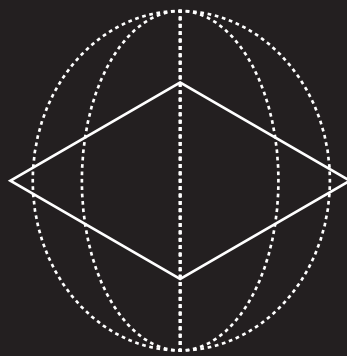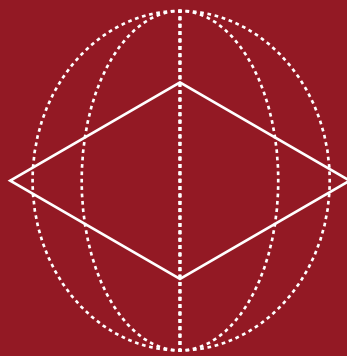# SISYPHUS and *ENTROPY*

Arnaud Leurquin

2017

SISYPHUS and *ENTROPY*

Adaptive Architecture in Flood Prone Nanjing

SISYPHUS and *ENTROPY*

Adaptive Architecture in Flood Prone Nanjing

By Arnaud Leurquin

A 120 point thesis submitted to the School of Architecture and Design, Victoria University of Wellington, in partial fulfilment of requirements for the degree of Masters of Architecture (Prof.)

Victoria University of Wellington

February 2017

Fig 1.01.   Baixia District - Nanjing; Flooded (June 2016) - Author's Photograph

Fig 1.02. Qinhuai River; Flooded (June 2016) - Author's Photograph

时

shí

tempus

N
time| condition| right time; season| occasion; necessity

temporarius

ADJ
suited to/built for the occasion; temporary| transitory; w/time limit (leg.)

temporary

/ˈtɛmp(ə)rəri/

adjective

1. lasting for only a limited period of time; not permanent.
   "a temporary job"
   synonyms: non-permanent, short-term, interim;

   1540s, from Latin temporarius "of seasonal character, lasting a short time," from tempus (genitive temporis) "time, season" (see temporal, late 14c., which was the earlier word for "lasting but for a time").

temporal ¹

/ˈtɛmp(ə)r(ə)l/

adjective

2. relating to time.
   "the spatial and temporal dimensions of human interference in complex ecosystems"
   synonyms: of time, time-related
   "spatial and temporal boundaries"

   from Old French temporal "earthly," and directly from Latin temporalis "of time, denoting time; but for a time, temporary," from tempus (genitive temporis) "time, season, moment, proper time or season," from Proto-Italic *tempos- "stretch, measure," which according to de Vaan is from PIE *temp-os "stretched," from root *ten- "to stretch" (see tenet), the notion being "stretch of time."
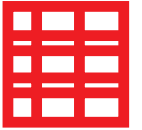
MICRO DESIGN
and activated edge

UNIT
nits in use

"There is somthing contradictory about building structures with the knowledge they will be '*raised*' (razed) a short time afterward. At least this is true when the structures are of pronounced architectural character. For architecture by definition is meant to be permanent, to serve a practical and also aesthetic purpose over an indefinite time."

- Barbara Chabrowe

Abstract

This thesis attempts to rationalize two diverging practices in Architectural discourse, that of Western pedagogy and that of the 'Other'. A disparity in approach to understanding architecture as a permanent object, can be noted in the dialogue between resilient architecture and temporary structure, this manifests itself in transient spaces and adaptive urban fabrics.

The increased danger of flooding within China; with a particular emphasis on river infrastructure, posits an interesting position for new urban typologies and innovative floating solutions. Positioned on the expansive Yangtze River Delta, Nanjing encompasses a complex narrative of historical reverence and progressive tendencies, which encourage experimental approaches. The process and methodology within, seeks to provide an adaptable and affordable response to the recurring floodings, through in depth concise historical, cultural and philosophical analysis of the social, spiritual and architectural landscape within China as a whole as well as in specificity.

These insights, juxtaposed with traditional western technique intend to produce an intricate and considered response to flood situations, with a particular focus on community generation and maintenance.

Although Nanjing remains the central focus of the research, the concepts and practical results are intended to be abstracted and drawn into all cultures within Asia, primarily those with Buddhist and Taoist social structures. The proliferation of Feng Shui and the Metaphysical throughout the region provide a framework from which to expand. This network of social and cultural similarity allows for cross disciplinary and pan Asian approaches, noting the Japanese Metabolist Movement as a practical indication of socio-cultural influence on architectural theory.

Acknowledgments

I want to acknowledge the gracious support of my Supervisor; Shenuka de Sylva, for her continued help throughout my extensive research and her encouragement.

My thanks go also to Dr Robin Skinner, whose courses and mentorship have been an inspiration

Table of Contents

CHAPTER ONE
Introduction

1937 年

0 年

7000 BCE Beiyinyang Neolithic
472 BCE Castle Built
229 CE Capital of Wu Kingdom
258 CE Imperial University Founded
313 CE Renamed "Jiankang"
317 CE Capital Relocated
420 CE Capital of Liu Song Dynasty
479 CE Capital of Southern Qi Dynasty
502 CE Capital of NannLiang Dynasty
557 CE Capital of Chen Dynasty
937 CE Nan Tang in Power
1168 CE Jiangnan Examination Hall Built
1367 CE Ming Palace Construction
1368 CE Capital of Ming Dynasty
1373 CE Hongwu Emperor Expands Ming Palace
1381 CE Imperial University Relocated
1382 CE Drum Tower Built
1386 CE City Wall Built
1408 CE Yongle Encyclopedia Written
1421 CE Ming Capital Moved to Beijing
1430 CE Porcelain Tower Built
1441 CE Yangtze River Flood
1657 CE City Beseiged by Koxinga
1723 CE Viceroy of Liangjiang Relocated
1842 CE Treaty of Nanking
1853 CE Battle of Nanking
1856 CE Battle of Nanking
1858 CE Treaty Port
1864 CE Battle of Nanking
1870 CE Presidential Palace Built
1890 CE Naval College Opens
1899 CE Foreign Trade Begins
1902 CE Nanjing University Founded
1907 CE Jiangnan Library Opened
1909 CE Nanjing - Shanghai Railroad
1910 CE Nanyang Exposition
1911 CE City Beseiged by Manchu
1921 CE Population Jumps
1927 CE Nanking Incident
1928 CE Liu Chi-Wen Becomes Mayor
1929 CE Sun Yat-Sen Mausoleum Built
1930 CE Wei Tao-Ming Becomes Mayor
1931 CE Capital of Republic of China
1936 CE Jiangsu Art Gallery
DECEMBER 13
1940 CE Capital
1941 CE Zhou Xuechang
1949 CE City Beseiged
1952 CE Aviation College
1953 CE Science University
1958 CE History Museum
1968 CE Yangtze Bridge
1988 CE Industrial Zone
1994 CE Football Club

1870 年
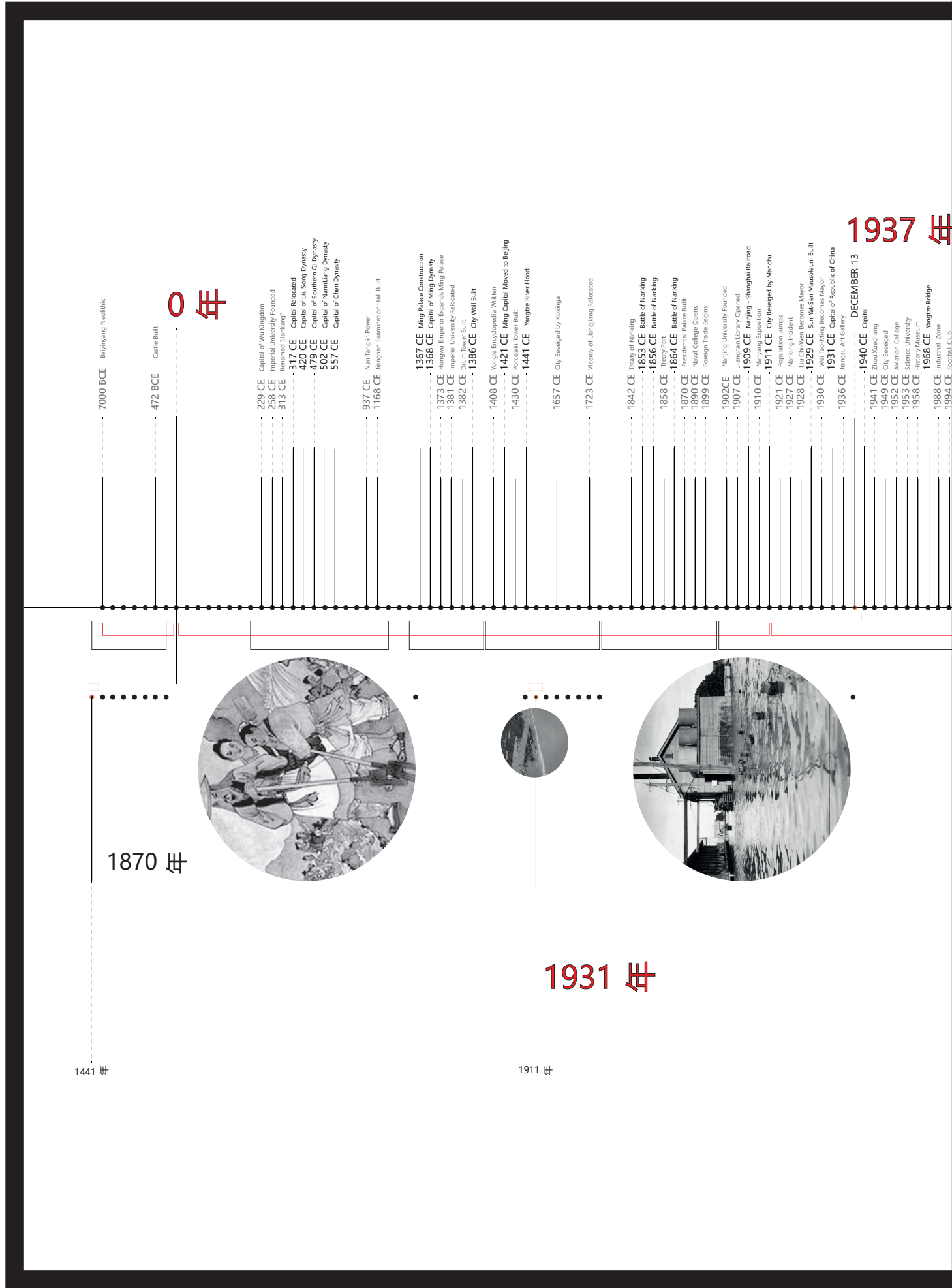
1931 年

1441 年

1911 年

Fig 1.00.   Nanjing City Binary Timeline: General City History (Top), Flood History (Bottom)

1995 CE Administration
1996 CE Basketball Team
1997 CE Lukou Airport Opened
2000 CE Jiangning District
2001 CE Yangtze River Bridge
2002 CE Yangtze River Bridge
2004 CE Port Opens
2005 CE Yangtze River Bridge
2008 CE Railway Opens
2009 CE Zifeng Tower Built
2010 CE Yangtze River Bridge

2016 年

1954 年

1998 年

2010 年

1935 年

1.0 □ Introduction
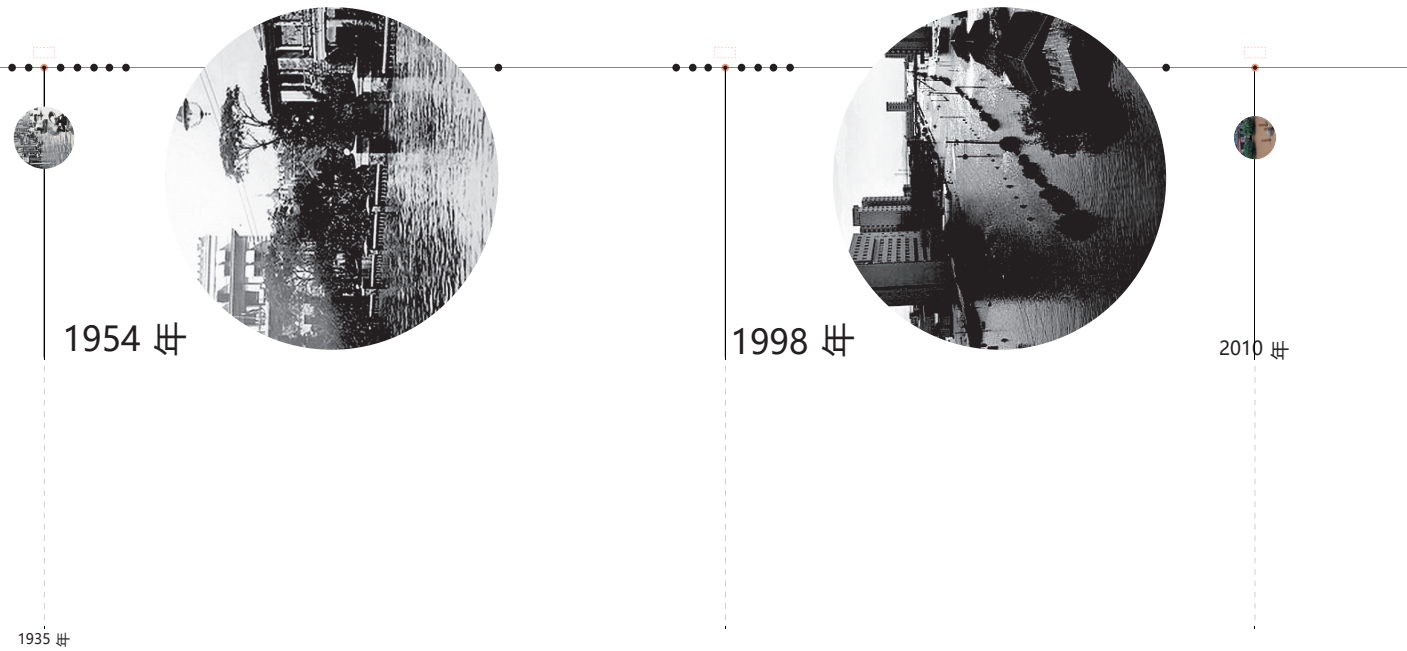
Nanjing (China) proposes a complex and strongly forward thinking notion of development, while maintaining a significant hold on the past. To simply 'Google' Nanjing would overwhelm the screen with images, stories and dialogues on a single, horrific moment in the millennium long history. The city is held within the grasp of the 1937 Nanjing Massacre; and yet, tragedies and triumphs have occurred there for millennia[1].

The notion of resilient and metamorphic[2] design within a city context has been widely researched and therefore in order to propound this body of work, it was paramount to identify a particular problem and city that could accommodate such research. Nanjing holds a historical past that it has difficulty forgetting, a geopolitical tension that permeates to the country itself[3], and a significance to culture, economy and progress within the ever expanding power of China as a Modern Empire.

Sitting on the Yangtze River Delta (a river historically dangerous when flooded), Nanjing allows an in depth look at the impact the ever increasing threat of floods has on the region and country as a whole. The historical flooding of Nanjing in 1931, proposes an interesting opportunity for flood design as it identifies a series of issues directly linked to the water level rise that are at times more dangerous than the water itself. Cannibalism, Infanticide and Disease all contributed to the death of up to 1,000,000 people within the city and are systemic to the issue; self-contained connection.

Positioning

Barbara Chabrowe's text "On the Significance of Temporary Architecture" seeks to suggest a unified polemic of Architectural Rhetoric. It defines; if subtly, Architecture as a practice undertaken by the 'initiated', as a cultivated and civilised tradition. The isolation of the term Architecture is immediately alluded to; within the introduction, and systematically and perhaps haphazardly propounds the notion that 'Architecture' is not practiced by the cultures that fall outside the purview of western tradition:

> There is something contradictory about building structures with the knowledge they will be raised a short time afterwards…For Architecture by definition is meant to be permanent (Chabrowe 385).

The delineation of Architecture as a solely permanent construct (through the term "by definition") separates; if not intentionally, all construction and structural oeuvres by cultures excluded form the authors perspective.

These texts adhere to the glorified notion of architectural nomenclature; with special reference to the term 'Architecture' itself, as a "Western Economy", defined by Judeo - Christian ideals and identity.
This tendency toward marginalisation of exterior philosophy and generalised 'disciplinarity' is exemplified within the nomination of "Case Studies" all residing within the scope of Contemporary Civilisation. Nowhere is found the 'Barbaric' constructions of Pacific Nations, nor the temporal permanence of Japanese Temple preservation.
Both Chabrowe and Greene convey the awareness of a historic tradition in "Temporary Architecture", singling out the Antiquity (Hellenic Period) as the inception of the practice, suggesting a lineage that dates back to the beginning of the 'Western Condition'.
However, Chabrowe proceeds to "describe" the history of temporality:

> The first visual records of temporary structures, mainly coins, date from the Hellenic times. But there are scarcely any records from then till the late Middle Ages, and a coherent history emerges only in the Early Renaissance. At that time such structures became a distinct genre, an art form to be cultivated; throughout Europe. This genre reached its perfection in the Baroque when political conditions were favourable. However, it subsequently declined to the point if dying out and in the mid-nineteenth century

gave way to an industrial equivalent (Chabrowe 386).

Despite the passage of time (31 years), the distinct lack of multicultural identity present in the diminutive 'history' is a stark cue to the individualistic notion of Architecture within Western pedagogy.

The text serves as an intent to understand the fundamental duality in Architecture; that of Firmitas (Durability) and temporality, but only suggests the breadth of a practice present universally in designed environments.

Steven D. Green compounds the breadth of permanence and temporality within a local context, asserting the necessity of temporal concepts within the contemporary discipline. However, much like Chabrowe, each study and analysis is fundamentally associated to western examples. The scope of the text encompasses a linguistic technique and seeks to 'deconstruct' the terms used to better understand the idea; however, each analysis is still rooted in a Western Doctrine.

In contrast to Chabrowe's text, Greene initiates a dialogue between physical and ephemeral notions of permanence, prescribing the definitions of both commonly accepted 'Permanence' and "Absolute Permanence". The disparity occurs when the concept of 'God' is utilised to differentiate between the two diverging concepts.

Greene posits that Permanence; like God, is a dynamic and transitional notion, redefined and manipulated through societal evolution; however, the connection between God and religion, and the concept of permanence is finite, as it extends only to the physical intervention:

The cathedral has a high degree of durability in terms of the built architecture. As will be explored below, considerable time, effort and money was expended ensuring that the cathedral can resist decay and wear for hundreds of years (Greene 46).

The idea of permanence, counter to the assertions of Greene, permeate the physical dimension, and reside more holistically within the fundamental conviction in many belief systems, of immortality. The persistence of the soul or spirit is intrinsically linked to the importance prescribed to a given structural object and through this, permanence becomes a driver for social stigma.

Once again, the text indicates an understanding of historical temporary practice, but refrains from incorporating "Oriental" or Pacific ideologies. These omissions can be attributed to the narrowing scope of the text (New Zealand), nonetheless mention of Maori principles in architectural dialogue is noticeably exempt.

Traditional Chinese Spatial Analysis
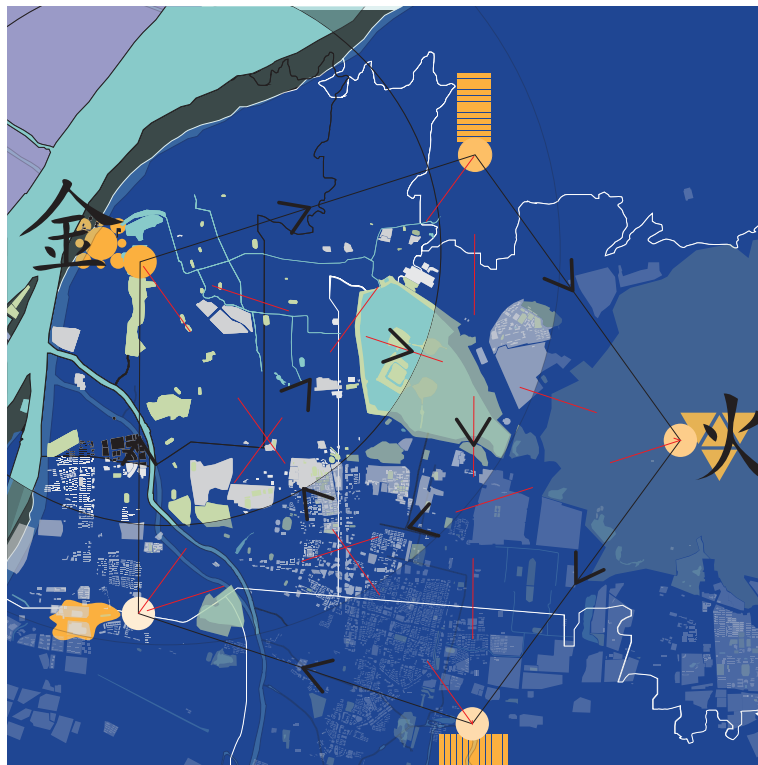
The **Wu-Chi** gives birth to the **T'ai-Chi**.
The **T'ai-Chi** moves and gives birth to **Yang**.
Rests, and gives birth to **Yin**.
Yang shift, **Yin** unites,
Then is born water, fire, wood, metal and earth.
The **Five Elements** make things flourish in their proper order;
The Four seasons progress according to them.

NANJING CITY
Feng Shui Site Context

1931 YANGTZE RIVER FLOOD
Flood Location Analysis
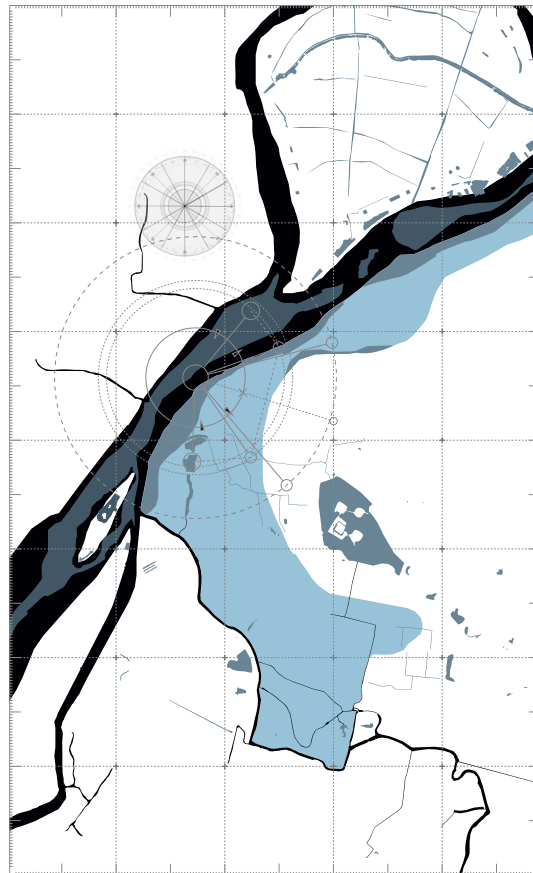
NANJING CITY
Qinhuai River Boundary

Fig 1.02.   Nanjing flood (1931) map outlining flood prone areas

1.3   ◻   **Methodology**

The inherent cultural divergence in approach to disaster mitigation design leads to a necessity to produce a binary research framework. Western pedagogy is predicated on the quantifiable and calculable, with a particular emphasis on the physical, while the 'Other' consists of explorations into the intangible and seeks to generate the physical causality from application.

These differing approaches in practice and theory are inextricably linked to the various aspects explored within this thesis, and are therefore necessary to a holistic understanding and rationalisation of the overarching situation within the site and the discipline itself. Understanding these complex systems and unifying their respective applications generates a cohesive exploration into the incorporation of culture and vernacular agency into 'resilient' and adaptive design.
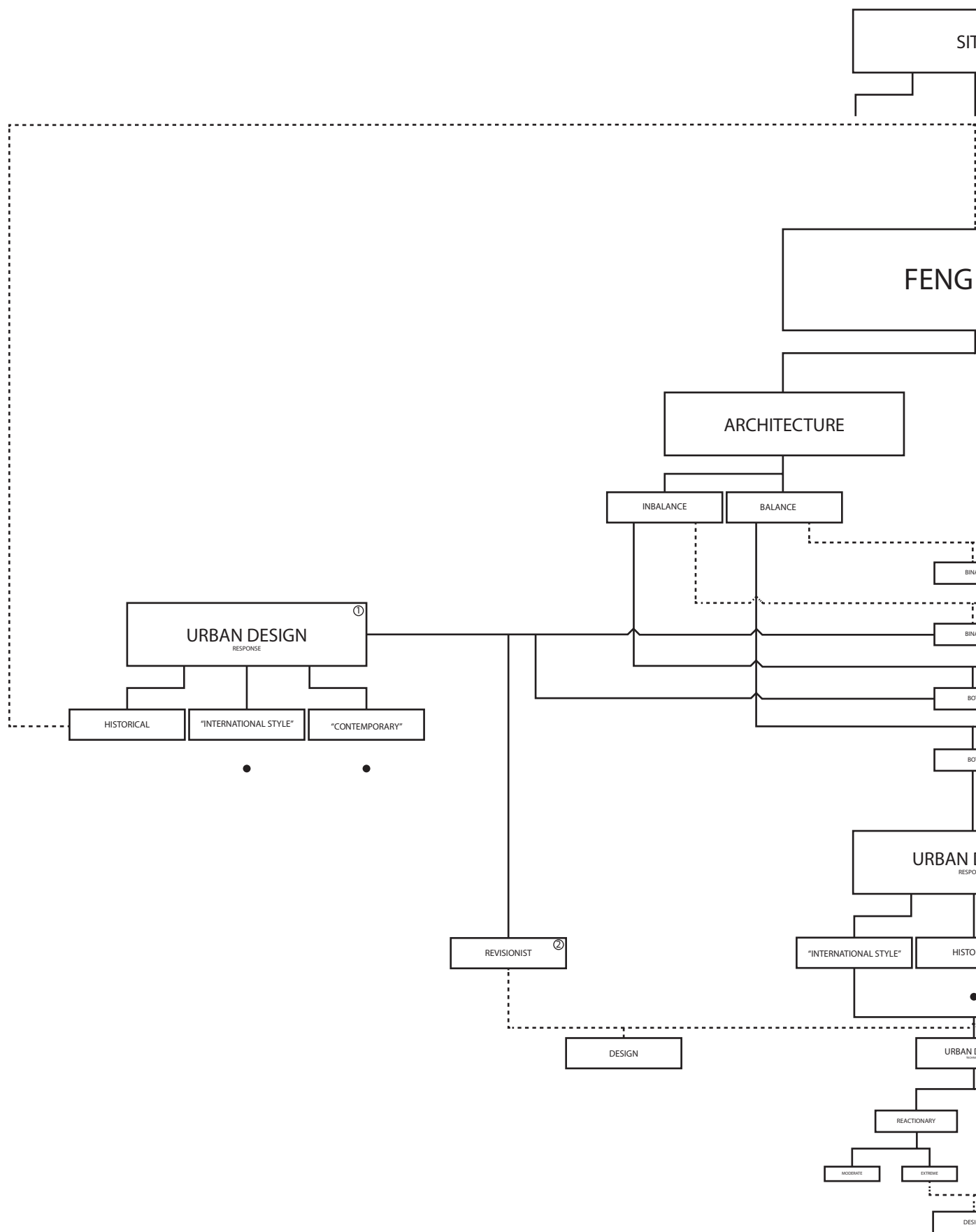
SIT

FENG

ARCHITECTURE

INBALANCE   BALANCE

BIN

BIN

BO

BO

① URBAN DESIGN
RESPONSE

HISTORICAL   "INTERNATIONAL STYLE"   "CONTEMPORARY"

URBAN
RESPO

"INTERNATIONAL STYLE"   HISTO

② REVISIONIST

URBAN
TECHN

DESIGN

REACTIONARY

MODERATE   EXTREME

DES

Fig 1.03.   Preliminary Project Methodology - Research Organisational Diagram

TE

SHUI

LANDSCAPE

INBALANCE BALANCE

ARY

ARY

TH

TH

URBAN DESIGN
RESPONSE ①

"INTERNATIONAL STYLE" "CONTEMPORARY" HISTORICAL

DESIGN
NSE

RICAL "CONTEMPORARY"

REVISIONIST ②

DESIGN

REVISIONIST

MODERATE HISTORICAL

GN

CHAPTER TWO
Literature Review and Case Studies

entropy
/ˈɛntrəpi/

noun

noun: **entropy**; plural noun: **entropies**; symbol: **S**

☐. lack of order or predictability ; gradual decline in disorder
"a marketplace where entropy reigns supreme"

☐rigin

☐nglish

en-
inside

Greek

tropē
transformation

entropy
☐☐☐☐☐☐☐☐☐☐☐*n*☐*u*☐☐
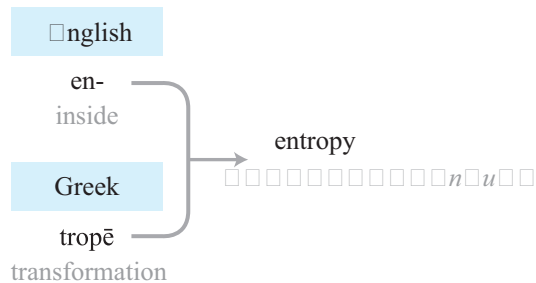
mid 19th century: from en-2 'inside' + Greek tropē 'transformation'.

sisyphean
/ˈɛntrəpi/

adjective

☐. denoting a task that can never be completed

Sisyphus

In Greek mythology Sisyphus (/ˈsɪsɪfəs/; Greek: Σίσυφος, Sísuphos) was the king of Ephyra (now known as Corinth). He was punished for his self-aggrandizing craftiness and deceitfulness by being forced to roll an immense boulder up a hill, only to watch it come back to hit him, repeating this action for eternity.

2.0 ▣ Introduction

In order to understand the complex perspective outlined within this research, fundamental historical events and the subsequent social impact demand a holistic view of the general context of the region. Certain specific circumstances have shaped the evolution of the socio-cultural landscape, with many originating during and from the subsequent unification and re-structure of the Chinese Geography

Literature Review

Contextual Literature

Unification and Control

The unification of China, by the sovereign of the Qin Kingdom; delineated by the founding of the first centralized empire in 221 B.C.E, introduced the widespread adoption of administration, under newly organised principles. Contrary to previous empiric rules, this paradigmatic shift extended to the limits of the Chinese state and is categorized as the emergence of the 'principle' of Universal Standardisation, within the now marked Chinese geography[1]. This regimented assimilation of varying cultures and ideologies worked to unify and dominate differing states, and sought to generate a cohesive, singular entity through which the doctrine of Chinese Song Rule could be administered[2]. This practice was characterized through the standardisation of communication and infrastructural systems, later to be adopted by each succeeding dynastic rule.

Unit measurements and dimensions; predominantly within infrastructure (such as roads and pathways) exemplified the doctrine of 'normalisation' within the newly organised state, with monetary systems and language following. Each regulation; manifesting a duality, allowed greater coherence within the empire, and applied strict control over the manifestation of identity.

Unification and control, with an emphasis on architectural rhetoric and the emergence of a physical cultural identity, was exacted; similarly, through the use of building manuals (now recognised as Codes). These 'codes' were compiled for the administration of civic culture and were enforced through the Yingshan Ling (Decree of Construction), or construction laws, introduced during the emergence of Tang Law (Tang Dynasty 618 – 907 CE). Each collated and edited by the now, centralized government, the 'treatise's' consisted of documents designating definitions and terminology; inclusive of furniture and buildings, and mark the first known appearances of Chinese Construction Law[3].

- □	Fashi and Zhidu (Song Dynasty: 960 – 1279 CE)
- □	Zhengshi (Ming Dynasty: 1368 – 1644 CE)
- □	Zuofa and Zeli (Qing Dynasty: 1644 – 1912 CE)

Throughout China, these building codes were implemented from a very early period, and exhibited the combined recollections of several generations of techniques and teachings, both from common people and state appointed architectural practitioners. However, over time these documents

The unified 12 Warring States was not 'christened' China (derivation of Qin [ch'in]; 221-206 BCE	**1**
960 - 1279 CE	**2**
Most significantly outlines wood types and properties (ie. building units; 1-9. Typology 6 = Residential)	**3**

have largely been lost and remain solely in citation and reference in constructions that utilised this system, and the few tenets that remain from a compilation documents, such as the Tang Lu (The Tang Code – 618 – 907 CE).

The oldest existing manual is the Yingzao Fashi, which deals with modular systems, architectural principles, and specified structural members along with construction methods and techniques to achieve a 'universally' aesthetic architectural form and dialogue[4].

Yingzao Fashi

The Yingzao Fashi ("Treatise on Architectural Methods or State Building Standards"), represents the earliest remaining insight into Chinese technical operations and architectural rhetoric, within building and timber craftsmanship. Compiled by Li Jie; a superintendent of State Buildings, in 1100 and published during the Song sovereign in 1103, the document consists of thirty-four (34) chapters, and maintains an in depth account of expectations and standards outlined by architectural practitioners and the State as a standardising body[5].

Although earlier manuals and documents on construction existed, the Yingzao Fashi is noted to have introduced the fundamental notion of the 'Modular Unit'. Li Shiqiao intimates that the central concept within the adapted system is the 'Timber Unit' (cai); outlined in chapters 4 and 5, which establishes a number of modular systems for each timber framing composition, inclusive of each component and their respective properties[6]. Li continues, suggesting an additional agency within the production of the document, and details its disparate nature from the "western" counterpart; Ten Books of Architecture (Marcus Vitruvius Pollio).

> "While Vitruvius set out to develop a view of architecture as a technical enterprise as well as a means to achieve beauty and intellectual enlightenment (for instance, the implications of venustas), Li wrote about imperial palaces where colors and forms were strictly codified in accordance with hierarchy and power" (Shiqiao 471).

This implied agency, reinforces the notion of control within the holistic entity of the Chinese State at this period and suggests a fundamental trait of code tradition. Furthermore, it suggests an overarching notion of empiric dominion which can be noted within the modern Code System (adopted in 1912)[7].

General Tenets of Document

Units of Measurement -
Design Standards -
Construction Principles -
Structural Patterns -
Building Elements -
Estimates for Labour Works -
Material Data -
Paint Recipes -

---

4 Also outlined typical workforce needed with payment and work expectations
5 State approved techniques and styles
6 Refers to timber types and uses
7 Prescriptive Code

Feng Shui

Within Chinese society, the establishment of building is not exclusively considered the physical implementation of technical process. Architecture is considered in a more holistic sense, directed and influenced by core ideational systems1. The complex philosophical exploration present in Chinese history compounded to produce a physiognomic system closely linked to Taoism, which draws from the binary nature of the physical realm. The format seeks to unify and apply structure to the divergent 'human' and 'natural' worlds. These metaphysical understandings gained importance within architectural practice through geometric significance and object / symbol based belief systems.

While intrinsically linked to the intangible, Feng Shui is often misunderstood to refer to the 'ineffable'; however, the art is firmly rooted in observation and natural phenomena. Much work has been recorded on the architectural implications of the form, with many reporting similar fundamental assertions to those widely accepted in modern pedagogy. The apparent binary condition of the tangible and intangible generates a common misconception and subsequent divergence in academic rhetoric and applied practice.

> *To the Chinese, the establishment of a building is not exclusively understood as a simple issue of technological implementation . Architecture was, in large part, directed by their ideational systems.... Gradually, the importance of ideational systems in architecture planning, including site selection and the orientation and internal organisation of buildings, developed into an independent art and science termed Feng Shui* (Lee Sang Hae in Lee Chin-Chong).

Binary Condition

A divergence in understanding of 'Feng Shui' is apparent in contemporary discourse. This is exemplified by the fundamental misunderstanding of the term itself. Although literal interpretations of the words refer to the elements of *wind* (feng) and *water* (shui), this but only reveals an explanation of the characters, rather than an understanding of the holistic notion[2].

The disparity between a superficial definition and a holistic understanding, generates a binary condition; which is notable in contemporary dialogue. This manifests itself as a "bastardized" and *westernized* concept that is widely

To form and idea; imagine or conceive   **1**
Simplified Chinese: 風水   **2**

disseminated through design based disciplines, in contradiction to the philosophical naturalism from which the art originates[3]. Core tenets of this 'modern' interpretation revolve around physical causalities and manifestations, with the most common example being the placement of mirrors within a space. Thematically, this refers to the reflection of energy; however, this object specific cause and effect negates a wider understanding of the ephemeral doctrine of Chi (Ch'i). While this is often transliterated to denote 'energy'; there is no 'western' equivalent. A more apt definition (though still limited in scope), is that of essence, which refers to all things.

Correlative Thinking

Analytical or Rational Thought is a practice grounded in dialectical and analogical technique, fixated with the interpretation and expression of physical causation and it's relative power (Xing Ruan 3). This methodology permeates contemporary 'Western' pedagogy, with a particular emphasis on the discussion of cities and planning. In contrast, Chinese techniques and approaches[4] rely fundamentally on a particular species of analogy, commonly referred to as 'Correlative Thinking'. This primarily revolves around the notion of image association in conjunction with intangible notions such as 'meaning' and 'sense' in lieu of physical manifestation or 'causation' (Xing Ruan 4).

This informal approach to rationalisation generates a holistic notion of culture and tradition, which becomes the intrinsic link between varying disciplines and people and develops as common views and 'assumptions' (Xing Ruan 3).

Within Chinese correlative thinking, *humanism*[5] dominates; with particular reference to Confucist[6] and Taoist[7] philosophy. This manifests itself as a binary economy, balanced by the tangible and the intangible, which can be interpreted at various scales (intangible realm and tangible realm / heaving and earth). This phenomenon is well documented in the architectural discipline, with the relationship between the 'house' and the 'garden', and is most commonly referred to as Yin and Yang[8].

Yin and Yang

The fundamental notion of Yin-Yang is rooted in natural phenomena, asserting that all things are a product of two opposing or binary elements. These principles are intrinsically linked and consequently interdependent. The differentiation and separation, theoretically; of each term, is finite and as a result,

---

3 All discussions (unless otherwise stated) refer to this definition
4 Refer to previous sections
5 Philosophical and ☐thical stance that emphasizes the value and agency of human beings.
6 ☐f or relating to Confucian Ideals
7 ☐f or relating to Taoist Ideals (Pronounced ☐ao)
8 Refer to previous sections

refers to a holistic entity; neither one excluding the other. Subsequently, all systems; natural and unnatural are subject to an overarching unity. This union in thought and approach is tantamount to understanding and can be found in all aspects of Chinese society

Furthermore, the recognised symbol reasserts this through the inverse colour spots within each component section. Each 'half' or section; referring to the aspects of a person or any entity, is made up of the opposing characteristics. All aspects of the world, within Chinese doctrine are built with the component pieces, thoughts, ideas and characteristics of the 'other'.

Essential to the thought system outlined above, is the notion of simplicity; demonstrated within the opposing forces. This simplicity manifests itself as complexity through regimented application (layering), and permeates the ideas and function of the Feng Shui art.
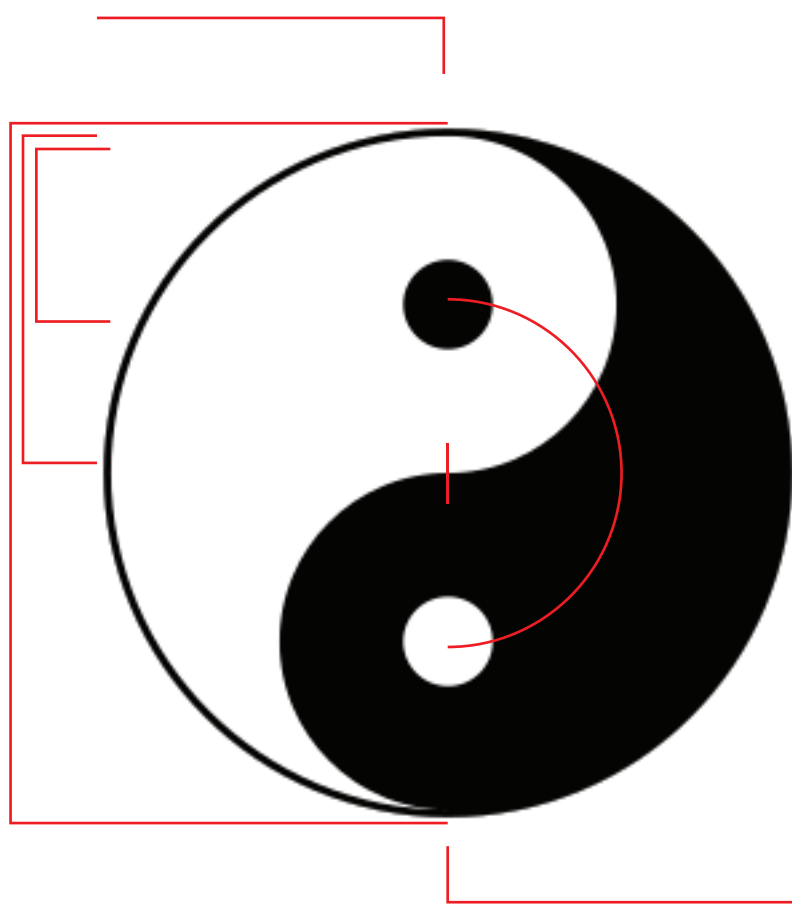
Yig Yang Symbol (Deconstruction)
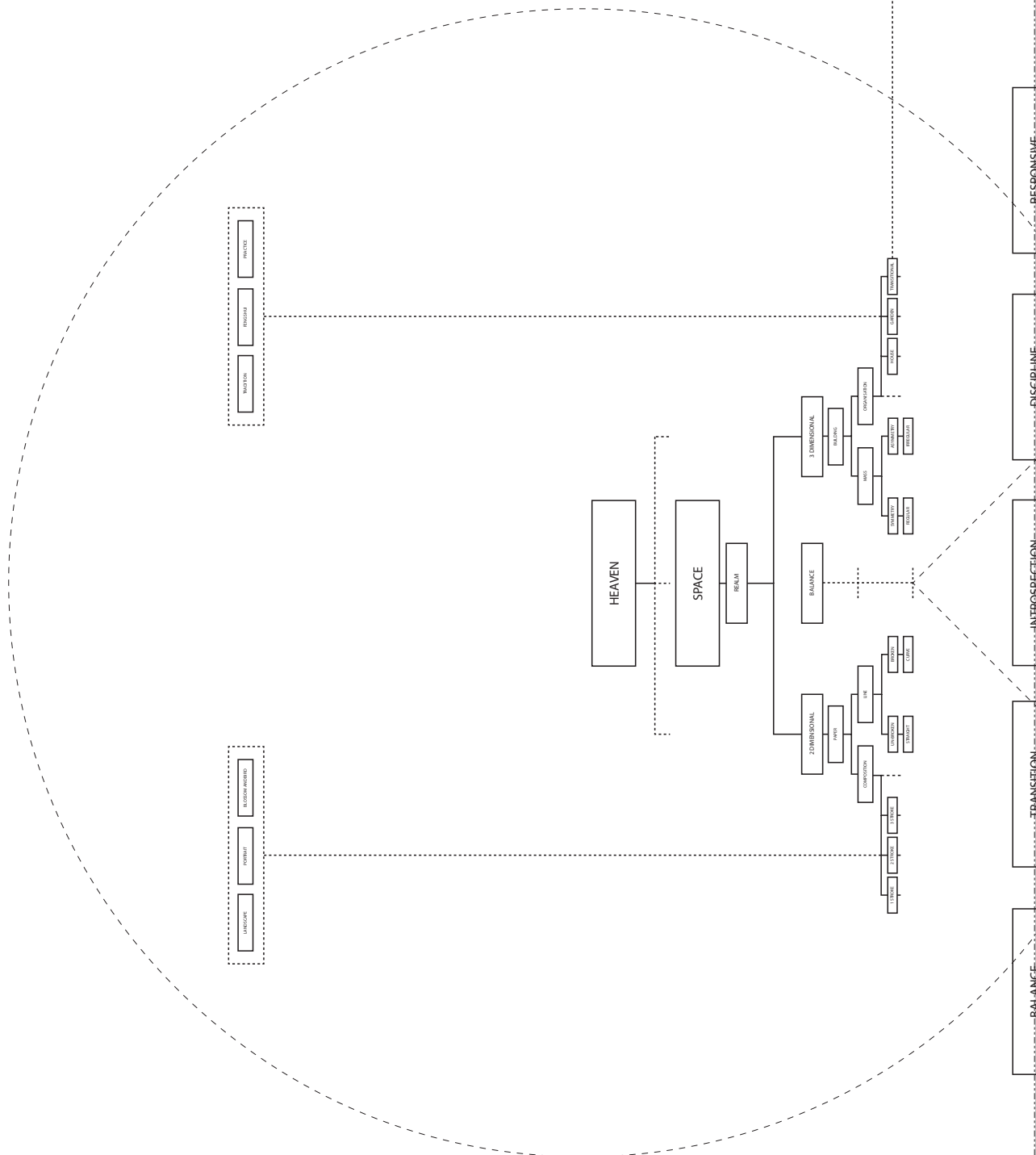
Fig 2.00.   Core Principles: Spiritual and Social Structure refined to fundamental concepts

RESPONSIVE
Context
Scale
History

DISCIPLINE
Order
Hierarchy
"Control"

INTROSPECTION
Community
Safety
"Self Sustainability"

TRANSITION
Temporal (Occupying both states)
"Permanent"
"Temporary"
Adaptable

BALANCE
Binary Opposition
Symmetry

EARTH

SPACE

REALM

BALANCE

2 DIMENSIONAL

3 DIMENSIONAL

PAPER

BUILDING

LINE

MASS

COMPOSITION

RELATIONSHIP

LANDSCAPE

PORTRAIT

RUSSIAN (MODERN)

NATURE

FINISHED

PRACTICE
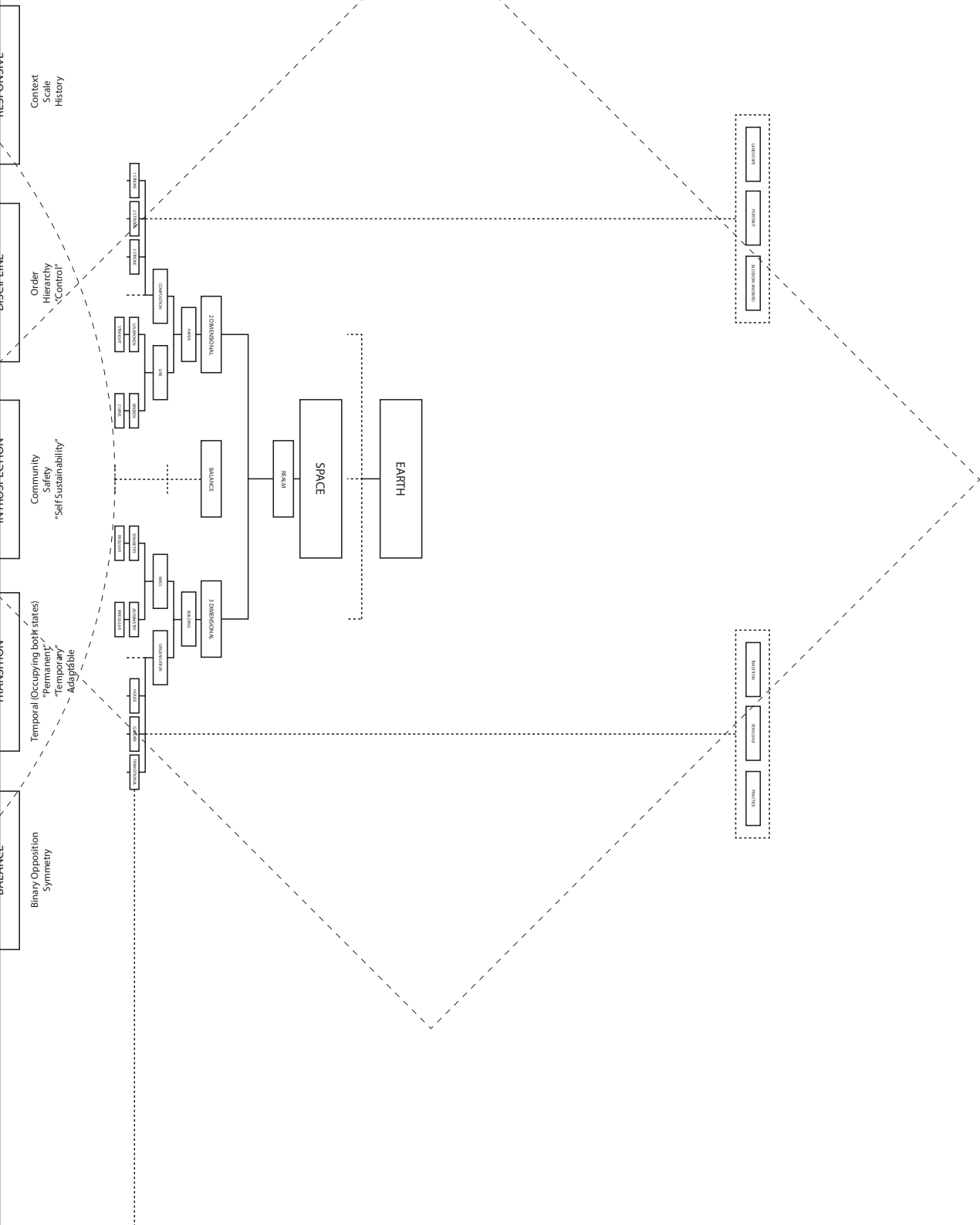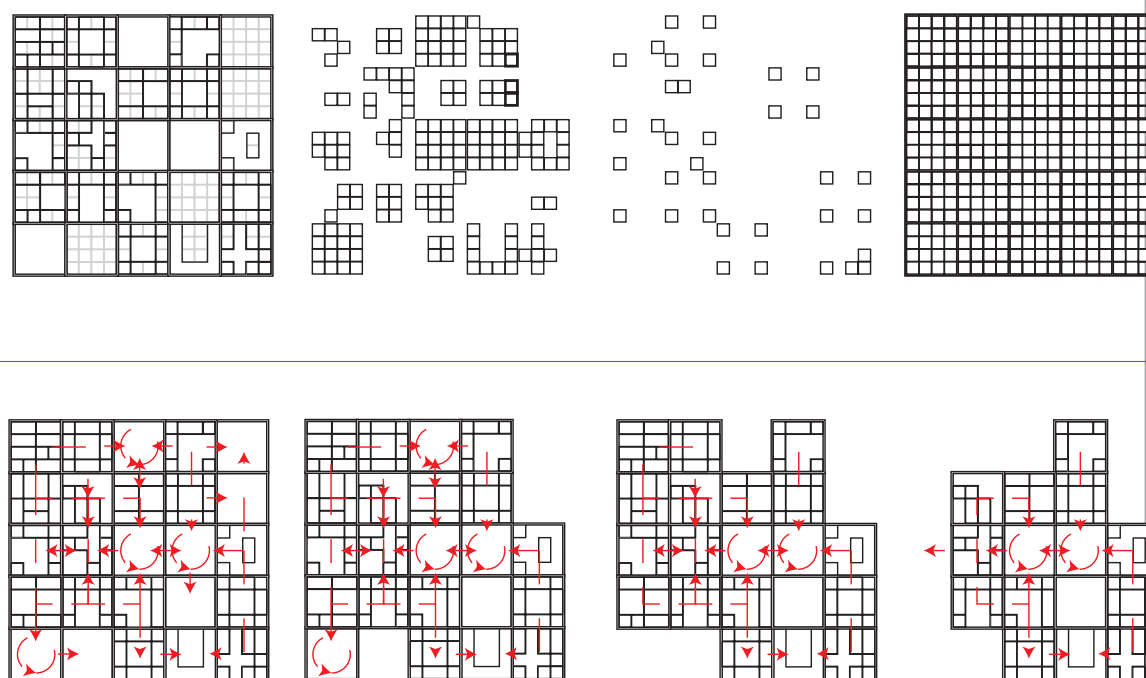
AGRICULT
Kisho Kuro

Fig 2.01.   Agricultural City (Kisho Kurokawa) Analysis and Diagramming - Component Pieces and Organisational Programming

Thematic (Intangible) Case Studies
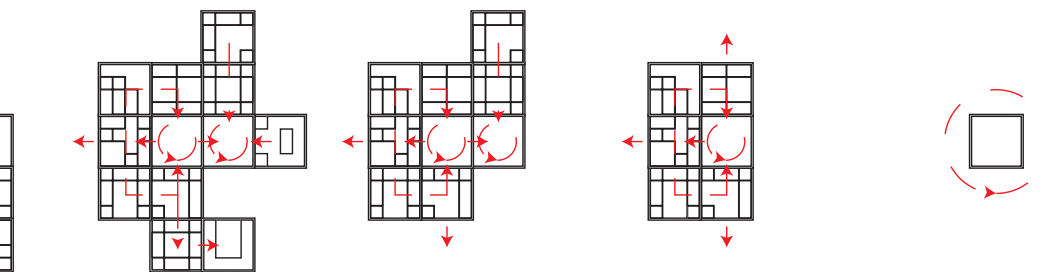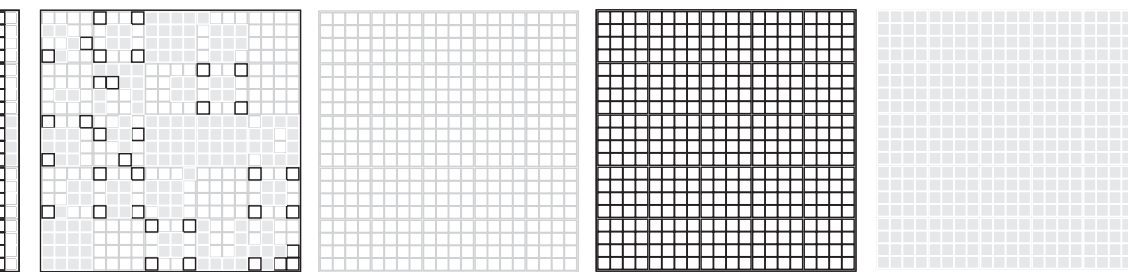
Metabolism

The Agricultural City

The Agricultural City, by Kurokawa represents the dogma of the Metabolist Movement[9], and seeks to open a dialogue about the utility of techology in conjunction with cultural identity, to produce an innovative solution to significant issues arising in Japanese society at the time. Kisho Kurokawa's Agricultural City exemplifies the culmination of the designer's work, both textual and physical, on the concept of the Japanese City, while also attempting to postulate on the processes of evolution and progression[10].

The fundamental themes of Metabolist work, as outlined, centre on the social, cultural and economic changes experienced and expected in post war Japan. Of these, and core to the project, is Land Shortage. With the rapidly increasing population and the growth of industrial processes, culture and technology became subsequent subjects of scrutiny. Kurokawa and the wider Metabolist Movement sought to integrate these aspects and produce an innovative and progressive framework for urban reform, of which, the Agricultural City is an apt example. Philosohically, the project encompasses the core convictions of the authors of the movement as well as the personal philosophy of the designer compounded over many years of research. Separated into significant aspects, the project exhibits explorations into Identity, Community and Progression; each represented by characteristics of the design.

Thematically, the design draws form the experiences Kurokawa had during the Ise Bay Typhoon in 1959, and seeks to approach the concept of responsive urban environments. This framework consists of a concrete grid structure supported 4m above agricultural soil, with the express attempt to 'synchronize' the divergent aspects of Living Areas and the Rural Landscape. This binary holism produces a form which seeks to prevent disconnection and distruction during flooding. The base grid hosts circulation of transport, and all utilities and services including programmes deemed paramount to Japanese society, such as Schools and Administration Facilities.

Housing units punctuate the design at various points througout the grid, rising from the ground in units between a single to three floors. These wood structures with aluminium caps appear as 'mushroom shapes' with a centralized lighting system (skylight) within[11]. Each gridded structure consists of a 500 x 500m space with twenty five (25) equally sized units (blocks) separated within. These are expected to hold 200 people, the

Commonly understood to be spanning 1959 - 1979   **9**
refer to Fumihiko Maki   **10**
Form and design intoduced by Kurokawa's House (by   **11**
Kenzo Tange) - SkyHouse

predetermined basic unit of an agricultural community. These in turn are periodically constructed and attached together to produce a modular city framework. Kurokawa explains:

Natural t█of p█tcv8wagricultural█ie□

sought to unify technology and architecture in order to generate an innovative urban environment.

This project and the Metabolist Movement itself is considered a failure due to it's lack of implementation; however, it is important to understand the process by which these ideas were formed. It can be surmised that the fundamental flaw within metabolist Group Form is a distinct disregard for human scale interaction (as well as the well documented cost and difficulty), with the human being incorporated within a holistic view of the city, rather than individualised.

Capsule Village

In response to the disconnection between 'part to whole' large scale urban form, the Capsule Village attempts to utilise the core tenet of Metabolism; technology, to generate a modular and more individualised personal design. Standardised units are prefabricated and applied together to produce a 'part to part' housing community, with minor modifications and personalisations possible. This approach to unitised urban development on a smaller scale indicates an attempt to incorporate the human scale; however, as a result, much of the environment is neglected; as these units are expected to be attached to a large rigging system and inserted throughout the Japanese country. Complementary to Nakagin Tower (Kisho Kurokawa), this capsule design interrogates 'living' within the Japanese context and suggests a more regimented and standardised system. Interaction between buildings and occupants is expected outside, in the megastructural circulation system, with no prescribed public arena. This tendency towars individuality in an urban context may be an attempt at a dialogue with the concept of suburban living (implementing the urban in the rural).

Capsule House

In continuation of the notion of human scale Metabolist work, the Capsule House seeks to examine the process by which people live. The tatami mat, in Japanese Culture, is viewed as a core example of transitional space being determined by standardised units, and the capsule house can be observed as a furthering of this discussion. Predicated on the idea that space needs to conserved, this project attempts to rationalise space as well as simplify the production of units for large scale implementation. While smaller in scale, the fundamental structural support is a space frame within which each unit is inserted, subsequently allowing for more intuative spatial and social planning. Once again, similar to the Capsule

Village outlined above, this proposal relinquishes the concept of public space and replaces it with high density housing possibilities, suggesting that all space, public and production would be housed beneath the sturcture (as explored in the Agrcultural City).

Group Form

Unifying many of these New Urban designs is the concept of Group Form. Originally concieved by Fumihiko Maki and Masato Otaka as Collective Form, this idea seeks to examine the process of city development, with a particular emphasis on identity. As stated earlier, there is a divergence in thinking between Metabolist Authors; between the concept of a "Part to Part Relationship" and a "Part to Whole Relationship", culminating in Maki generating a personal design philosophy on the idea of identity within a mass society and the search for ways in which the the city might accommodate "distinctive places". Maki furthers this discussion in his text Investigations in Collective Form (1964), by affirming that the urban society is a dynamic field of interrelated forces, and that these forces must be accomodated and interrogated for a successful outcome.

Group Form seeks to postulate on individuality and identity within a mass or megastructural system, and suggests that the inherent relationship between component parts of a city are connected by interaction and personality, rather than predetermined technology. It is important to understand that much study has been undertaken on methodologies for urban growth; however, rapidly changing social, economic and cultural needs are outrunning the physical reality.

Fig 2.02a.S etagaya Flat (https://s-media-cache-ak0.pinimg.com/564x/bc/d5/86/bcd58618cbc41d65cf1b0e3884ac32e7.jpg)

Fig 2.02b. Fondazione Querini Stampalia (https://s-media-cache-ak0.pinimg.com/originals/0d/42/34/0d423429aa7659b7fecd384af1c9b59e.jpg)

Practical (Tangible) Case Studies

Setagaya Flat

Naruse Inokuma & Hiroko Karibe Architects
Affiliation: White Clan
Project: Setagaya Flat
Date: 2011

Setagaya Flat

Naruse Inokuma & Hiroko Karibe Architects' Setagaya Flat (Fig. 1) is a response to the proliferation of the globalised tendency towards destruction and reconstruction present in modern Japanese Architecture. Japanese construction engages at a spiritual and ephemeral level, deriving its transient affect from the evolution of its societal predisposition, suggesting that architecture; like Borges states, transcends time and space (Borges). This fundamental ideology dictates much of the conservation and preservation work in Japan, predominantly observed in the ritualistic deconstruction and recreation of historic temples and shrines, periodically. Each reconstruction consists of 'purifying' the sacred building and replacing it with an identical (in essence) structure, ameliorated by 'tradition sensitive' modern techniques. This cardinal polemic of conservation is a stark contrast to the notion of permanence within Western pedagogy and represents the differing traditions of each locale, with respects to the binary architectural concepts of Permanent and Temporary (Lazarin 96). This base concept and subsequently the Setagaya Flat Project, present the tertiary agency of adaptability, which is often substituted for the term "Resilient".

Inokuma and Kiribe approached the refurbishment of this Tokyo city apartment with the intention to evaluate the tradition of adaptation within their respective social discipline; however, integrating both the Japanese definition of "Temporal" and the Western understanding of "Temporary" allowed for an innovative and sustainable solution to both the ethereal concept of permanence and the pragmatic reality of budget (Inkuma).

By delicately peeling away the 'façade' of the interior of the building and amplifying the underlying structural and material properties of the space, Inokuma and Kiribe postulate on the reductive practice of conservation (Fig. 2). Through the concepts of amplification and focus, the architects apply multidisciplinary techniques (Object Conservation as well as Architectural Preservation) to generate a minimalistic, modern residential apartment.

In contrast, the local context; Façadist Architecture, represents a similar resolution, postulating that adaptability occurs within the programme of a given design and that the shell is merely the vessel within which is contained the essence and affective response of tradition and evolution (Chabrowe 357).

The "White Clan's" deconstruction, when contrasted with New Zealand's tendency towards an adaptive Facadist agenda generates synchronization between the two diverging polemics.

The disparity in this project occurs when juxtaposing this technique to the traditions apparent in Anglo – Saxon or "Western" culture. Material characteristics and quality differ greatly between the New Zealand context and that of the Japanese architectural discipline, suggesting that reproduction and alteration of this particular technique is intrinsically linked to a cultural paradigmatic shift.

The inherent material calibre utilised in Japanese construction, the intricacy with which the construction is undergone and the detail techniques involved, inclusive of concealed formwork, allows a reductive approach to architectural conservation and maintains the esoteric notion of temporality.

Fondazione Querini Stampalia

In contrast to Inokuma and Kiribe's work, Carlo Scarpa's Querini Stampalia Foundation (Fig. 3) epitomizes the Architect's historically focused architectural rhetoric. Concerned with architectural preservation, the building refurbishment exemplifies the notion of adaptability with a determined emphasis on 'Resilience'; exploring the temporal nature of architecture and its association with entropy. Architectural Resilience refers directly to the proliferation of environmental factors and their significance to the built domain; however, the limitations of environmental resilience negate the social and hierarchical evolution that can be inferred in the term 'temporal' (Shultz 96).

Carlo Scarpa's Querini Stampalia Foundation renovation derives much of its theoretical framework from the doctrine of Architectural Conservation and Preservation, which subsequently dictates the physical manifestations of the work's polemic. It consists primarily of retroactively sustaining the existing historical context, which propounds the discussion between Conservation and Preservation (Shultz 11). In contrast to preservation, conservation is the 'proactive' technique seeking to analyse and evaluate the respective qualities of a given object or building and mitigating the necessity for reconstruction. This differentiation indicates diverging polemics on the notion of historical narrative and its significance within the architectural discipline.

Carlo Scarpa
Location: Venezia (Venice): Italy
Project: Fondazione Querini Stampalia
Date: 1959

The Querini Stampalia Foundation consists of a transitional circulation space that adapts and programmatically modifies with regard to the temporal nature of the tides in Venice. This 'transformation' is contrary to the techniques outlined for historical preservation as it responds to change through a dynamic and passive system (Fig. 4). As a result Scarpa's work is interrogating the historic traditions he himself utilises, and combines the conceptualizations observed in cross-disciplinary work (Biological Conservation and Landscape Architecture resilience). Programmatically, the sporadic flooding within the building generates a dynamic organisational and flow circulation system that requires an intimate affective response from both the architectural intervention and the occupant, encouraging active engagement with the historic notion of temporality and encompassing the local identity present at the site.

Where Scarpa's work expands on the texts outlined above; is the specific attention to the detail design and construction. The permeation from a macro scale to a micro scale renders the affective response in the work and directs the notion of cultural identity through transience holistically. This approach to transient design once again runs contrary to the prescribed ideology of Architectural Preservation and in turn refers to the extra disciplinary work done in Biological Conservation and Object Conservation.

Venice City: Italy

Venice as a whole; when considering Scarpa's work, is core to the outlined process and theory behind the project analysed above. While the approach taken is considered novel, the requirement for innovation is a product of continued discussion on the evolution of the city. Venice City's history is full of political and economical intrigue; however, the physical manifestation of the city and its districts helps to explain the manner in which communities of this scale occur. It is understood that smaller water faring communities cultivated small portions of land and housing at various points in the area and slowly expanded over time. These eventually overlapped. The moment individualistic purpose became unified purpose is unknown, but it informs us of the interesting interplay between various peoples and helps to show tendencies in amphibious communities.

Marsh Arab Community: Iraq

Conversely, the commonly coined Marsh Arab Community illustrates a separate approach to community and connection, as a product of evolution. While similar in early process, the community remains disconnected physically, with each domicile remaining on isolated pieces of land. These are subsequently connected by the boat faring people, whose traversal of the river generates interaction. This approach is intrinsically linked to the transitional tendency of the Tigris-Euphrates Marsh and River, whose periodical flooding and movement produce a semi nomadic predisposition. This process is tantamount to understanding the conflict and harmony between local people and their environment and helps to illustrate the dialogue between the two.

Furthermore, the delineation between community and individual manifests itself as a non-physical causality. Visually, each appears separate, but they are connected by personal interaction. This posits an interesting notion on individual units and their relationship to urban layouts and community.

Makoko Floating School: Nigeria

The Makoko Floating School by NLA represents the contemporary tests in resilience within a consistently floating community. This differentiation between 'constant' and 'inconstant' infers a separate agency than that of transitional resilience, and subsequently suggests a concept of permanence within temporality. The treatment of community and design within an unpredictable element allows for an in-depth look at the complex interactions between community / people and their environment. The success of the project is noted through the inclusion and fundamental interconnection with the community; with all aspects of the work being integrated. Construction techniques, materiality and design are all informed by local involvement and showcase strong community lead design. This level of interaction moulds the outcome by interrupting traditional theoretical solutions and applying practical solutions to problems that are core to amphibious communities and gives a keen insight into the lives within (rain water collection). However, it is important to understand an underlying separation between the process and the product. While successful, the outcome remains a singular and isolated unit, which directly conflicts with the concept of adaptable community life.

Ko Panyi: Vietnam

In addition to the discussion on floating communities outlined above, Ko Panyi helps to elucidate on the notions of connection between individuals within a community. The manner in which the town evolves with each new construction sheds light on the distinction between purpose built urban design and freeform vernacular (serendipitous) layout. The initiative to produce a public space within this floating community illustrates the constraints of cost on rural and small communities, and the level to which small-scale design concepts must be applied in order to achieve the desired effect. Cost, furthermore influences the involvement and support of low socio-economic groups, for whom public space is necessary. Community in these groups is fundamental to existence and is the driving force behind major changes in urban layout.

Suzhou: China

In contrast, Suzhou illustrates the stark delineation between consumer based historicism and common everyday life. Based on a grid produced by canal formations, the water-based sections of the city remain a touristic façade; a wall between the local community's everyday routine and the visitors sold on the concept of "Venice in China". This city helps to expound on the procedures and intent of local and larger Chinese Government, and suggests an agency in historical conservation with an economic initiative. As a result, the amphibious portions of the city remain within a perceived point of time (that of requirement for larger or outside investors), while the main city evolves and changes according to the local populations needs and actions. This binary existence is fundamental to the understanding of larger water-based communities, especially within China, as it illustrates the conflict between major driving forces in urban development and community.

Floating Houses: Netherlands

The Netherlands has for a long time been regarded with near reverence with regards to their approach to water-based solutions. This is due to the low-lying nature of the country, and the history of land and water manipulation. As a result, many projects have revolved around amphibious communities, each drawing from a collective understanding of the environment and their people's interaction with such. This project shows a more traditional modern approach to amphibious community living; gridded housing units laid out in row formation. While technically simple, this approach indicates the attention to local

expectations and a global understanding of living requirements and demand. In contrast to the outcomes of older water-based communities, this design lead product seeks to inform the people of what is expected or understood about urban development in contemporary design, as opposed to 'natural' local evolution.

Bamboo Utility

Amphibious Communities, both formal and informal, are distinctly linked to considerations of Cost and Materiality. Despite a minimal practical history of Bamboo utility within Chinese construction, practical applications of materiality choice and subsequently practice are fundamental to the generation of informal settlements and adaptive, community based development. Refer to Appendix I.

Bamboo Utility
    Green School: Bali
    Sharma Springs: Bali
    Low Cost House: Vietnam
    Bamboo Micro House Proposal: Hong Kong
    Bamboo Scaffolding: Various

1 ENTRANCE

2 FOYER

3 PORCH

4 NORTH-EAST ROOM

5 MAIN EXHIBITION ROOM

6 STAIRCASE

7 SOUTH-WEST ROOM

8 GARDEN

9 POTTING YARD
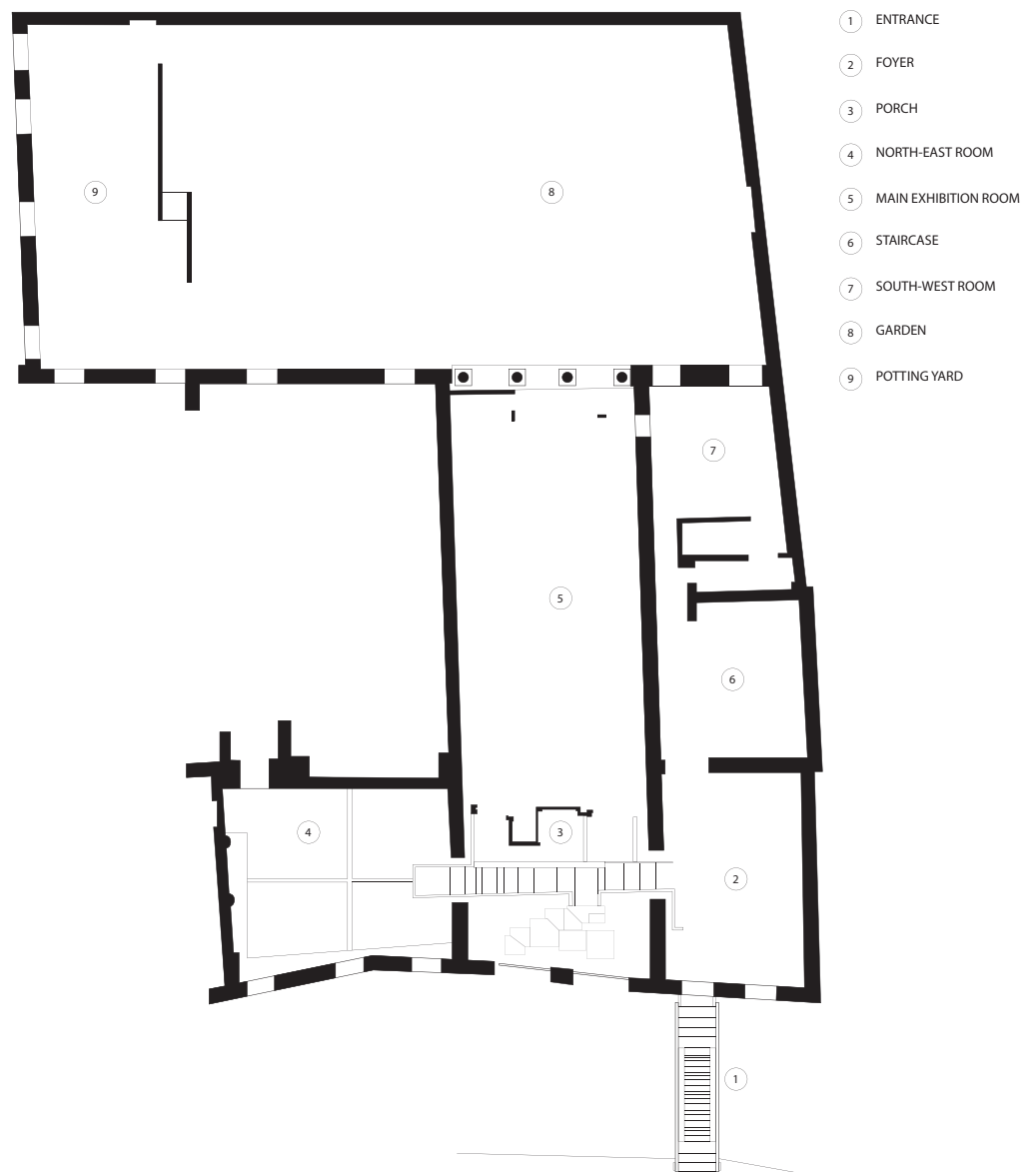
Fig 2.03.   Fondazione Querini Stampalia (Carlo Scarpa)
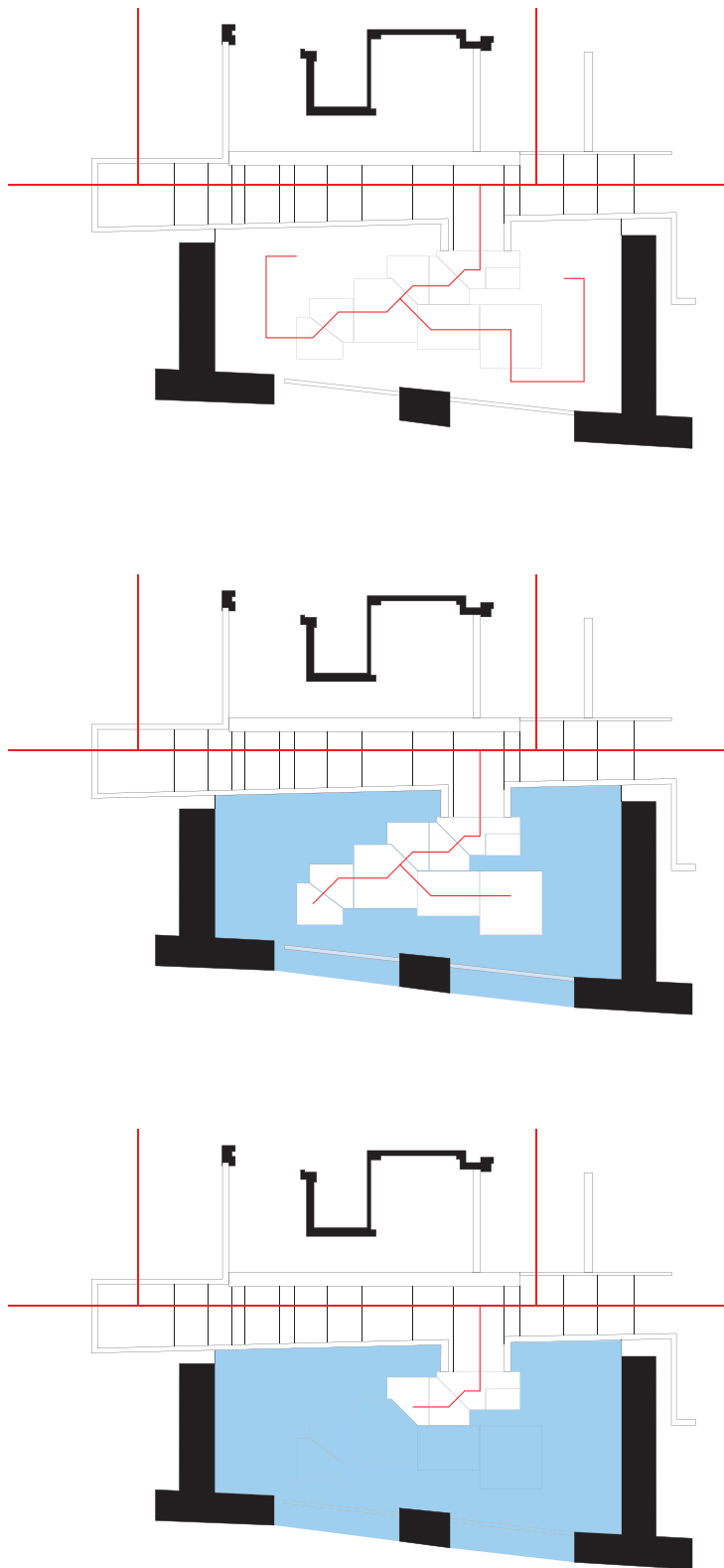
Fig 2.04.   Fondazione Querini Stampalia: Transitional / Temporal Spatial Analysis

Venice

1100   1300

Suzhou

Ko Panyi

Fig 2.05.   Floating Community Case Studies (Diagramming Space)
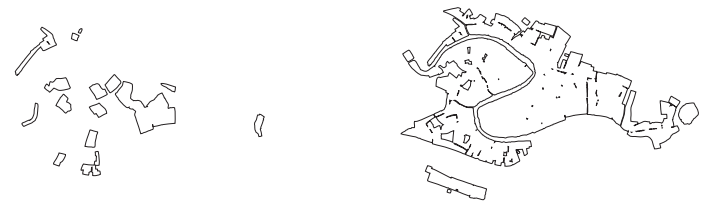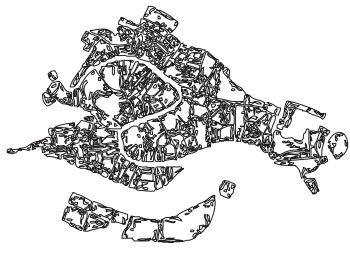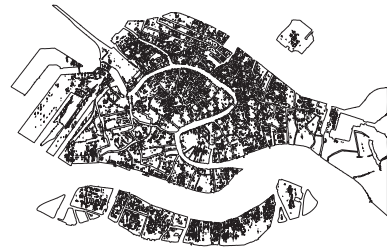
1500   1820   2016

Netherlands
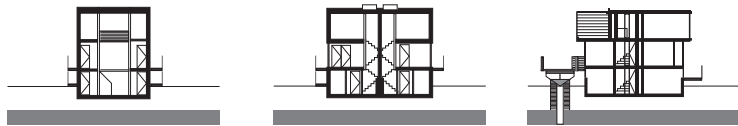
Marsh Arab Community

Makoto Floating School

CHAPTER THREE

Site Analysis

Fig 3.00a   Baixia District - Nanjing (Authors Photography)

Fig 3.00b Goulou District - Nanjing (Authors Photography)

3.0 ▣ Introduction

The history of the city is embroiled in the politics and wars of 10 (ten) Chinese Dynasties and the modern Republic of China, with the Qin, Tsui and Ming Dynasties of which are the most reputable (Nanjing – Ancient Dynastic Capital)4. Tracing its urban development back to the Warring States Period and the differentiation between the North and the South, Nanjing is uniquely modeled from political forces and the surrounding environment (Masaaki). The Yangtze River symbolized a truncation between the 'civilized' north and the 'impoverished' south, therefore; when Jiangsu (Nanjing) was founded, Prior to the Tsui Empire (Chen and Qin), it signified the distinct rebellion to this polemic (Su Su).

Sui Emperor Wen seized control of the region through the systematic conquering of the Chen Empire and the transfer of centralized power to Jiankang (Jiangsu), suggesting the province due to its natural boundary created by the Yangtze River and the Mountainous terrain (used as rear defense). During his reign, Wen initiated large-scale construction projects, which lead to the subsequent construction of the wall and 'employed' millions of labourers, reminiscent of the previous Qin Empire. His major policies were spreading Buddhism and reinstituting rule by Confucian authority (Wu).

These notions have permeated all aspects of Nanjing City, with many core principles and ideas remaining within local consciousness.

Basic Informatio n

Nanjing's total population currently sits at 8,190,0005 making it the 29th largest population within China; however the density within the region is comparable to both Shanghai and Beijing (two of the largest populations in China), despite their significant land area disparity. Nanjing's population in 2013 was officially recorded at 8.2 million, making it more populous than Tier 2 YRD6 cities like Wuxi and Ningbo, but smaller than fellow Tier 1.5 cities Hangzhou and Suzhou (wider area statistics). However the estimated metropolitan population is 6.3 million, which makes it the second largest city in the YRD after Shanghai.

Total Population:
2007 Census: 6,171,700
        2013 Census: 8,190, 000
Density:
        2007 Census: 929 Km2
        2010 Census: 5001 – 21611 Km2
Early District Based Density:

District	Population	Population per Km2	
Xiaguun	260,000	8,293	
Bairxia	300,000	11,538	
Gulou	455,600	18,051	
Jianye	230,000	15,436	
Qinghuai		222,000	9,937
Xuanwu	360,000	4,444	
Core	1,827,600	9,100	
Dachang	200,000	2,395	
Pukuo	190,000	1,152	
Qixia	320,000	941	
Yuhua	206,000	1,051	
Suburban		916,000	1,168
Total	5,323,600	814	
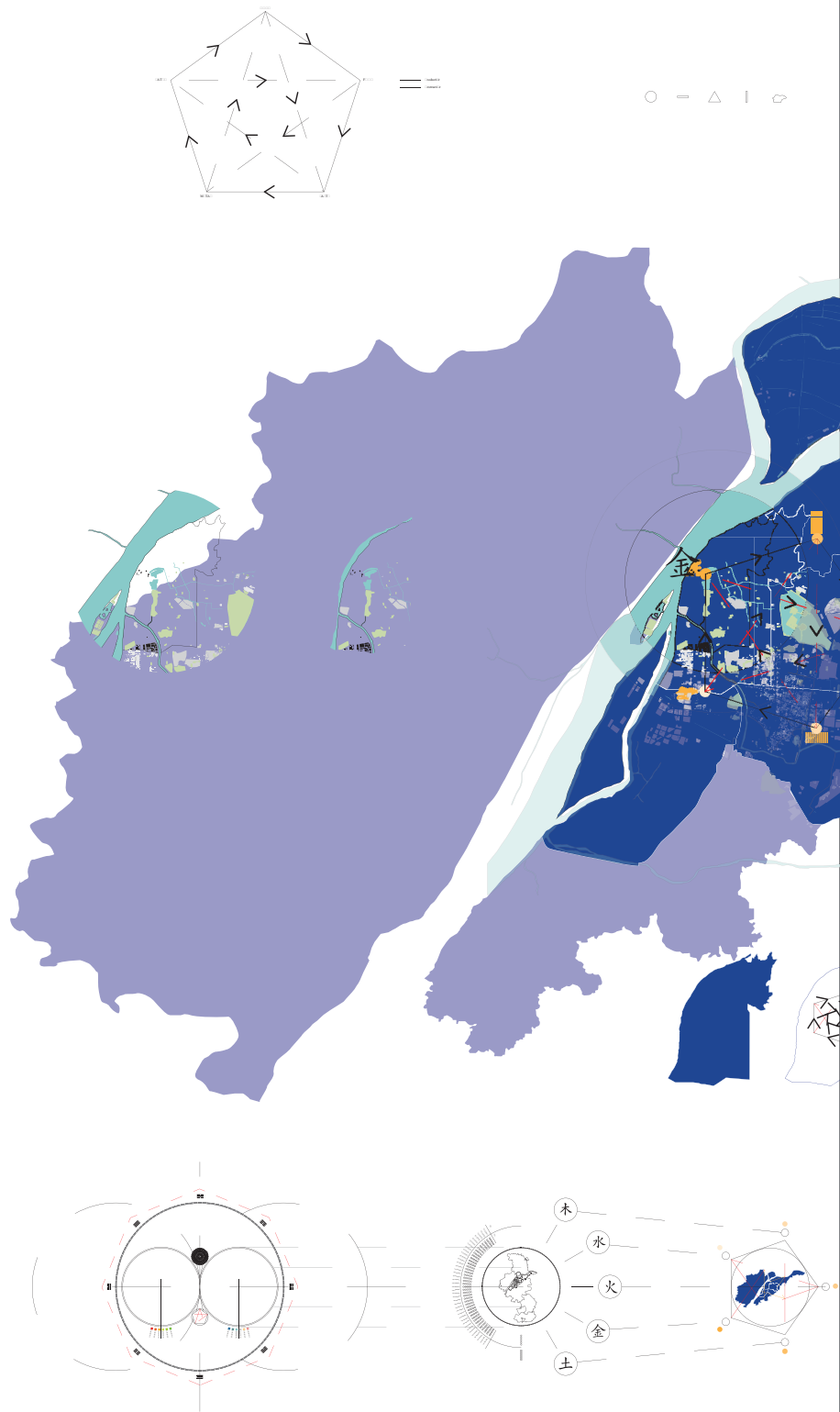
Fig 3.01.   Macro Site Analysis (Chinese Traditional Application) - Feng Shui and Metaphysical characteristics of Nanjing City
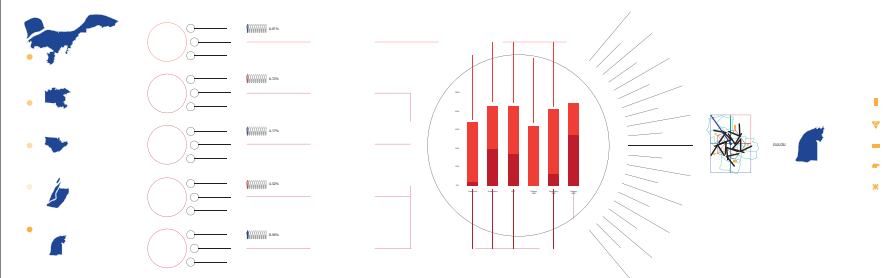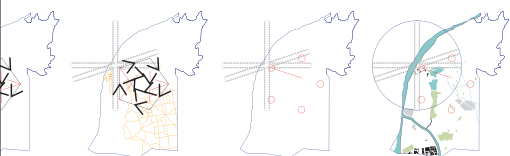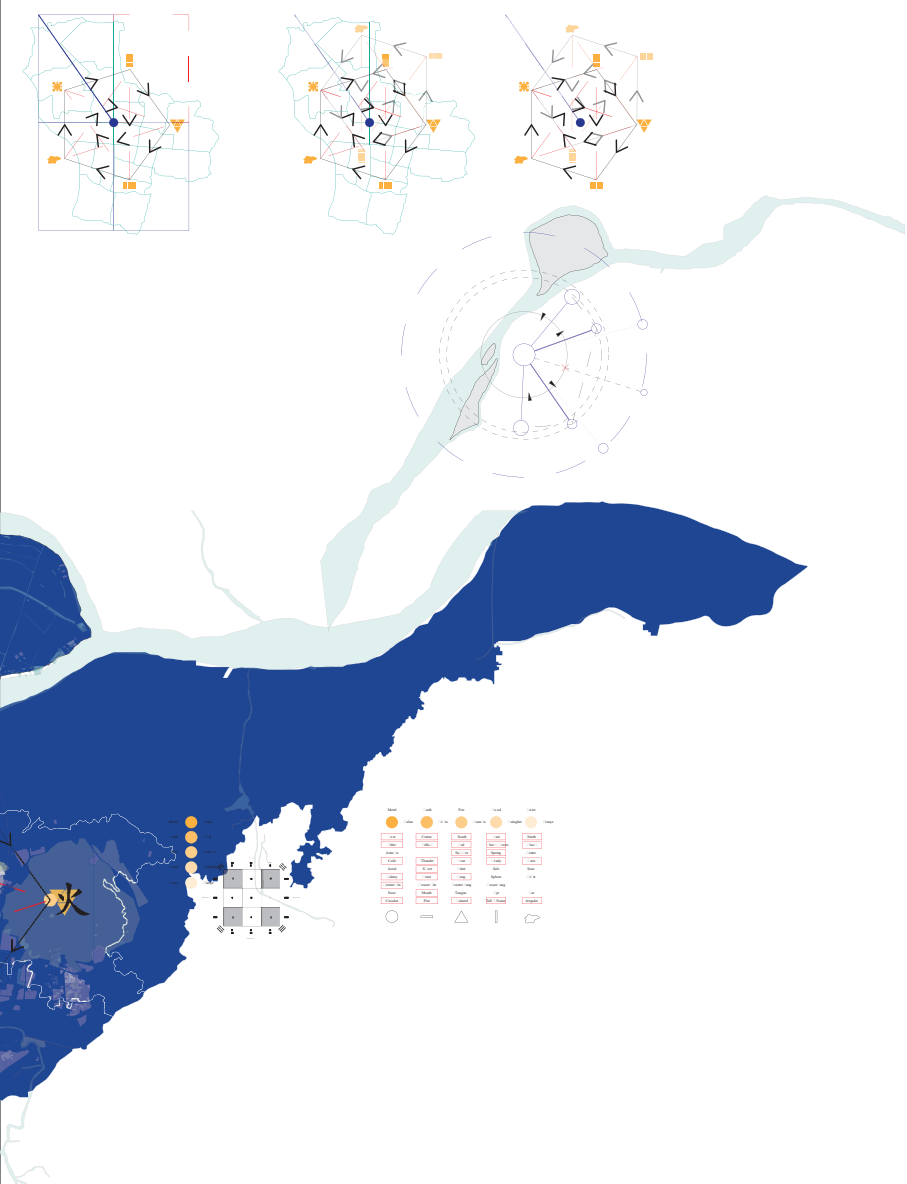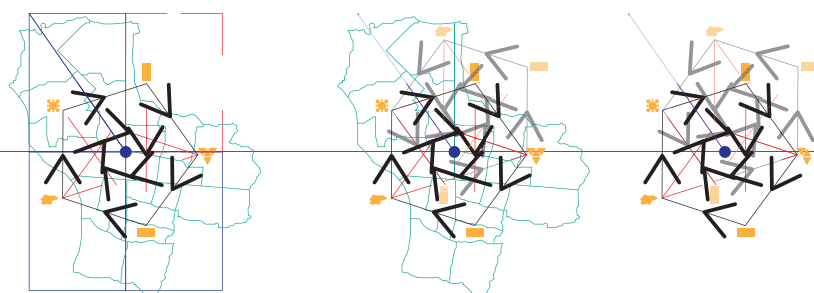
The **Wu-Chi** gives bir
The **T'ai-Chi** moves and
Rests, and gives
Yang shift, **Y**
Then is born water, fire, w
The **Five Elements** make things
The Four seasons progre

NANJING
Feng Shui Site

Fig 3.02.   Site Analysis (Chinese Traditional Application) - Feng Shui and Metaphysical characteristics of Nanjing City (Focus on Gulou)
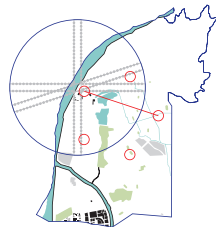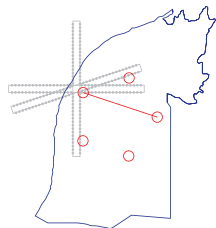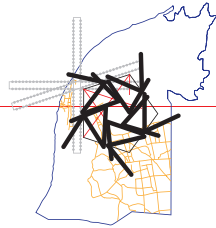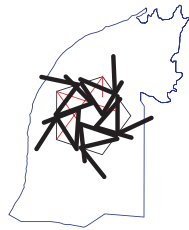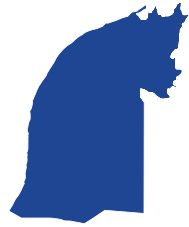
th to the **T'ai-Chi**.
l gives birth to **Yang.**
 birth to **Yin**.
Yin unites,
wood, metal and earth.
flourish in their proper order;
ss according to them.

Anhui

The typical Anhui Village traditionally occupied a closed valley, in order to take advantage of the topographical features, primarily for defence and agriculture. No particular discernible plan is noted in the organisational scheme of the village; however, it is well documented that Feng Shui (Geomantic Omen) was of prime importance. Due to the nature of geometric significance (the square symbolizing the earthly realm and the circle symbolizing the heavenly realm), many traditional dwellings manifested their plans as a rectangle, this also refers to the symmetry clauses within their cultural system.

A courtyard like space, surrounded by inward looking houses dominates the design with hierarchy, (patriarchy) overlooking the courtyard from the back. The long housing structure, mimics corridors, with significantly reduced unit sizes; however, all is surrounded by dense brick wall. This introspective tendency is well noted in Chinese Traditional Architecture, with many forms of dwellings throughout the country (geography) implementing this tool (Wang Wenqing).

> Province: Jiangxi, Zhejiang (Huizhou)
> Terrain: Mountainous (1000m)
> Climate: Warm – Temperate (Tranquil)
> Utility: Farming

Guangzhou

Traditional Chinese Architectural buildings primarily used timber as the major structural supports; however, bamboo (though used within walls as secondary) remained fundamental to the depiction and representation of their philosophical and cultural ideals. The Guangzhou "Bamboo Tube", is a prime example of characteristic correlative thinking (refer to Chapter 2). Developed in the 19th century to combat spatial issues within cities, the single bayed dwelling (4m wide and as long as necessary) encompassed the spaces between existing buildings and stretched as long as was necessary for the deemed program. As a result, some instances of this building have been documented to read 35m in length (a ratio of 1:3 – 1:9).

Due to the evolution and progression of social and cultural life within China, the design of this dwelling was based on the ability to expand and modify as required. Additional segments would be added, with a singular stepped corridor truncating the building. The segmented characteristic of the building is noted to come from the physical

characteristics of bamboo reeds, with growth lines marking the segmentation. Bedrooms within Chinese culture are singularly for sleep, with these spaces being relegated to small areas with little light. Courtyards or communal spaces dominated this community and family based urban typology (Wu Qingzhou).

Province: Guangdou, Guangxi
Terrain: Urban
Climate: Sub-Tropical
Utility: Urban (Family)

Hani

The Hani traditional construction exhibits a stark contrast in spatial organisation and directionality. While many traditional dwellings demonstrate an introspective quality, the composition of the space within this community is contrasting. All entrances within the village face the same way, which is understood to be in reverence of their specific rites, such as a particular relationship with natural and spiritual elements, with much of the materiality and design decisions influenced by the separation of the Earthly and the Heavenly Realms.

Primary to the community is the semi nomadic tendency. The dwellings are made from bamboo and timber with grass coverings; however, they are expected to last between five (5) and eight (8) years, with the expectation that they can be deconstructed, moved and reconstructed in a new location. This distinct apparent disassociation with the particular site reinforces the intangible quality of site and design specifics within the community.

Province: Yunnan
Terrain: Steep (Nomadic)
Climate: Humid
Utility: Farm (Nomadic)

Jiangsu

The spatial planning and urban form within the Jiangsu province are dominated by canals and waterways. Due to the Ming Dynasty's influence in the region (Capital), merchandising trade routes (rivers) were of importance to dwellings and commerce buildings, which were often incorporated. The building would house a family above with the primary business occupying the ground level. This facilitated interaction and trade between merchants and highlights the tendency towards multi-use space, as well as a fervent need to conceive of spaces capable of encompassing many programs.
Similar to many traditional Chinese dwellings, the

base composition of the space is predicated on courtyards, with inward looking buildings surrounding. The inherent separation of conflicting spaces, by thresholds, marks the universal concept of hierarchy and order within the Chinese Geography. The rear most dwellings were reserved for the eldest and prime family, with dwellings further down housing lesser names.

Collapsible panels and movable sections indicate, similar to other examples, a need to maintain freedom within the composition of space. Adaptable and organisable interior spaces are core to traditional Chinese architecture, with the outside excluded from this observation (Feng Yueqiang, Francoise Ged).

> Province: Jiangsu
> Terrain: Plains
> Climate: Mild
> Utility: Mercantile (Housing)

Keija

Contrary to all other known examples of traditional Chinese Dwelling, the Keija (Toulou) have a rounded form. As stated previously, the circle is a heavenly symbol and remains unused within human conditions. As a result, the aspect of this dwelling is, once again in contrast to other examples, not concerned with spiritual and wider socio-cultural context, but rather with particular and local requirements. During the 11th century, the Hakka people produced large scale traditional courtyard housing, recognised as Han design; however, over time, the walls were extended and began to resemble a fortress. This once again marks the introspective tendency of the Chinese people as a whole.

The round form began much later, but reflects the communities focus on community program rather than spiritual reverence. The dwelling is separated into wedges, of up to four (4) storeys, each a family domicile, with a communal function in the centre courtyard or a communal open space. This facilitated trade and interaction between the various peoples within and indicates a self-sustaining community typology. These structures have been recorded to have housed 400 individuals (eight extended families).

Constructed of split bamboo and rammed earth, the building houses many multi storey dwellings; however, neither have internal circulation, all is relegated to the exterior. This tendency to allow significant social interaction reinforces the community nature of the region (John K.C. Liu).

Province: Fujian
Terrain: Lowland Hills
Climate: Seasonal
Utility: Community Housing (Village)

Suzhou

Suzhou is a medium sized city situated south of Shanghai. Characterised by the significant canal infrastructure throughout the city, much of the architectural typology is influenced by trade routes and water based transportation, as a result many dwellings have a string relationship with the water's edge.

They consist of two (2) storey buildings, with; similar to previous examples, the top floor dedicated to housing and the ground floor utilised for trade and business. A rectilinear plan is also noted with specific areas marked out buy permanent walls. While this differs from others, much of the hierarchical composition is the same.
No plumbing is noted in these dwellings, with the inhabitants utilising the canal for washing and cleaning. This tendency to incorporate all aspects of the environment marks a distinct divergence in social systems between the west and the 'Other'. Furthermore, the climatic considerations within the design are considerable; with whitewashed walls for reflecting the sun, but also small recesses designed to catch daylight. This example also indicated the closed exterior and open interior characteristic (Joseph C. Wang).

Province: Jiangsu
Terrain: Riverland
Climate: Seasonal
Utility: Mercantile (Housing)

Dai

Traditional Dai housing is characterized by stilts. Due to periodic flooding, the dwellings are supported on a platform above the ground. There a various forms of this building, which each refer to a particular local issue with environment and conditions. The lower level (beneath the frame) is primarily for storage and animal housing, while the above floor is dedicated to housing. Similar to other examples, the distinct separation between various realms within society is expressed (Wu Qingzhou).

Province: Yunnan
Terrain: Riverland
Climate: Sub-Tropical
Utility: Farming (Housing)

Additional examples adressed include; Dong and Han

Jiangsu
Suzhou
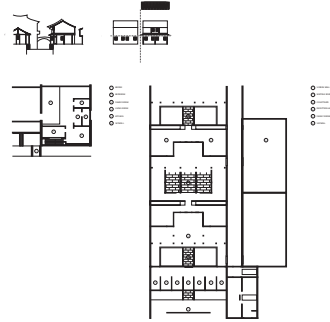
Kejia
Tulou Style
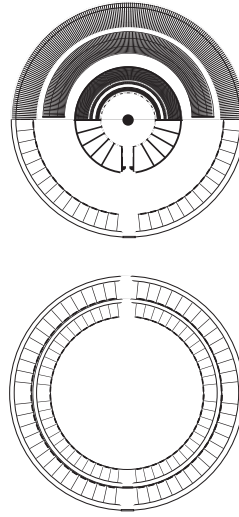
Anhui
Twin Dwelling
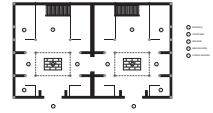
Guangzhou
Bamboo Tube H

4m
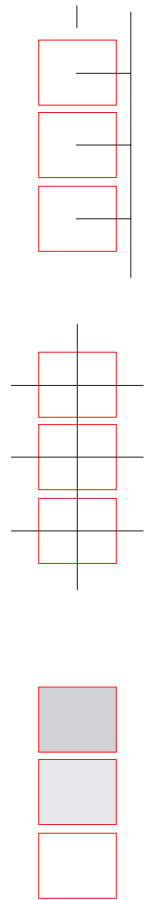
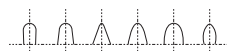Fig 3.02a. Chinese Traditional Housing Analysis
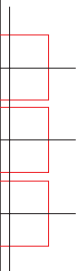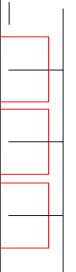
ouse

Hani
Farm House
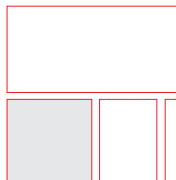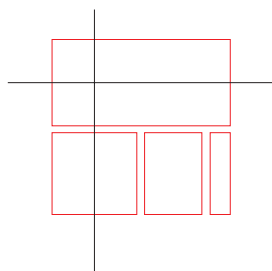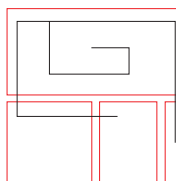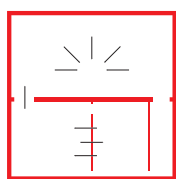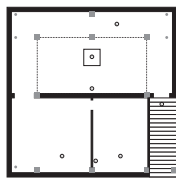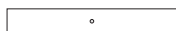
Hunan
Farm House
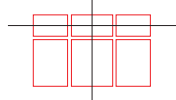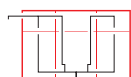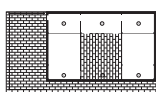
Henan
Excavated Dwelling

THREE GORGE DAM
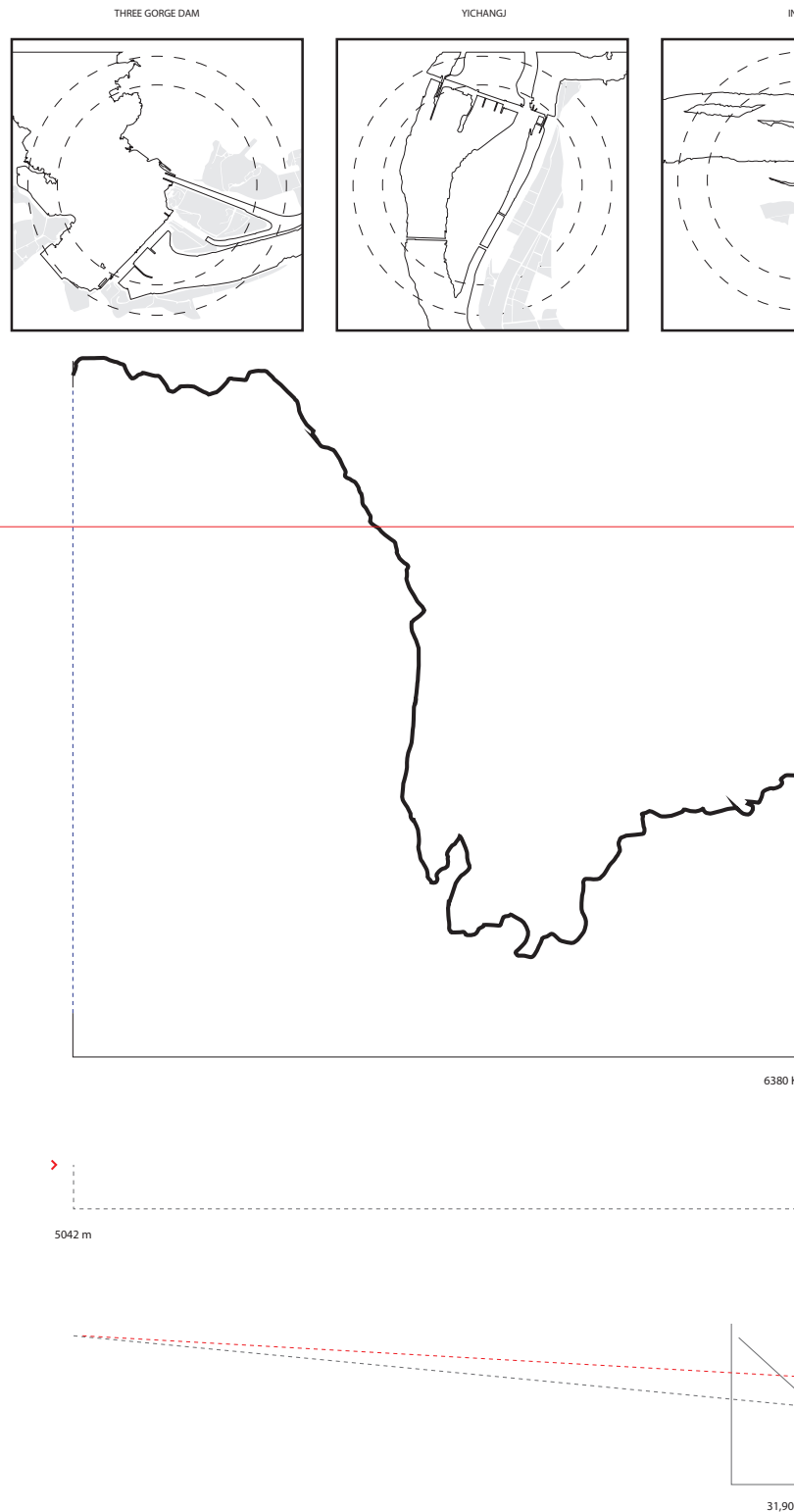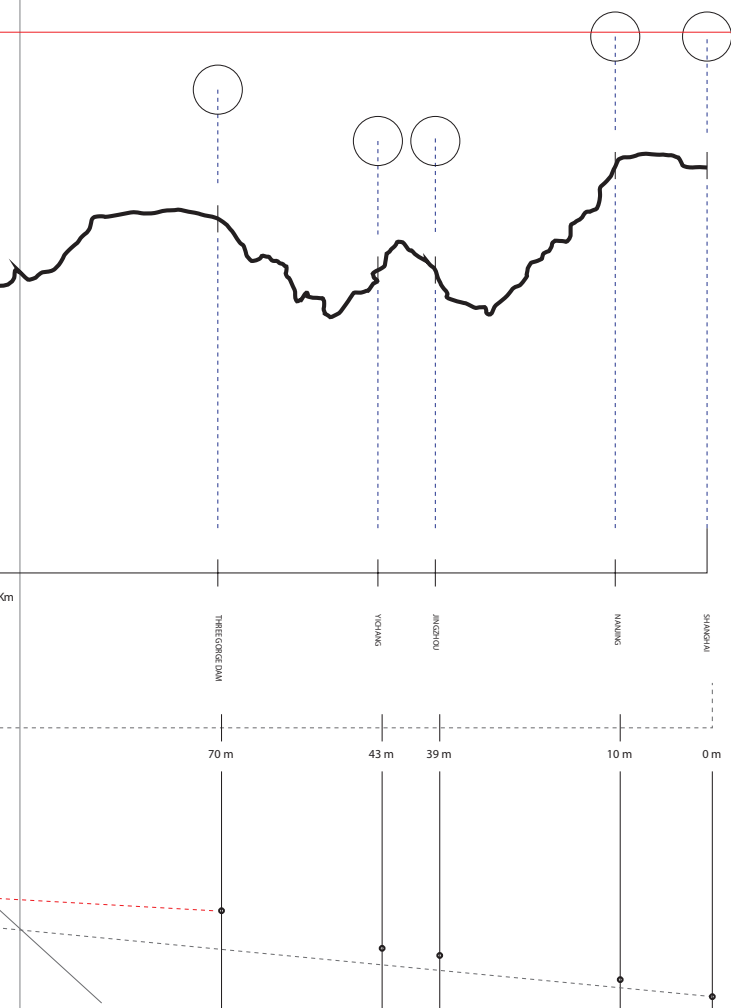
YICHANGJ

IN

LENGTH

6380 k

ELEVATION

5042 m

31,90
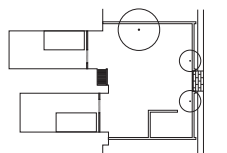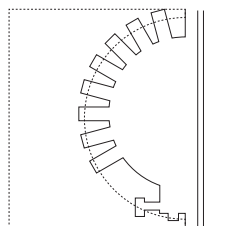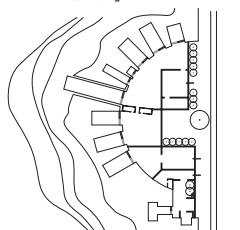
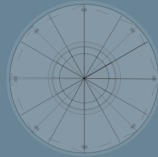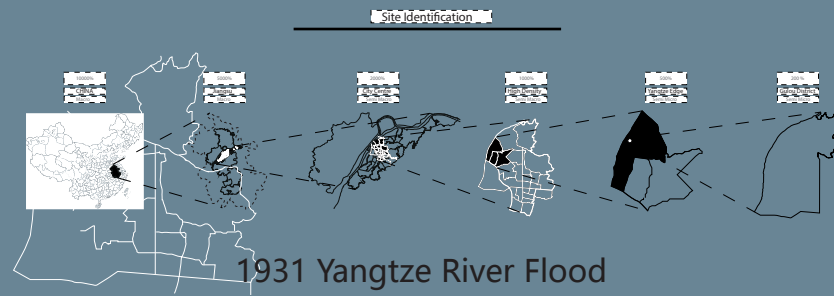Fig 3.03.   Site Analysis (Traditional Euro-American Application) - Yangtze River Dam and Ecosystem

NGZHOU

NANJING

SHANGHAI

Km

THREE GORGE DAM

YICHANG

JINGZHOU

NANJING

SHANGHAI

70 m

43 m

39 m

10 m

0 m

305 m

0 Cubic Meters

1931 Yangtze River Flood

Preliminar Site Work

Ming Wall Locale

Fig 3.05.   Nanjing City Roading Infrastructure - Ming Wall Delineation
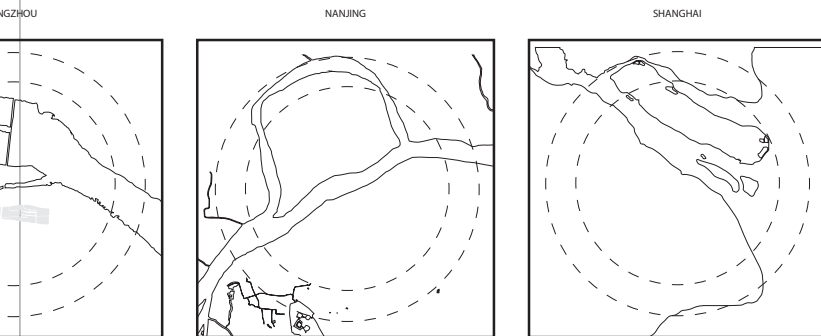
CHAPTER FOUR
Preliminary Design

PHASE 1

PHASE 2

PHASE 1

PHASE 2
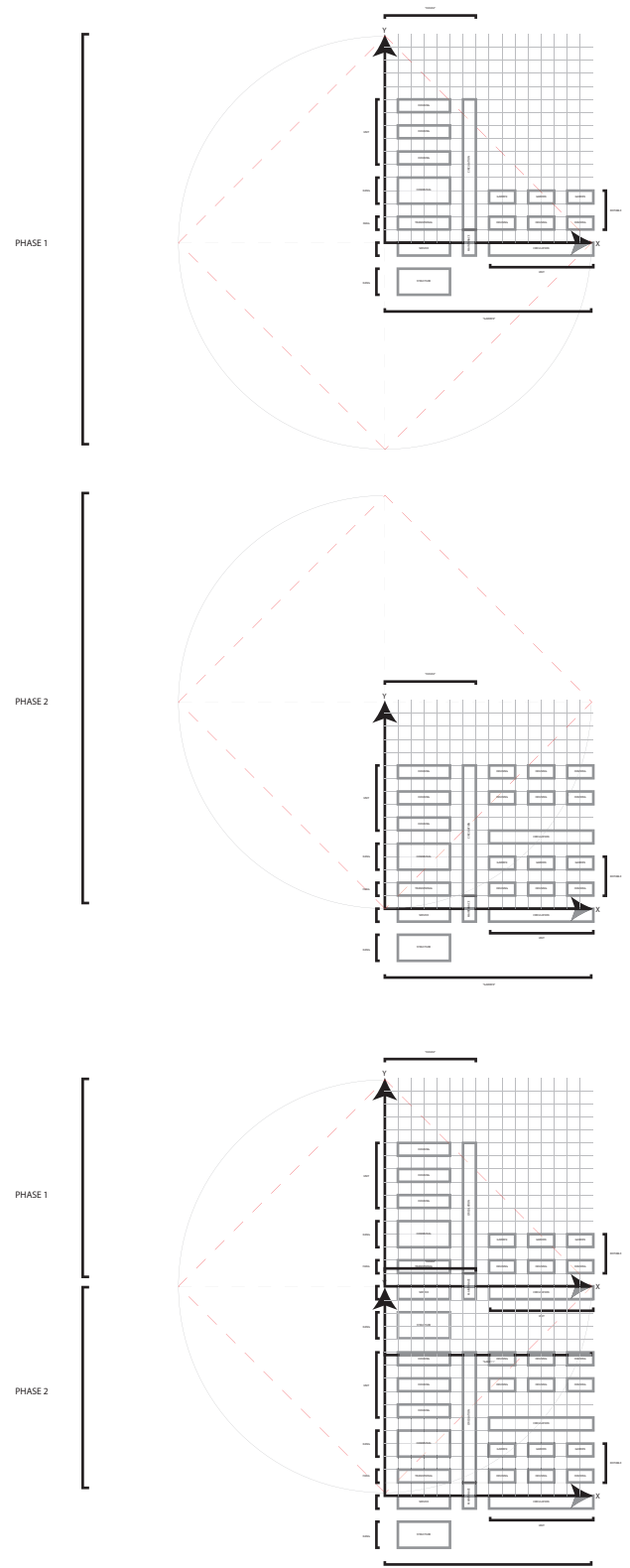
Fig 4.00a. Program organisation diagram (1/2)
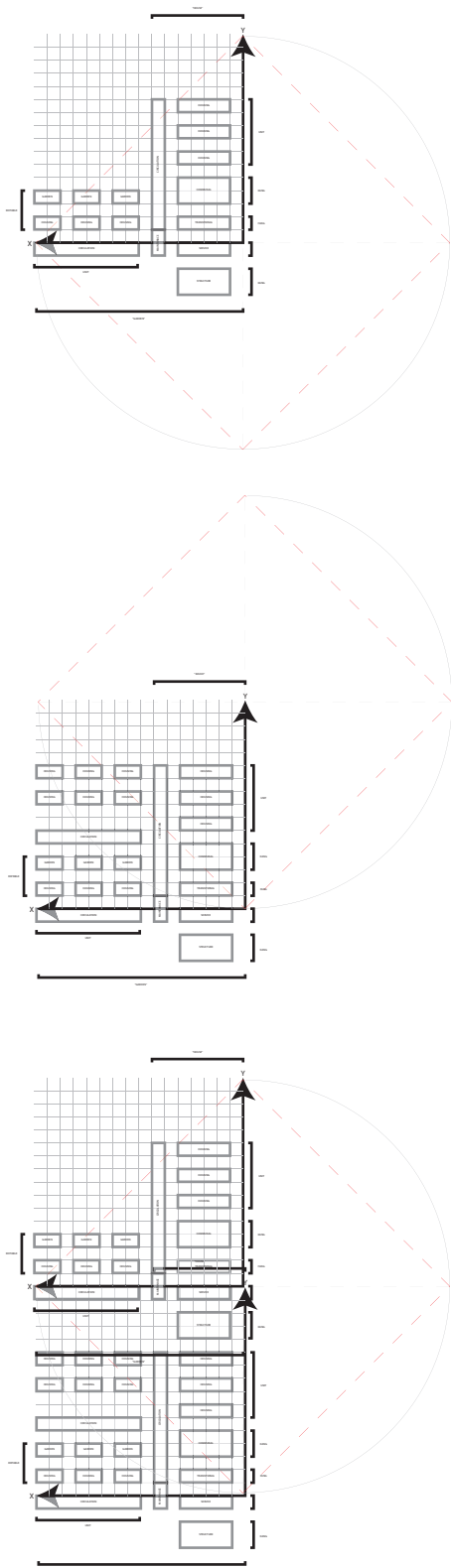
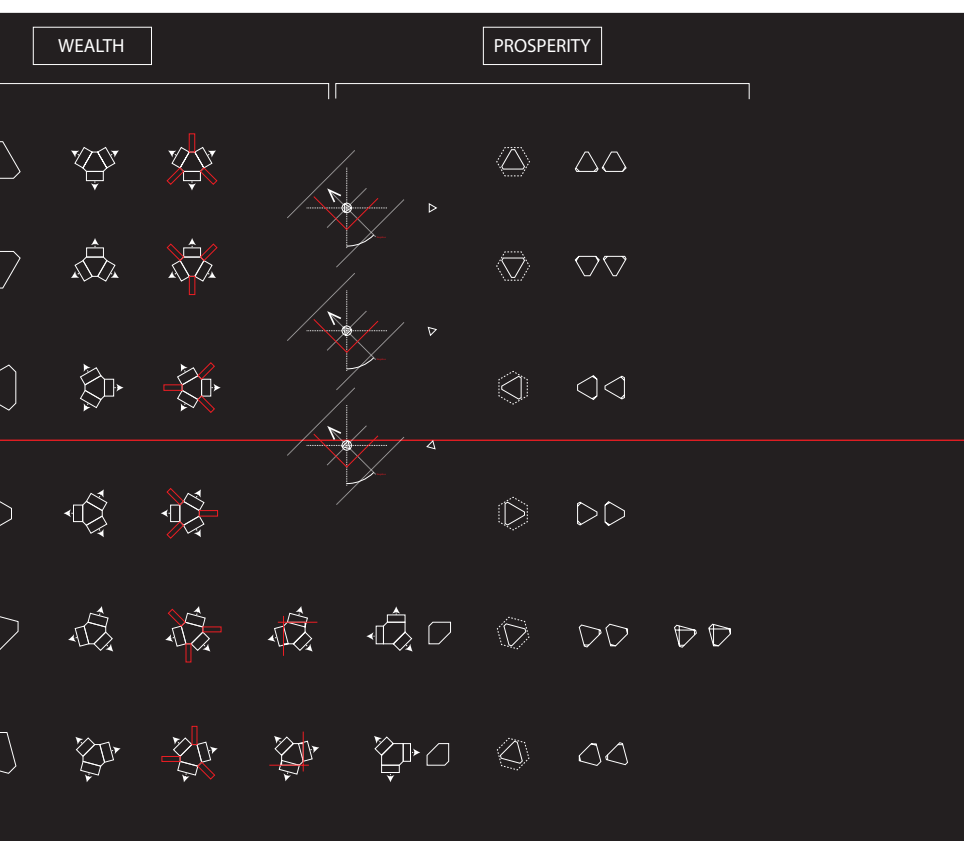Fig 4.00b. Program organisation diagram (2/2)

COMPO

Planning and organisation with
conside
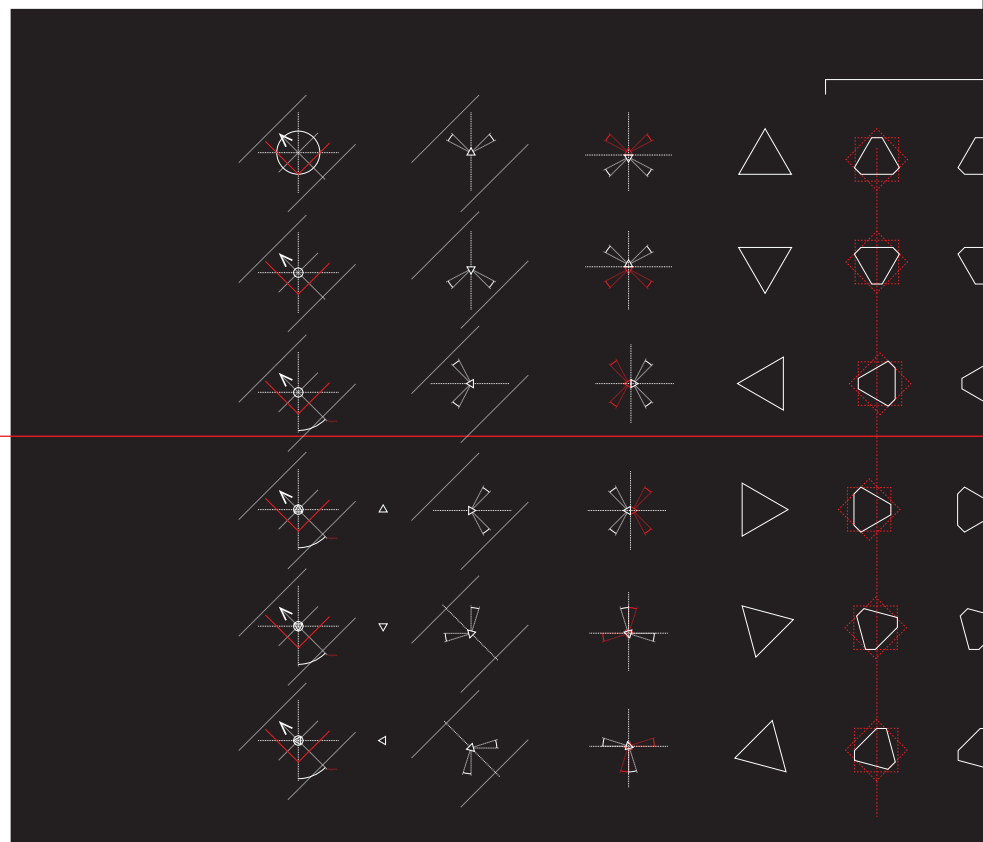
DIAGRA

Orientation and

Fig 4.01.   Orientation Diagram - Site Analytics combined with Feng Shui Principles.

OSITION

site context and philosophical
erations

WEALTH

PROSPERITY

AMMING

spatial planning

4.0　□　Introduction

The juxtaposition of core Chinese principles and western emperical analysis determines the fundamental binary condition central to this work. Observing the interplay between various aspects` of design, such as material availability, social and spiritual context, and construction technique, allows for a compounding of diverging concepts and processes. Detailed analysis and research on these, are fundamental to the design experimentation and the subsequent development.
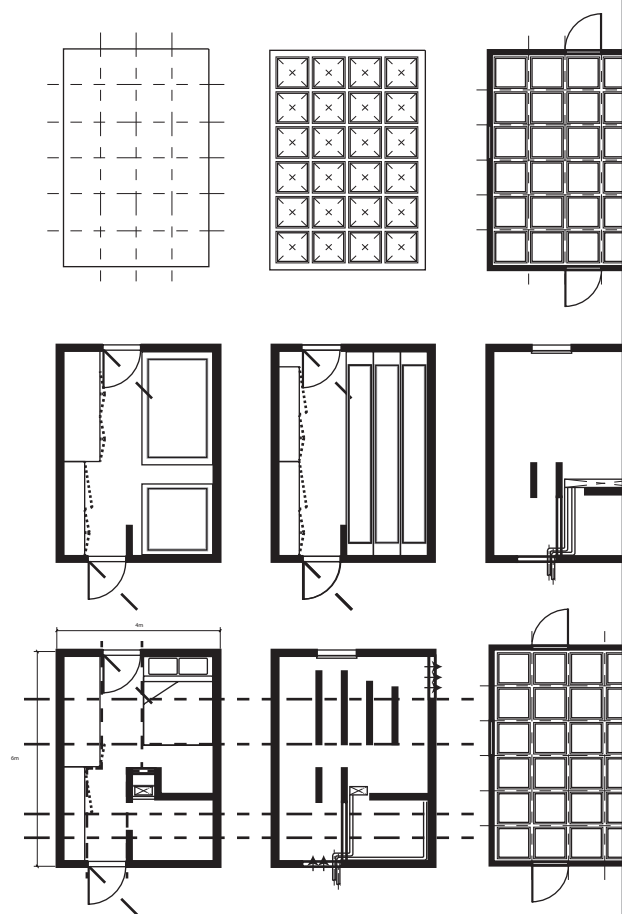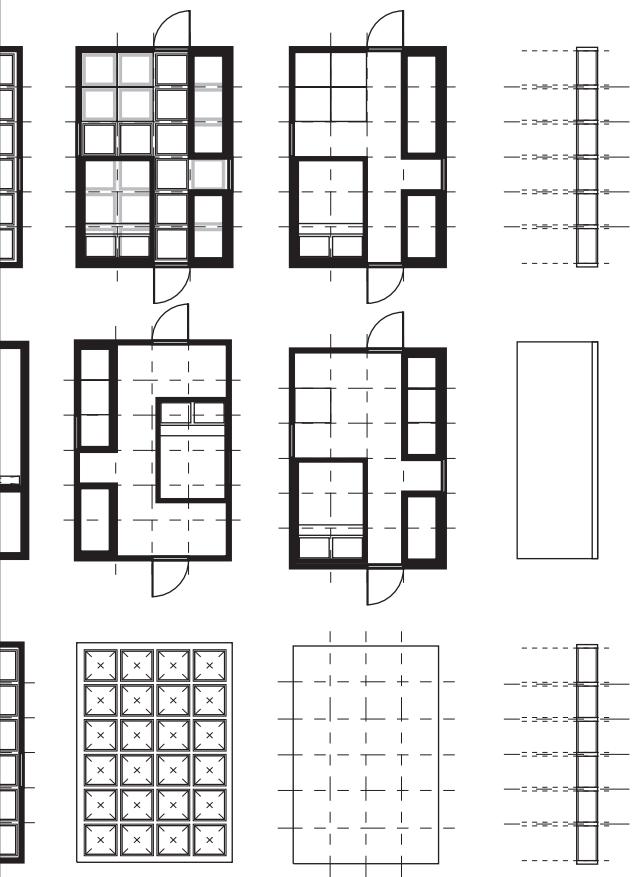
Iterative
Adaptable m

Fig 4.02.   Preliminary Spatial Planning and Organisation - Grid structured modular unit design (4x6)

Design
nodular unit

Modularity

Fumihiko Maki posited that individuality and adaptability were core drivers to urban reform and 'resilient' design, further intimating that modularity on a large scale facilitated the natural evolution of a city without compromising on the individual. It is within this dogma that the notion of human scale modularity and unit based design was interrogated. The production of a universal unit which could be adapted to various housing requirements under the explicit supervision of practitioners has been well documented and implemented; however, in conjunction with Metabolist theory, the concept of 'universal' units that could be utilised for multiple simultaneous programs would allow for a community to expand and adapt based on highly specific factors that can not be anticipated.

Domicile Modularity is inherently tied to the restrictions of expected outcomes, a given design can respond to a set of standardised situations, and expectations within living standards; however, the limitation occurs when considering the wide array of programmatic changes and social requirements a given community demand. Considering a unit, which can encompass the requirements for all programs, the requisite construction process necessitates simplicity. Chinese philosophy intimates that complexity is achieved through the continued application of simplicity, and therefore all aspects of the design outcome must be achievable; simple.

Base fang units are standardised and rationalised on a grid (4x6) in order to facilitate the itemisation and possible separation of sections. A given platform or structural system can be modified along a particular gridded format in order to allow for local and personal modifications, while also granting the possibility of improvement and creation of smaller units for particular programs (ie. split flooring unit can be repurposed as circulation or movement platforms). A standard rectangular unit can therefore be arranged and adapted to any form.

Complementary to modularity on a human scale is the macro scale Metabolist Group Form. The gridded framework furthermore allows for the arrangement and organisation of 'unit to unit' planning. Any unit can be positioned and attached to another following the gridded base structure. Due to the standardised base format, any given program can be attached and removed from any other and allows for the natural compartmentalisation of community utilities and housing spaces. Contrarily, this system enables the collection and amalgamation of any section and

program required. Large scale planning as well as individual planning is maintained by the community and the individual as a whole. Cultural and region specific vernacular planning techniques and processes can therefore be reproduced.

Construction (Dougong)

The Yingzao Fashi asserts that unit based modularity is fundamental to the protection and maintenance of culture and hierarchy within Chinese design, and therefore outlines the accepted construction techniques. As stated earlier, this treatise marks the introduction of the timber unit, as well as the well known bracketing system; the Dougong1. Standardised timber sections punctuate the Dougong with notched formwork, designed to fit together firmly and without additional adhesive or restraint. This technique permeates all timber construction throughout historical China, and is fundamental to the local understanding of construction.

Each base structure of the fang unit is based on this notion of applied layered simplicity. All beams, rafters and supports are adapted from an abstraction of this technique, and require only systematic application to build.

Many Western countries provide housing solutions and aid for communities disrupted by natural disasters; however, a large majority of these improvised solutions are based upon traditional and modern local techniques (local to the sending agency). As a result, plan details and construction process is rooted in foreign dialogue. A construction framework designed from historical techniques known and understood by the community, helps to facilitate the transmission of information and increases the speed with which the process of understanding becomes application. Furthermore, local materials are the foundation of traditional vernacular design, with timber framed construction dominating; however, it is important to understand that the bamboo production within China is significant.

Utlitity

Modularity allows for an adaptive construction and application process, but individually this is dependent on expected environmental outcomes. Transient design often encompasses the concept of floating construction as an approach and solution to the impermanence of the environment, which in turn refers to the binary conditions of practicality and ephemerality. The inherent manipulation and reorganisation of the human environment regardless of the surrounding conditions, as expressed in Metabolist discourse as well as the
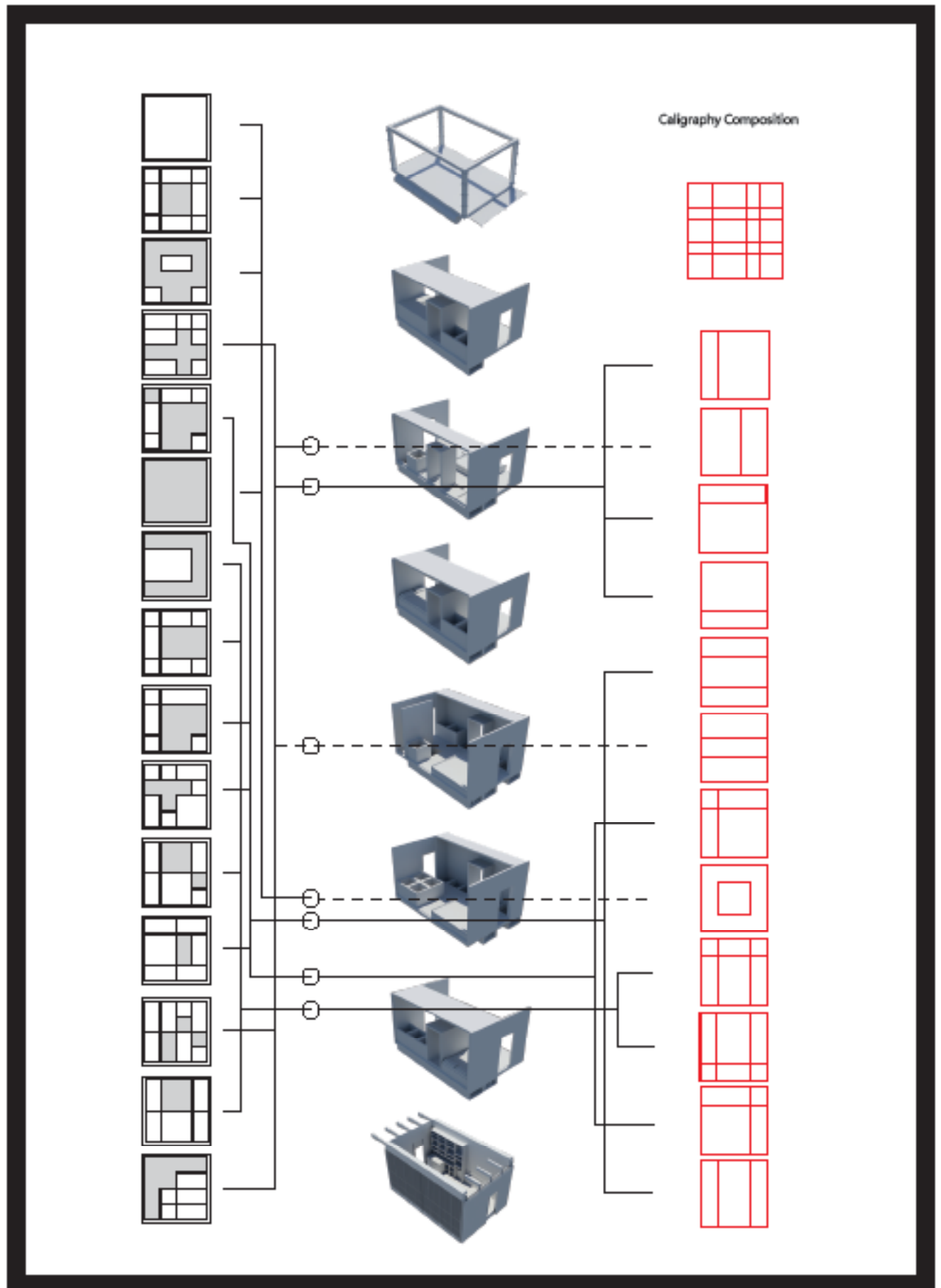
Caligraphy Composition

Fig 4.03.   Two (2) Dimension Organisational Composition - Calligraphy

Confucius

Ordering

Confucianism

Formal

Formality
Regularity
Man Made (Elements)

Taoism

Informal

Informality
Irregularity
Natural (Elements)

Sha Ch'i

Important

If ALL Feng Shui Principles
cannot be adhered to,
the negation of Sha Ch'i is
required

House

City

Formal

Formality
Symmetry
Clarity
Straight Lines
Regular Forms
Human

Garden

Park

Informal

Informality
Asymmetry
Mystery
Curved Lines
Irregular / Romantic
Nature

The **Wu-Chi** gives birth to the **T'ai-Chi**.
The **T'ai-Chi** moves and gives birth to **Yang.**
Rests, and gives birth to **Yin**.
Yang shift, **Yin** unites,
Then is born water, fire, wood, metal and earth.
The **Five Elements** make things flourish in their proper order;
The Four seasons progress according to them.

Binary Oppositions

Hierarchy

Hierarchy

Hierarchy

Fig 4.04.   Fundamental Feng Shui Architectural Principles analysed - Derived from Lee Chin-Ching's Work

conservationist approach in Venice, is fundamental to amphibious communities, and complements the community lead design principles outlined through modularity and unit based construction.

Many amphibious communities reside largely on the water, and as a result, the floating platforms are specifically adapted to the requirements of wet surface program; moreover, 'dry season' or non extreme condition utility has little application. Due to the inconsistent nature of the Yangtze River's periodic flooding, it can be determined that in a given year, large scale flooding will occur minimally, suggesting that any design framework must showcase utility effectively in both extremes. Transitional structural systems exhibit significant possibilites, with semi disconnected pile fittings displaying the most effective execution.

Bamboo

Materiality is the central focus of studies on vernacular architecture, with particular emphasis on ease of acquisition and ease of construction. These notions are principle to communities with low socio-economic standing and housing issues, such as parts of Gulou (Nanjing). Subsequently, investigations into local material productivity and properties is necessary to generate a successful scheme for community lead expansion, while also maintaining traditional construction techniques.

Bamboo construction within the Chinese context is not concerned with physical causalities, but rather with cultural and linguistic meaning. Although, bamboo scaffolding is prevalent throughout the Country, rarely is it used for residential structural construction, preferring to be used as furniture and finishings. Conversely, the properties of the bamboo reed and it's structure heavily influence the spatial organisation of traditional housing in various parts of thr country (ie. Feng Shui and Bamboo Tube House).

Macro Design

The Japanese Metabolist Movement posited the concept of Group Form; a solution to the housing and infrastructure crisis in post-war Japan, which attempted to produce a collective community based 'mega'structure. This is explored as a means to create nodal points within the site (Yangtze River), to which singular units or communities built from the design outcome, can attach themselves. These Core Units would house extensive services as well as act as a community hub during extreme conditions. Individual units can be attached at various levels on the Core allowing for dynamic

changes in program (hierarchical) to adapt to changes in the environment (water level rise). Several cores would be spaced along a given site; and be connected by the expansion of communities within units, subsequently generating a bridge between areas within the city and allowing for a dynamic urban typology to form (favela, shaty town etc).
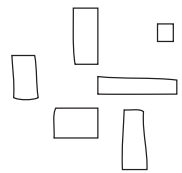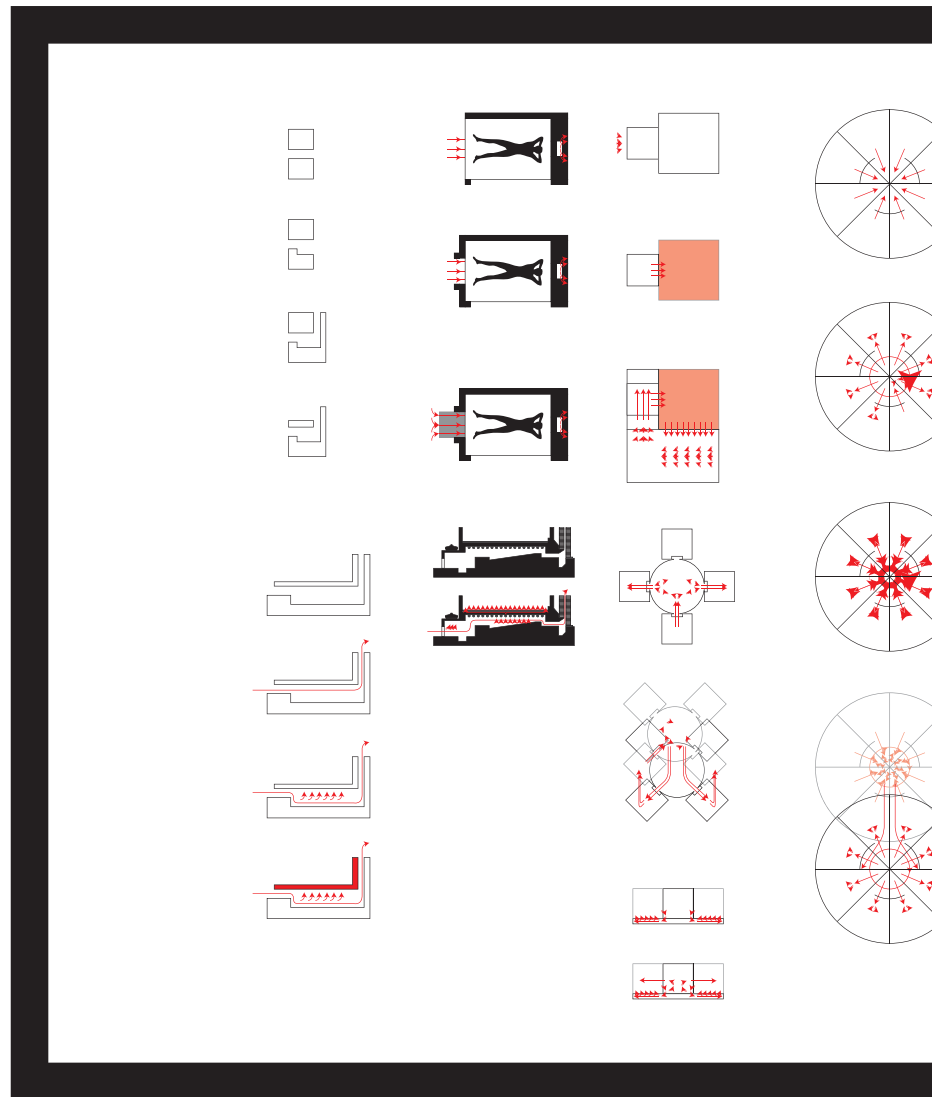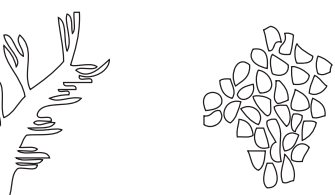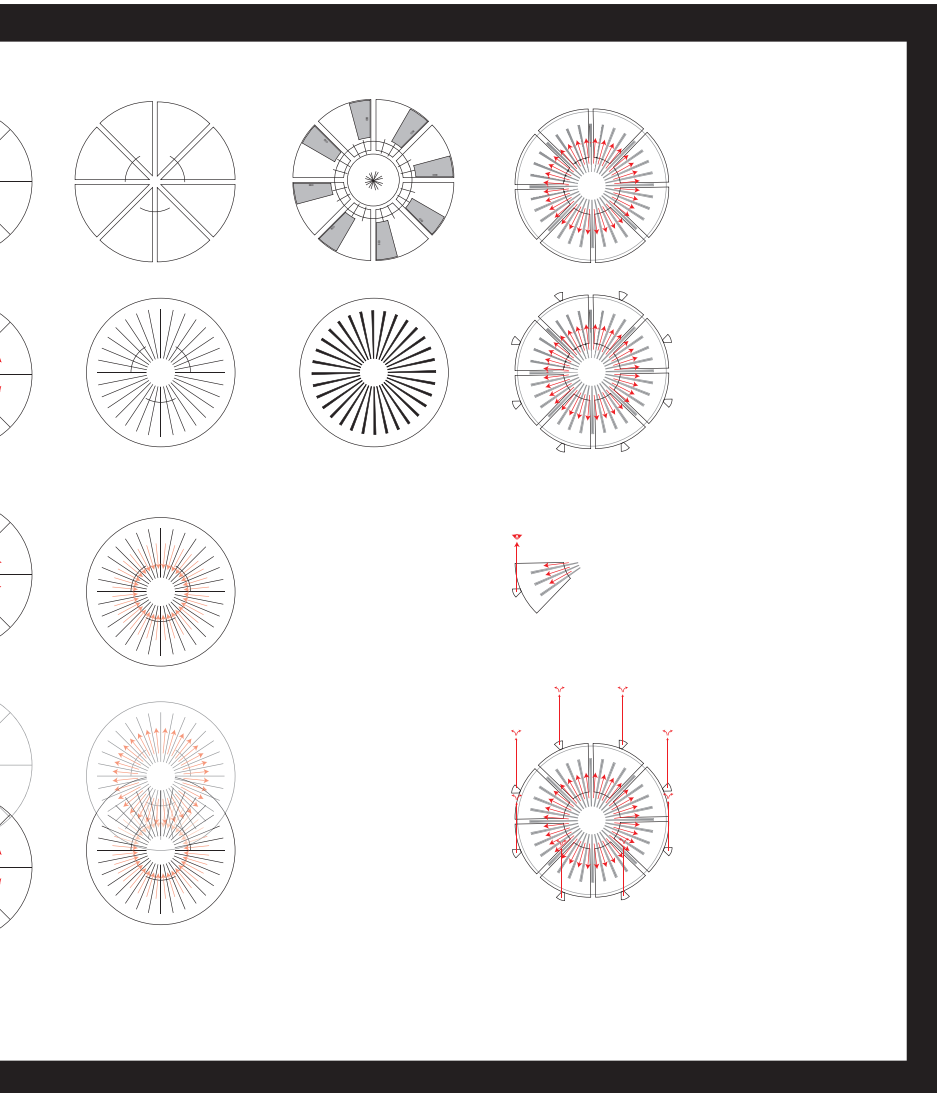
Ka
Collective F

Group
Fumihiko

Fig 4.06.   'Kang' (Natural Heating System) Analysis and Design - Community sized heating and cooking framework derived from Northern Chinese Housing Technolog

p Form
Maki (1960)

SECT[...]
Collective form a[...]

LONGITUDINA[...]
Permanent unit set[...]

Fig 4.07.   Longitudinal Section of core structures (without individual units attached) - 'Kang' design analysis and testing

...ION
...nd core system

...AL SECTION
...t up / suggestion
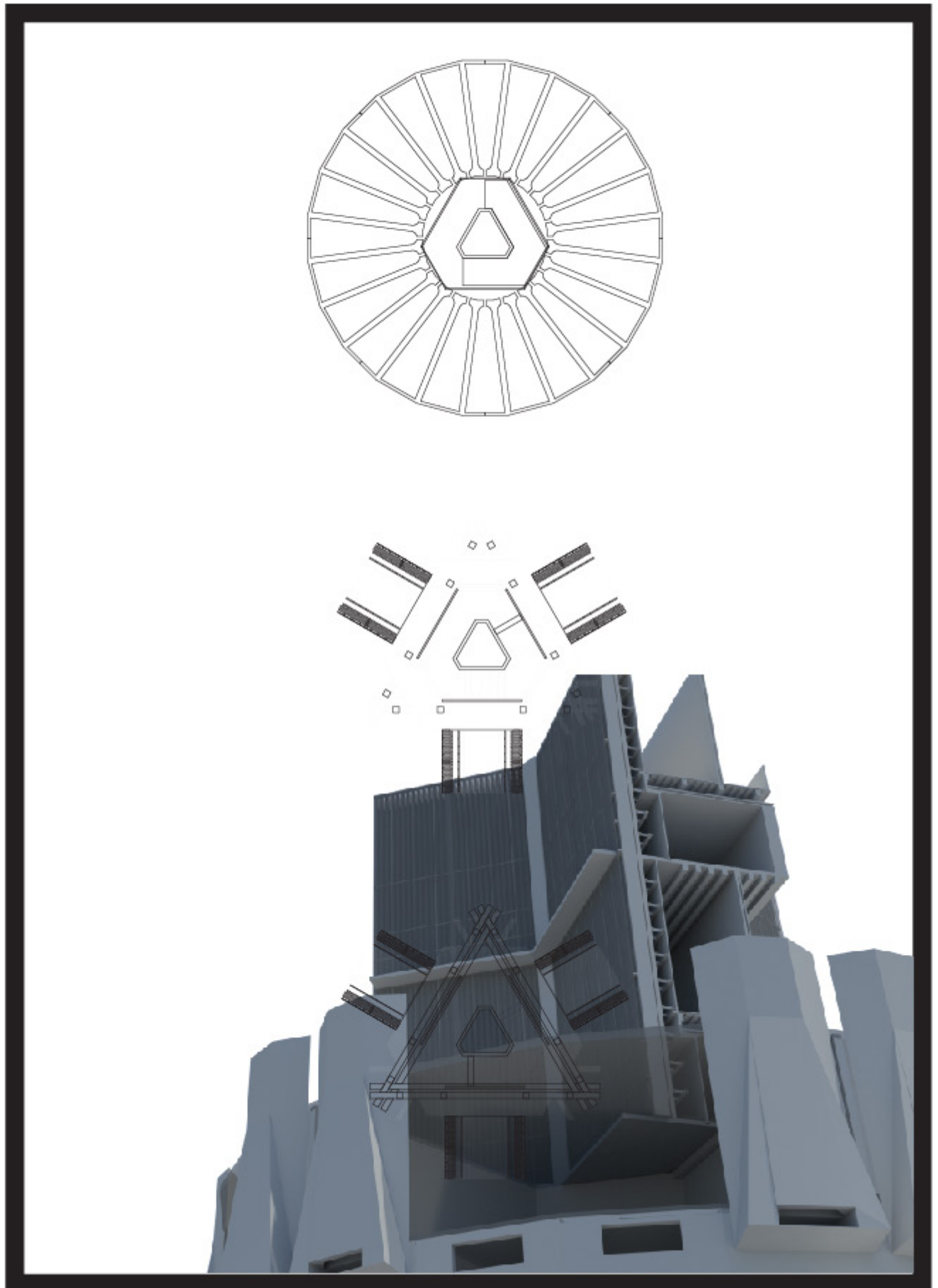
Fig 4.08   Macro Scale (Core) Image - Plan Component Section (Preliminary)
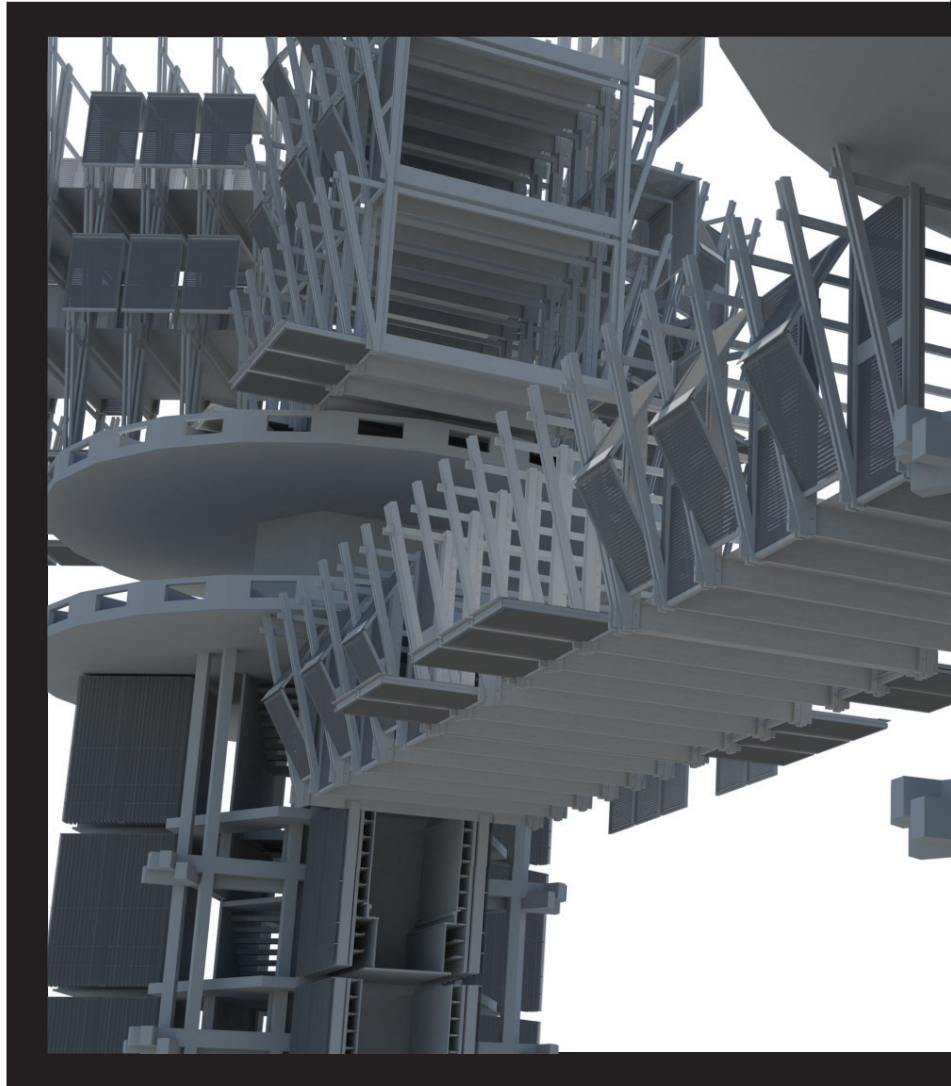
Fig 4.10.   Macro Core Design Image - Structural Connections and permeable spaces (Tri-Directional and Hexi-Directional)
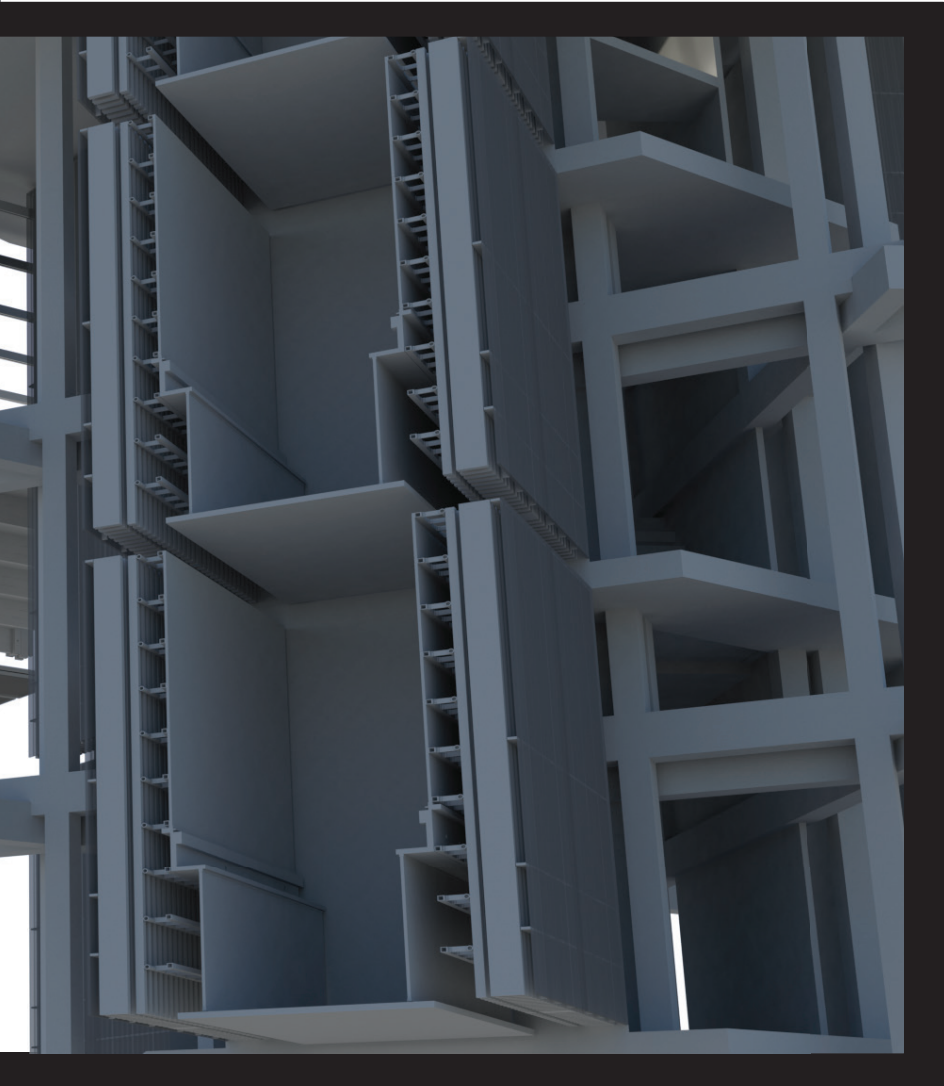
CHAPTER FIVE
Developed Design
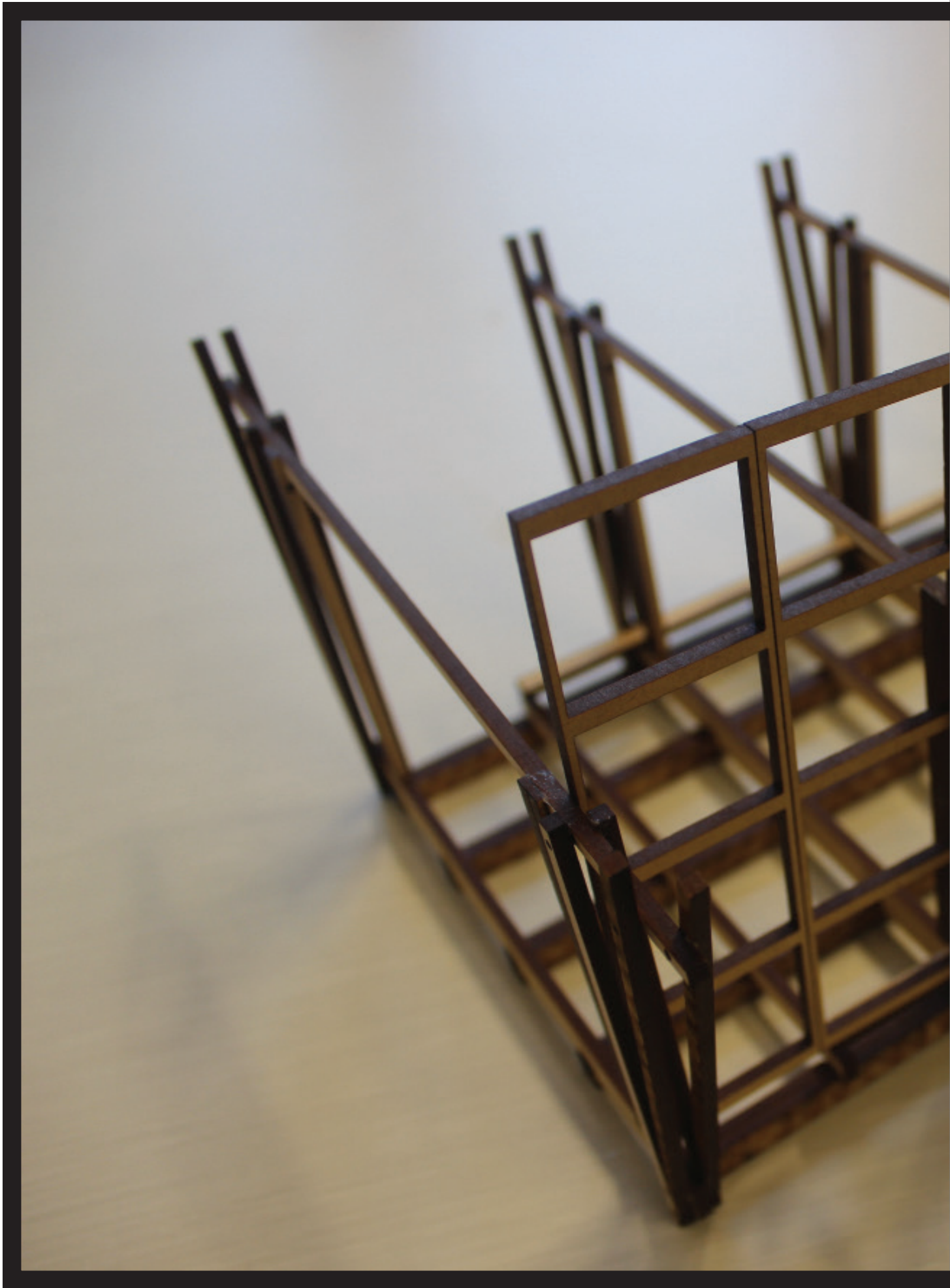
Fig 5.00.   Structural Model (MDF) - 'Fang' component pieces and organisation; Assembly Test
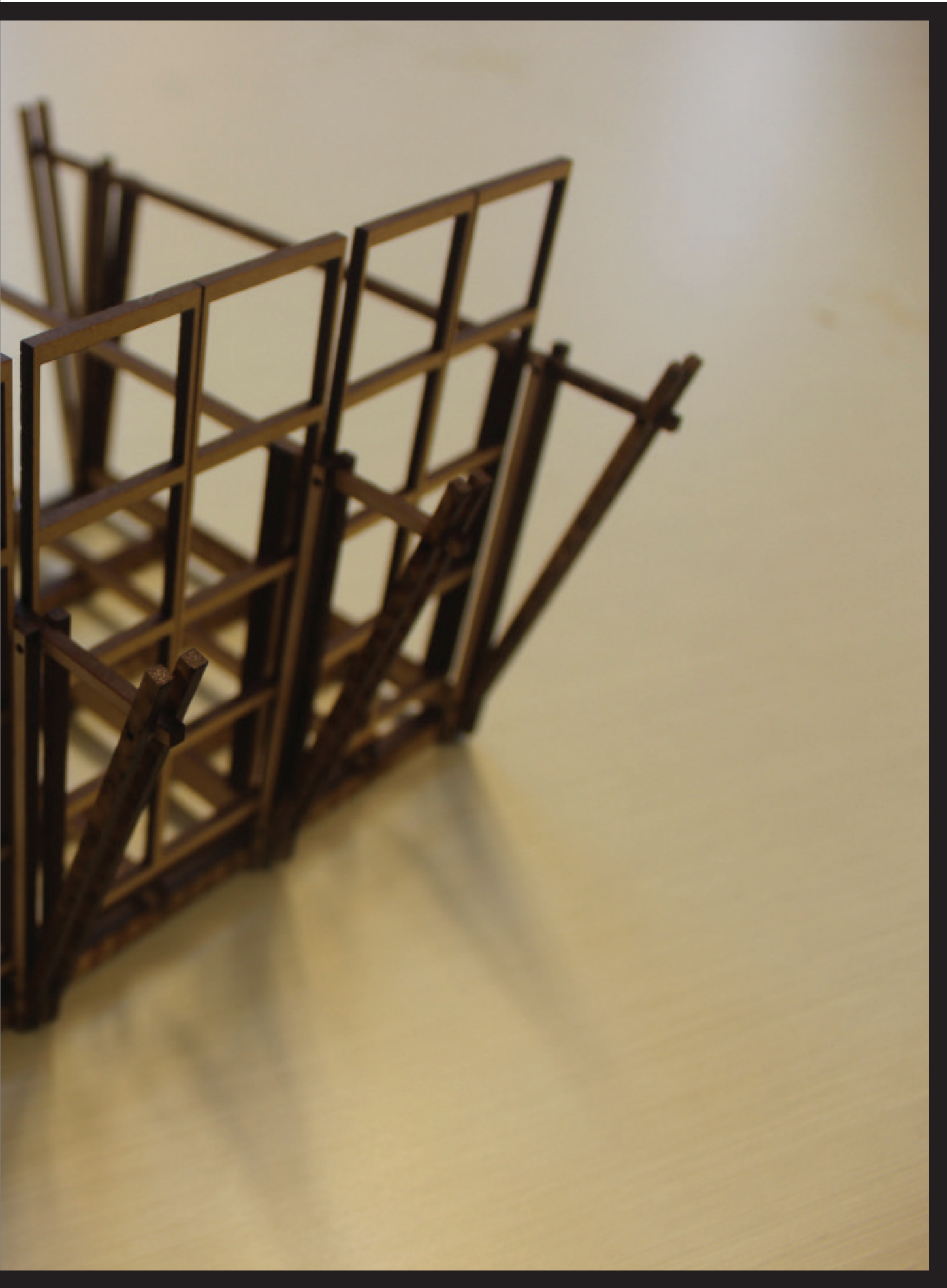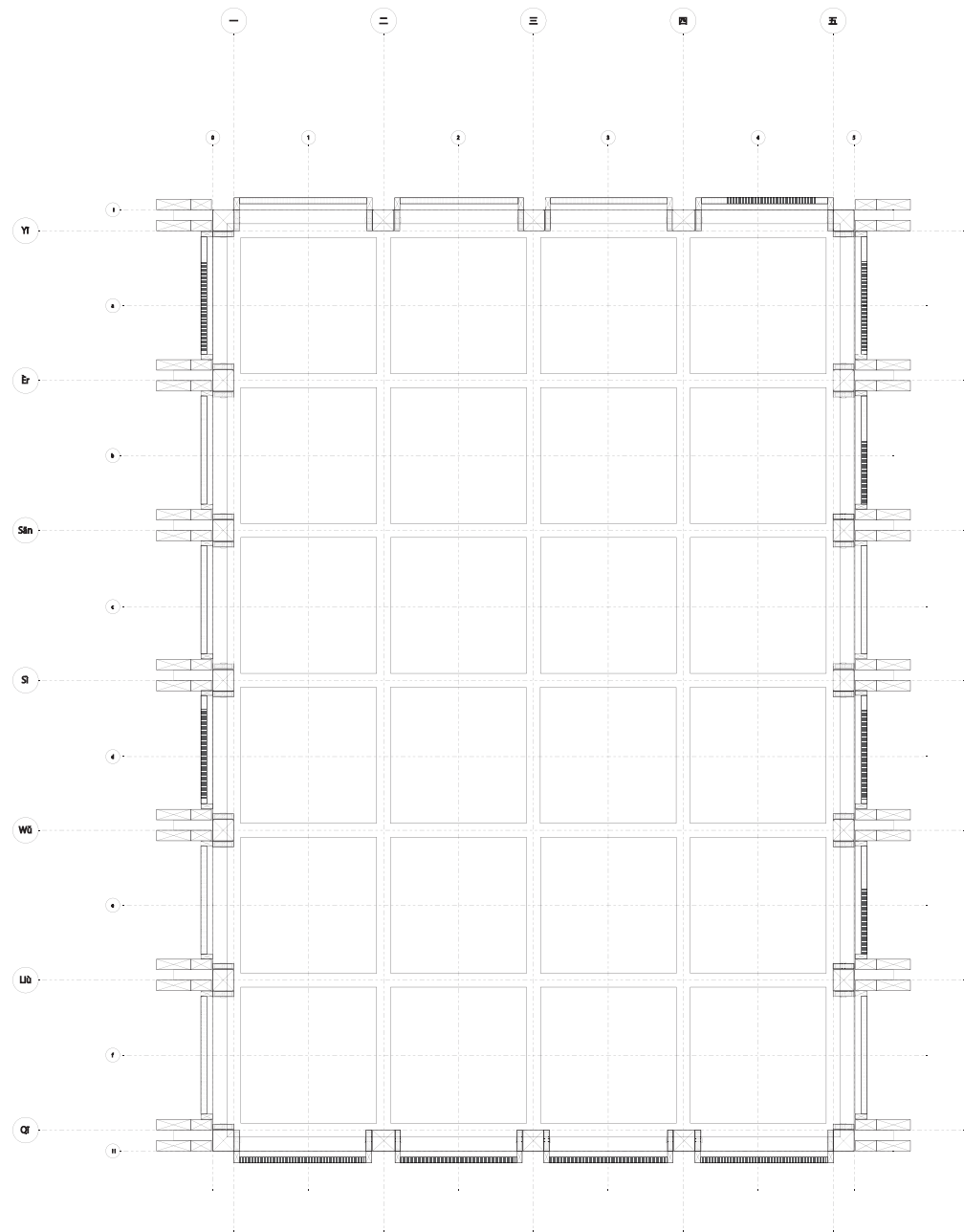
Fig 5.01.   Timber Frame Unit Construction - Double support structure
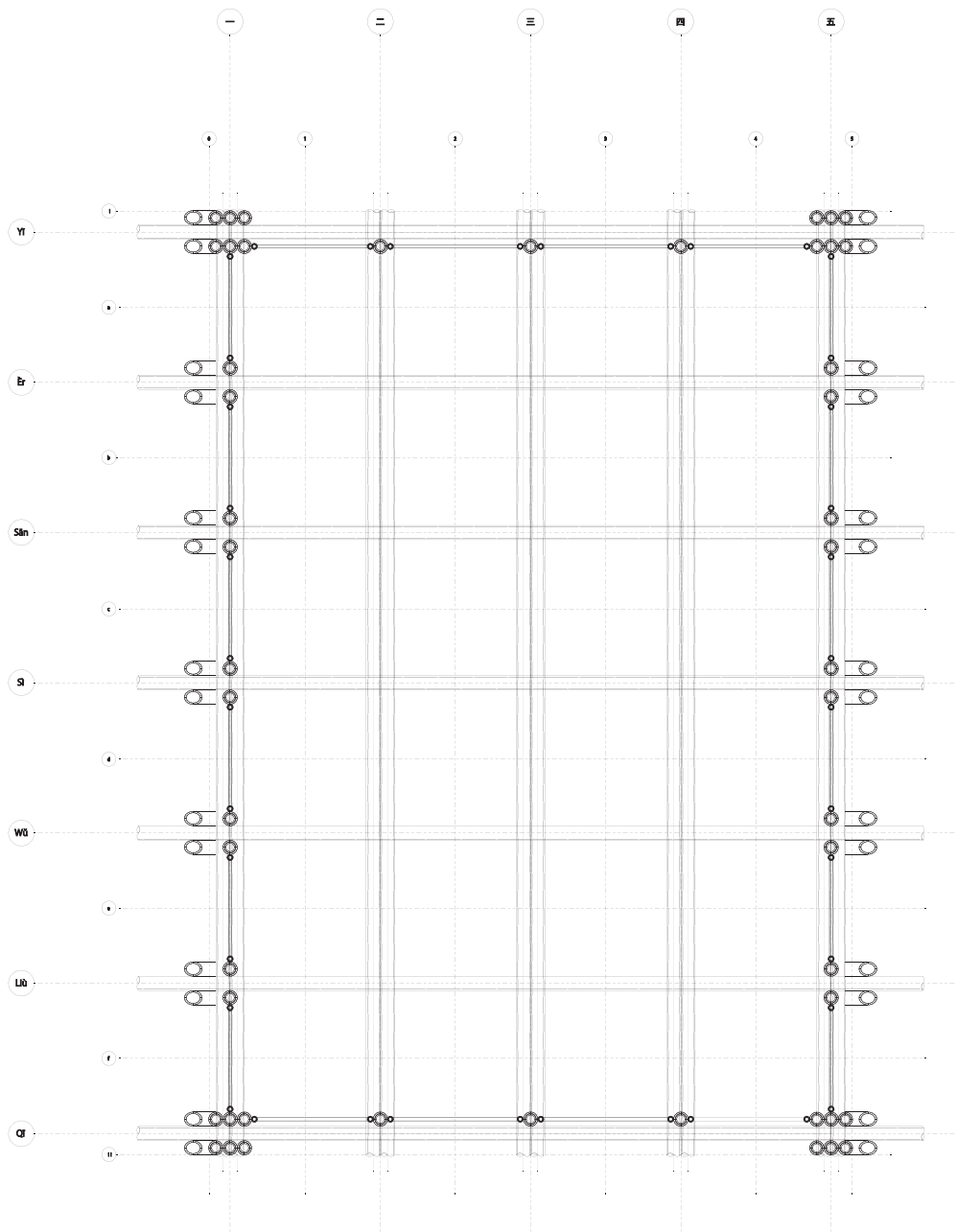
Fig 5.02.   Bamboo Frame Unit Construction - Multiple support structure

Design Implementation

Developed Design

Utlitity

Traditional Chinese Architecture (Explored in Chapter 3), follows a series of compositional rules. These directives are both tangible and intangible, with many observed within the Feng Shui art. Sizing orientation and physical characteristics are based on correlative ideational systems, including geometric rationale and signifier based (semiotics) collective consciousness. Consequently, the base unit (Fang) draws much of its core characteristcs from similar explorations and theoretical readings.

A singular unit is separated into 3 structural components, and a cosmetic component; each built from either standardized materials or recycled pieces. These components consist of a floor unit, wall units, a roof unit and facade panels respectively. Each component unit can be modified and repurposed to additional programmes, and can be attached with minor local modification. Based on a grid (4x6), symmetry is maintained while forcing non symmetrical door placement (Chi), while furthermore allowing for minor spatial modification, dependent soley on personal preference or cultural need. Multiple units connected can be spaced at metre intervals to generate dynamic and adaptable spaces and exterior conditions.

Roofing units and flooring components are interchangable to allow for stacking and vernacular urban typologies to expand from a singular 'cell'. The intercgangable nature of each component within a given unit allows for natural (metabolic) evolution and progression within a city / community context, positioning the occupant and the wider community in control of the development of their particular environment. Furthermore, any organisational system; irrespective of philosophical thought can be created should the circumstance change.

☐   *Modularity*

The part to part modularity permeates all aspects of the unit, with each component from each section of the building sized to availability. The design follows the notion of interchangeabilty through to materiality, suggesting the use of bamboo (widely available in China and Nanjing) as a suitable exchange for timber. While the details of the design change due to bamboo fixing techniques, the overarching framework is the same, allowing for non-identified materiality modification. Bamboo utility within China is wide spread, with well documented lashing and fixing techniques (similar to those in South East Asia) are available and

within local knowledge. Furthermore, all components of a unit can be stripped back to facilitate changing function, such as is noted in the Kang and Tang systems.

☐ *Construction*

Additionally to all recycled and widely available materials, floatation devices are included. Each unit is design to accommodate dry and wet seasons, with extremes (3- 5m) water rise. The flooring structure is comprised of the grid base with a structural frame beneath, with storage and attachment possibilities, however, the space beneath the flooring is compatible with 55L Plastic Drums (air), maximising at a total of 24 (with additional attachment), or 16 self contained. Due to the lattice flooring (grid), sub floor structures are accessible from within, allowing for adaptable storage or barrell maintance.

Design

Fang

The first Design Unit, focused on the program of a self contained singular unit (primarily housing), but inclusive of vendor and any occupant programming, consists of a single flooring unit, a standard (full) wall unit set, an angular roofing unit (designed for solar panels and water collection), and a standard (full) panel set.
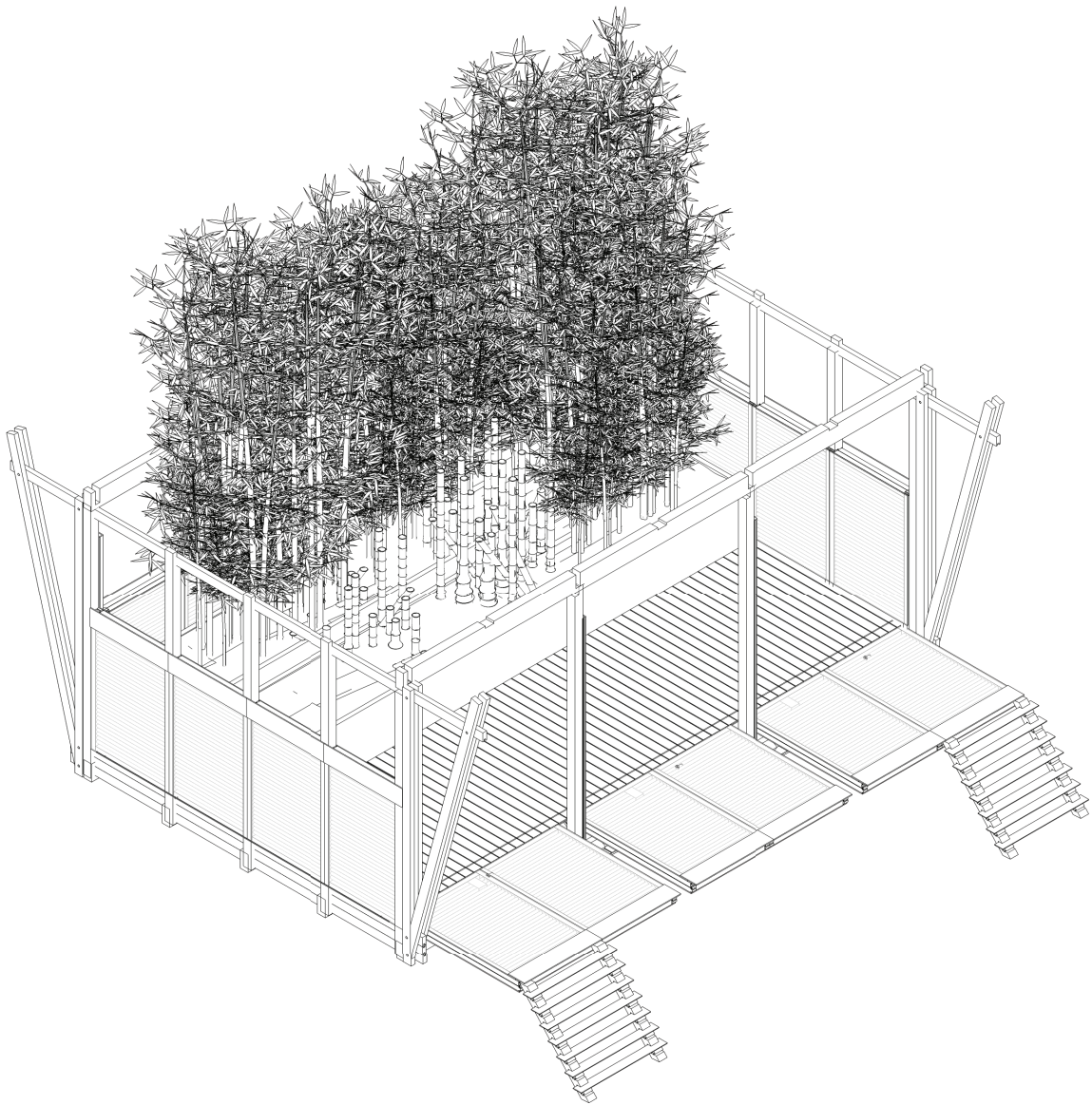
Kang

The second Design Unit, focused on secondary or ancillary programs; such as farming units and community space, allows for spacing and routes to be generated between established units as well as smaller light weight additions. It consists of a single flooring unit, a reduced wall unit set (half) and a standard (full) panel set. Within Chinese architectural rhetoric, the concept of the home is directly related to the holistic view of unity. The House and the Garden are co-dependent, with neither existing (theoretically) without the other. The Kang Unit scheme allows for the generation of this 'home' while minimising waste and space pollution.

Tang

The third Design Unit, in addition to the programmatic use of the Kang Unit, focuses on spatial maintainance. Infrastructure, both human and service based, require connection produced by these units. It consists of a single flooring unit,

which is primarily expected to be used as roading infrastructure, pathways and open spaces (possible markets and community outdoor meeting areas); however, as a single unit, it can be attached for any necessary programme or used as barge during extreme conditions for movement and maintainance.
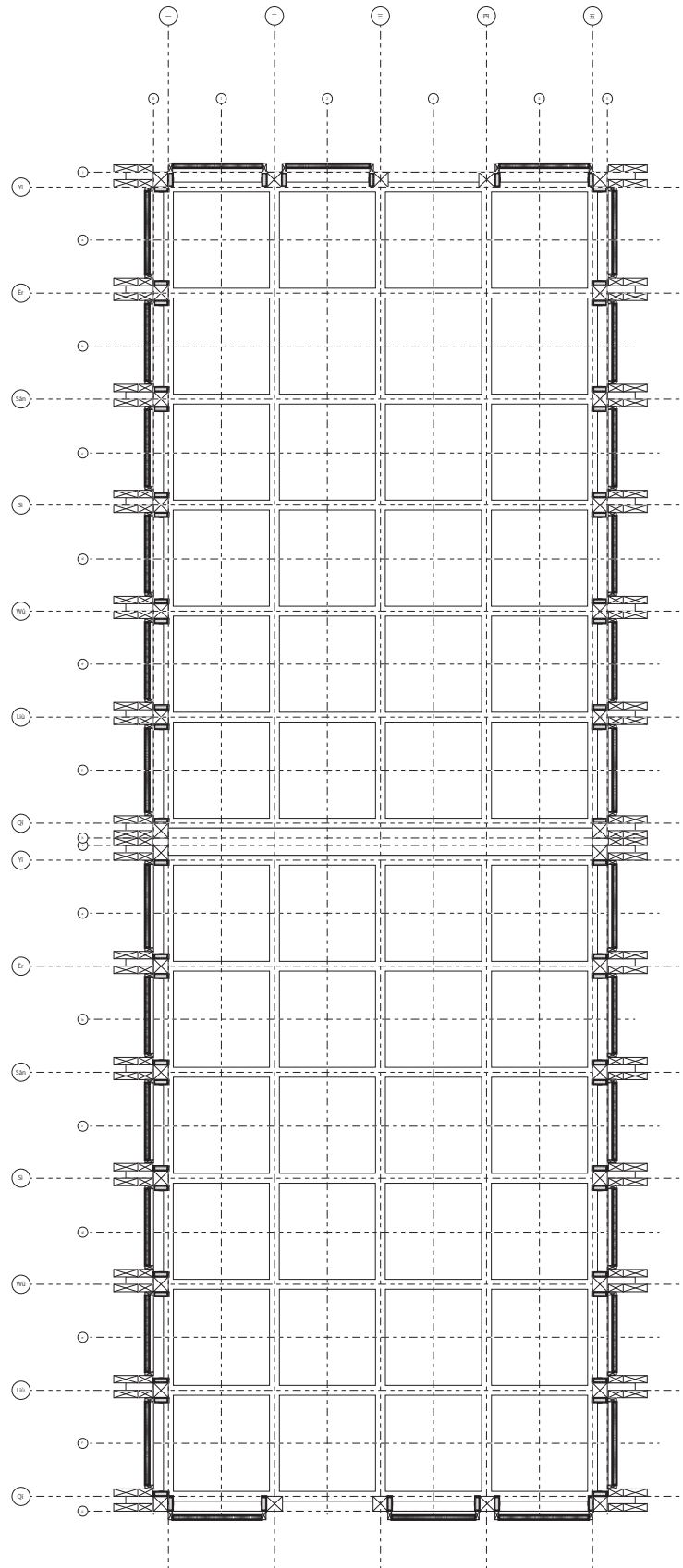
Kang Unit (Constructed)

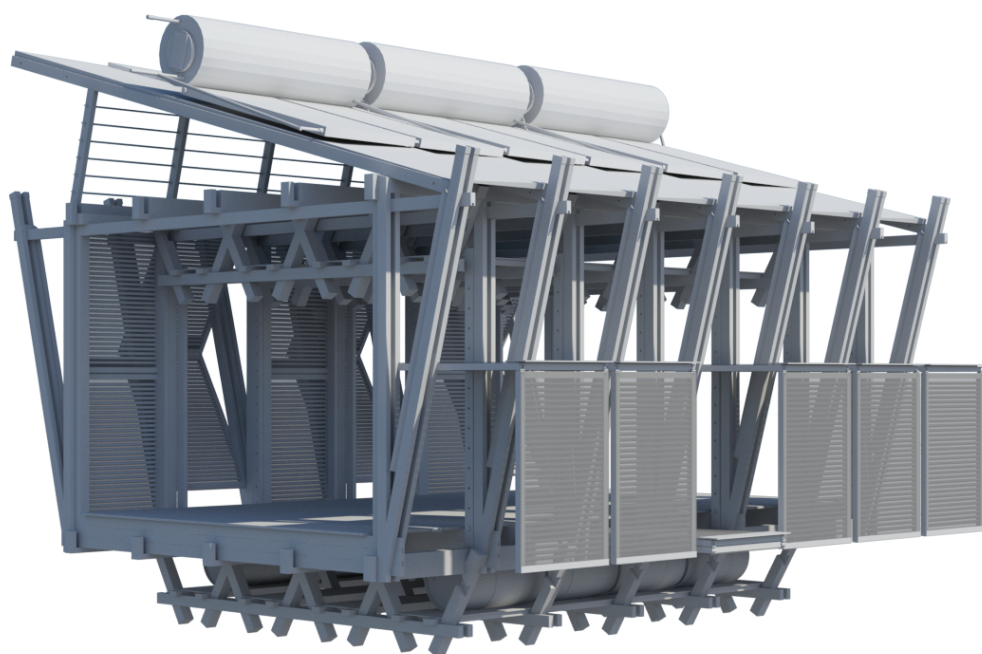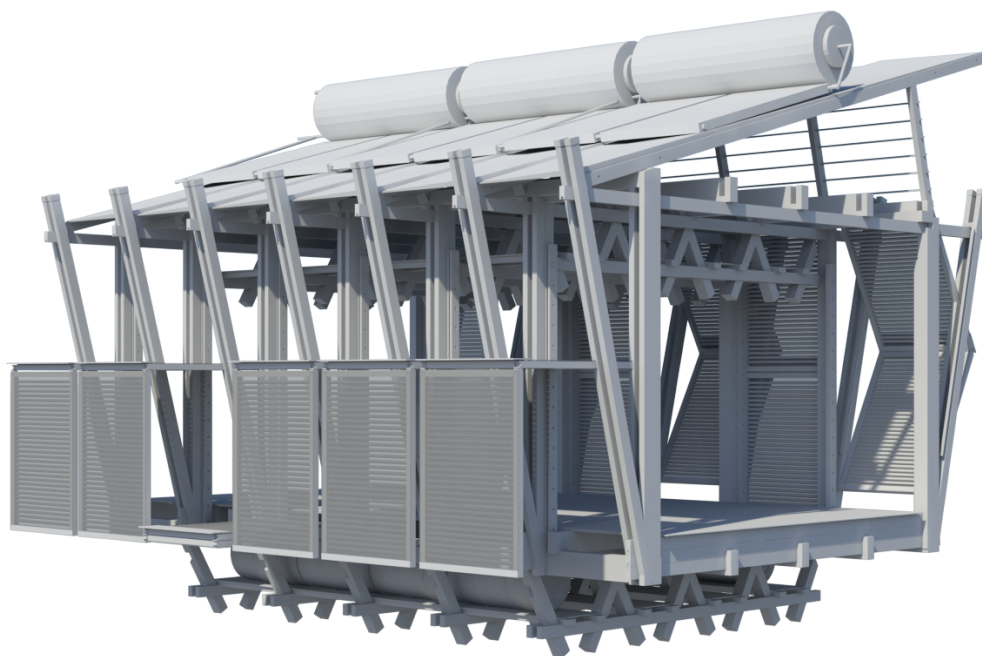Fig 5.05a. Indication of Possible Additive Design - Linear Attachment

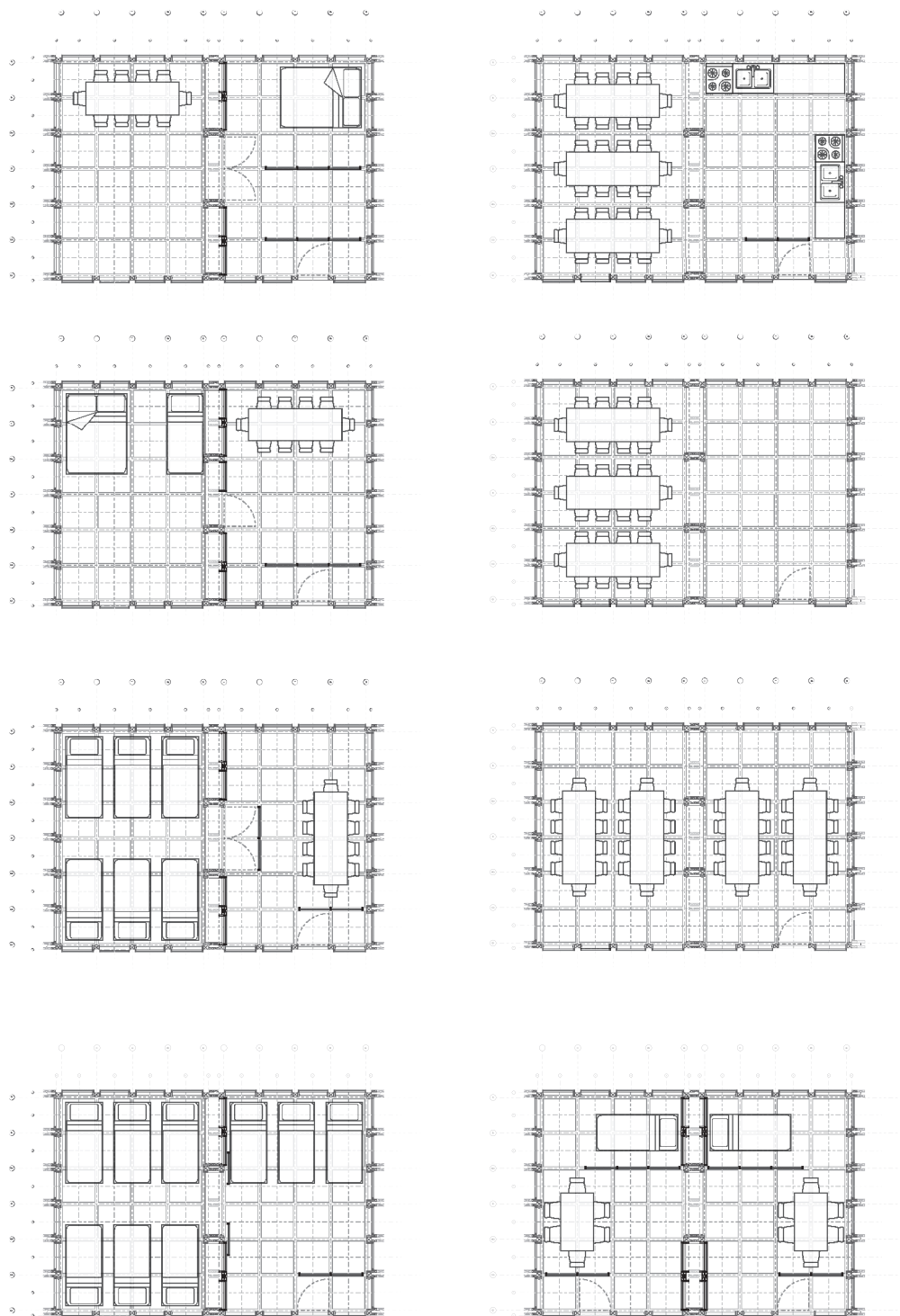Fig 5.05b. Clay Render - Structural Image (Indication of Solar Panel Use) - 55L Barrels

Fig 5.05c. Possible Organisation Interiors

3 Line Composition

- Separate 'Heaven' and 'Earth' - Division of space (paper is important)
- Begins with a 'Host Stroke'; a dominant feature
- Then add a 'Supporting (Guest) Stroke'; small weaker etc...follows the Host Stroke
- Finally add a 'Turning Stroke'; changes direction, but not too intensely
- Then add more with similar consideration as first three strokes = "Perfect Simplicity"
- Separating the space with each stroke inherently splits heaven and earth
- Each stroke invokes chi within the space it inhabits
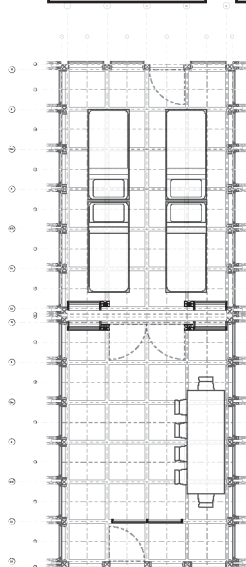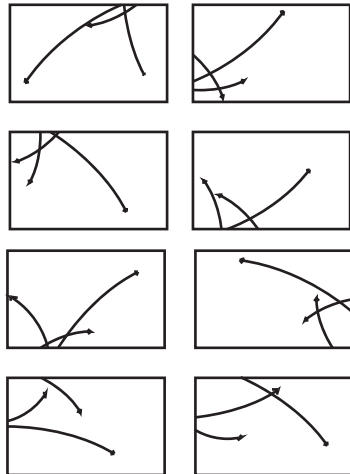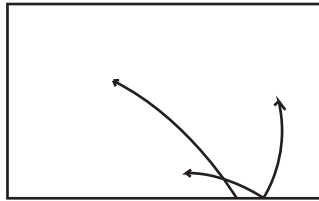
RULES

2 Line Composition

- There should be a dominant direction of movement.
- One "Long", one "Short"
- One "Big", one "Small"
- One "More", one "Less"
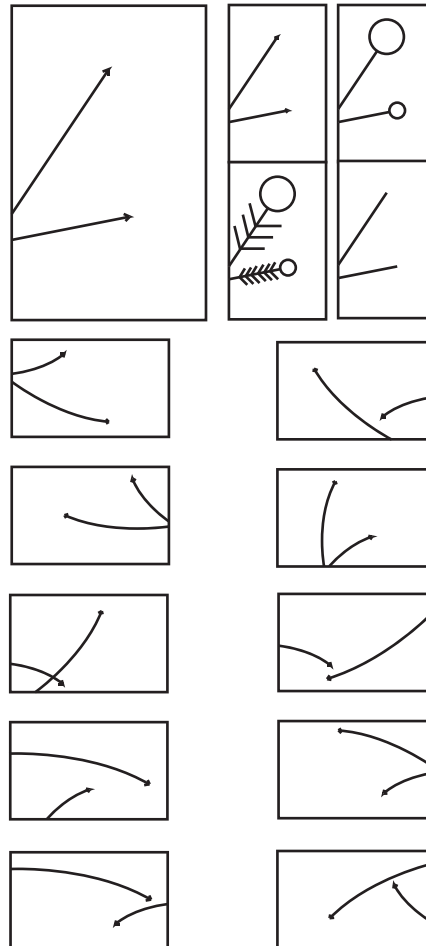- One "vertical", one "Horizontal" - Not perfectly Horizontal or Vertical

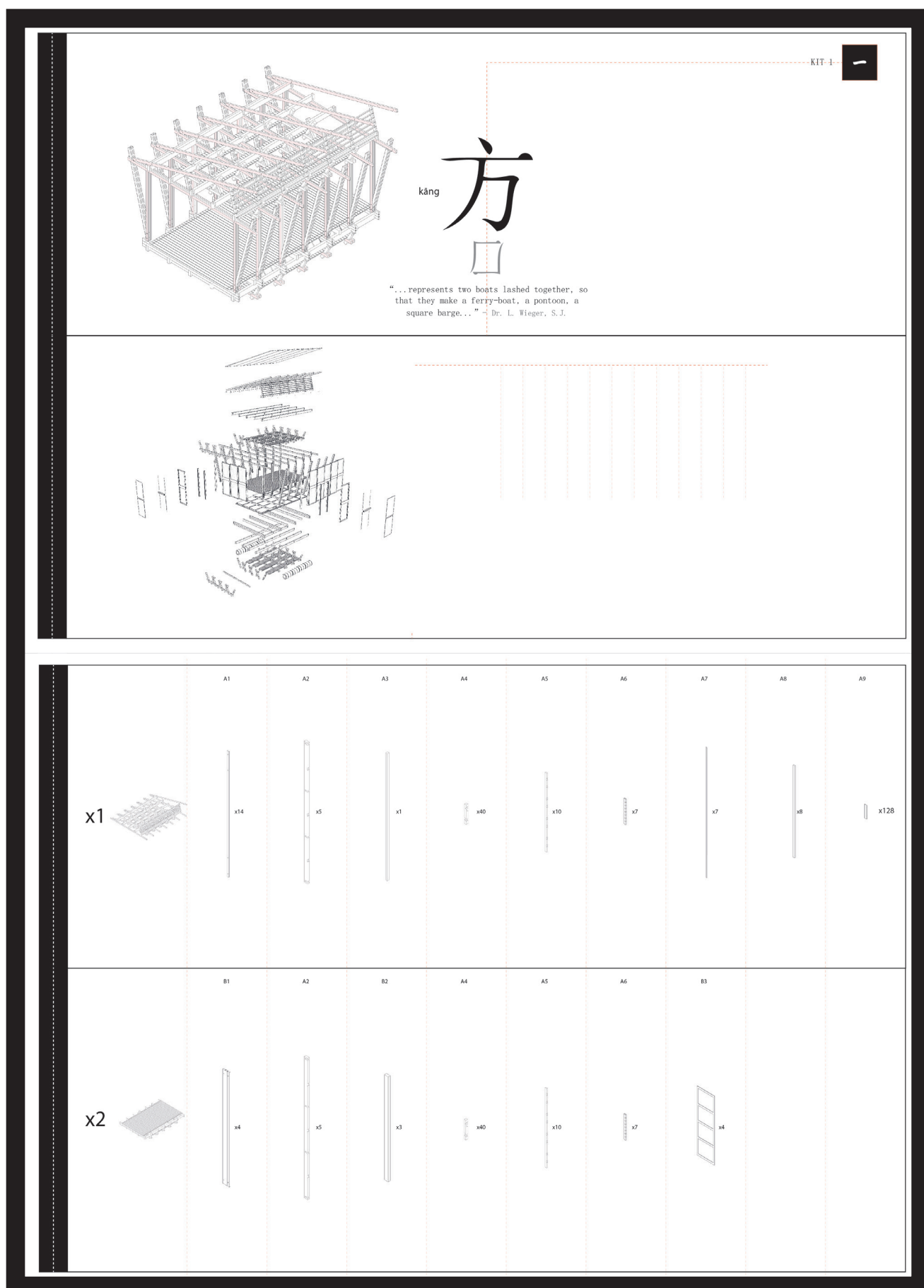Fig 5.0d.   Painting and Two (2) Dimensional Composition

kāng 方

口

"...represents two boats lashed together, so
that they make a ferry-boat, a pontoon, a
square barge... " ¬ Dr. L. Wieger, S.J.

	A1	A2	A3	A4	A5	A6	A7	A8	A9
x1	x14	x5	x1	x40	x10	x7	x7	x8	x128

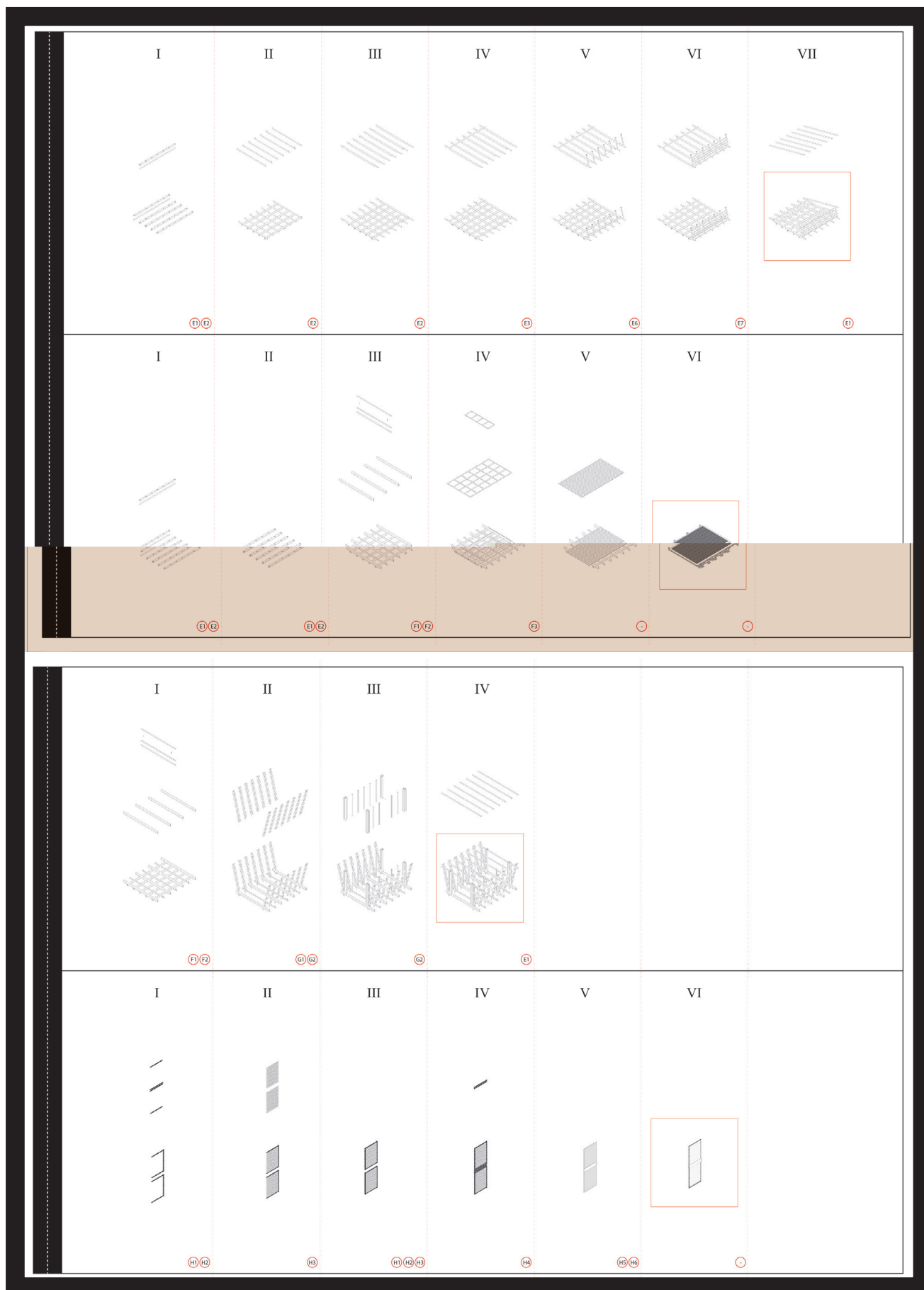|	B1	A2	B2	A4	A5	A6	B3
x2	x4	x5	x3	x40	x10	x7	x4

Fig 5.06a. Construction Manual Produced For Presentation - Simplified Construction Technique (Dougong)

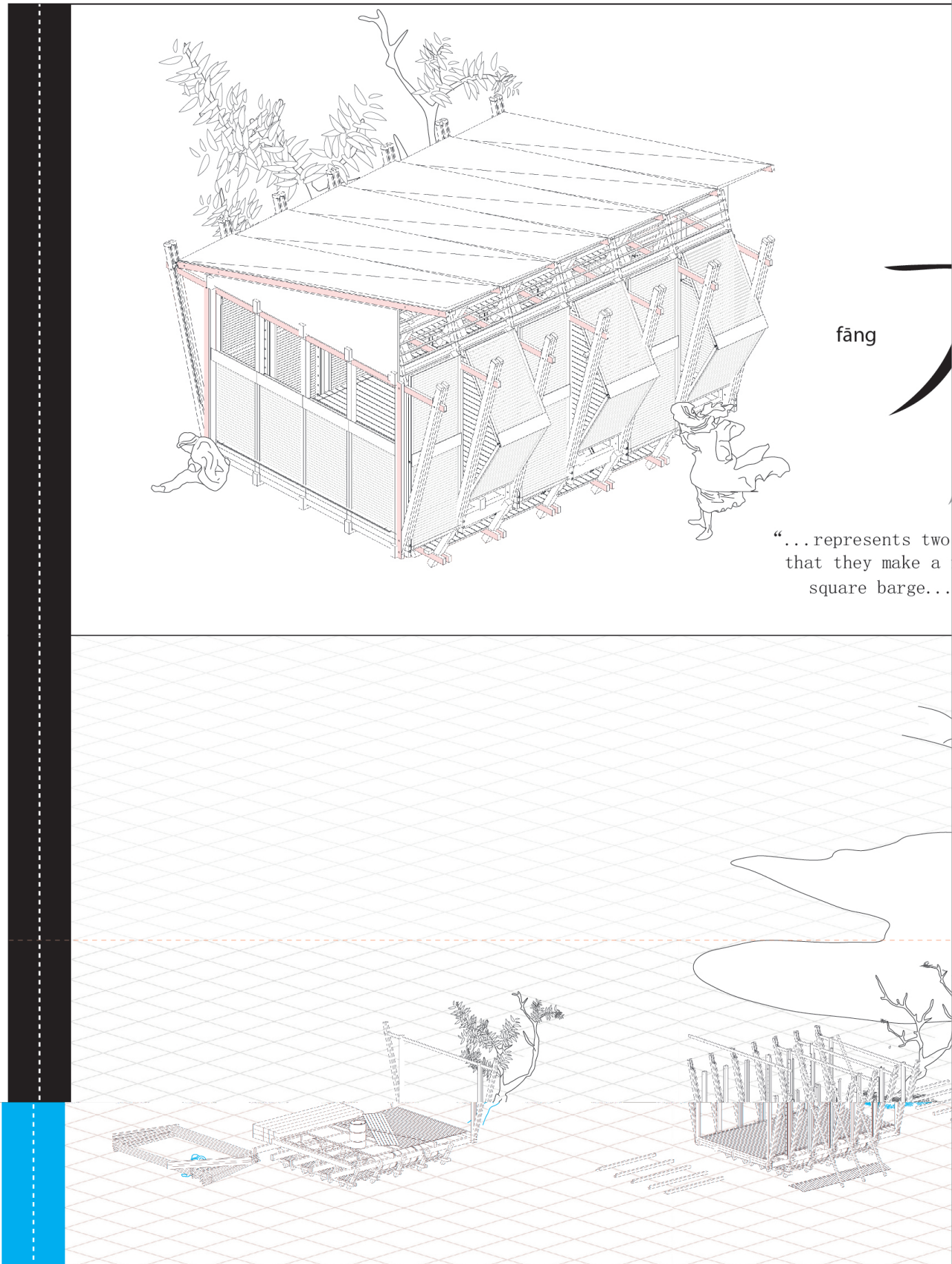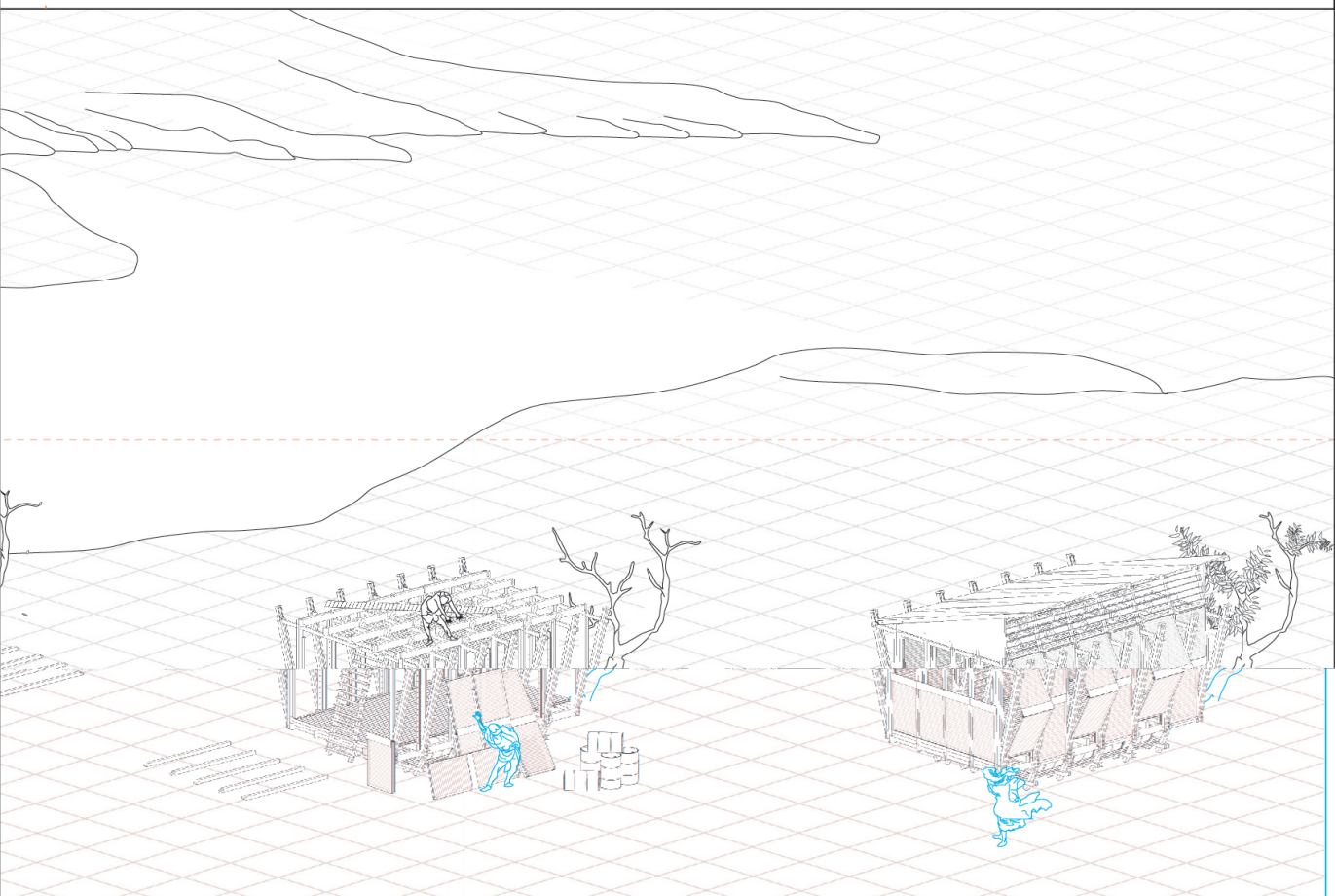Fig 5.06b. Construction Manual Produced For Presentation - Simplified Construction Technique (Dougong)

fāng

"...represents two
that they make a
square barge..."

Fig 5.06c. Unit Construction Diagram - Community Based Construction (Fang Unit)

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boats lashed together, so
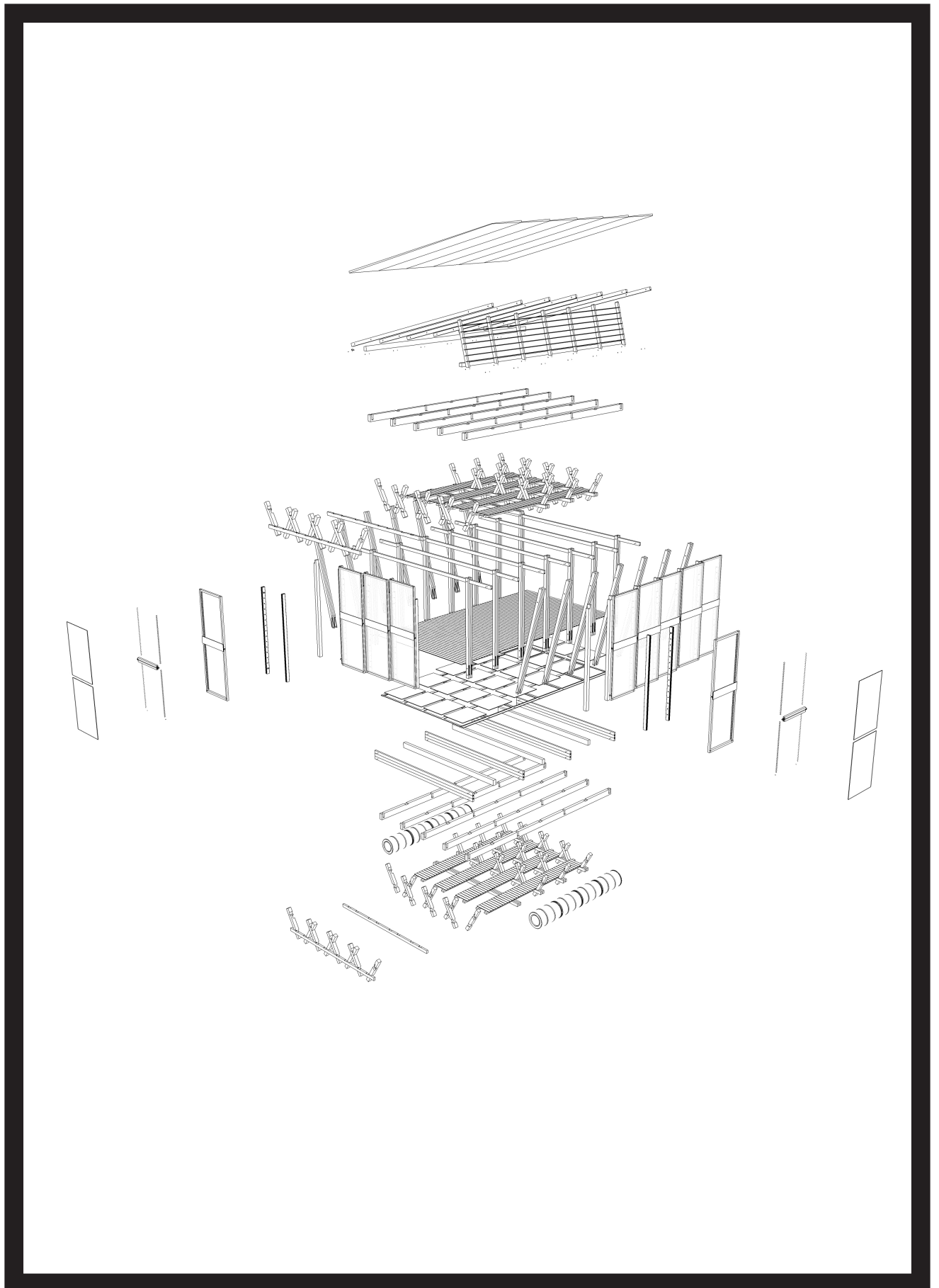ferry-boat, a pontoon, a
" - Dr. L. Wieger, S.J.

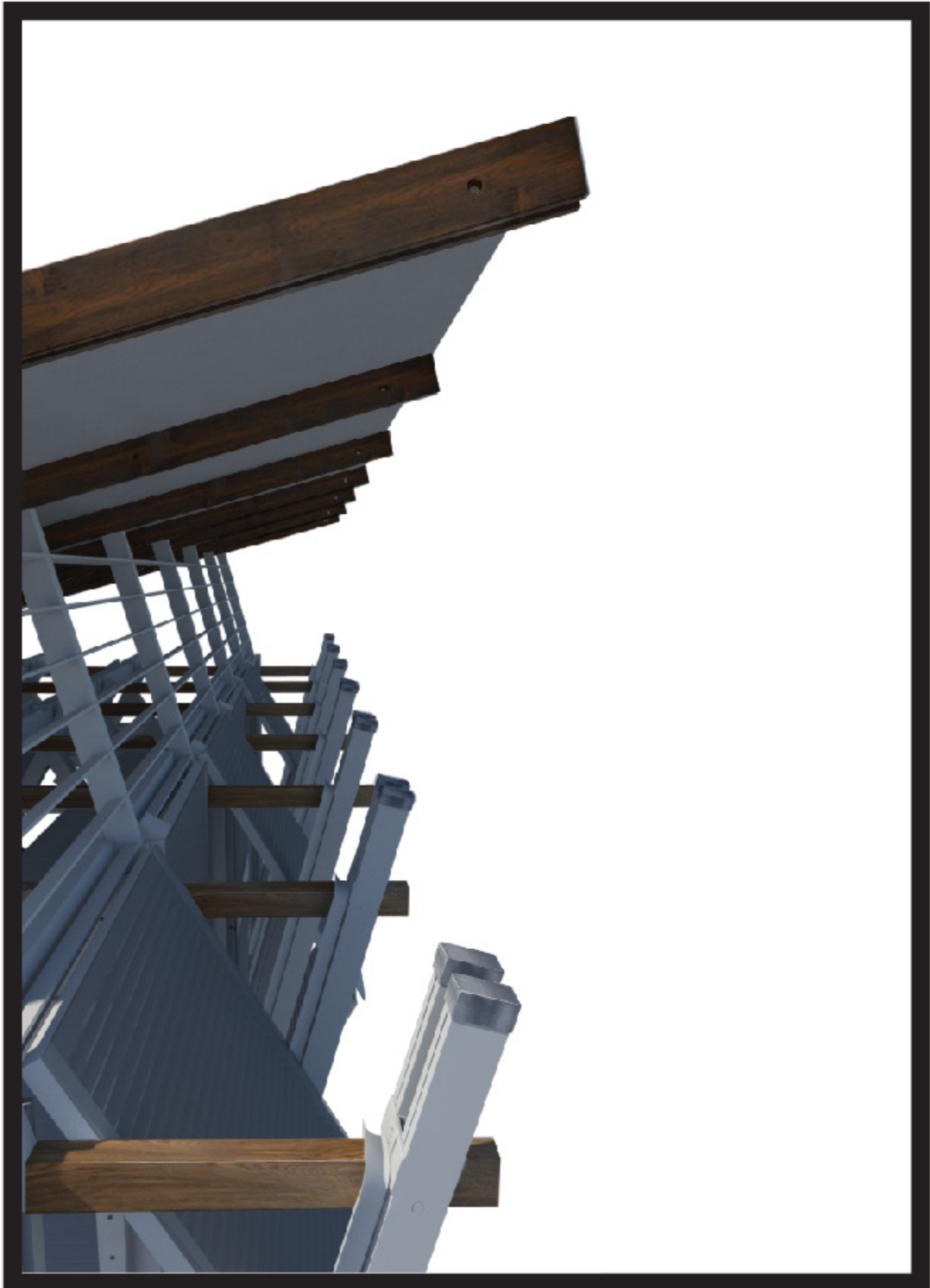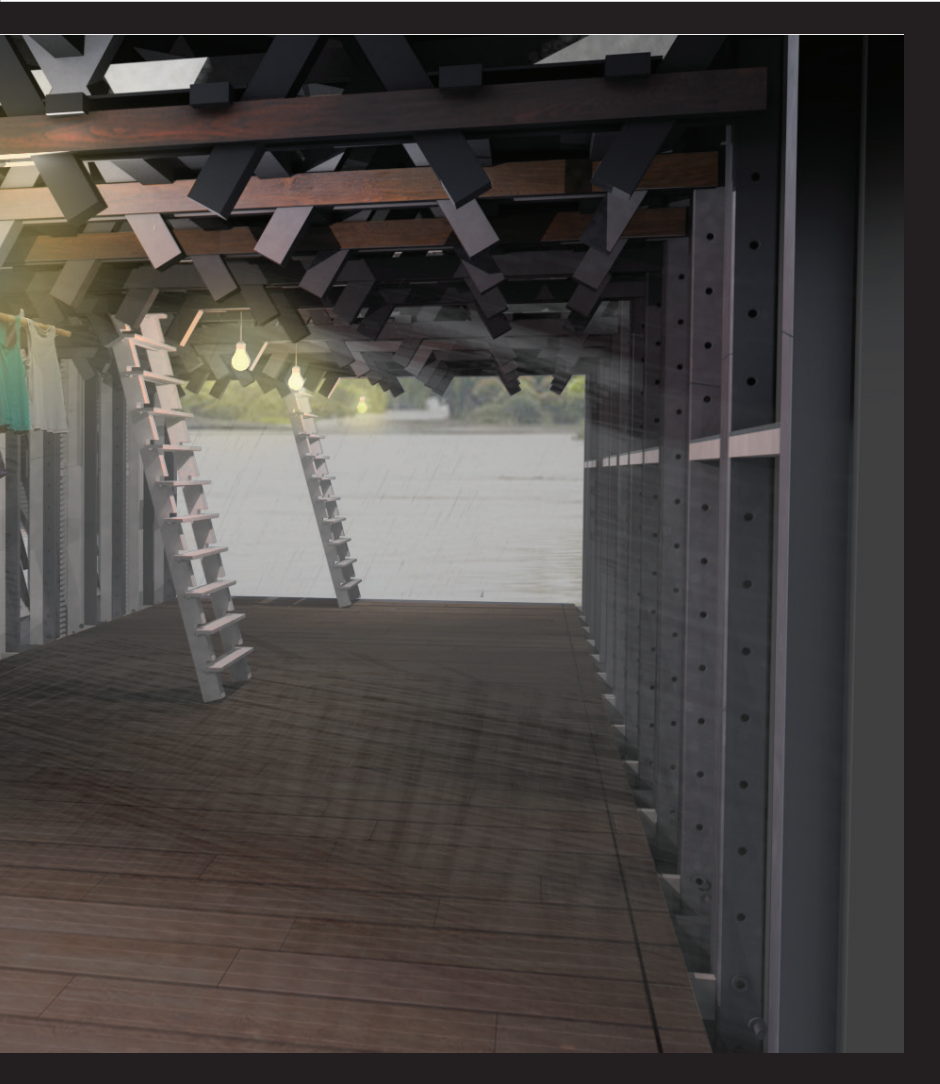Fig. 5.07a   Exploded Timber Unit (Orthographic)

Fig 5.07.   Roofing and Structure Detail - Timber Unit Construction

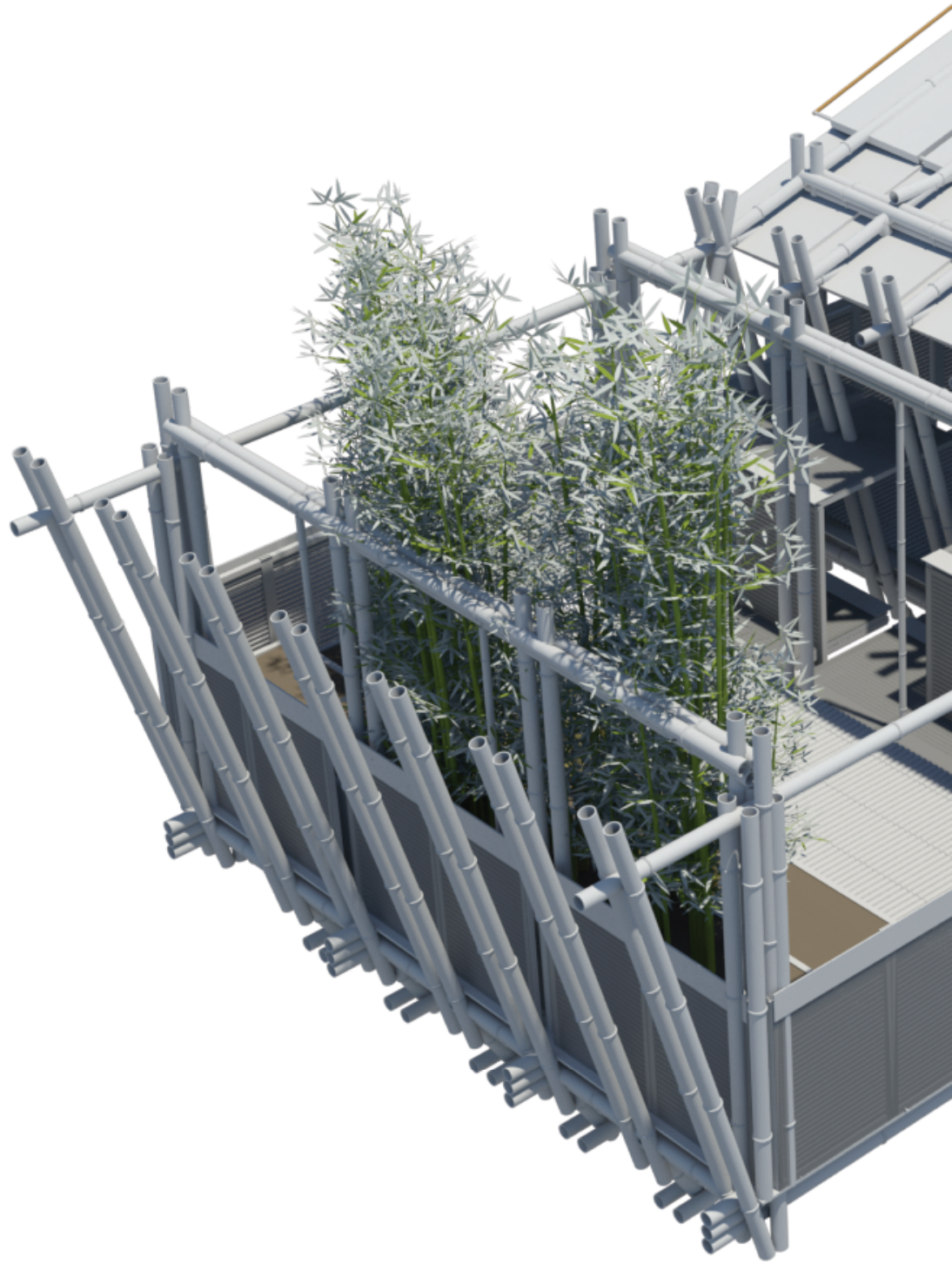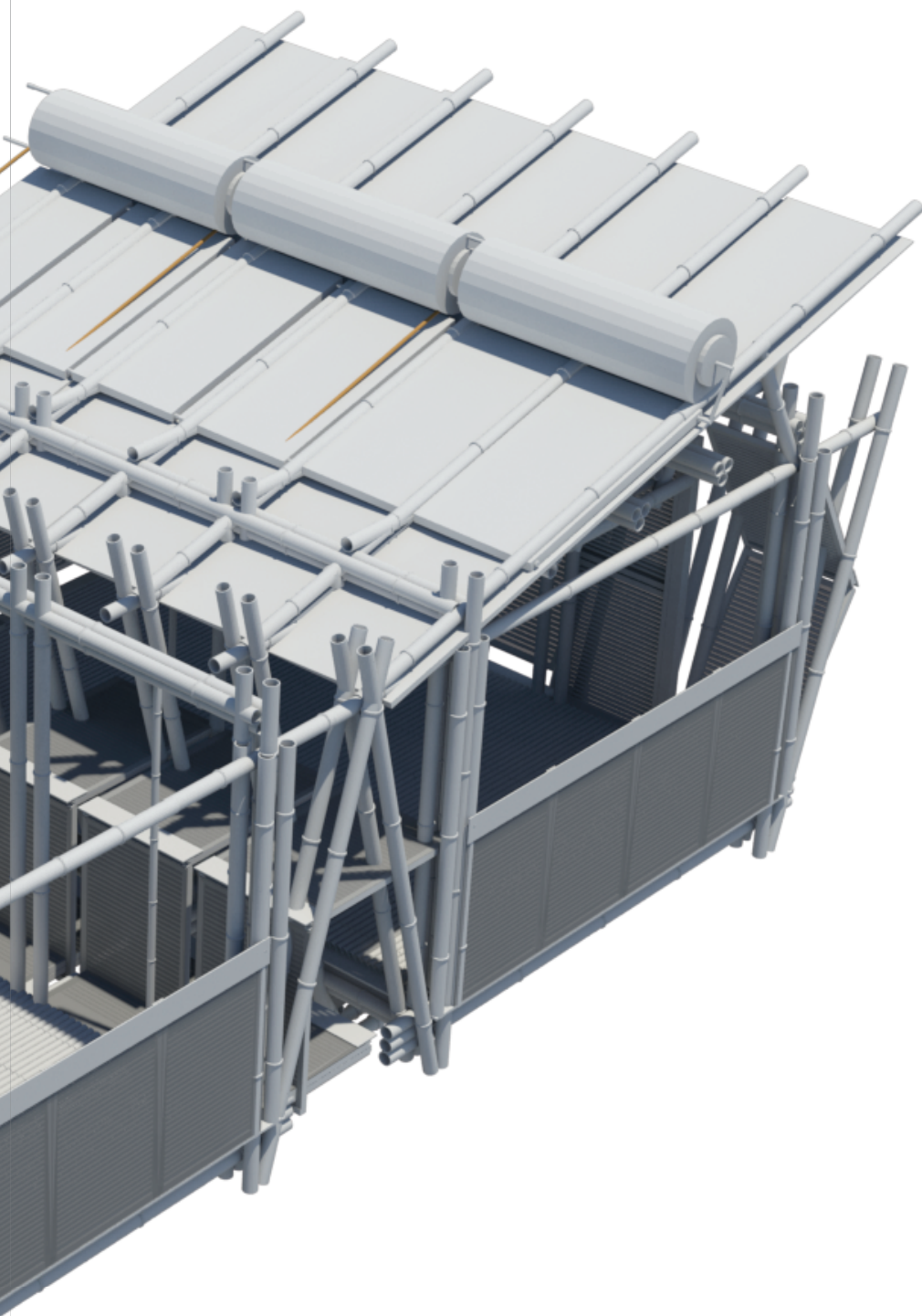Fig 5.08a   Interior (Empty) - Multiple Unit Attached

Fig 5.08. Bamboo Construction Unit - Base Sturctural Elements used for multiple programs (Bamboo growth depicted for natural urban expansion)

CHAPTER SIX
Reflection and Conclusion

6.0 ◻

Chabrowe's text, in conjunction with Greene's work, produces a diverging and binary polemic in Architectural discourse. The physical state of architecture is challenged and put forward as either a permanent or temporary causality, subsequently applying a particular agency upon the outcome. The discussion of Chinese and 'Other' philosophical ideals and dogmas posits a counter to this, and proposes a holistic approach to architectural dialogue as well as design research. The notion of the 'temporal'; occupying multiple states, demonstrates the inclusive approach outlined, and seeks to expand on the methodology incorporated within research and work within the realm of the other, and in this case; a particular emphasis on Asia and China. The inclusion of the metaphysical within the traditionally physical practice of design adds a secondary complex layer of data and consideration, and allows for innovative solutions that attempt to rationalise two disparate socio-cultural systems.

Core to this work is the fundamental notion of 'comprehensive understanding'; the attempt to determine and analyse underlying factors, ideas and beliefs that are intrinsically linked to the evolution of culture and design. The rigor with which it is necessary to grasp historical moments and cultural convictions within thousands of years of developed and complex history, suggests the importance of an approach willing to entertain and acknowledge the 'intangible' in conjunction with the 'tangible'.

This divergence in approach, with a particular emphasis on disaster mitigation design produced a binary research framework, which in part, is predicated on the opposing agencies. The complex rationalisation of these allowed for an in-depth and an unconventional outcome, which draws heavily from Chinese cultural practices. The incorporation of Feng Shui, and it's own binary condition further intimates the attention given to central ideas; however, the resaerch done into the origin of these ideas and subtle assertions and beliefs found within traditional texts allows for an at times wider, and conversely more concise and particular understanding of the evolution of the culture as well as the design outcome expressed. Furthermore, the paradigmatic shift apparent in presentation and representation as both a physical and non-physical causality, within the work, attempts to test these unerlying assertions and forces a particular non-traditonal perspective. The analysis of two (2) dimensional space and composition, as well as three (3) dimensional programming, indicates the holistic nature of Chinese thinking and design, which is explored within presentation organisation and a differing representational medium (refer to Appendix iii).
The complex nature of a research work with such a methodology, produces a neccessity to limit and curate the scope of the design and outcome, subsequently much of the research can not be effectively expressed; however, the wider cultural and philosophical research is apparent within the text and imagery itself. A limitation in scope for the work would focus the research field but in turn limit the process, of which is central, and reduce the implications and conclusions drawn from the method.

The binary nature of the design outcomes expressed within the work, are moreover, reiterations of the notion of extended scope. Investigations into single units (Fang) as well as macro scale structures intended to posit new urban typologies, generating a diverging directionality. This duality in architectural discourse communicates, both the tangible and intangible concepts proposed at the beginning of the text, and indicate differing focuses. The Micro Scale attempts to rationalise and signify architecture, as a result, applying 'tangible' agency, while the Macro Scale seeks to open a dialogue about the 'intangible'; drawing from the Japanese Metabolists Group Form. Each design outcome proposes a vast and compelling possibility for extension and subsequently requires focus.
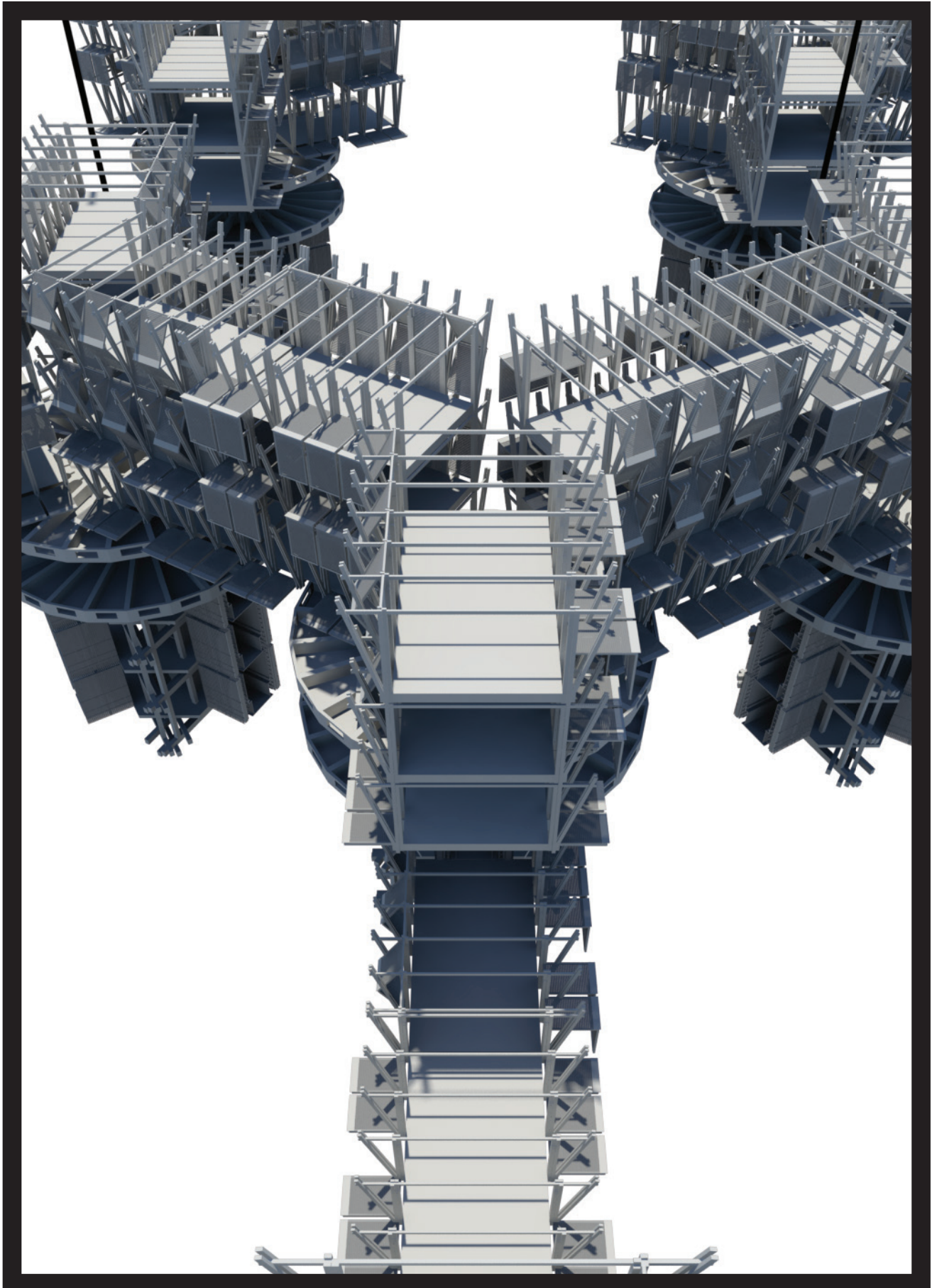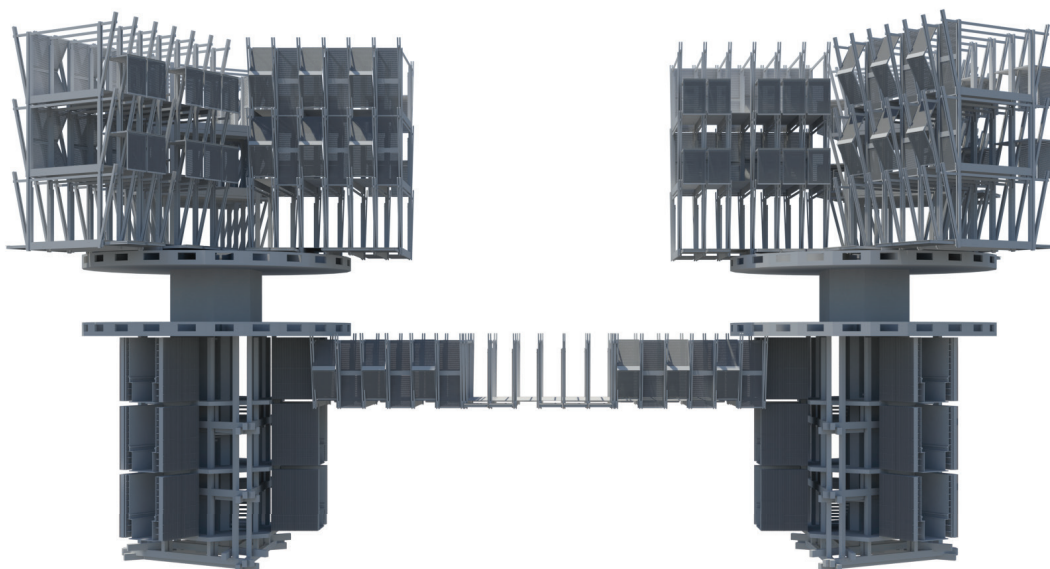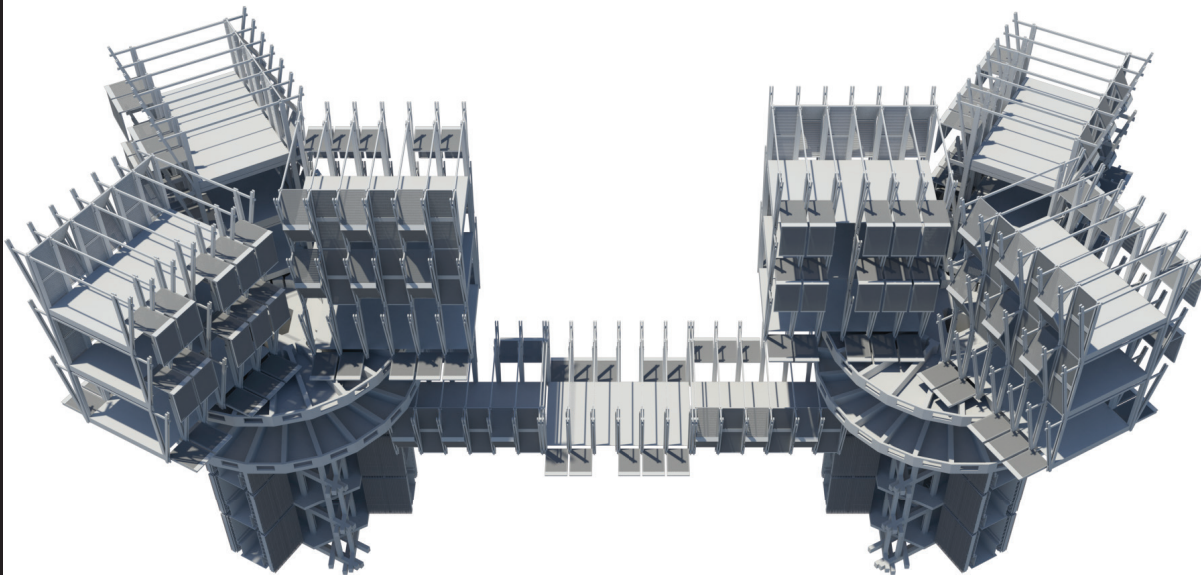
Fig. 7.01F   Macro Design Structure

ig. 7.021   acro Design Structure (angles)

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APPENDICES
Additional Research

7.1 ◻ **Appendix i**

The complex nature of Chinese culture, history and society necessitates an indepth exploration and analysis of varying disciplines. The fundamental concepts and dogmas within the Chinese society expand beyond architectural design and permeate all aspects of the percieved environment. Many of these aspects are the foundation of understanding and practice within the architectural discipline and must t herefore be analysed, internalized and expressed.

Discussions within this appendix will encompass additional concepts and research undertaken in the attempt to gain a concise and effective understanding of the wider context as well as design within the 'Other'.

Core to discussions on vernacular architecture and disaster risk communities, is the notion of materiality. The availability of a given material in a disaster s ituation dominates the organisation, design and process by which solutions are produced, and subsequently requires some additional research. Although Bamboo, as stated previous remains a secondary structural material within China, its utility and cultural significance is important

The relative strength of bamboo is similar to that of steel, with a significant flexibility. This allows for innovation with regards to form and structure. Although examples of traditional Chinese bamboo construction is limited, examples throughout Asia in general allow an in depth look at the possibilities and indicate a possible additional research direction.

Green School: Bali

The Bali Green School bamboo construction indicates a distinct polemic in materiality choice and structural capability. The building encompasses a school and additional teaching programmes, with many focusing on bamboo utility. It must be noted that this design was aided by the input of the local community, who were involved in the collection and construction of the school. The community based and lead design process is of importance as it indicates the community's willingness to partake in the shaping of their environment and space.

Sharma Springs: Bali

In addition to the Green School, Sharma Springs showcases a similar polemic. However, it must be noted that the program of the building (get away), is more focused towards tourists. Tourism is a significant part of the Bali community's income, though it indicates a separation from community based design that benefits the community through physical causality.

Low Cost House: Vietnam

Availability and cost of bamboo is a major contributor to its increased use. Many projects, such as this utilise it to generate simple and affordable shelters for people.

Bamboo Micro House Proposal: Hong Kong

Similarly, Hong Kong exhibits a need for low cost, micro houses that can adapt to the circumstances within. The lightweight and ease with which bamboo can be used allows for innovative small space design.

Bamboo Scaffolding: Various

As stated earlier, bamboo construction utility is limited within China, as a Primary Structure. However, the use of bamboo as a scaffolding material is widespread. Due to its tensile strength and flexibility, a bamboo scaffold can rise several storeys and function adequately. The level to which workers exhibit ease when traversing the lattice structure indicates a level of understanding and familiarity with the material.

7.2 ◻ Appendix ii
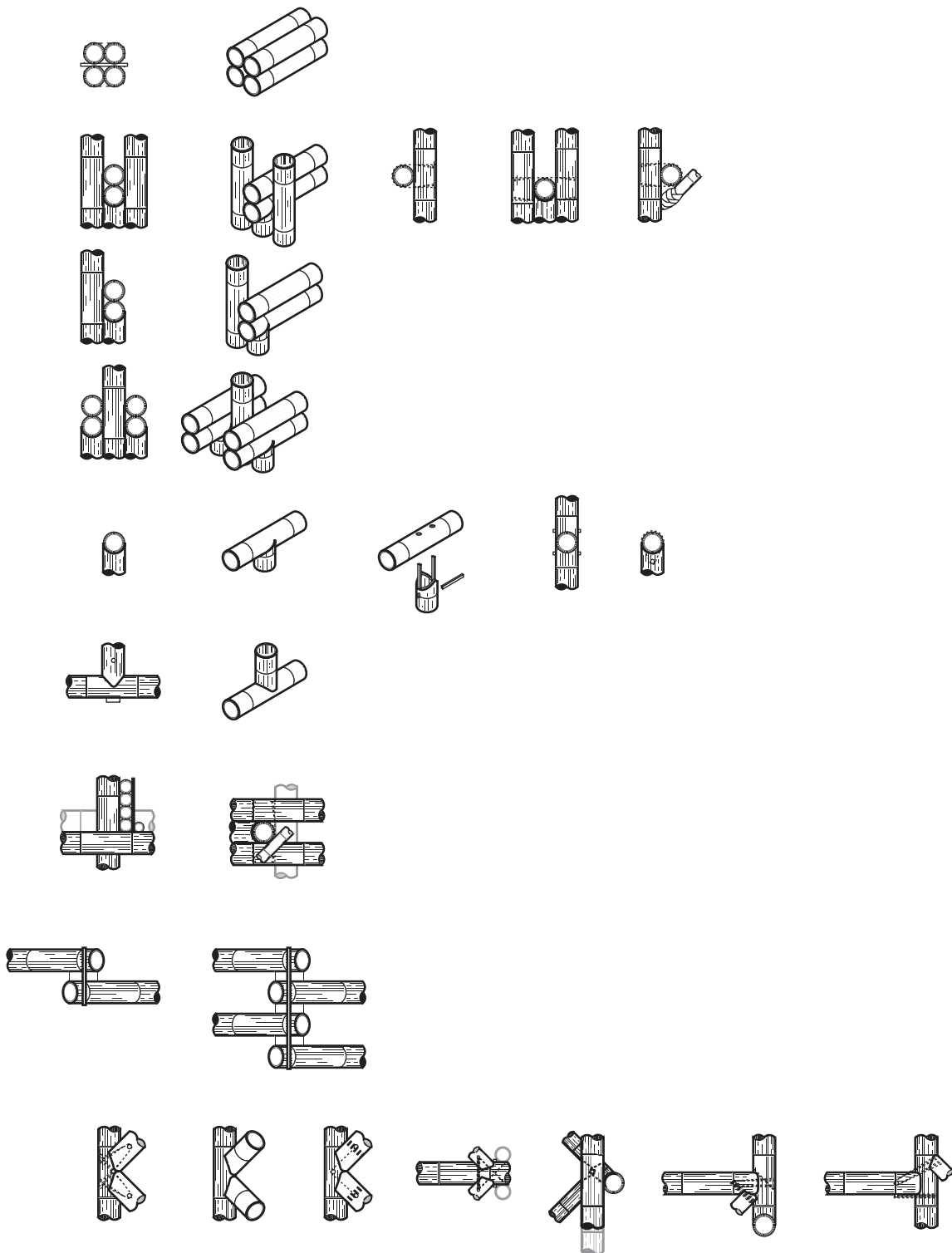
The inherent binary condition noted within the work entails at times wide and focused design and analysis, manifesting itself in iterative image based design. These explorations are core to the holistic enquiry into culture and architecture within China, as well as the position stated throught the text.

Discussions within this appendix will encompass additional design and research imagery deemed necessary to the overarching process observed within the work.
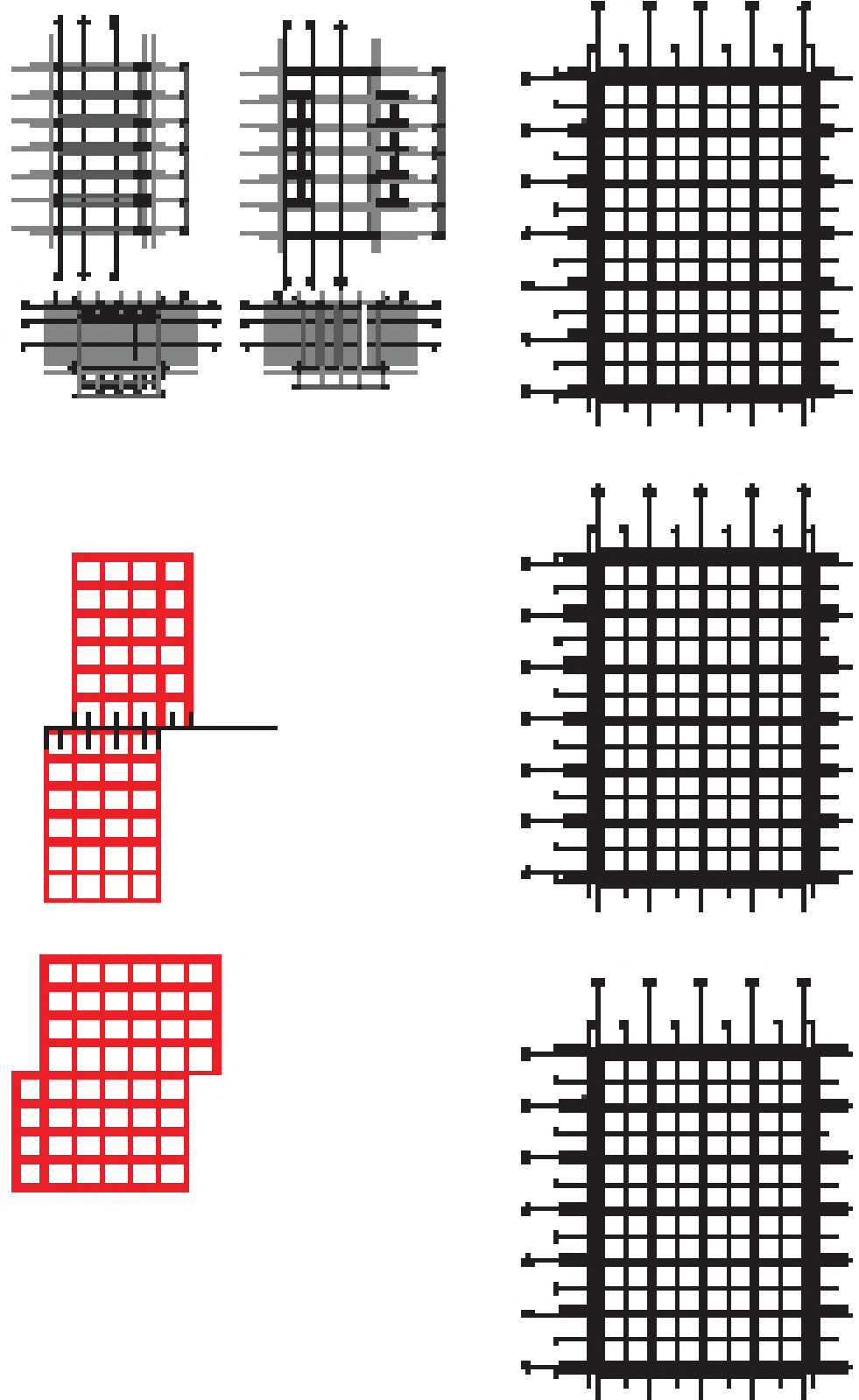
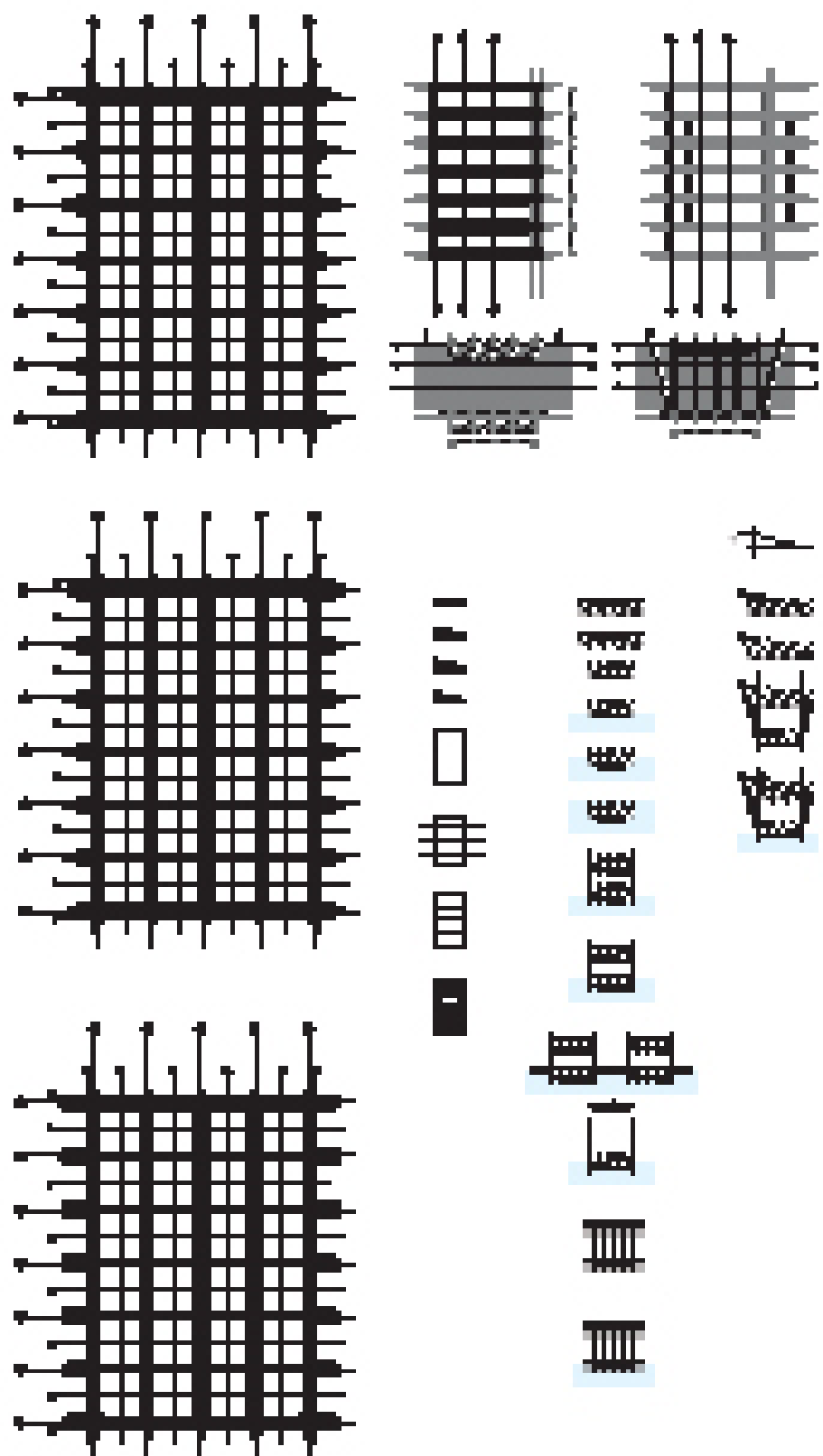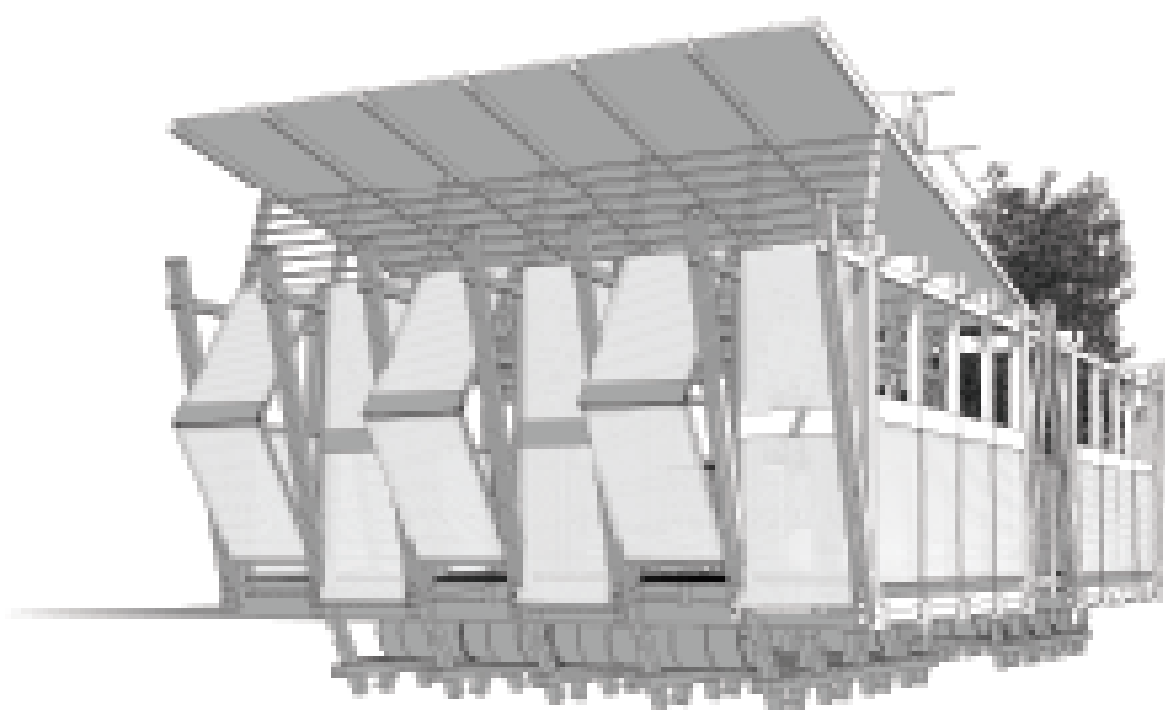Fig. 3.63   Varying Level Cut Plane - Timber Framed Construction (Open)

Fig 5.54.   Varying Level Grid Plans - Bamboo Framed Construction (3pts)

Appendix iii
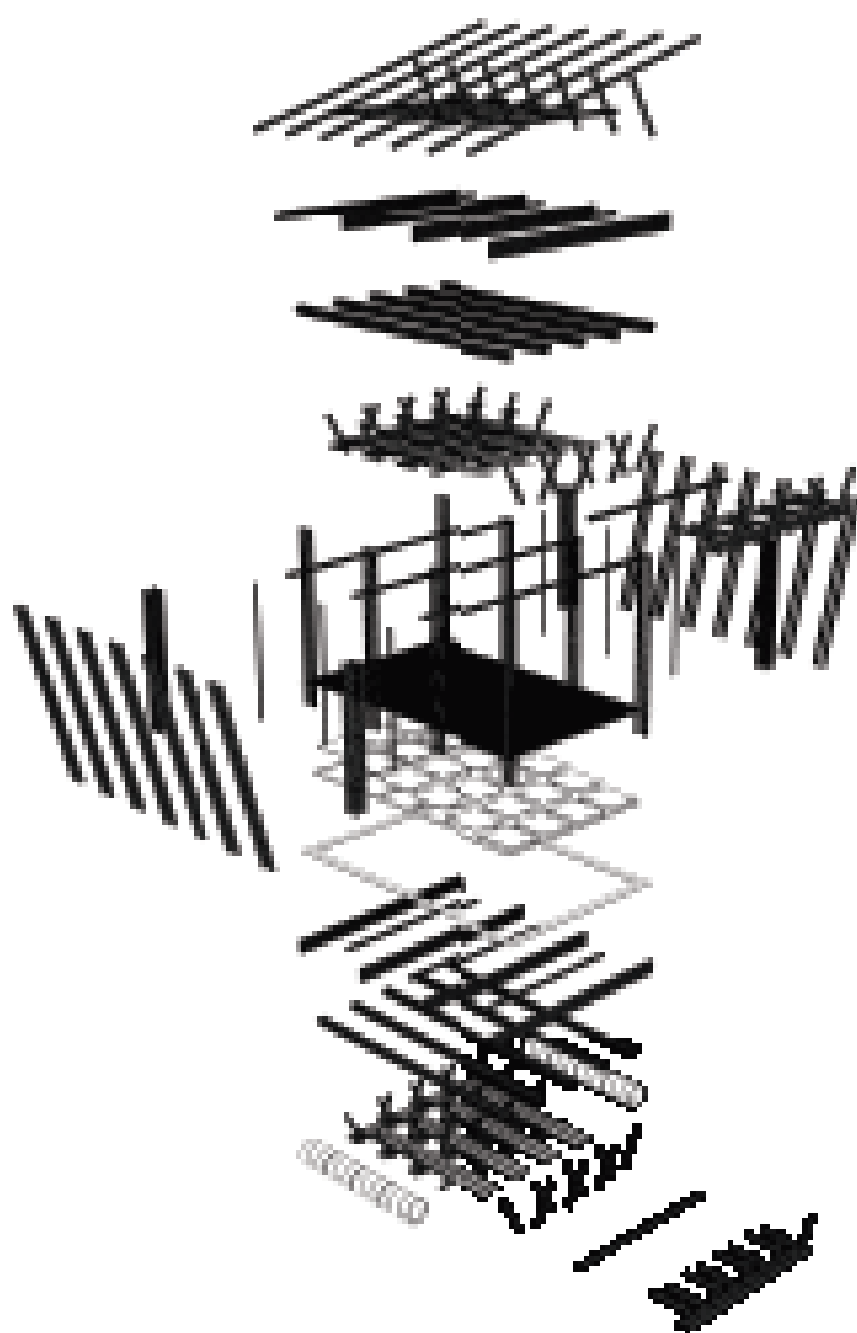
Principle to the explorations within the work, is the notion of representation and presentation. The distinctive divergence in polemic between the Western and the 'Other' generate a condition of imagery and iconography that differ greatly. As a result, all aspects of design; inclusive of presentational work and organisational systems follow fundamental rules derived from traditional Chinese texts and ideas. These in turn indicate a dialectic language between the architectural outcome and the process.

Discussions within this appendix will encompass representation and presentation with a particular emphasis on process and intent. The works involved are tests in understanding and overarching design principles
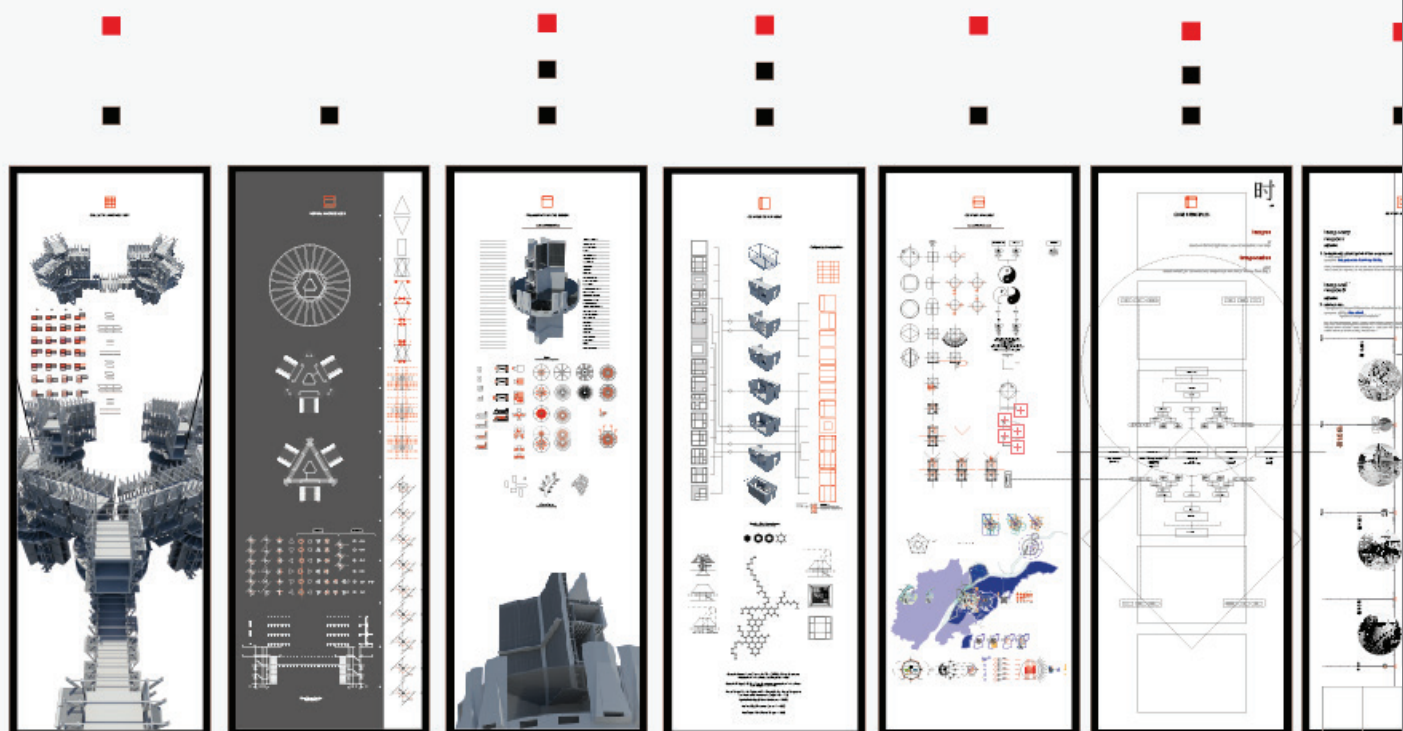
Fig 7.01.   Presenttion Organisation - Testing spatial and representational research (Horizontality vs Verticality, West vs Other) - Bi-Directional (Centre Out)