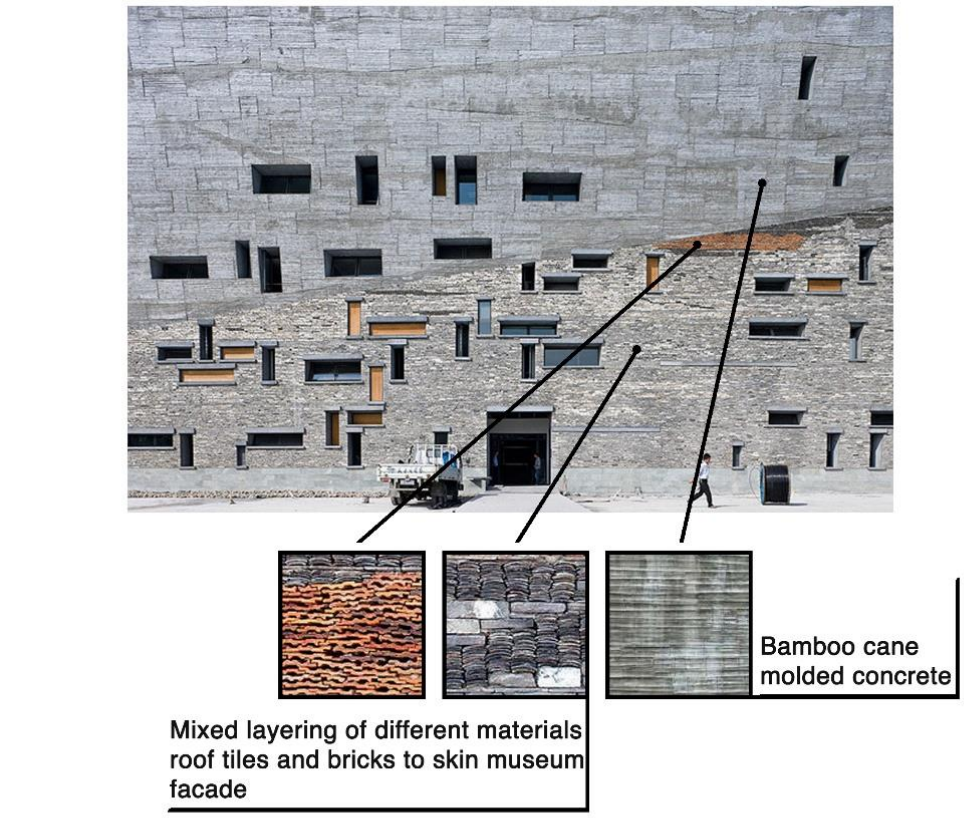


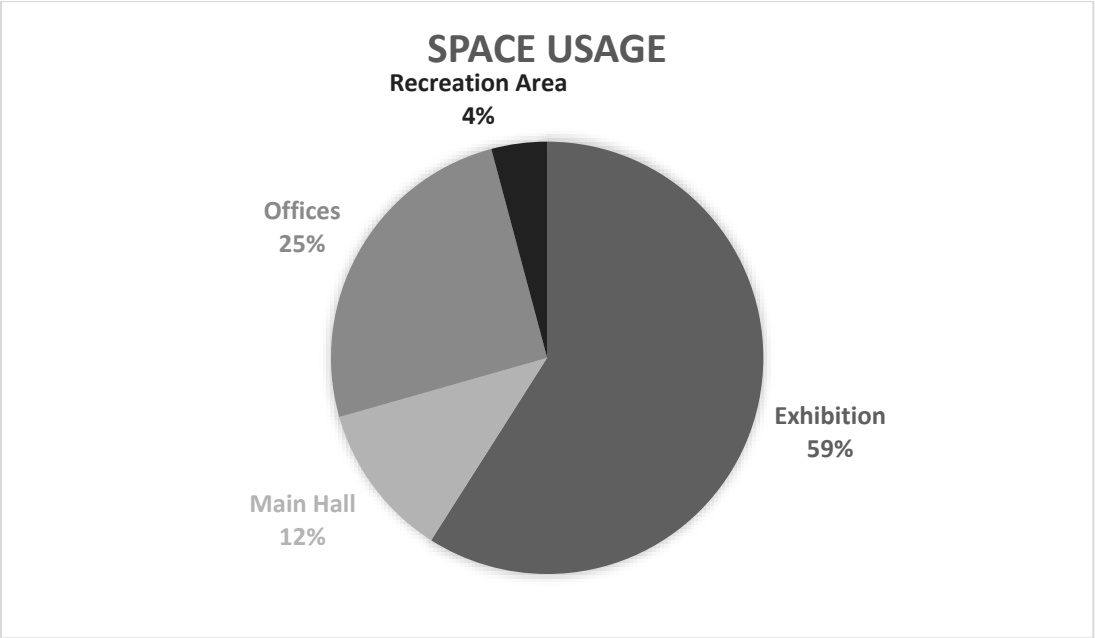
Figure 52: Wapan construction method (Recomposed by Author)

Figure 53: Floor plans and section of Ningbo Historic Museum(source-archdaily.com)

4.1.4. Functional Programs of Ningbo Historic Museum

Program	Area in approximate square meter(sq.-m)
1. Main Hall 1	238 sq.-m
2. Main Hall 2	1164 sq.-m
3. Exhibition gallery 1st Floor	2270 sq.-m
4. Exhibition gallery 1 at 2nd Floor	872 sq.-m
5. Exhibition gallery 2 at 2nd Floor	1747 sq.-m
6. Exhibition gallery 1 at 3rd Floor	852 sq.-m
7. Exhibition gallery 2 at 3rd Floor	456 sq.-m
8. Exhibition gallery 3 at 3rd Floor	952 sq.-m
9. Offices at 1st Floor	1759 sq.-m
10. Offices at 2nd Floor	1300 sq.-m
11. Multi-purpose Room	463 sq.-m
12. Café	258 sq.-m
13. Restaurant	246 sq.-m

Table 1: Functional Programs of Ningbo Historic Museum



Exhibition Gallery Categories

1. History Gallery- This gallery is the heart of the museum. It tells the story of the city, its evolution is shown from the past to the present time or geographical openness to the world, and through the Asian route “Martin Silk Road”.
2. Regional Gallery- Here a lot of collections related to the cultural “folklore” of the place are exposed, like people of the area lived on the threshold of the twentieth century.
3. Bamboo Carving Gallery- This gallery shows the bamboo carving skills during the Ming and Qing dynasty.(Shu, 2007)

4.1.4. Reflection on the Environment

The appearance of the building derives not only from the hill and valley, but also includes several minor changes of inclination that takes visitors to associate the building with space and scale of the traditional villages of Ningbo.(Shu, 2007) The formal language of Ningbo Museum has been derived from the topography of the surrounding area where the sensual experiences and memories of local people has been existed from grand old to youth.

The building, which begins to lean on the second floor, has the shape of a mountain, but also a boat. The first refers to the existing landform in Ningbo, the second highlights the importance of maritime trade throughout the history of the place, making the museum a symbol of the history and culture of Ningbo.(Shu, 2007)

Finding from Wang Shu's Interpretation of Tradition

Over recent years, the economic development of China has significantly changed the lifestyles of the people and cityscapes. Urban development projects have the profound effect on the older building and society of Ningbo, many traditional buildings like village houses which cannot support the functional requirements of modern society have been torn down, memories of place have begun to diminish.

Traditional Wapan construction method has been long forgotten in the past recent years, until Wang Shu interpreted upon the design of iconic Ningbo Museum along with his guidance to craftsmen on how to apply these traditional construction techniques but was not allowed to control the whole process. The architect commemorates the cultural history of old Ningbo, on the skin of Ningbo Museum with recycled tiles and bricks, along with integration of today's functions and construction methods. The materials, tiles, and bricks, from old villages have belonged the memories of ancestors, similarly, the memories of materials, are composed together into the content of contemporary building type along with the interpretation of vernacular landscape of Ningbo city into formal language.

Wang Shu's design approach for Ningbo Museum has based upon the memories of materials to stimulate the sensual experience of people to highlight the culture, history, and nature of Ningbo city.

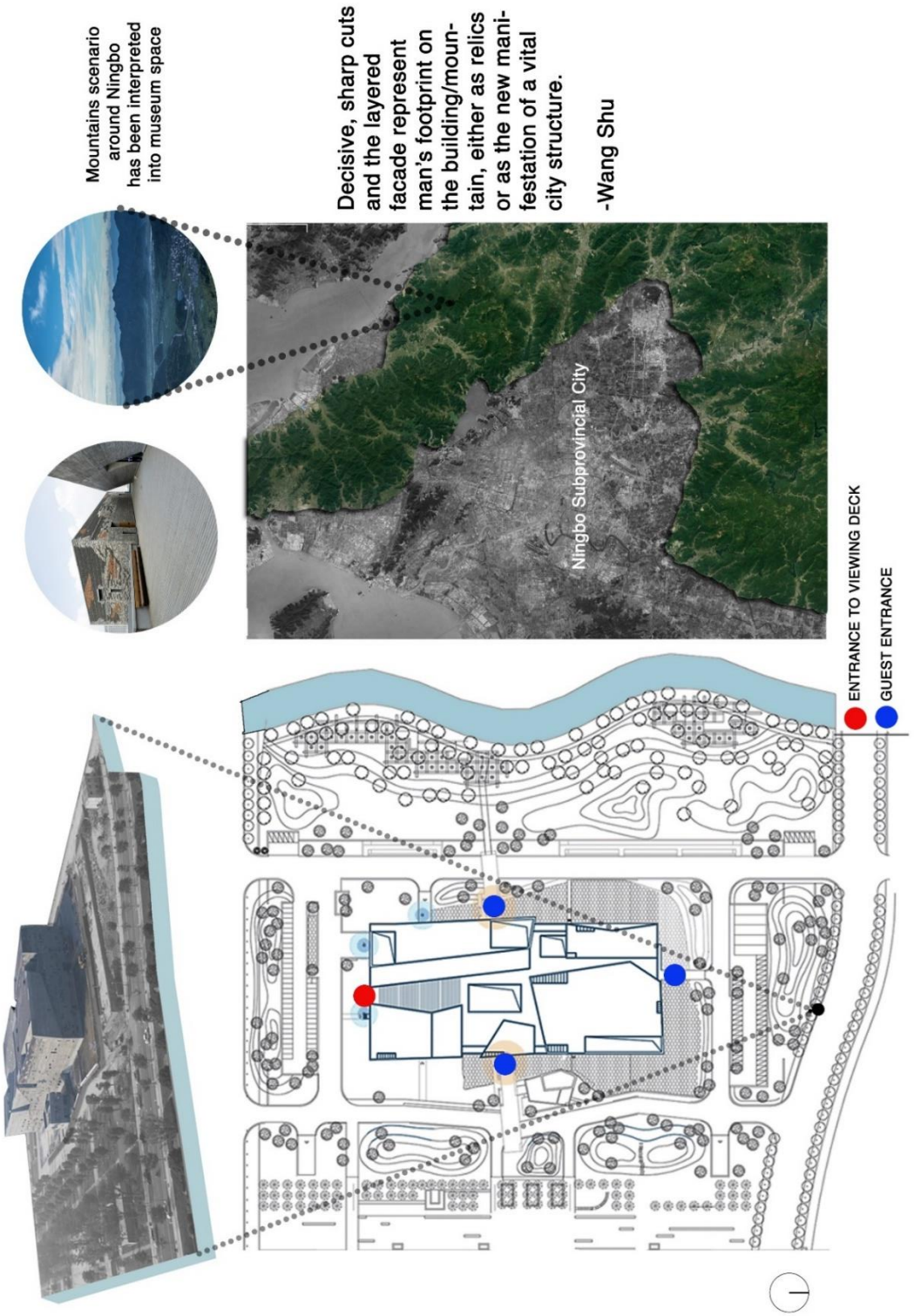


Figure 54: Site Analysis and reflection of natural topography (Recomposed the images from www.archdaily.com)

4.2. Odunpazari Modern Art Museum (OMM) by Kengo Kuma & Associates

Overview

Odunpazari Modern Art Museum (OMM) was designed by Kengo Kuma, well known Japanese architect, in Eskisehir, Turkey. The ambition of the museum is to nourish the art and cultural activities of Eskisehir city, the region which located is famous for timber trading market and traditional Ottoman wooden houses. Odunpazari is a town famous for its historical market and it is listed on UNESCO's Intangible Cultural Heritage List. Founded by art collector and businessman Erol Tabanca, the OMM holds a massive collection of 1,000 pieces of modern and contemporary art, featuring works by Turkish and international artists and along with the ambition to create an institution for young artists. The permanent collection includes art from the '50s until our present times. (Harrouk, 2019)

Figure 55: OMM (source-archdaily.com)

4.2.1. Design Concept and Approach

The contents of the site, Eskisehir city's tangible and intangible culture and history, are the main factors influencing to manipulate the design of OMM. Material of the town, wood which is the main construction material for traditional houses of the town,

has been interpreted with the appliance of modern construction technique. The form of Odunpazari's traditional Ottoman wooden houses' characteristics is cantilevered wooden beam and column in boxes of rambling along the street of town, cantilevered upper levels add an unexpected texture to the meandering small streets. This unique characteristic of the region and its historical timber trading market inspired the stacked timber design of the museum. Synthesizing into the surrounding site's context of traditional Ottoman wooden houses, and bridging with the heritage of Odunpazari, are the design intention of OMM. The stacked and interlocked boxes of the museum are arranged in various sizes to accommodate diverse scales of exhibition spaces inside with the intention for large scale artworks and installation arts on the ground, and at the upper floor, there are smaller boxes for small artwork. "The town is quite different than Istanbul—it's a totally different scale, and type of materiality. I wanted to translate that sense of intimacy and warmth to the building, and create a harmony with the neighboring architecture," says Kuma. (McGrath, 2019)

Kengo Kuma and Associates describes its philosophy as "Amalgamating nature and architecture in a manner that creates a strong bond between the 'building' and its 'location'."(Foundation) The interpretation process of Kuma for OMM has done on the historical fabric of the Odunpazari district from the contemporary perspective, paying awareness to the vernacular architecture of Odunpazari, Ottoman dome architecture and cultural integration with Japanese architecture essence. According to the description of OMM official website, the formal language of the design has four major components: geometry, light, stacking and timber. The non-linear forms, the architectural stacking, quality of natural light entering to the central void and the timber construction which is the skin of the building, are sources of inspirations for tangible quality of OMM design.(Foundation)

The other intangible aspect of OMM is the architecture to establish a connection between people and art and the physical building to resonate the social activities of public for art with meeting point for the city. The intersection points for up-and-coming artists to express and exhibit their works which are the reflection of time and society.

Figure 56: Contemporary OMM and Old Town Alley of Odunpadzari(source-archdaily.com)

The soul of the space from the old town has been interpreted into contemporary term mingling of traditional wooden construction method of historic town which has been inherited from generation to generation with modern glass, reinforced concrete, and steel. The formal language of OMM is derived from the composition of stacked and cantilevered houses along alley. The topography of the site, slope of a series of hills, is also one of the influencing factors to compose the formal language of the museum.

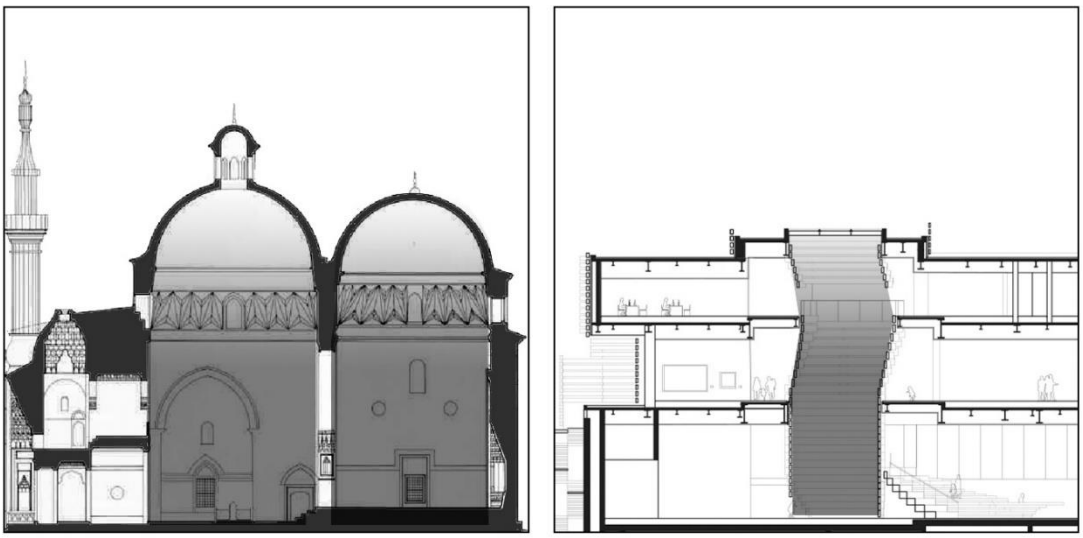


Figure 57: Central Void Area of Ottoman Mosque and OMM (recomposed the images from www.archdaily.com.)

Induction of natural skylight into the interior of Ottoman Mosque which is main area is one of the unique characteristics of Islamic architecture. In OMM, Kuma inspired this language to create the similar atmosphere of Ottoman architecture.

4.2.2. Odunpazari Historical Urban Site

“Odunpazari Historical Urban Site” is a World Heritage site according to the social, cultural, traditional, and physical values. The information from the UNESCO website, the criteria for the Odunpazari Heritage are the area of site preserves the intact products of the Seljuk and Ottoman religious architecture as well as invaluable examples of traditional Turkish houses, Konak, with interior and exterior spatial setups, materials and structural elements and street textures compatible to nature. Mevlevism, which is to be the largest and famous Sufi religious orders and formed by needs and opportunities of the time, has lived for four centuries in the site. The intangible traditional patterns of Mevlevism have impact on the social and urban development of the city. The Odunpazari traditional way of life can be experienced at the Kursunlu Mosque Complex, where master artisans are living and contributing to the development of traditional art skills and knowledge.

Figure 58: Site Plan of OMM (Recomposed the images from www.archdaily.com.)

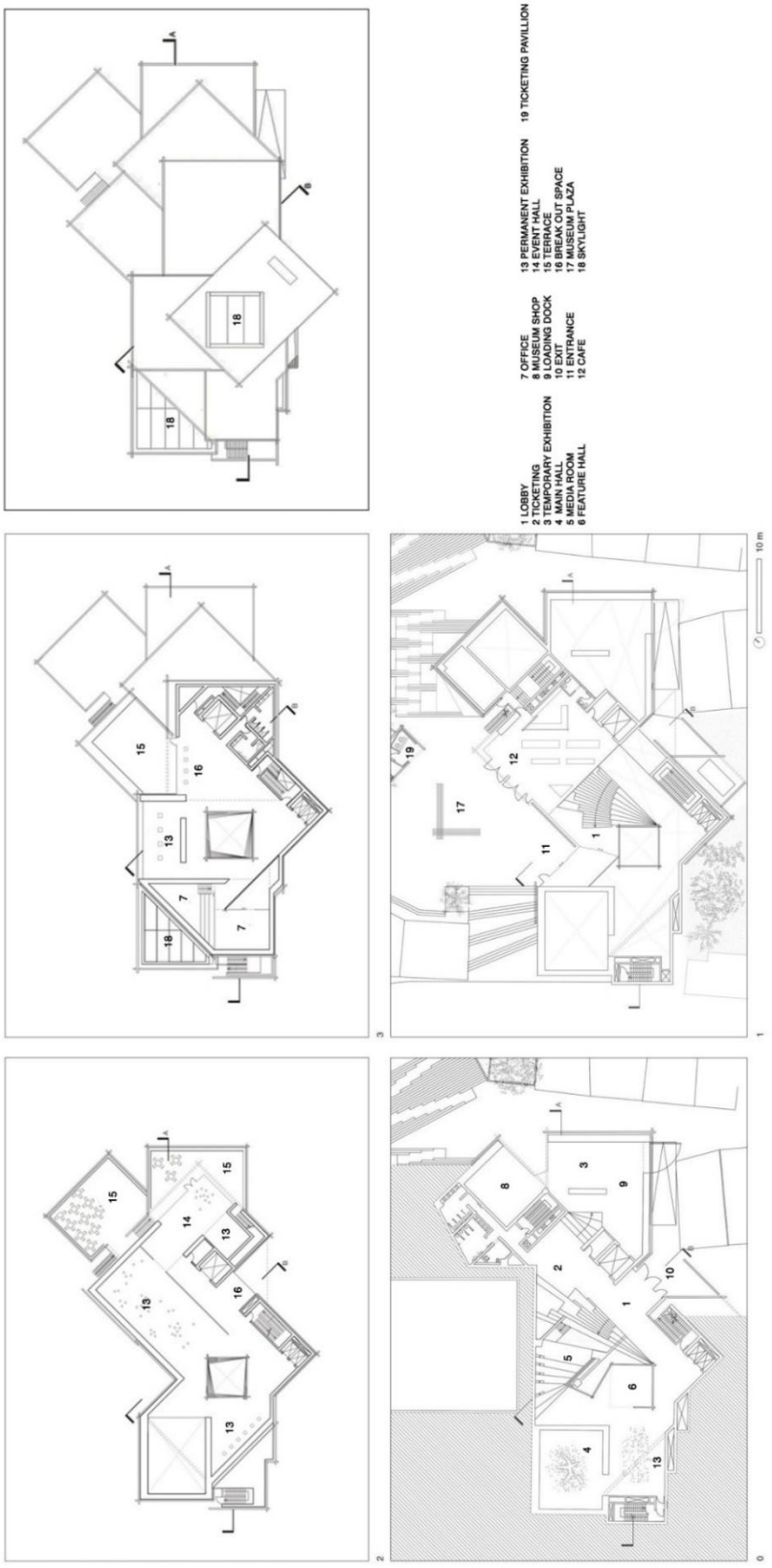


Figure 59: Floor Plans of OMM (Source www.archdaily.com)

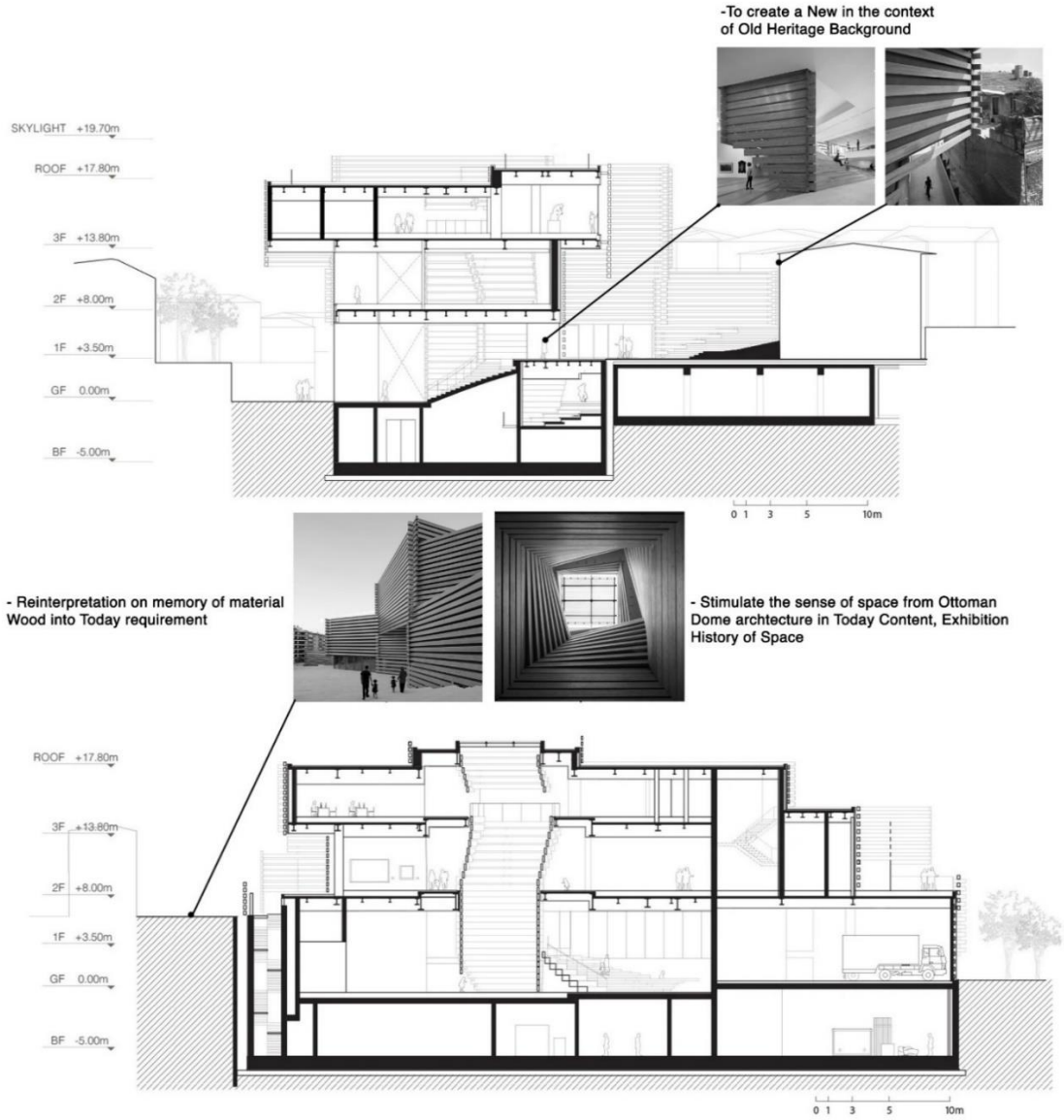


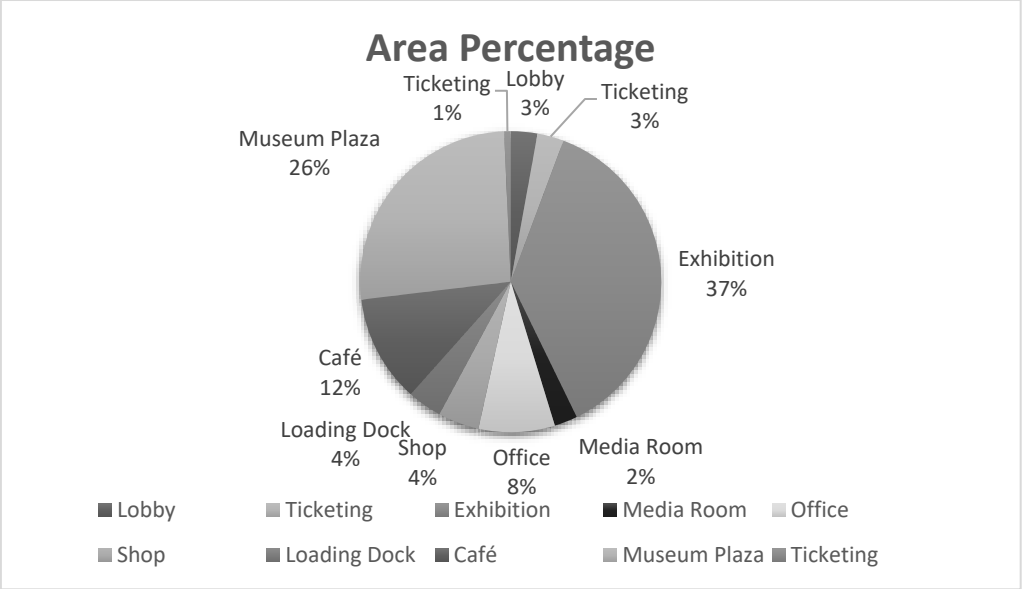
Figure 60: Sections of OMM (source- www.archdaily.com)

4.2.3. Functional Programs of OMM

Program	Area in approximate square-meter (sq-m)
1. Lobby	40 sq-m
2. Ticketing	40 sq-m
3. Temporary Exhibition	60 sq-m
4. Main Hall	39 sq-m
5. Media Room	35 sq-m
6. Feature Hall	25 sq-m
7. Office	115 sq-m
8. Museum Shop	62 sq-m
9. Loading Dock	52 sq-m
10. Café	162 sq-m
11. Permanent Exhibition	326 sq-m
12. Event Hall	71 sq-m

13. Terrace	172 sq-m
14. Break Out Space	98 sq-m
15. Museum Plaza	368 sq-m
16. Ticketing Pavilion	10 sq-m

Table 2: Functional Programs of OMM



Total Floor Area - 3582 sq-m

Finding from Kengo Kuma's Interpretation Process on OMM

The contextual background of the site, tangible, and intangible culture, which are deeply rooted in the Odunpazari district, have become the formal language. The historic district, Odunpazari, has the rich cultural heritage buildings, art community and traditional Konak houses. Among those cultural heritage from the past, Kuma has done the interpretation of sensual experience of the space by utilizing the memory of materials, wood which is the main material of Turkish Konak traditional houses, the spatial void of Ottoman dome architecture from mosque, and he created a new space

within the traditional cityscape of Odunpazari. Time has changed the demands to new functions which require the adaptation, evolution and invention of new materials and construction methods. In OMM, Kuma combined the historic material of the site, wood with contemporary building construction to exhibit the culture and history of the site. The stacked and cantilevered timber houses' forms is the inspiration for the square boxes of the museum to accommodate the different exhibition spaces.

4.3. Yusuhara Wooden Bridge Museum by Kengo Kuma

Overview

Kengo Kuma and Associates has done the design in 2011 at Taro-gawa Yusuhara-cho, Takaoka-gun, Kochi Prefecture, Japan. It is a wooden bridge-typed facility to connect two public buildings, a spa and a hotel which have been divided by the road in between. It is the bridge museum not only communicating two area but also to facilitate workshop for artist in residence programs. In this project, Kuma challenged on the structural system by means of traditional craftmanship, technique and material. (Associates)

Figure 61: Yushuhara Bridge Museum (Source- www.archdaily.com)

4.3.1. Design Concept and Approach

According to the description of the architect, he bears to create a cantilever structural system instead of big cantilever with generous sized materials, employing small wooden pieces composed together in the same way as in traditional architecture in Japan and China. Kuma used locally produced red cedar timber with the contemporary glass and method of laminated timber in small sections rather than

bridging an oppressive-looking crossbeam with large sections to merge the silhouette of the bridge into the forest around it.

"The essence of architectural craft is for human making and human designing to speak directly to progress by carefully examining the possibilities of craft"- Kengo Kuma.

In the design process, Kuma has chosen the wood as main material with the intention to use the new possibilities of craft as an intermediary for human communication. The traditional craftmanship has been the main inspiration for Kuma. The bridge museum connects various themes with various issues of the town, revitalization of the local culture, urban design, technique for frame construction, application of natural materials in the traditional design are representing with one architectural work. (Associates)

4.3.2. The Structural Construction Method

The traditional construction method of "To-Kyo" (square framing) is a complex construction method which composes of many cross-section beams that connected repeated in multiple times to form a core structure, such kind of method was applied in Japan and China, which was devised to support the load from the eaves.

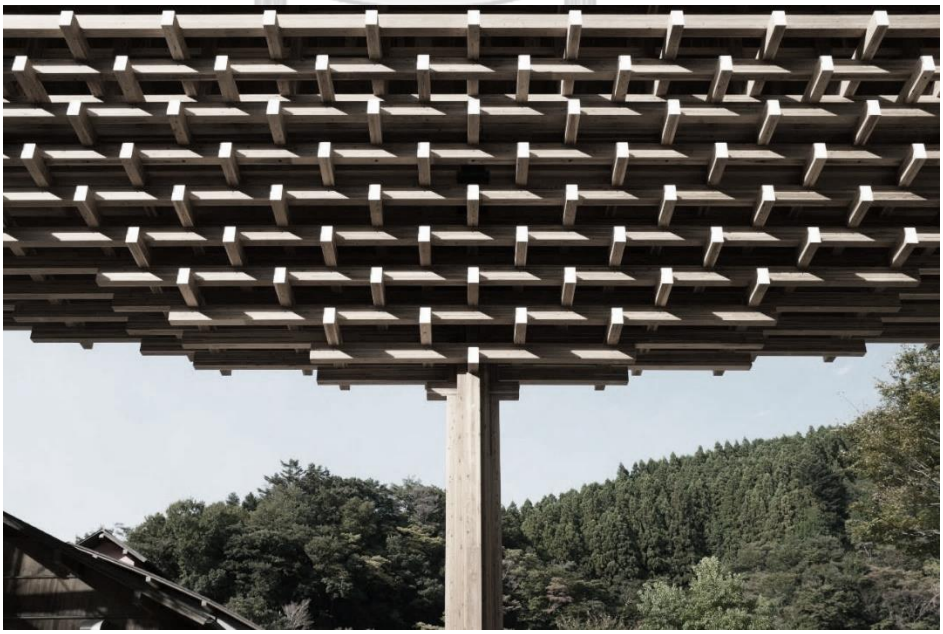


Figure 62: To-Kyo, square framing system (Source- www.archdaily.com)

Such kind of structural system makes the bridge structurally strong to create long span bridge supported by one single pole at the center. There is an elevator at one end of the bridge, on the other side it is connected to the gallery.

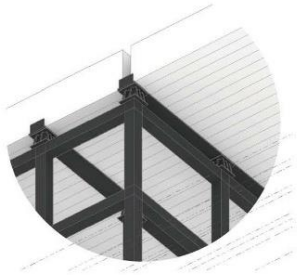


Figure 63: Construction joint betweeen wood and steel structure (Edited the source- Kengo Kuma's official website)

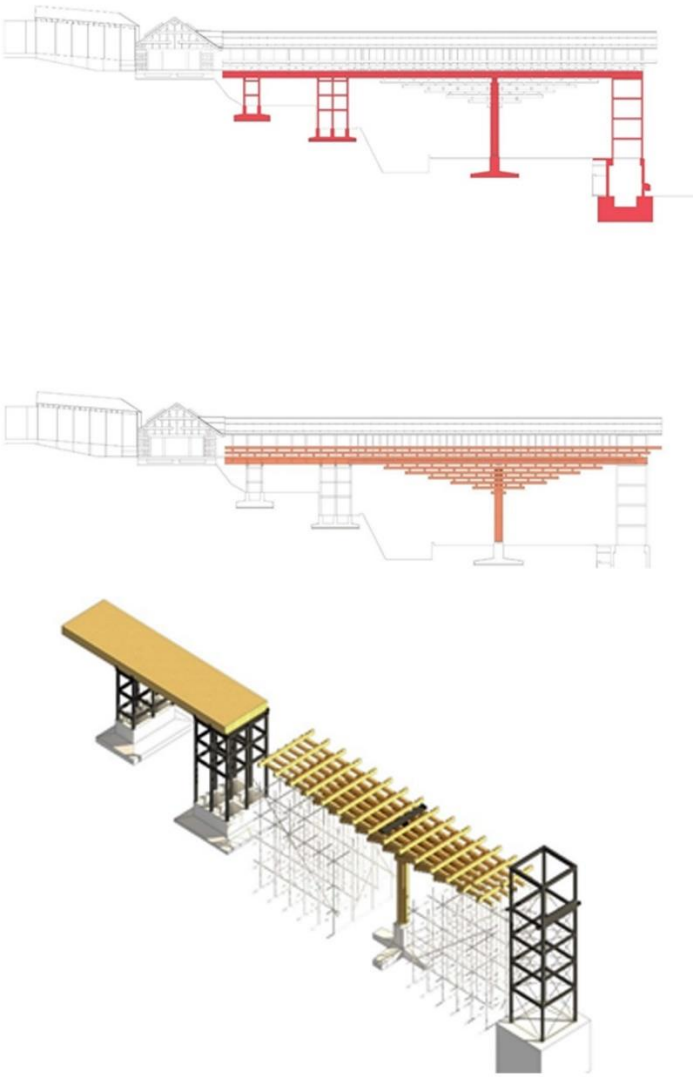


Figure 64: Mixed use of traditional construction method and present one, (Source-Kengo Kuma's official website)

Finding from Yushuahara Bridge Museum

In this project, Kuma applied the craftmanship as the tool to create a space combining with contemporary materials like steel column and beams, laminated timber technique. He resurfaced the To-Kyou system to support the eave construction in Japan and China traditional architecture to elaborate with a same tectonic language in the museum. Kuma used mainly wood which has been the historical material of Japan and culturally rooted thousands of years, to stimulate the human sensual experience.

Figure 65: Interior Wooden Square Beams (Source- www.archdaily.com)

Comparison on the Study and Analysis of Precedents

I conducted the studies on three precedents of two well-known Asian architects, Wang Shu and Kengo Kuma whose design approaches are inspired from the tradition, culture, environment, and historical background of the site and how they interpreted those factors into contemporary language. Following table listed the factors influencing the interpretation process of the architects.

Wang Shu	Kengo Kuma	
Ningbo Historic Museum	OMM	Yushuhara Wooden Bridge Museum

• Awareness of natural landscape • Vernacular built forms, houses • Traditional construction method, WaPan • Memories of materials • Memories of the site	• Historical value of the site • Vernacular built forms • Culture and tradition of the site • History of material • Awareness of natural landscape • Cultural integration between Turkish and Japanese	• Awareness of natural landscape and topography • Locality of material • Craftmanship • Tradition and culture of the site • Vernacular construction technique

Table 3: Comparison on Case Studies

Kuma and Wang come from the countries of historically and culturally prominent background and their works have been mainly influenced by those factors. From the three precedents studies, their inspiration for design method has a lot of similarities between them. The culture, tradition, vernacular landscape and built forms, memories and culture of materials which have been embedded in the memories of the locals. Instead of imitating to the past, they interpreted the influences of the past into contemporary language to answer the time and space in architecture of today. Their interpretation process has done to stimulate the human sensuality along with the tangible and intangible tradition and culture of the site by means of contemporary formal language.

Conclusion

From the previous case studies, tradition term in architecture does not mean to be isolated in past, instead it has the property to be rejuvenated its soul with materiality and functionality. Sensuality of the space, the mental process, or haptic influences on people experiences, is the timeless way of architecture. Bagan is one of the culturally

prominent sites in Myanmar with stunning panoramic view of majestic landscape. The area has not only the tangible cultural identities like temples, but there are also intangible cultural aspects of local artists community and craftmanship like Myanmar traditional lacquerware. So, the findings from the interpretation process of Kuma and Wang Shu can assist in my design proposal for the cultural center that will support not only the visitors to Bagan but also for local community by reflecting the traditional, cultural, and historical backgrounds of the area.

Chapter 5 Design Process for Reinterpretation

5.1. Choosing the Sites for Bagan Cultural Center

5.1.1. World Heritage Site, Bagan

The outstanding universal value of Bagan as nominated World Heritage Property of UNESCO states the site located in the central dry area of Myanmar, is an extensive cultural landscape framed by the Irrawaddy River, Tankyi Mountain တန့်ကြည့်တောင် and Tuyin Hills တုရင်တောင် with the traditional boundary of four stupas in the corners.

Intangible attributes of the property are reflected in Buddhist worship and merit-making activities, traditional cultural practices, and farming. The serial property of eight components consists of 3,595 recorded monuments – including stupas, temples and other structures for Buddhist spiritual practice, extensive archaeological resources, and many inscriptions, murals, and sculptures. Bagan is a complex, layered cultural landscape which also incorporates living communities and contemporary urban areas. The authenticity of Bagan is demonstrated by the landscape of Buddhist monuments of diverse sizes, scales, materials, designs, and antiquity; and the rich and continuing religious and cultural traditions. The major built elements within the property, particularly the large temples and stupas, retain a high degree of authenticity in their form and design, both internally and externally. The decorative elements of many of the individual monuments survive in their original form. The authenticity has been impaired by inappropriate interventions from the 1970s and 1990s, and by the extensive damages that resulted from earthquakes. ("UNESCO,")

5.1.2. Criteria for Site Selection

As mentioned before, the cultural value of Bagan has tangible-built forms of Buddhism architecture, utopia scenery landscape and intangible socio-cultural factors, practice, traditions and beliefs on Buddhism, local artists community of Bagan area well known for painting, lacquer works, crafts and other art mediums. The location of the site will support for the local and visitors to the Bagan area with community space, tourist information center, galleries and other socio-cultural spaces, such functional

requirements will evaluate from the further on ground site observation and survey of other scholars.

The heritage impact assessment (HIA), surveying on the viewing platforms to view the sunrise and sunset scenario, impact of temple climbing on old monuments and interviews on visitors' activities in Bagan area have been referenced on the " Studio Bagan: Building in Heritage Context", the field work and observation by editor Clara Rellensmann and Alexander Romer from University of Technology Cottbus- Senftenberg. (Rellensmann et al., 2018; Romer, 2018; UNESCO) Following the data from the mentioned reference, the summary of attributes assessment on Bagan area as follows-

Rank of value	Value	Attribute	Contribution to significance
International Value	Landscape of monuments	Monument's ensemble, its setting and aural noise	Very High
International Value	Living Traditions	Continuity of religious practices: festivals, celebrations, rituals, and merit making contributions	Very High
International Value	Overall setting of Bagan	River and corner stupas	Very High
International Value	Archaeological remains	sub-surface archaeological deposits, old Bagan wall, the	Very High

		ancient palace site, ancient reservoirs, and other water management features	
International Value	Associated cultural assets	Sculptures, mural and cloth paintings, inscriptions	Very High
International and national value	Landscape	Flora, forestry, fauna, and wildlife	Very high- high
Local value	Land-use	Agricultural fields	Medium

Table 4: Criteria for site selection

The site selection for Bagan Cultural Center has been followed up to those attributes' assessments on Bagan area, from which following criteria have been evaluated-

- Awareness of Bagan ancient monument's location and impact of proposed new building sites on them (see attached Monument's location map)
- Viewing to scenery of Bagan landscape and monuments
- Awareness of archaeological remains on surface and sub-surface.
- Means of transportation and information for tourists to ancient monuments zone.

The location of the site has been chosen at the new Bagan Township, which is located at eastern bank of Irrawady river, the outskirt of old Bagan area with ancient monument and so the location of the site does not disturb with ancient monument zone laws. Moreover, the new Bagan Township area's local people living business are the tourism, art gallery, lacquer war, traditional clothes, and restaurants. The location of the site has the following qualities-

- The scenery viewing quality is fair enough to watch sun rise and sunset along with Irrawady river.
- Located in government properties area of new Bagan township, it is suitable for cultural center for public.
- Location is like the entrance to monument area and tourism area.

In figure 68, layout of the site has the accessible point in 3 directions by 2 small street and one main road connecting Chauk township to Bagan. It is located at the entrance area of Bagan heritage zone. Surrounding environment has no high-rise buildings and low silhouette of residences and hotels. The location of the site is not too far or too close to the Bagan heritage zone.

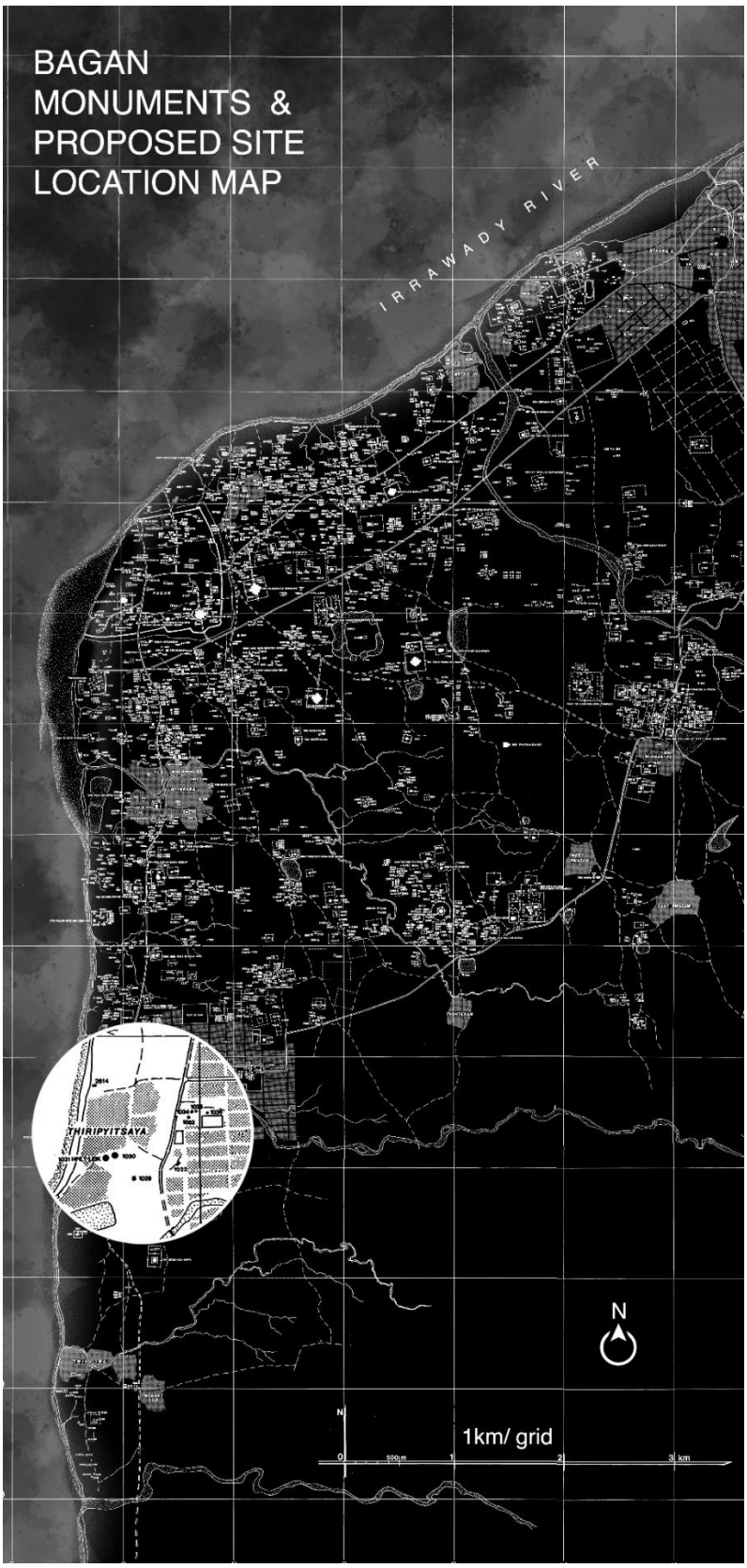


Figure 66: Bagan Monuments Locations and Proposed Site (Recomposed by Author)

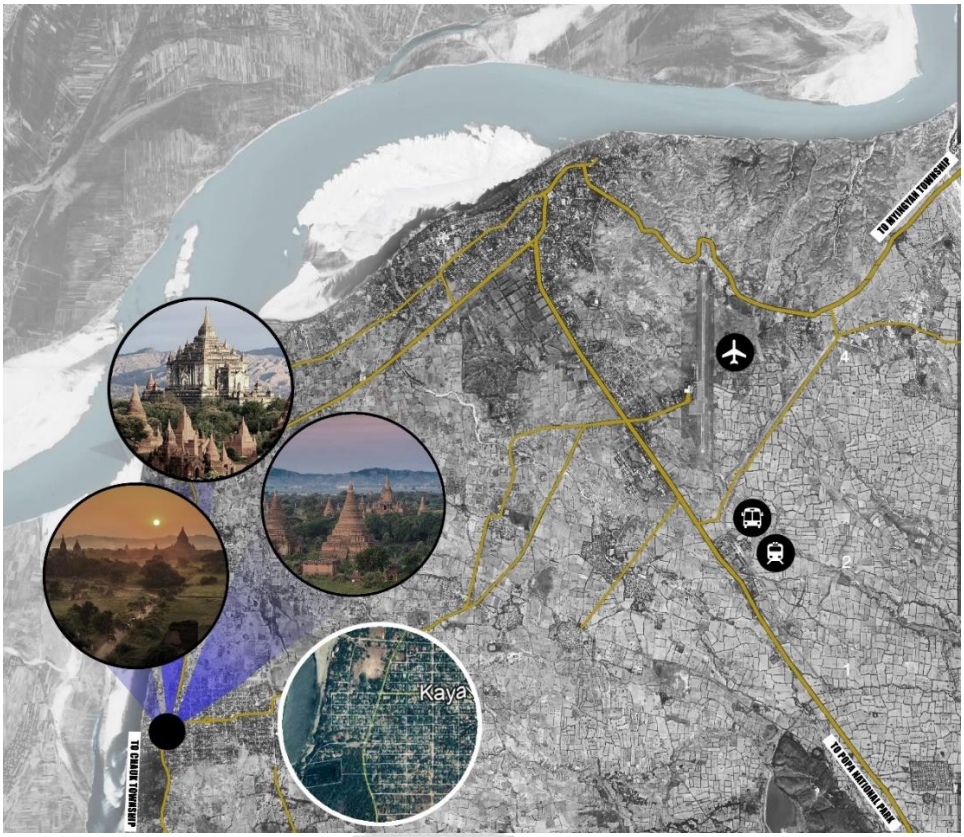


Figure 67: Scenery Viewing Quality of Proposed Site (Recomposed by Author)

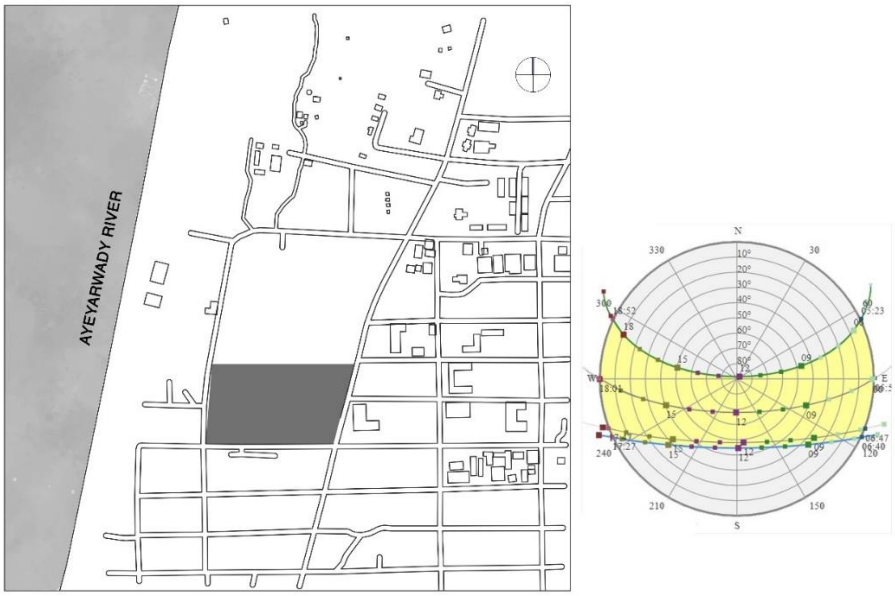


Figure 68: Site Location Map (Drawn by Author)

5.2. Functional Programs for Cultural Center Bagan

Following functional requirements for the cultural center in Bagan have been taken reference from the **Metric Hand Book Planning and Design Data 6th edition**.(Rellensmann et al., 2018)

Main Theater- it can accommodate 500 people. The indoor art performance and activities can be done. Bagan traditional dance and performance are one of the intangible heritages of Bagan area since ancient time. The theater design is intended not only for indoor art performance, but it can also serve as viewing decking area.

Rehearsal rooms and changing rooms- it is the supporting area for main theater activities. Dancers and art performers can rehearse for their activities.

Outdoor Theater- Since ancient Bagan period, the open-air dancing performance is prominent which has the relation with India art performance. Such kind of outdoor art performance can be done in outdoor theater.

Exhibition Hall- Today Bagan area has many art gallery and artist studios. Not only for local artists but also for artists from other place can exhibit their artworks and exchange knowledge.

Artist Studio- Rentable space for artists to create their artwork.

Library-Learning place for art and history of Bagan area.

Coffee shop- Social activities and refreshment area.

Viewing Decking area- the rooftop place to experience the scene of Irrawady river and Bagan heritage zone.

Souvenir Shops- Commercial area for products of Bagan area and local community.

Dancing Room- Visitors and artists can learn and perform art activities.

Office- Admin and staff area of cultural center

Multifunction Hall- Flexible area for different activites

Programs	Area in sq-m
Souvenir Shop	528 sq-m
Dancing Room	550 sq-m
Restaurant	958 sq-m
Office	483 sq-m
Gallery Room	1100 sq-m
Multifunction Hall	473 sq-m
Changing room	473 sq-m
Outdoor Theater	724 sq-m
Exhibition Hall	743 sq-m
Art Studio and Gallery	12000 sq-m
Coffee Shop	74 sq-m
Library	12000 sq-m
Rehearsal Room	473 sq-m
Main Theater	750 sq-m

Table 5: Programs for Cultural Center

5.3. Design Approach

5.3.1. Old within New

Culture embodies the complexity of distinctive spiritual, material, intellectual and emotional features that characterize a society or social group. It includes not only arts and letters, but also modes of life, the fundamental rights of people, their value systems, traditions, and beliefs. The tradition is the intangible item which has been passed on

from one generation to another and memories embedded in a society. Memories like these contain the deepest architectural experience that I know. They the reservoirs of the architectural atmosphere and images that I explore in my works as an architect.(Adler, 2007; Zumthor, 1998) So, the reinterpretation process of tradition in architecture means to reutilize the tangible and intangible architectural aspects from the past, but it has to maintain and evolve the sensual experiences of the space. The survival of traditional language in architecture has been challenged by socio-economic and architectural homogenization, e.g., mass production of industrialized materials and building forms to be more economically feasible and time efficient in a project rather than getting skilled craftsman to work on detail. Materials, construction methods, rituals, natural topography, and landscape form are also part of tradition term. Reawakening architectural soul of Bagan temple and traditional houses to reinterpret in today Bagan is the old within new of architecture.

5.3.2. Taxis and Symmetry of Axis in Contemporary Time

The reinterpretation of traditional architecture has been done upon the original taxis and symmetry of temples and traditional house by rearranging, rotating, subtracting, or adding to original taxis. The dramatic order of arrangement in spatial composition can also be rejuvenated into the contemporary architectural term according to the socio-cultural requirements of the time. What make prominent to the classical architectural buildings as a poetic thing from ordinary buildings is there, on the surface, in its formal organization. (Zumthor, 1998)

In figures 71 and 72, the taxis of Ananda temple and Thatbyinyu temple have been mixed and rearranged and then place in the site to see how poetic order of space can be obtained. Subtracting some central part of original taxis has created the central courtyard space for art and cultural performance and accessibility of the site in three directions create three entrances to the perimeter of the building. See figure 72. The weather condition of the Bagan area is hot and sunny and so the shading area is quite essential. The tree plantation creates shelter of sun by following the taxis of the

buildings. See figure 73. Based upon the reinterpreted taxis, functional programs have been added.

5.3.3. Memories of Materials

It is prominent that the brick and wood are the important materials which has been attached to the traditional architecture of Bagan temple and traditional house. Bricks and wooden panels have been utilized to recreate the sense of traditional architectural atmosphere which has been attached to the people experience and memories. See figures 77 and 78.

5.4. Analysis on the Reinterpreted Cultural Center Bagan

In analysis diagram figure 84, the three main circulation derived from accessibility of the site is the dominant factor to divide the composition of functional programs. See figure 84 and b. The location of four stair cases have also been the formative factor of the building. See figure 84c. In figure 84.d, the central courtyard serves as the space within space, at that space, main theater and outdoor theater create submerged spaces. One horizontal and two vertical axes of symmetry have been followed the direction of the site. See figure 84.e. The basic formative geometry is square rule which is the main formative factor of temples and traditional house, can be seen in the contemporary cultural center design. See figure 84.g.

5.4.1. Relation between Plan to Elevation and Section

In figure 85, the square taxis pattern is the main formative factor for the generation of layout plan to section and elevation. This design approach has been derived from the system of ancient temple and traditional house, there is always a relation between plan to section and elevation which has been studied in case studies chapter.

Conclusion on the Reinterpretation Design Process

The soul of the old temples and house are not only trapped in the past, but it can also be rejuvenated into the today socio-cultural circumstances and demands. The taxis and symmetry of axis are the design tools not only for the past but also for the

contemporary time. The geometrical order of the past can be the design tool along with memories of materials to create new poetic of space for contemporary time.

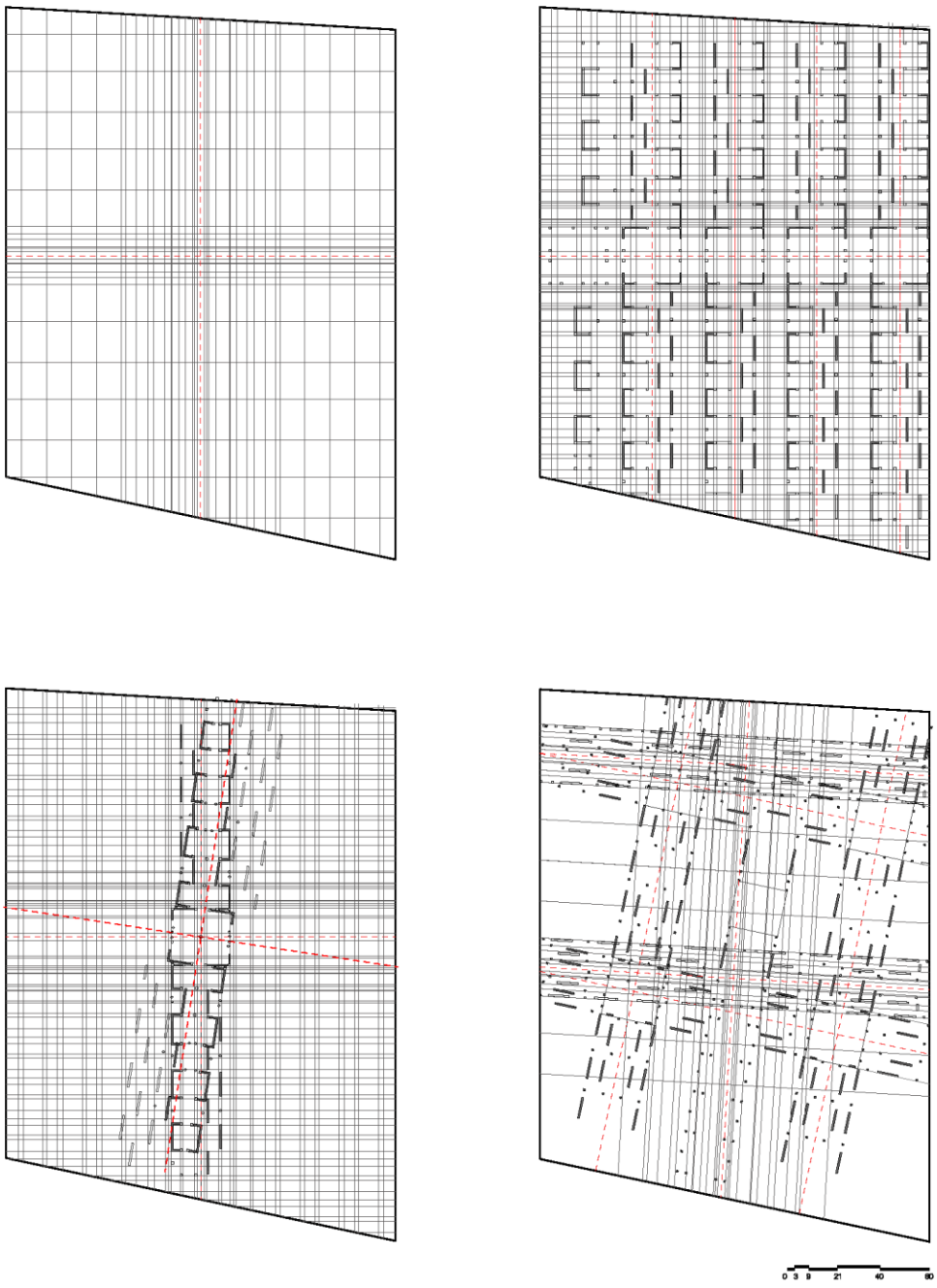


Figure 69: Taxis study diagrams to experiment possible space at the chosen site.

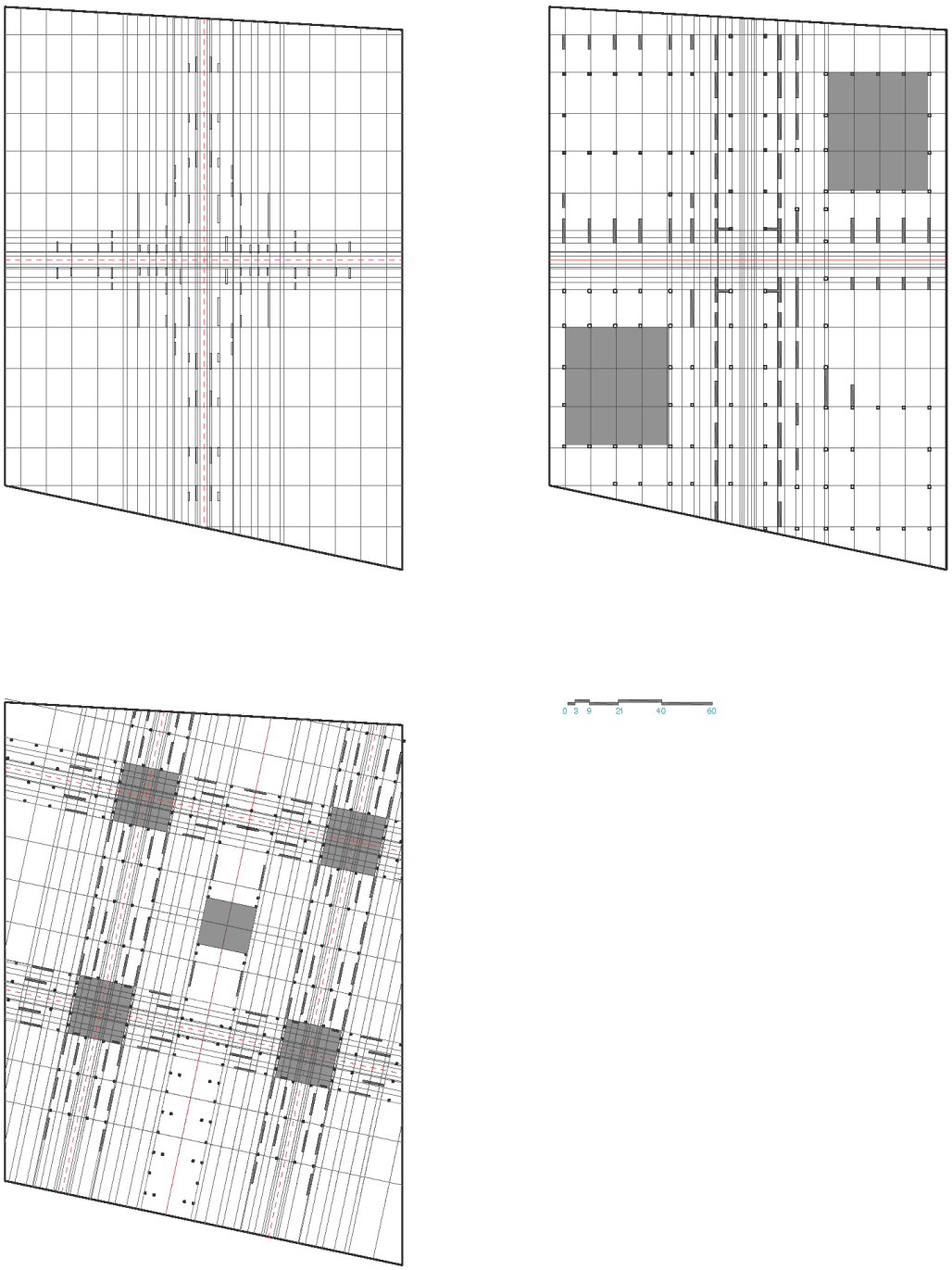


Figure 70: Taxis study diagram to experiment the possible space at the chosen site.

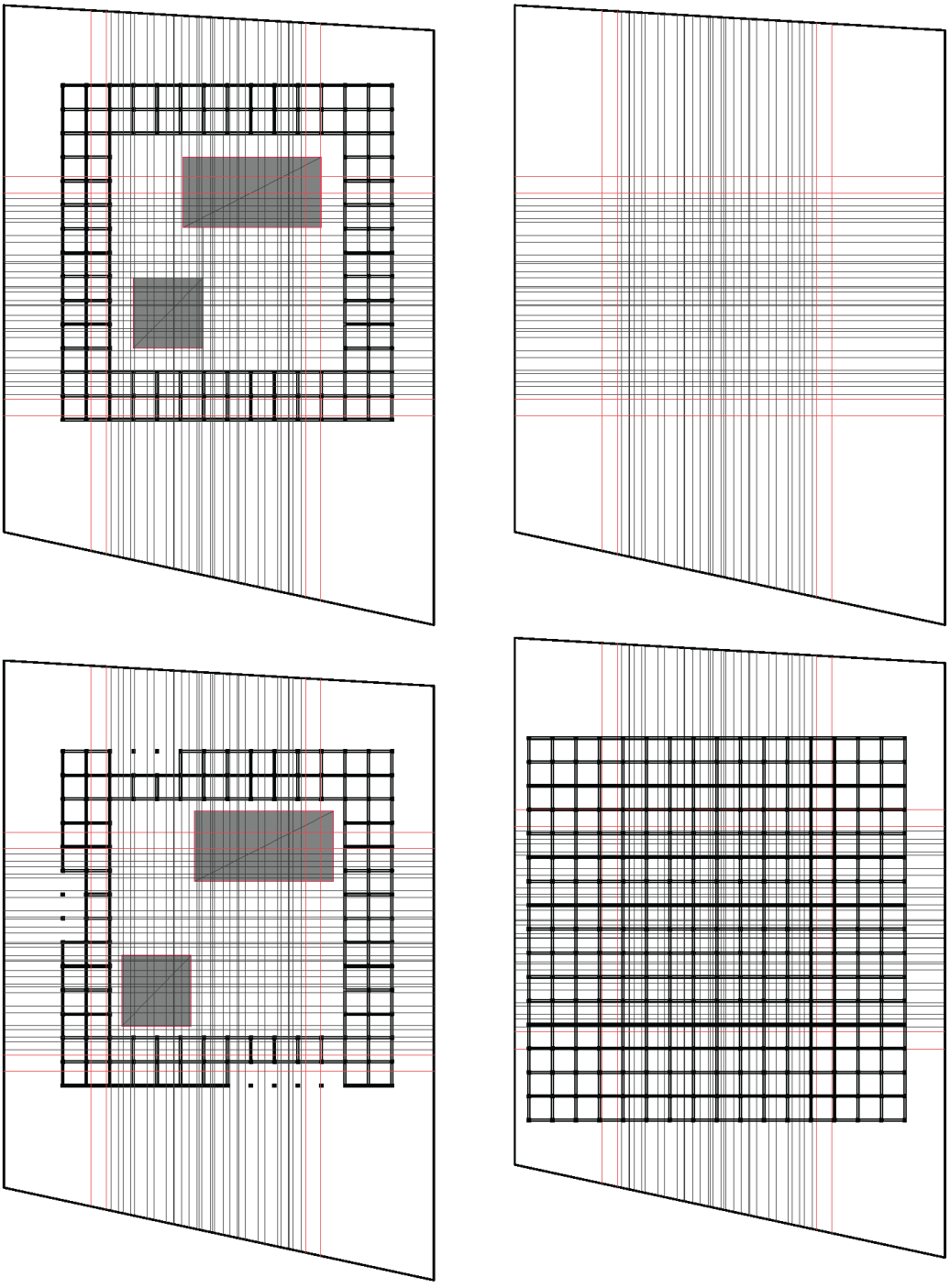


Figure 71: Formative taxis of temples in contemporary architectural design site.

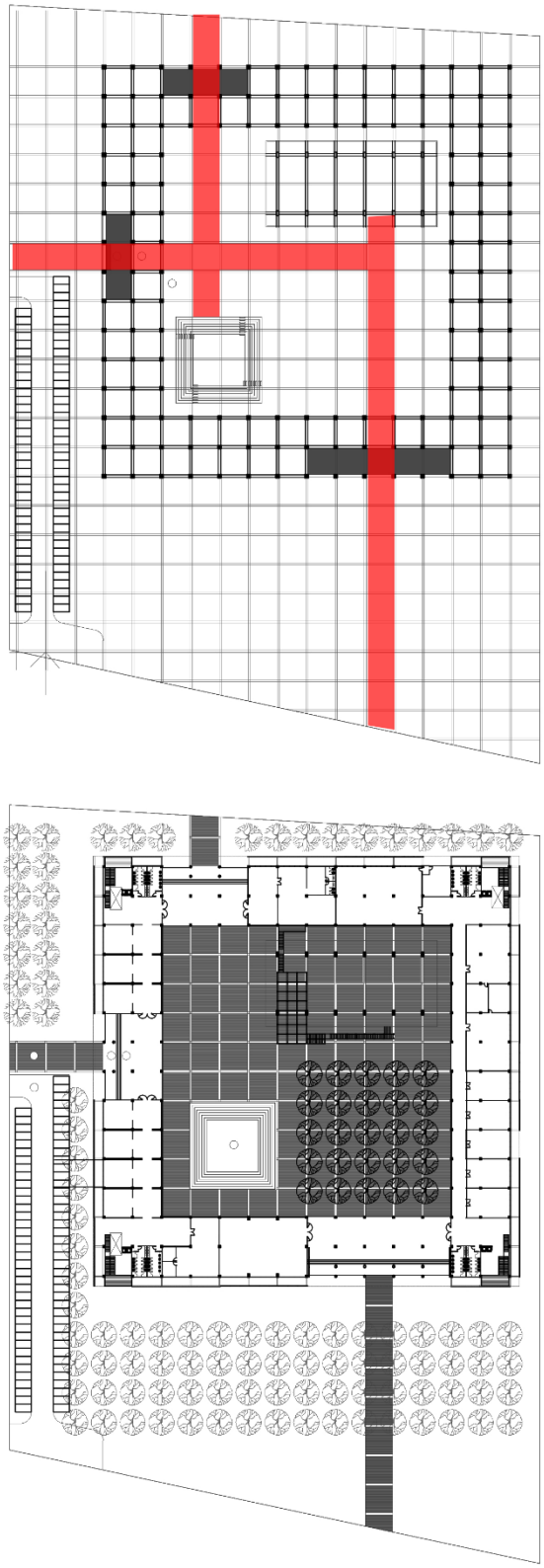


Figure 72: Accessibility of the site interacting with taxis to be formative idea.

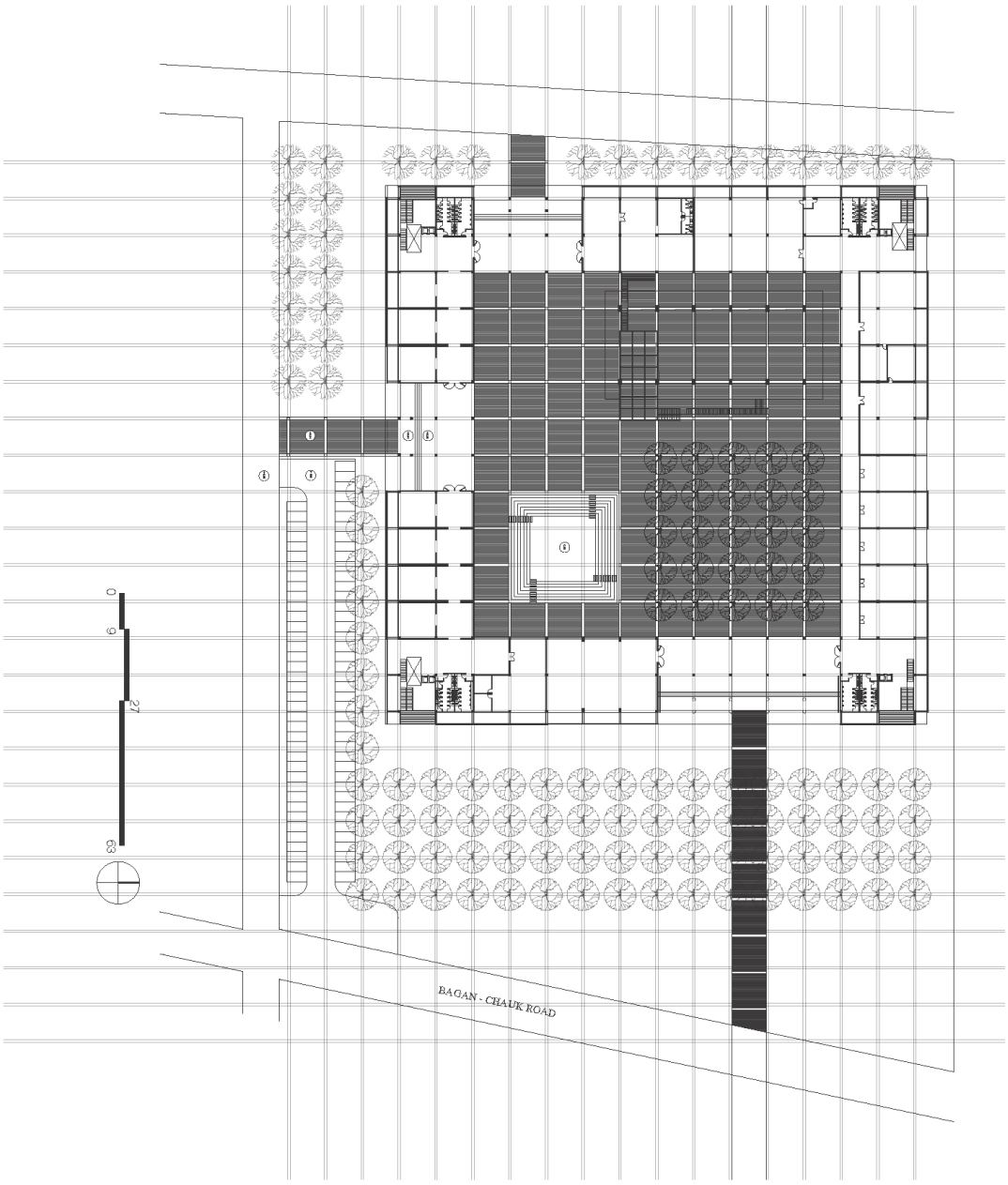


Figure 73: Site layout plan with taxis based on 9m grid of site.

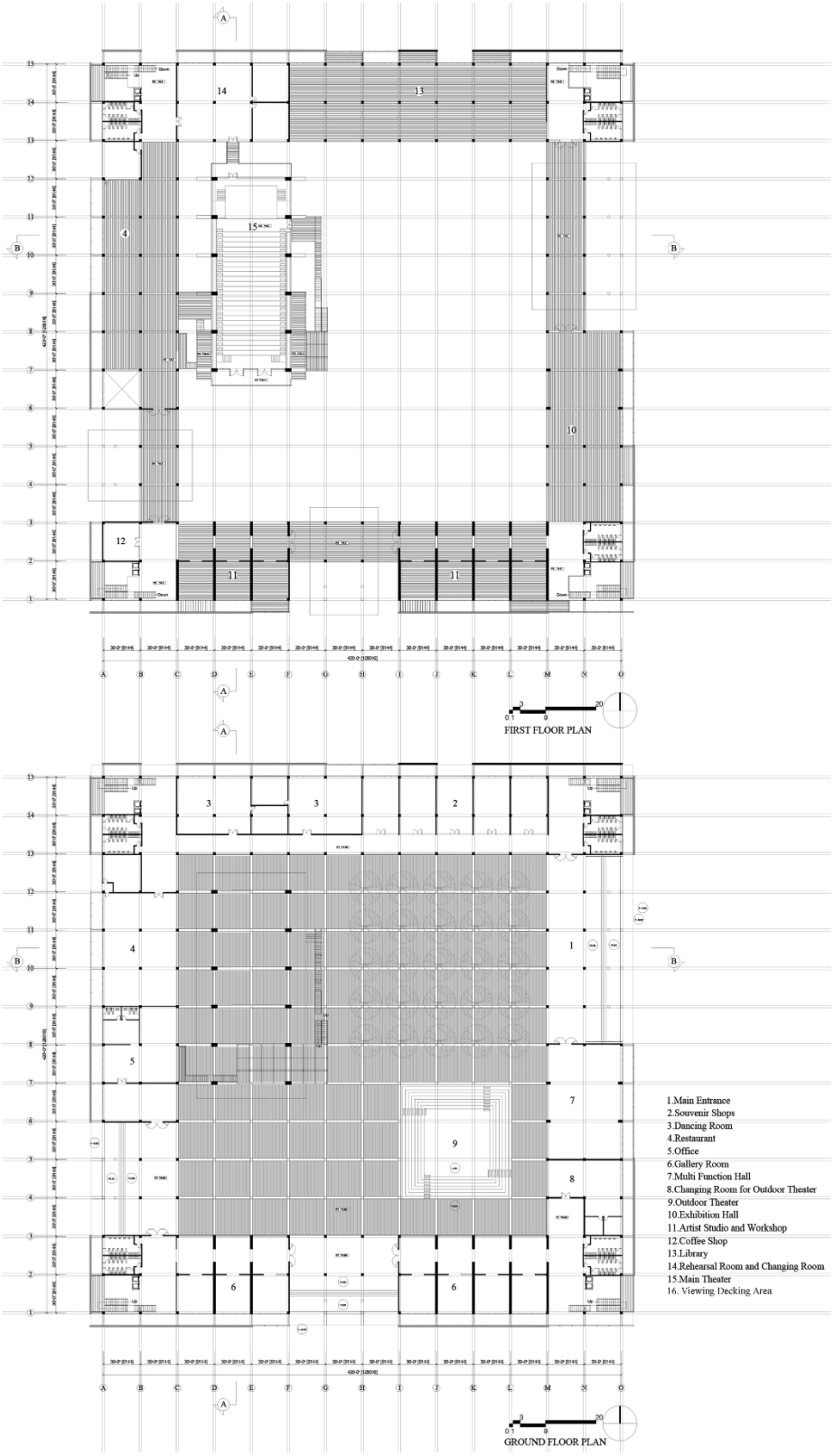


Figure 74: Ground and first floor plan

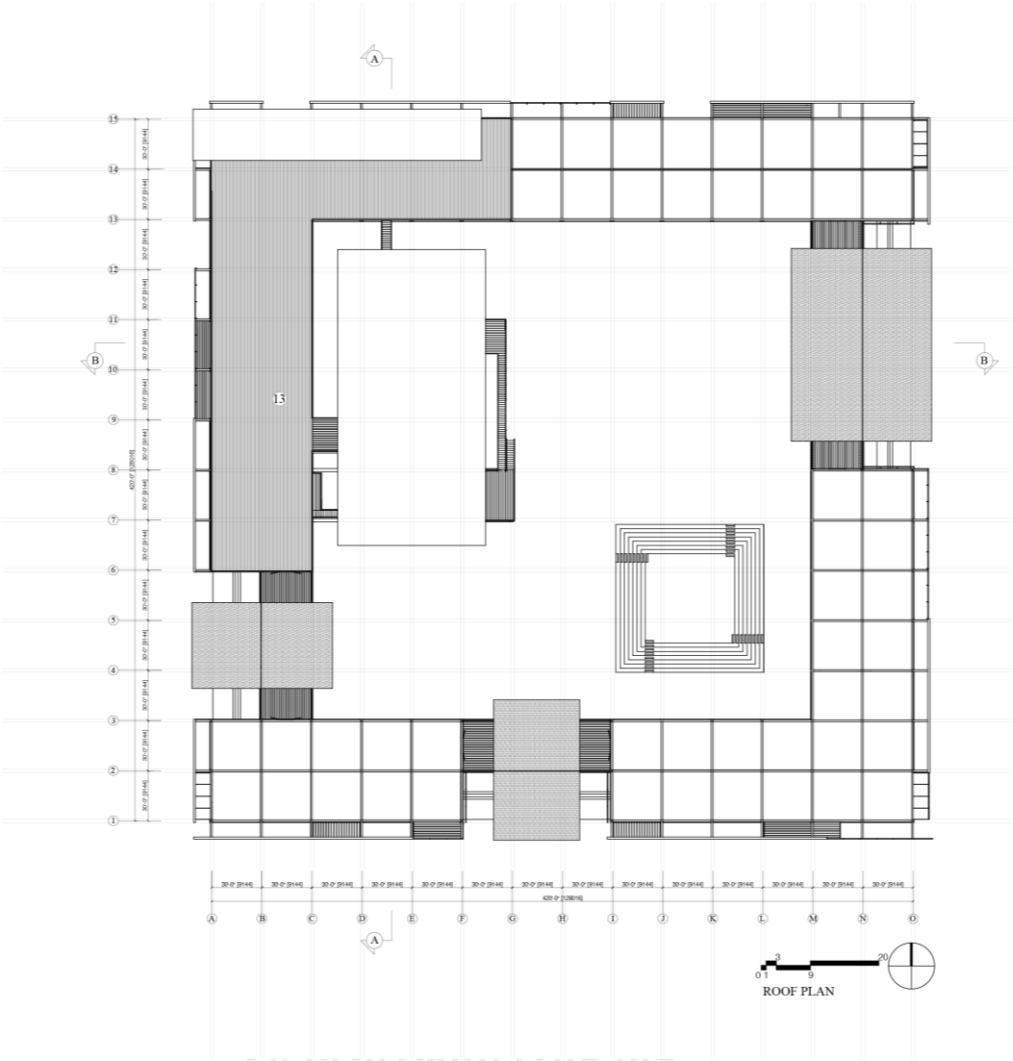


Figure 75: Roof plan

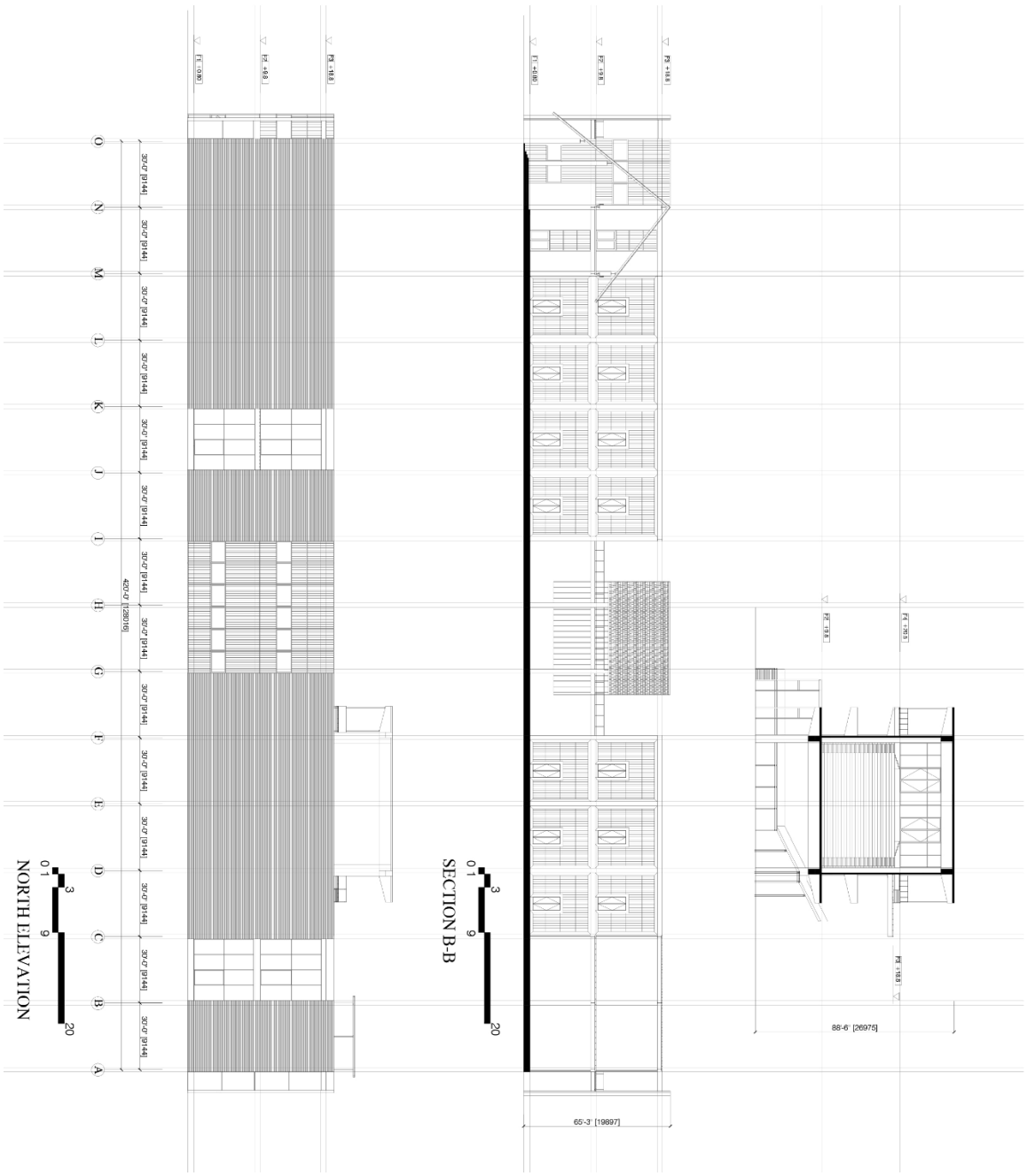


Figure 76: North elevation and Section B-B

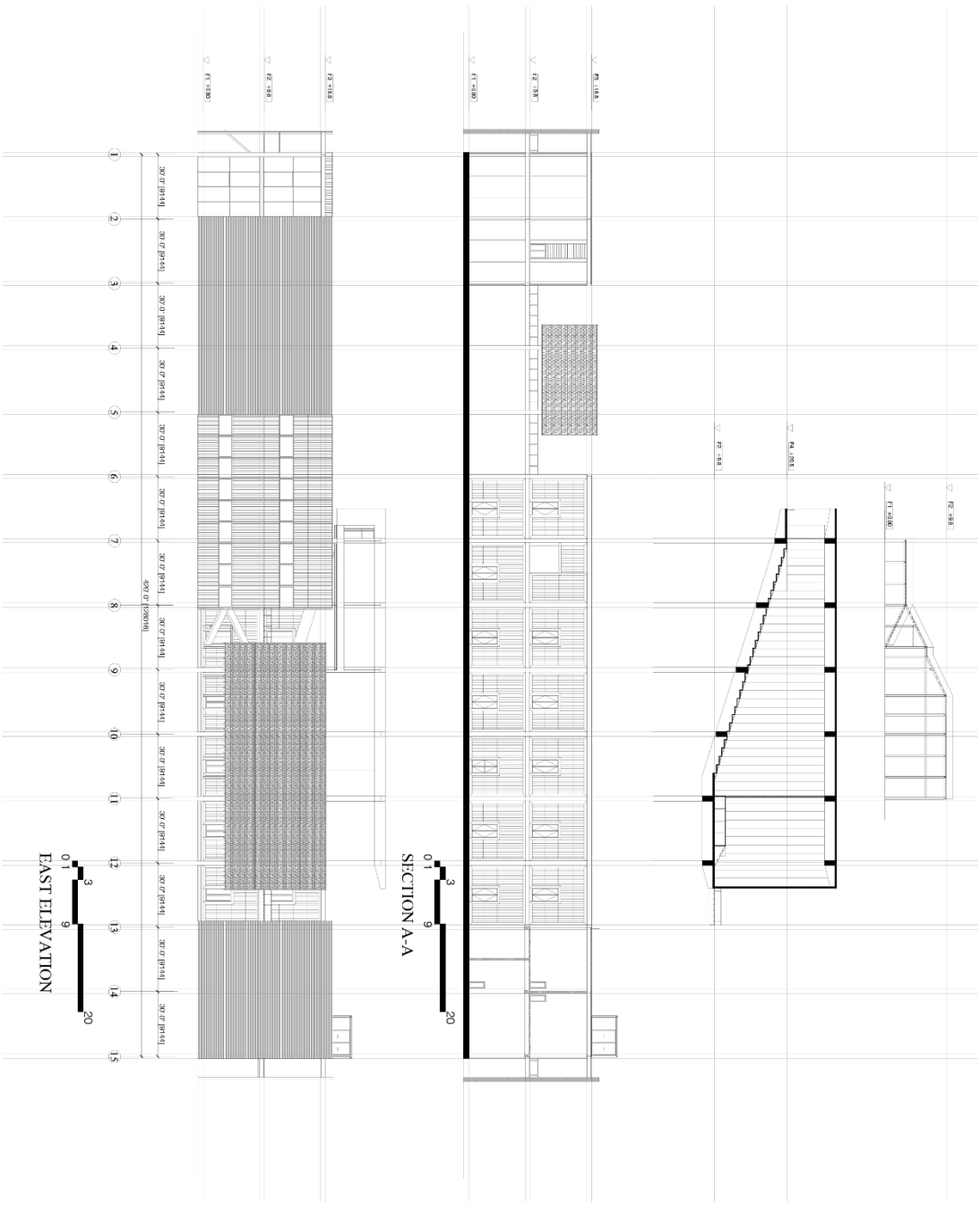


Figure 77: East elevation and Section A-A

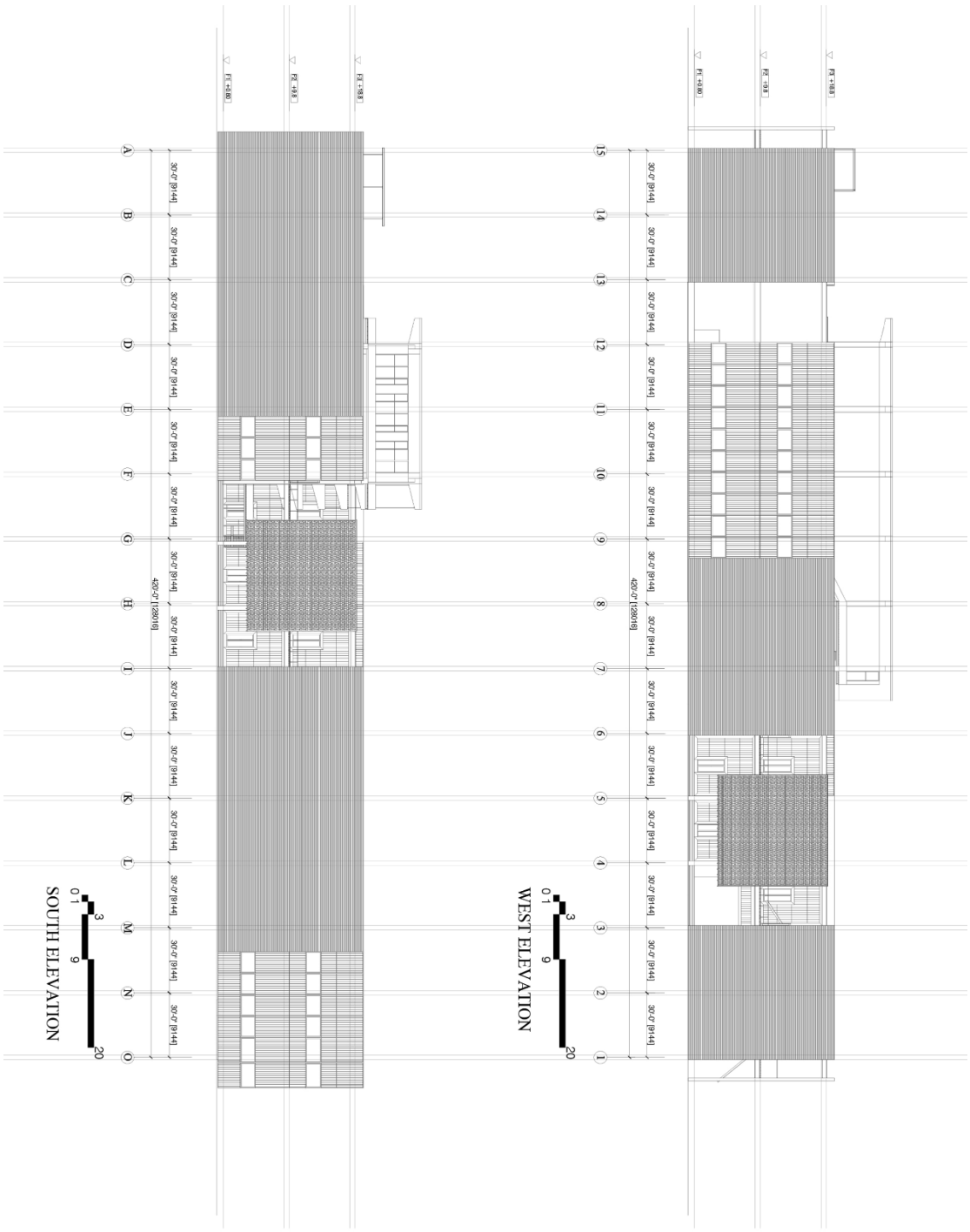


Figure 78: South and West elevation

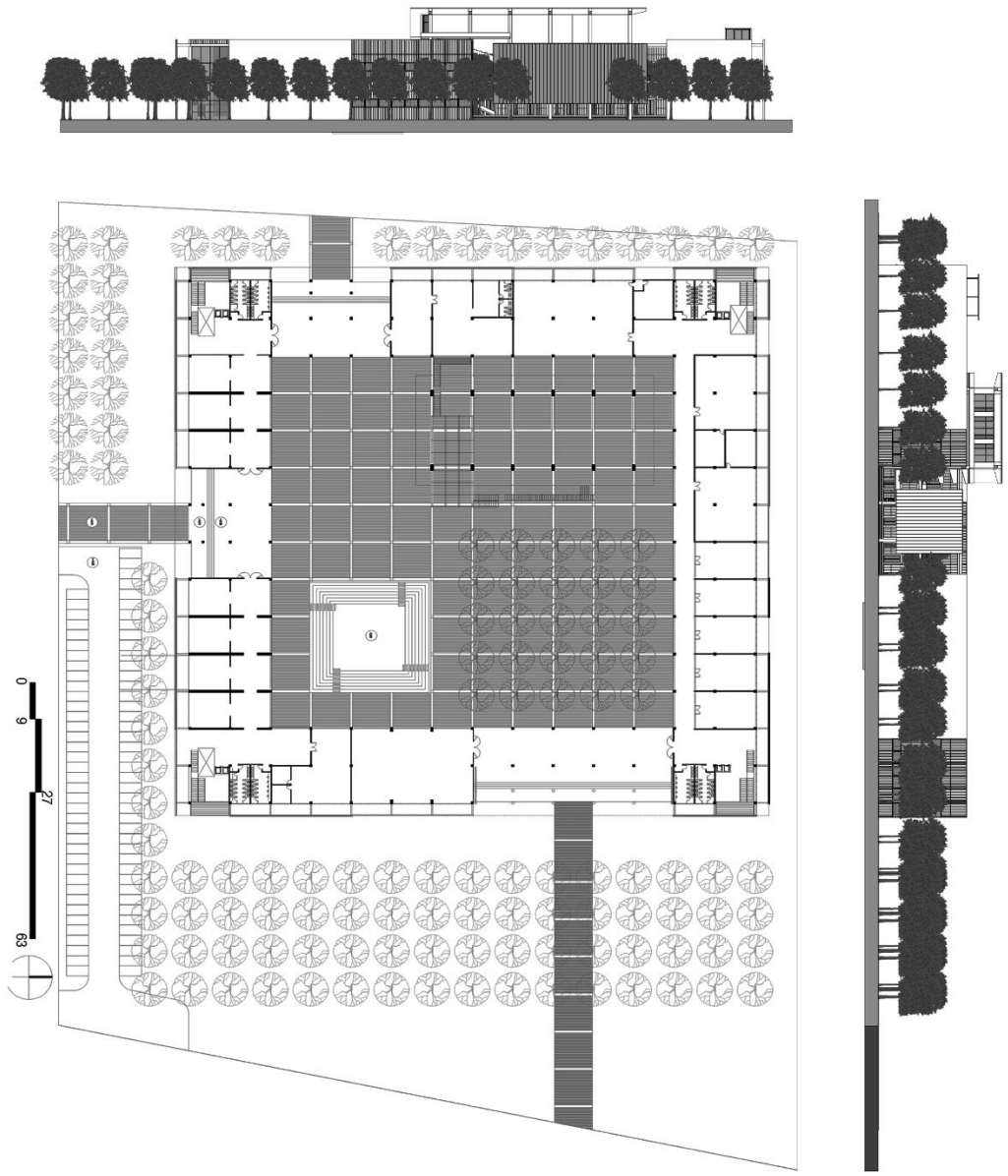


Figure 79: Plan to elevation diagram

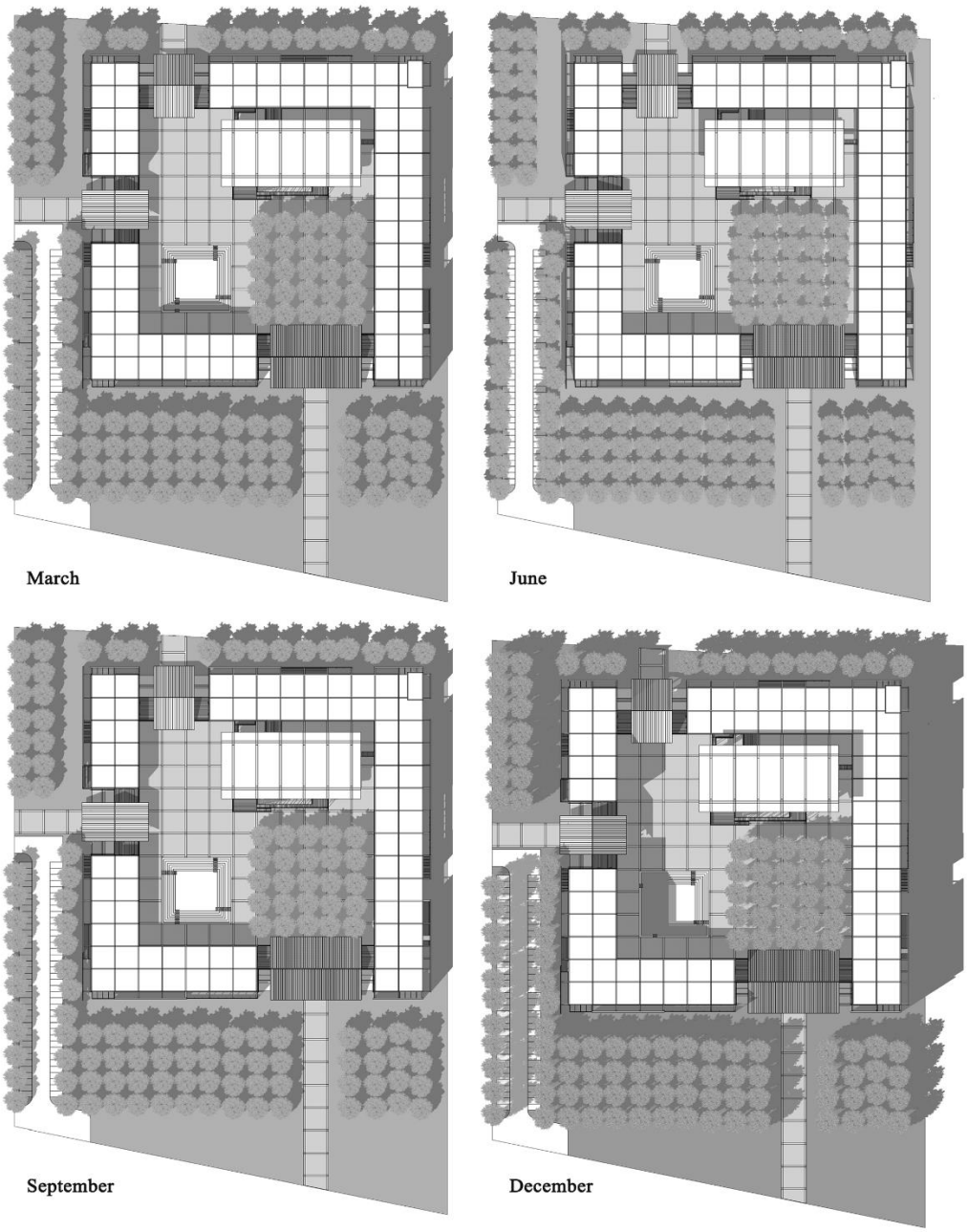


Figure 80: Seasonal shade and shadow study(10am)

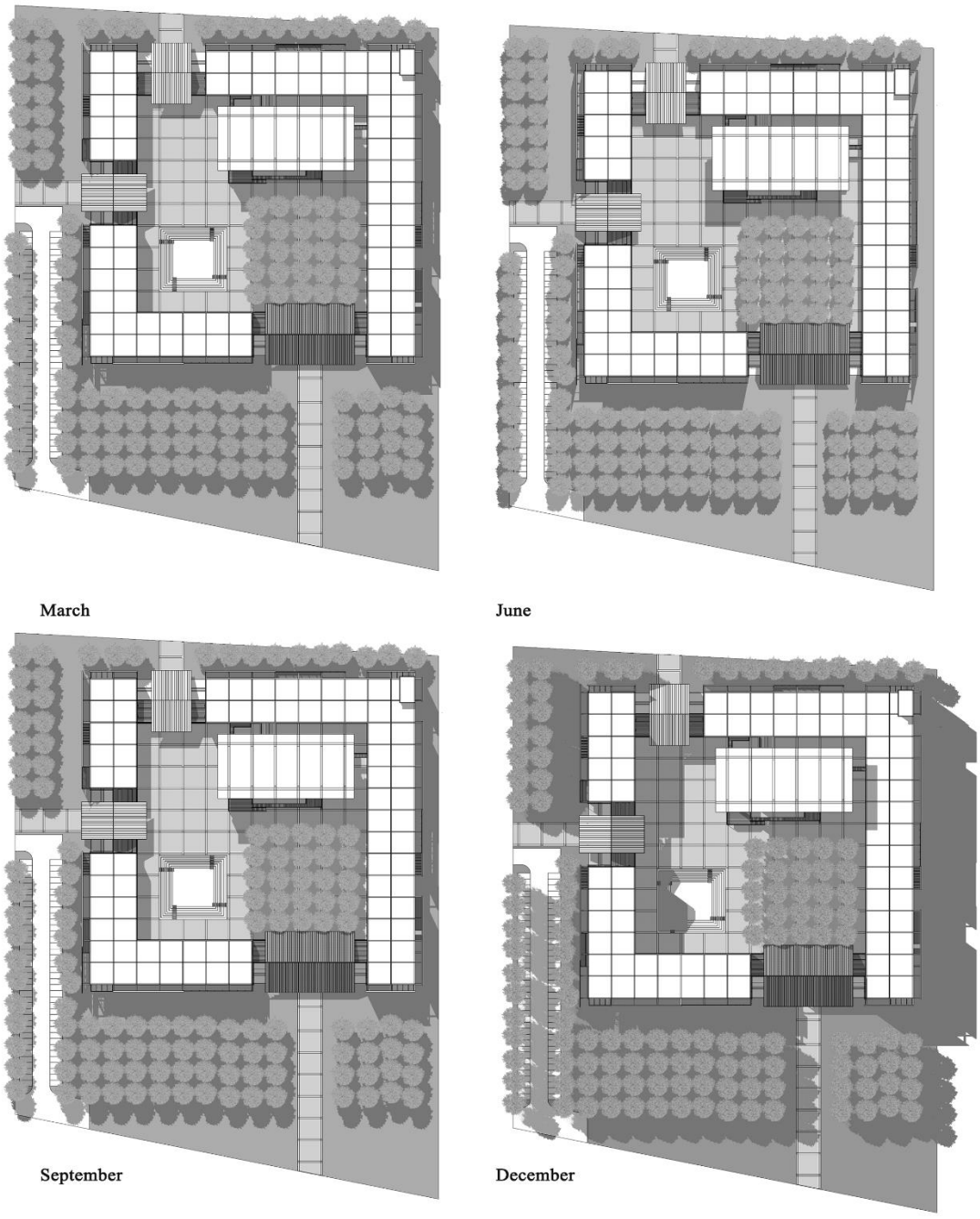


Figure 81: Seasonal shade and shadow study(3pm)

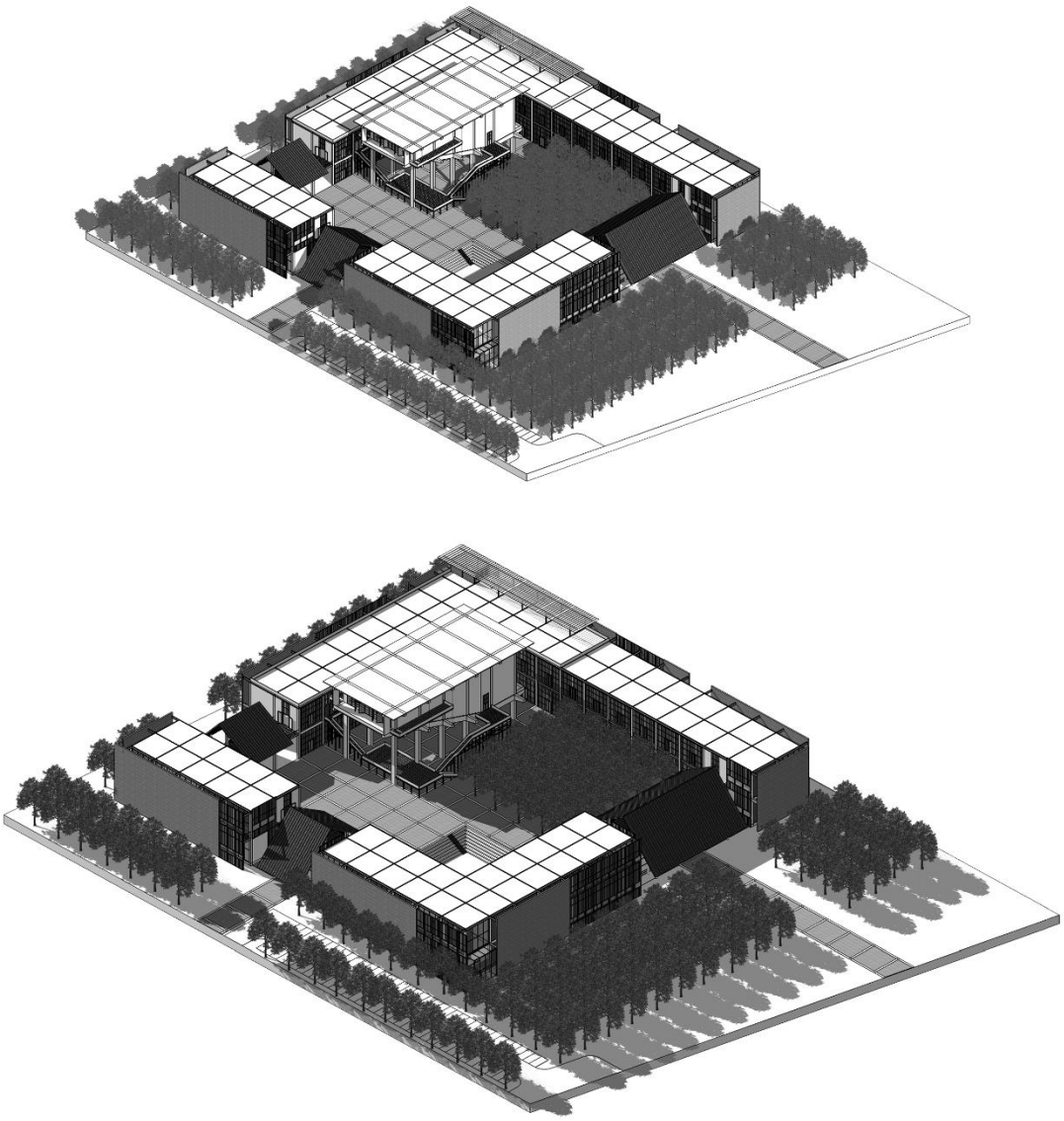


Figure 82: Seasonal shade and shadow study in isometric (9am and 3pm in March)

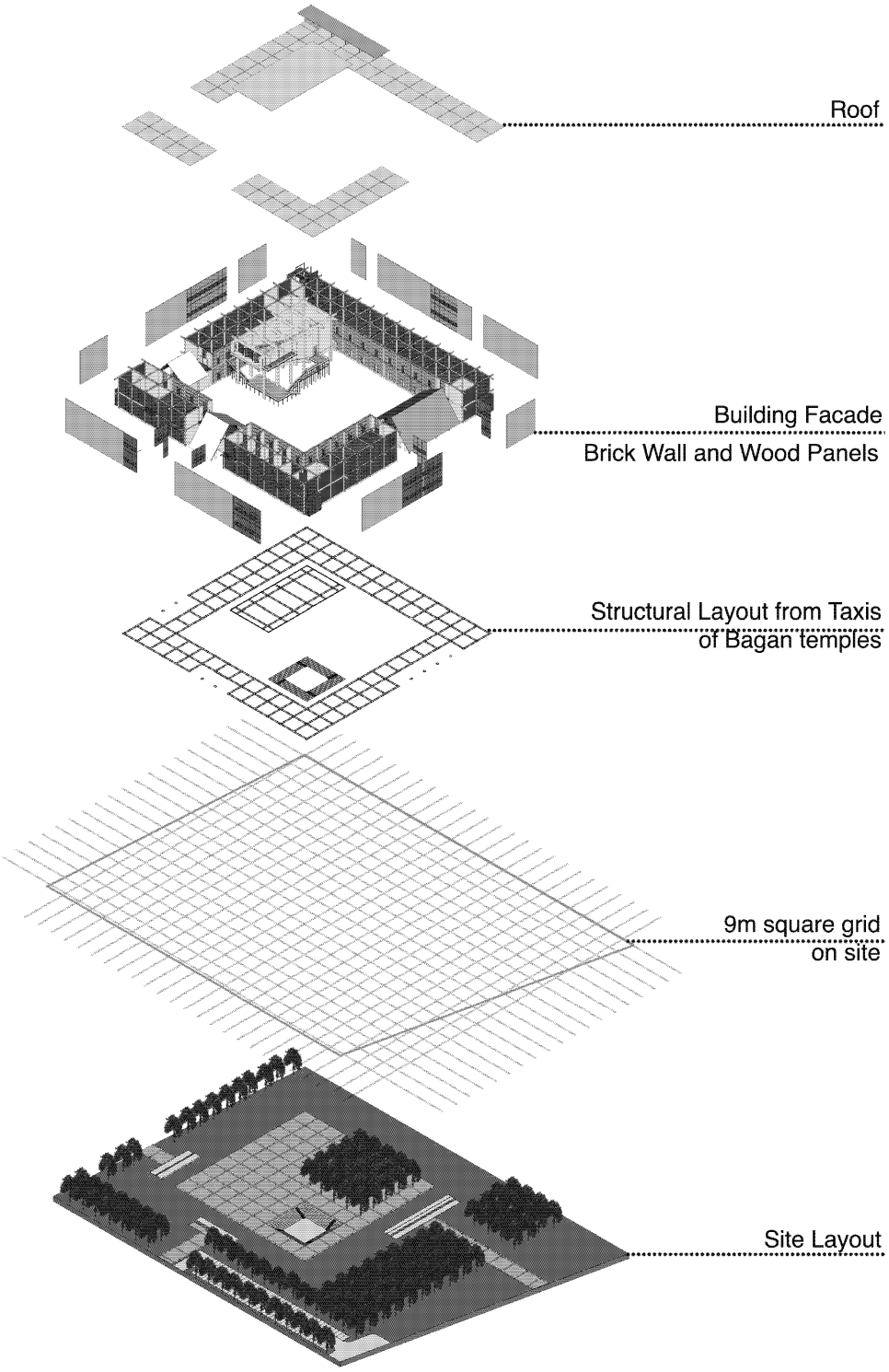


Figure 83: Exploded isometric diagrams.

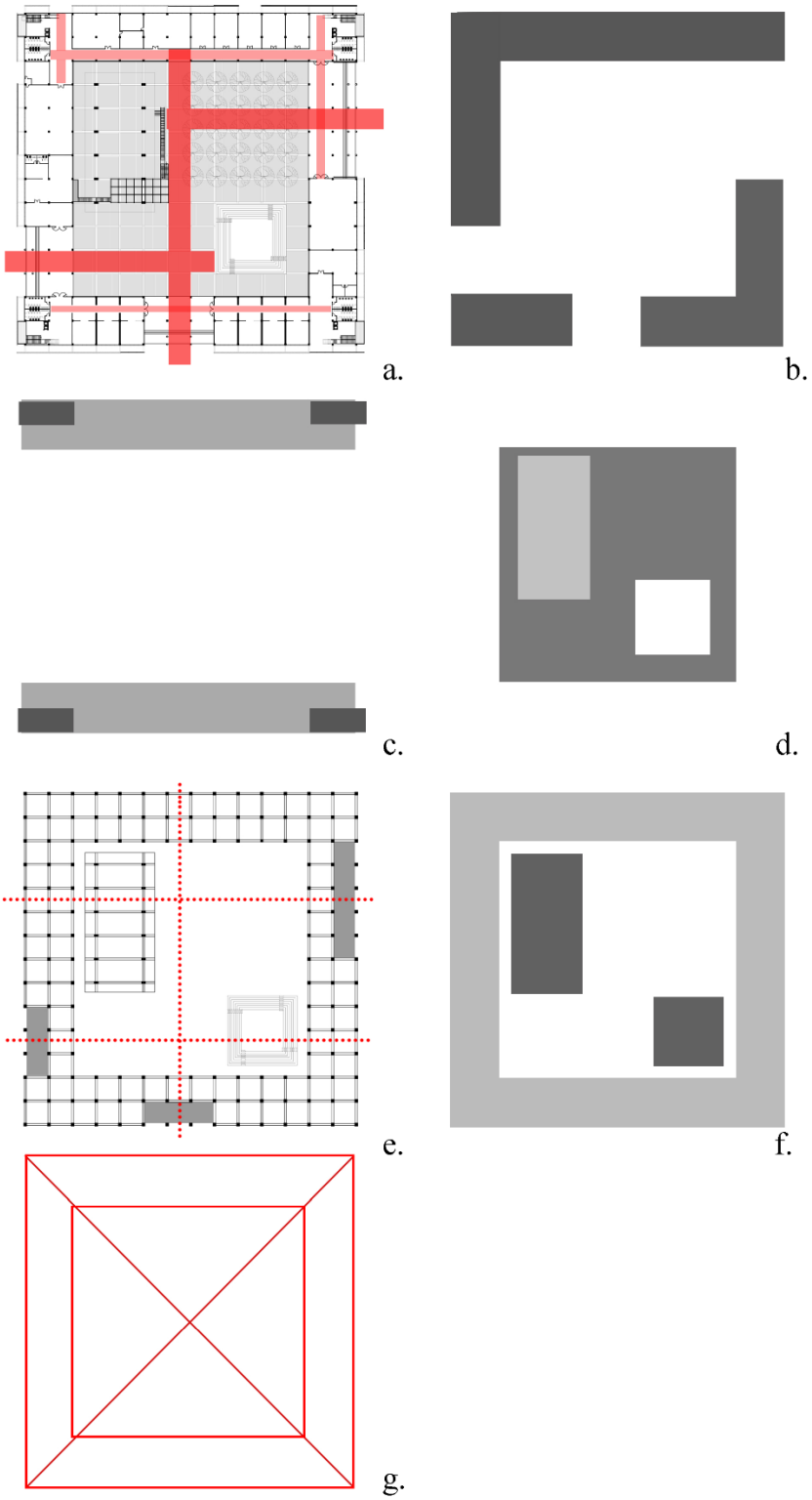


Figure 84: Analysis diagrams.

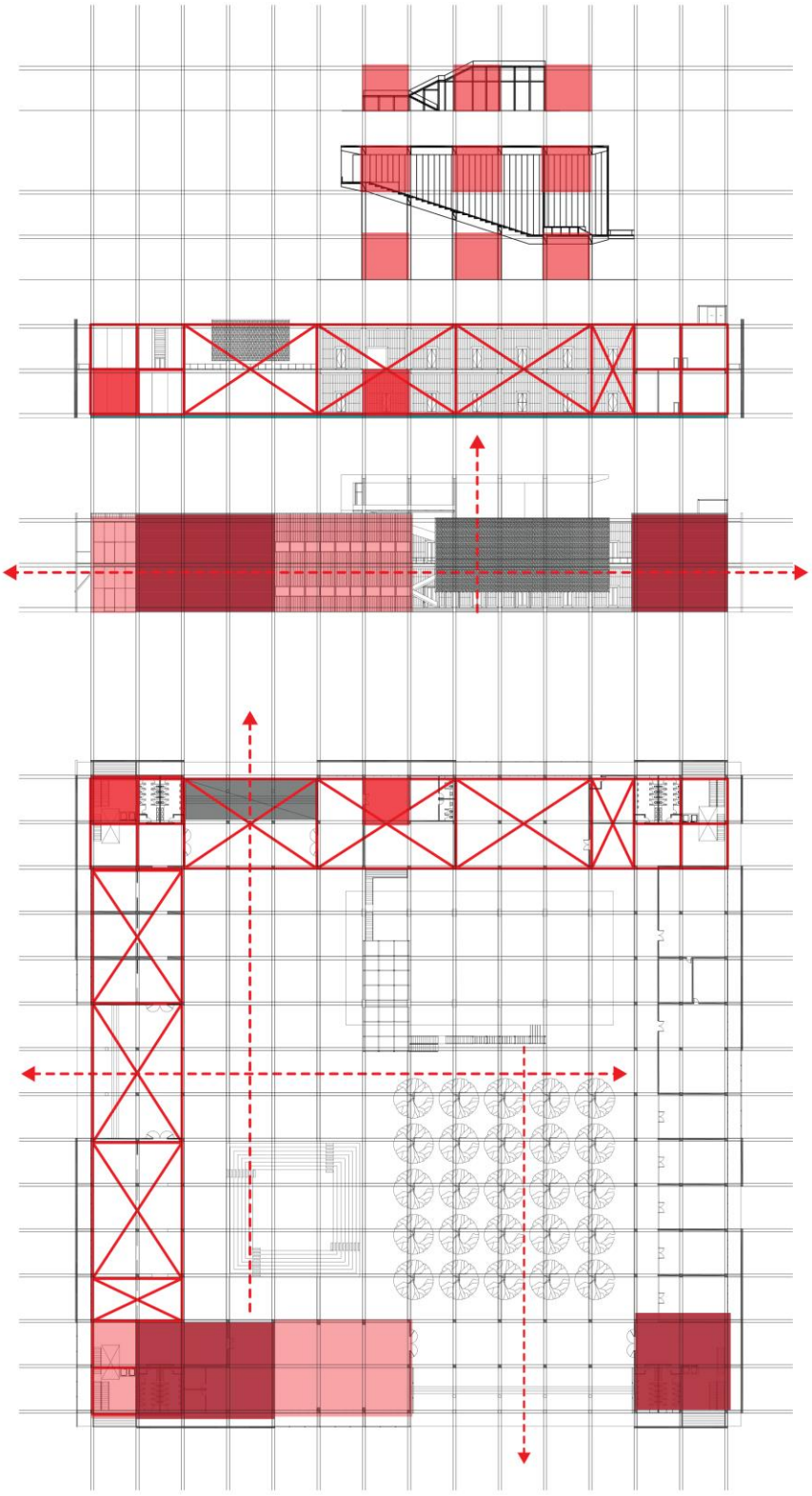


Figure 85: Plan to section and elevation relation analysis diagrams.

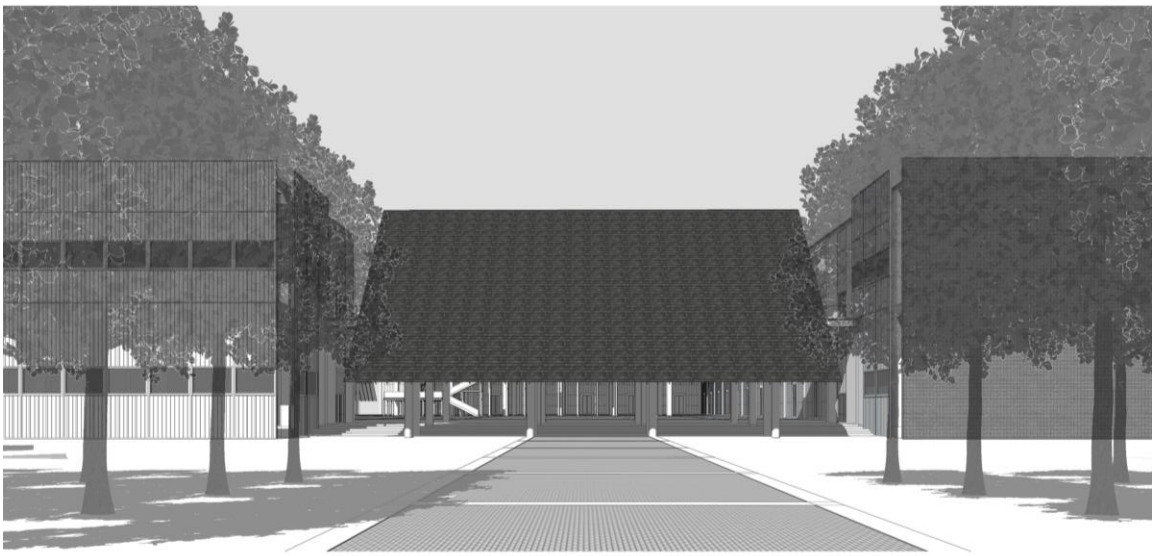


Figure 86: Perspective view

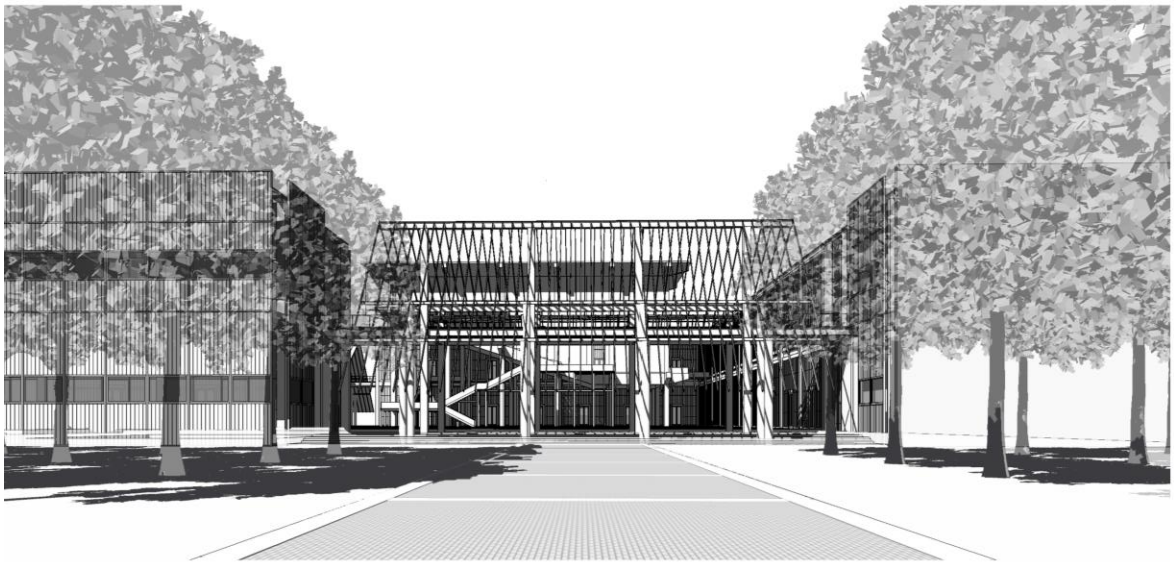


Figure 87: Perspective view

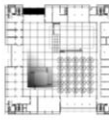


Figure 88: Perspective view

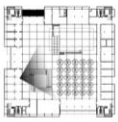


Figure 89: Perspective view

Figure 90: Perspective view

Figure 91: Perspective view

Figure 92: Perspective view

Figure 93: Sectional perspective.

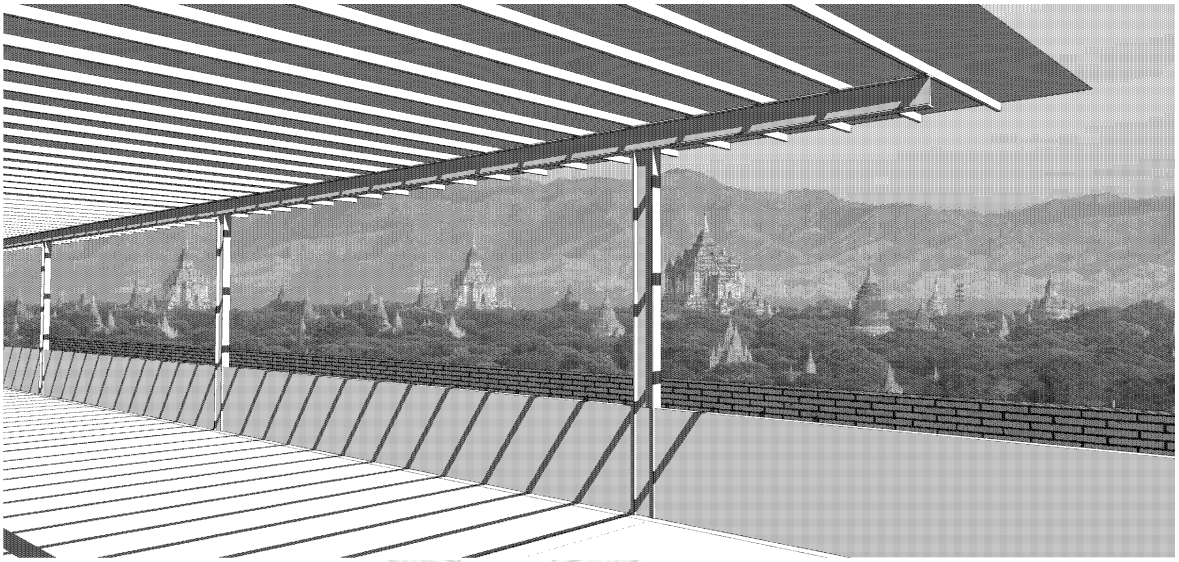


Figure 94: Roof top viewing decking

Figure 95: Perspective

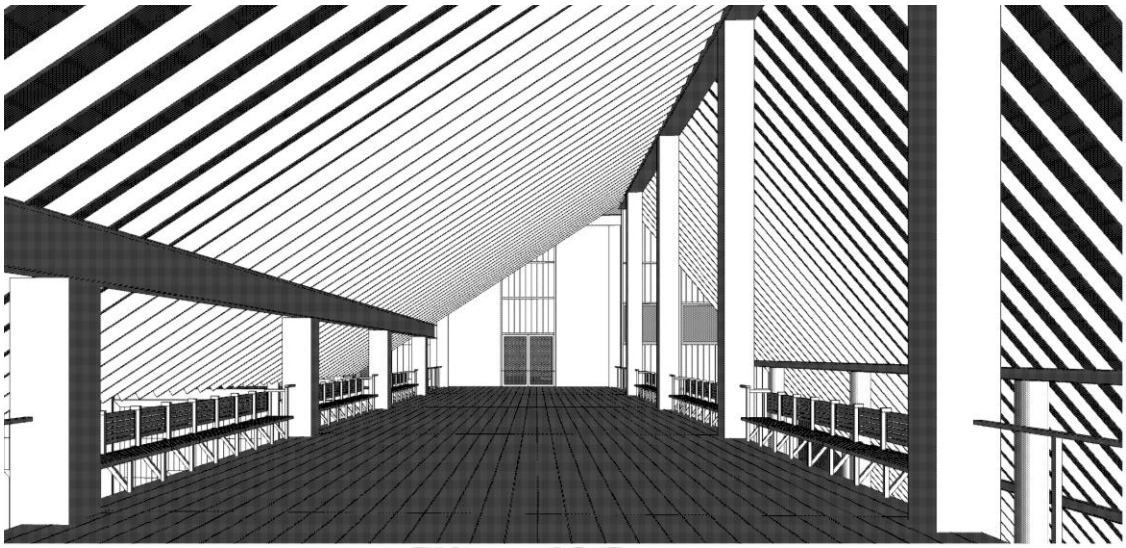


Figure 96: Atmosphere of interior space (Old within New)

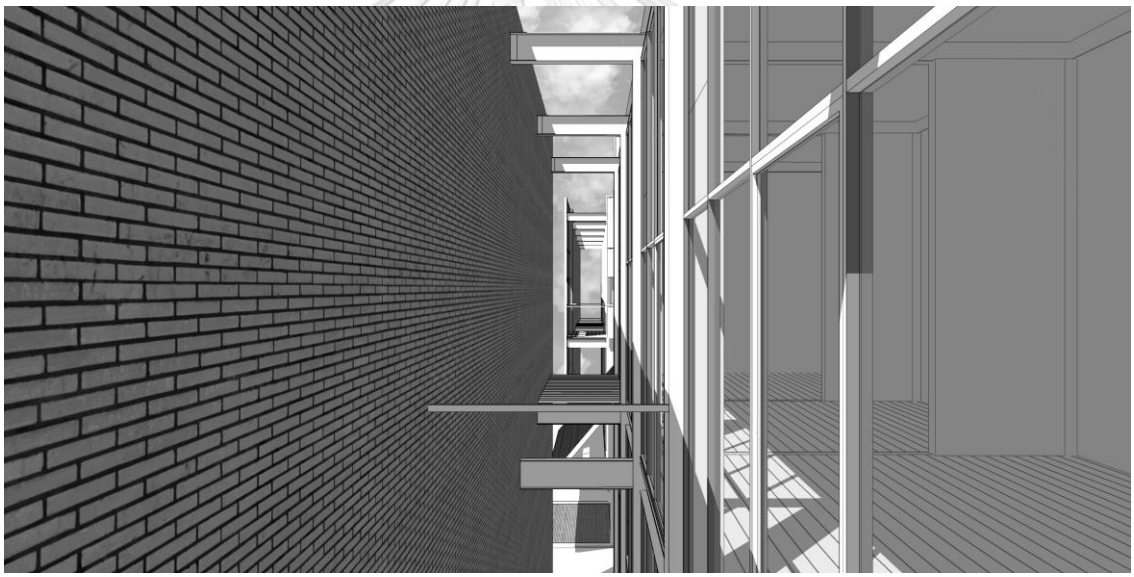


Figure 97: Atmosphere of interior space (Brick, light, and darkness)

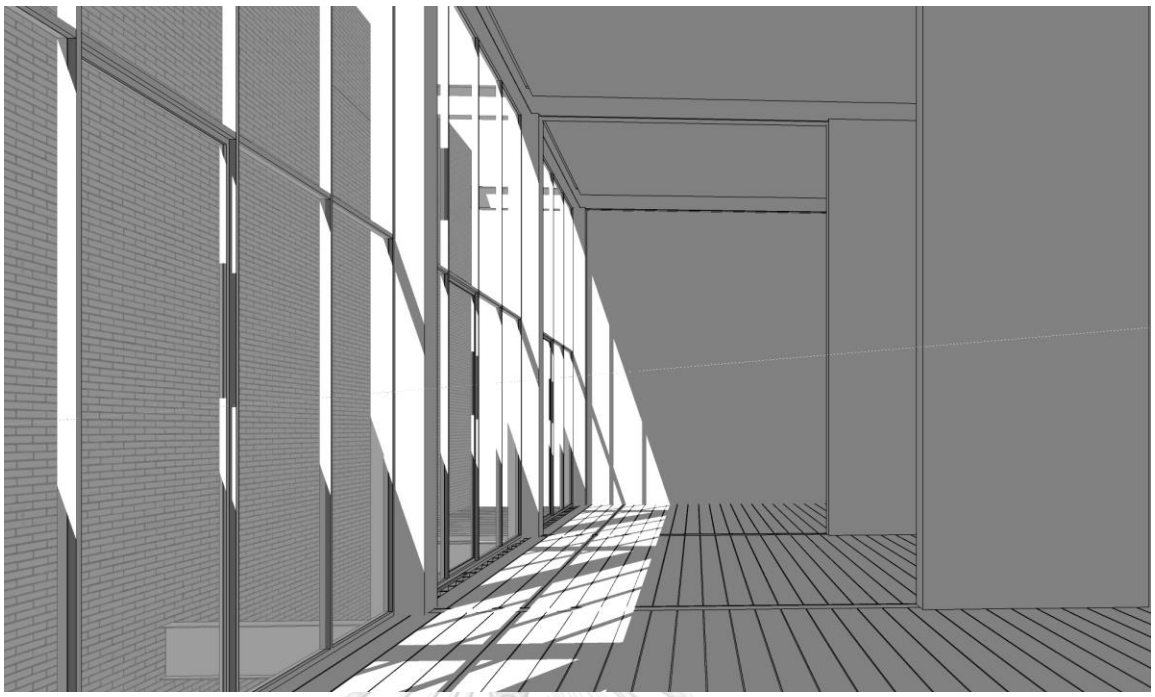


Figure 98: Atmosphere of interior space (brick, light, and darkness)

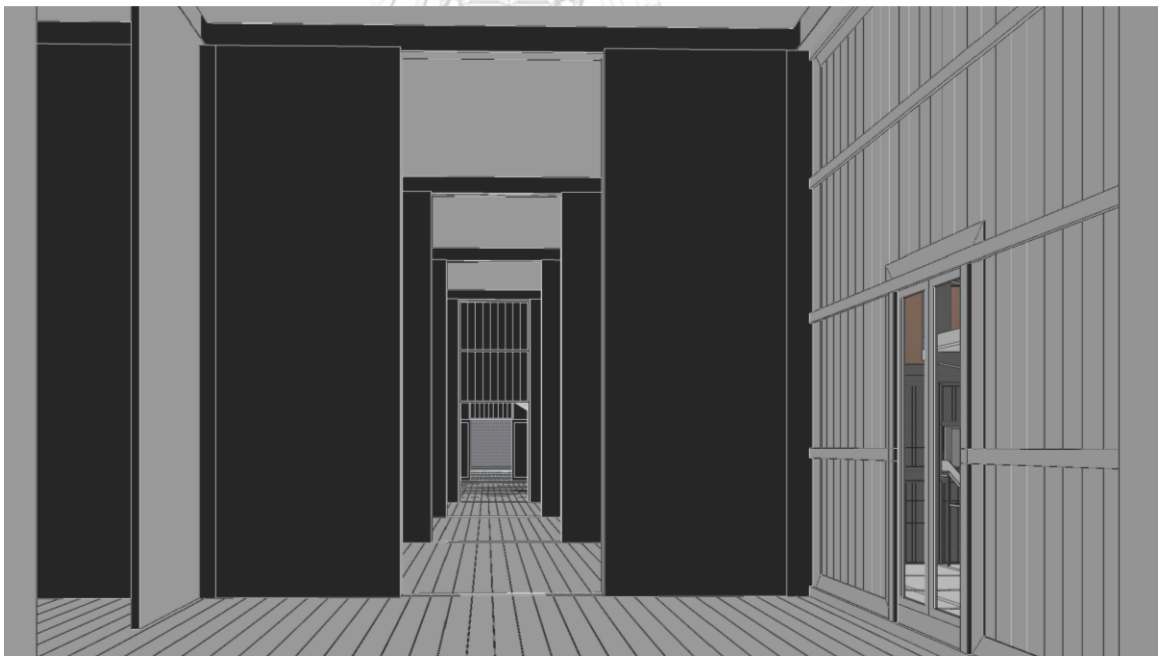


Figure 99: Atmosphere of interior space (Sequence of interior space)

Chapter-6

Epilogue

Human society has experienced so many paradigm shifts. At every paradigm, socio-cultural evolution has occurred and leading the creation of tangible and intangible culture and traditions attaching to the mental and physical sensation of Homo Sapiens, human. From those evolution, architecture has also got no exemption. Architecture responds to the socio-cultural evolution regarding the demands of living environment for human to evoke the well-being of human experience from the sense of space. Rituals and religions have impact on the socio-cultural evolution of human society. The Buddhism has brought the cultural revolution to Myanmar and erected many monuments around the Bagan area promoting the human experience with scale, massiveness, light, and darkness. Traditional house described the socio-cultural status of a family with workmanship and materials of construction.

Study on the formal system, material, and analysis of this research show that geometrical taxis and system played the important role in the creation of temples and traditional house in the past. The sensuality enhancing factors of Bagan temples, quality of space, scale and proportion, light, and darkness, are unique way of timelessness in architecture. Human experience in architecture is the universal truth for architecture. Formal system has directly attached to the human experience.

Tradition in architecture of formal system based on simple taxis and axis of symmetry has not been terminated at the past. It can be rejuvenated into the contemporary socio-cultural demands as a design tool with contemporary construction materials and methods to stimulate the human experience. From the case studies on the contemporary Asian architects shows that the tradition is never outdated in contemporary architecture. Tradition can be reinterpreted into contemporary architecture based on the human experience, memories, and place. Scale and volume

are important architectural factors effecting how we respond to the experience of a space. The taxis system or compositional rule of the classical architecture from the Western world can be found in the temples and house of Eastern world to understand the formal system.

The pattern of events has the relation with geometric layout system, taxis, and axis. The study on the formal system of Ananda temple and Thatbyinyu temple have shown that simple geometrical taxis and axis can create endless possibilities of space for pattern of events for human experience. To pay attention to the Buddha way of teaching, the spatial composition system of temples has the same focal point on Buddha images by axis of symmetry. The hierarchy of family private space is the main formal factor in traditional house. All those are the pattern of formal language or system in architecture. By reutilizing and reinterpreting in contemporary cultural center in Bagan, has shown that traditional design language based on human experience has never outdated. Tradition in architecture has the nature of evolution by means of reinterpretation along with the time and human experience.

It has been shown in design chapter with the testing ground of cultural center in Bagan. Human experience on architecture has been discussed with the theory of phenomenologist architect like Juhani Pallasma in literature study. The systematic compositional rule or taxis from the past has been reinterpreted. The reinterpretation process in contemporary architecture design is applicable in any other building type more than the cultural center, by means of human centered experience and socio-cultural factors. Our mind and body are the universal truth in the making of architecture.

REFERENCES

Adler, D. (2007). **Metric handbook**: Routledge.

Alexander, C. (1979). **The timeless way of building** (Vol. 1): New York: Oxford University Press.

Arnold, D. (September 1996). **The Problem of Nature: Environment and Culture in Historical Perspective**: Wiley-Blackwell.

Associates, K. K. (Producer). arch2o. *www.arch2o.com*. Retrieved from https://www.arch2o.com/yuhara-kinbashi-museum-kengo-kuma-associates/

Bagan in our heart. (2018). *Facebook*. Retrieved from https://www.facebook.com/MyanmarHeritageBagan

Corbusier, L. (1985). **Toward An Architecture**. New York, United States: Dover Publications Inc.

Department of Higher Education, M. o. E. (1989). **Archtiectural Drawings of Temples in Bagan**. Yangon: Yangon Technological University.

Department of Higher Education, M. o. E., Rangoon. (1989). **Architectural Drawings of Temples in Bagan**: Ministry of Education

Eisenman, P. (1963). **The formal basis of modern architecture**.

Foundation, O. (Producer). OMM. *Odunpazari Modern Museum*. Retrieved from https://www.omm.art/en/details/the-building

Harrouk, C. (Producer). (2019). archdaily. *www.archdaily.com*. Retrieved from https://www.archdaily.com/924568/new-iconic-museum-for-turkey-by-kengo-kuma-and-associates

Lall, V. (2014). **The Golden Lands:Myanmar, Indonesia, Laos, Cambodia, Thailand & Vietnam**. New York: JF Publishing.

Lat, K. (2010a). **Art and Architecture of Bagan and Historical Background**. Yangonn: မဒုံစာပေ.

Lat, K. (2010b). **Art and Architecture of Bagan and Historical Background with data of Important Monuments**. Yangon: Mudon Sarpay.

Lefaivre, A. T. a. L. (1986). **Classical Architecture: The Poetics of Order**. London: MIT press.

McGrath, K. (Producer). (2019, May 7). architecturaldigest. *www.architecturaldigest.com*. Retrieved from https://www.architecturaldigest.com/story/kengo-kuma-odunpazari-modern-museum-turkey

Morris, W. **Influential factors in the design of religious monuments in ancient Bagan**.

Myo Swe Than. *Facebook personal account*. Retrieved from https://www.facebook.com/DESIGN.MST

Ouyang, F. (2016). *Discussion on Fusion Method of Tradition and Modernity in Architecture Design.* Paper presented at the 2016 5th International Conference on Civil, Architectural and Hydraulic Engineering (ICCAHE 2016).

Pallasmaa, J. (1996). **The Eyes of the Skin**: Wiley.

Pallasmaa, J. (2012). **The Eyes of the Skin: Architecture and the Senses**: John Wiley & Sons.

Peter, E., & Matt, R. (2015). **Palladio Virtuel**. In: New Haven: Yale University Press.

Pilesasmile (Producer). gettyimages. *Bagan old city temple entrance, Mandalay region, Myanmar. Bagan, - stock photo*. Retrieved from https://www.gettyimages.com/detail/photo/bagan-old-city-temple-entrance-mandalay-region-royalty-free-image/1194505212

Pusca, A. M. (2010). **Walter Benjamin and the aesthetics of change**: Springer.

Rapoport, A. (1969). **House Forms and Architecture**. Englewood Cliffs, N.J.: Prentice Hall.

Rellensmann, C., Römer, A., Brandenburgische Technische Universität Cottbus-Senftenberg, L. D., Architects, A. o. M., Archaeology, D. o., & Myanmar, N. M. (2018). *Studio Bagan - Building in Heritage Context*: BTU Cottbus - Senftenberg.

Romer, C. R. a. A. (2018). **Studio Bagan: Building in Heritage Context**. Brandenburg, Germany: University of Technology Cottbus-Senftenberg.

Saetre, T. (Producer). (2013, December 23). That Byin Nyu temple. *WIKIMEDIA COMMONS*. Retrieved from https://commons.wikimedia.org/wiki/File:That_Byin_Nyu_temple_(115212).jpg

Shu, W. (Producer). (2007). wikiarquitectura. *wikiarquitectura*. Retrieved from https://en.wikiarquitectura.com/building/ningbo-historic-museum/

Students, C. B. W. P. a. (2016). *Wapan Technique used in Ningbo Historic Museum to Revive Traditional Chinese Construction Techniques*. Retrieved from Subang Jaya, Selangor, Malaysia:

Team, U. M. M. S. a. (1970). **Ancient Myanmar Houses** ရှေးမြန်မာအိမ်များ. Yangon: Rangoon Technological University.

Than Tun, M. A., B.L, Ph.D, D.Lit(London). (2005,December). **Myanma Design**. Yangon: Plastica Rainbow Book Publication.

Thaw, T. A. (2012). **Aspekte zur Tempelarchitektur in Myanmar**: eine Beurteilung des räumlichen Aufbaus.

Thein, O. (Producer). (2017). Okkar Thein. *Facebook*. Retrieved from https://www.facebook.com/oakkar.thein

Tzonis, A., & Lefaivre, L. (1986). **Classical Architecture: The Poetics of Order**: Mit Press.

Ulusoy, M., & Kuyrukcu, E. Y. (2012). The meaning and importance of the traditional architecture in architecture education; Gönen Winter school model. *Procedia-Social and Behavioral Sciences, 47*, 2120-2126.

UNESCO. *UNESCO*. Retrieved from https://whc.unesco.org/en/list/1588

UNESCO. Retrieved from https://whc.unesco.org/en/tentativelists/5733/

UNESCO. (1982). *World Conference on Cultural Policies, Mexico City, 26 July-6 August 1982*: UNESCO.

Vidler, A. (2012). Palladio Reassessed by Eisenman. *Architectural Review, 232*(1389), 88-93.

WÖhler, T. (Producer). (2010, March). architectural-review. *www.architectural-review.com*. Retrieved from https://www.architectural-review.com/buildings/ningbo-museum-by-pritzker-prize-winner-wang-shu/5218020.article

World conference of Culture Policies. (1982).

Zumthor, P. (1998). **Thinking Architecture**. Switzerland: Birkhauser Verlag AG.

Zumthor, P., & Lending, M. (2018). **A Feeling of History**: Scheidegger & Spiess.

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