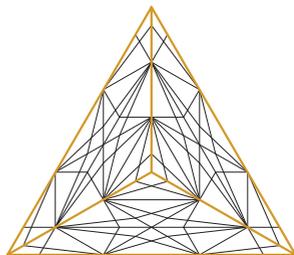
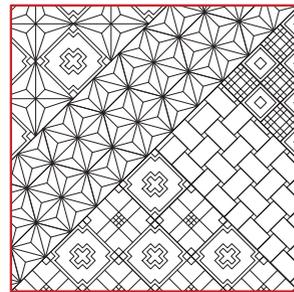
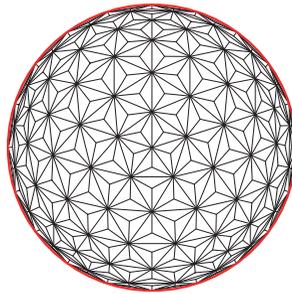


Project of the Museum of Japanese Patterns in Tokyo

Survey on patterns in the Japanese culture

東京での日本の文様博物館プロジェクト

日本文化の文様調査



"The most mysterious forces in the universe manifest themselves via patterns, as they are a collector able to receive cosmic energy, metabolize and filter it, and finally release it in ordered shape back to life."

- Salvator-John A. Liotta



Utagawa Kunisada, *Yokogushi no o Tomi*, Waseda University Theatre Museum, 1860.

Project of the Museum of Japanese Patterns in Tokyo

Survey on patterns in the Japanese culture

東京での日本の文様博物館プロジェクト

日本文化の文様調査

由美お母さん

Master Thesis in Architecture Construction and City

Politecnico di Torino, Faculty of Architecture

University of Tokyo, Department of Architecture, Kengo Kuma Laboratory

Supervisors:

Manfredo Nicolis di Robilant, Professor

Kengo Kuma 隈 研吾, Professor

Toshiki Hirano 平野 利樹, Assistant Professor

Student:

Koji Gabriele Crisa' 影山 光司

INTRODUCTION

ENGLISH VERSION

This thesis work started during a one year stay for studies in Japan, at the Kengo Kuma Lab of the University of Tokyo, where I found a very stimulating international environment, between professors and students, in the study and research.

Foundamental in my research was also the experience of Japanese life, where among several visits in places and museums in Tokyo and other cities of Japan, but also thanks to my Japanese family, I managed to immerse myself into the culture.

Hence the thesis investigates on the importance of the use of patterns in the Japanese culture, analyzing the developments they have had throughout history, the characteristics that distinguish them from the patterns used in other cultures, the different uses of these in different contexts and ways and the profound meaning that the decorative systems assume in tradition, how they are reflected in the fascinating Japanese culture and how they still exist today.

The research is concluded with a project for a museum on Japanese patterns in the city of Tokyo, considered the importance they have in the culture. Therefore, the design methodology of the museum project is based on the research background on the use of the patterns.

The museum will be divided in three pavilions: Kimono Pavilion, Craft Pavilion and Architectural elements Pavilion, arranged on the project area according to the principles of the Japanese rock garden.

The three structures will take their concept from objects that reflect the theme of the pavilion, hence characterized by patterns.

So the result will be to obtain a museum in which the structure itself is a part of the exhibition and to show how this methodology can achieve to recall the tradition of the Japanese culture in a modern key.

VERSIONE ITALIANA

Questo lavoro di tesi nasce durante un soggiorno per studi della durata di un anno in Giappone presso il Kengo Kuma Lab dell'Università di Tokyo, dove ho trovato un ambiente internazionale molto stimolante, tra professori e compagni di corso, nello studio e la ricerca.

Fondamentale nella mia ricerca è stata anche l'esperienza di vita giapponese, dove tra svariate visite di luoghi e musei a Tokyo ed altre città del Giappone, ma anche grazie alla mia famiglia giapponese, sono riuscito ad immergermi nella cultura.

La tesi quindi investiga sull'importanza dell'uso dei pattern nella cultura giapponese, analizzandone gli sviluppi che essi hanno avuto durante la storia, le caratteristiche che li contraddistinguono da i pattern utilizzati in altre culture, i differenti usi di questi in diversi ambiti e modalità ed il profondo significato che questi sistemi decorativi assumono nella tradizione, come essi si rispecchiano nell'affascinante cultura nipponica e di come essi ancora oggi sussistano.

La ricerca si conclude con un progetto di un museo sui pattern giapponesi nella città Tokyo, data l'importanza che essi assumono nella cultura. Perciò anche la metodologia compositiva del progetto del museo si basa sul background di ricerca sull'utilizzo dei pattern.

Il museo sarà definito in tre padiglioni: Padiglione Kimono, Padiglione dell'artigianato e Padiglione degli elementi architettonici, disposti su area secondo i principi del rock garden giapponese.

In cui le tre strutture trarranno il loro concept da oggetti che rispecchiano il tema del padiglione, per cui caratterizzate da pattern.

Per cui il risultato sarà di ottenere un museo in cui la struttura stessa è parte integrante dell'esibizione e di dimostrare come questa metodologia sia efficace nel rievocare la tradizione della cultura giapponese in una chiave moderna.

PART 01

MEANING AND HISTORY OF PATTERNS

1.1 Meaning of "pattern"

- 1.1.1 Definition of the word "pattern" 11
- 1.1.2 Ambits of the word "pattern" 13

1.2 History and evolution of patterns in architecture

- 1.2.1 Concept of pattern in architecture 16
- 1.2.2 First patterns and evolution through the history 16

1.3 Patterns in contemporary architecture

- 1.3.1 New possibilities of patterns 26
- 1.3.2 Patterns of the present 28
- 1.3.3 Patterns of the future 28

PART 02

PATTERNS IN THE JAPANESE CULTURE

2.1 On Japanese Patterns

- 2.1.1 Patterns in the Japanese culture 33
- 2.1.2 History 35
- 2.1.3 Meaning 38
- 2.1.4 Characteristics 39
- 2.1.5 Family crests 39

2.2 Typologies of patterns

- 2.2.1 Organic patterns 44
- 2.2.2 Geometric patterns 49

2.3 Uses

- 2.3.1 Craft 52
- 2.3.2 Architecture 56
- 2.3.3 Textile 58
- 2.3.4 Rock garden 60

PART 03

PROJECT

3.1 Introduction to the project

- 3.1.1 Introduction to the museum 65
- 3.1.2 Case studies 66
- 3.1.3 Proportion systems in Japan 72

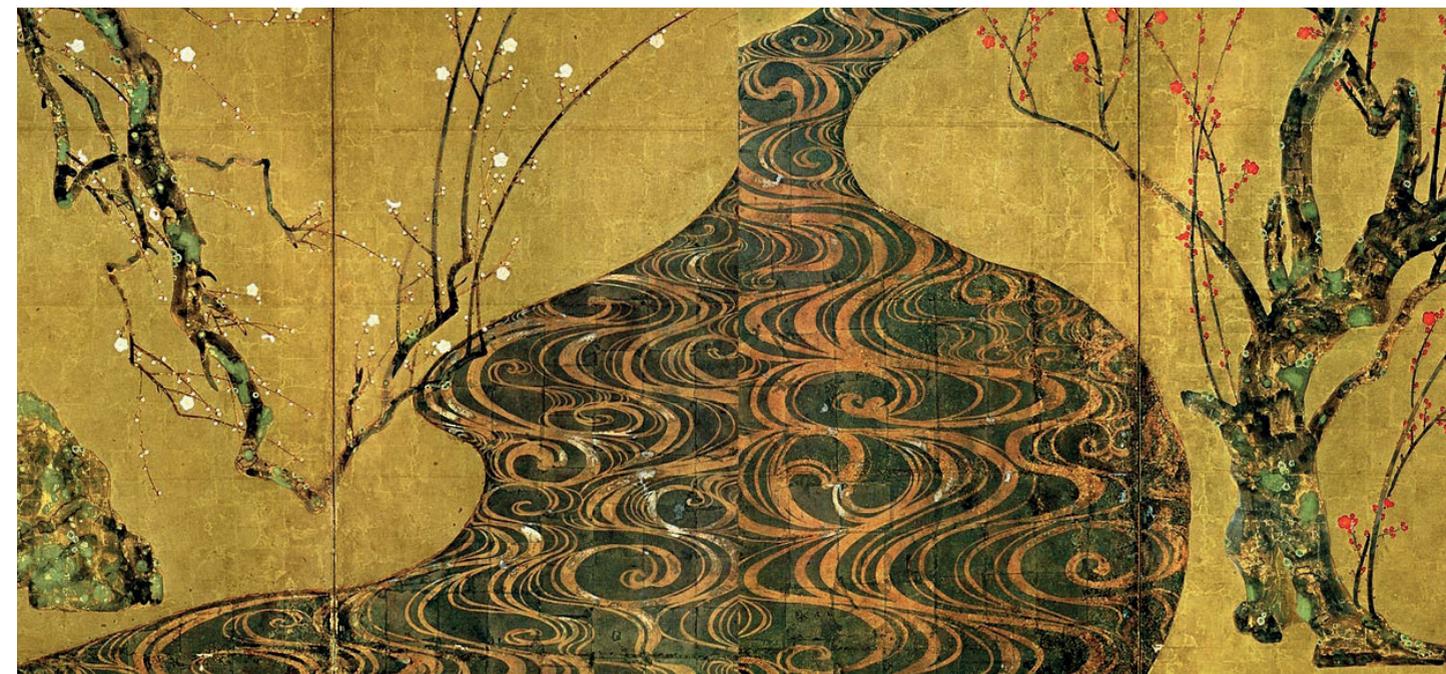
3.2 Concept strategy

- 3.2.1 Garden and site disposition - Rock garden 78
- 3.2.2 Architectural elements pavilion - Shoji and kumiko 80
- 3.2.3 Kimono pavilion - Temari 82
- 3.2.4 Craft pavilion - Yosegi 84

3.3 Design

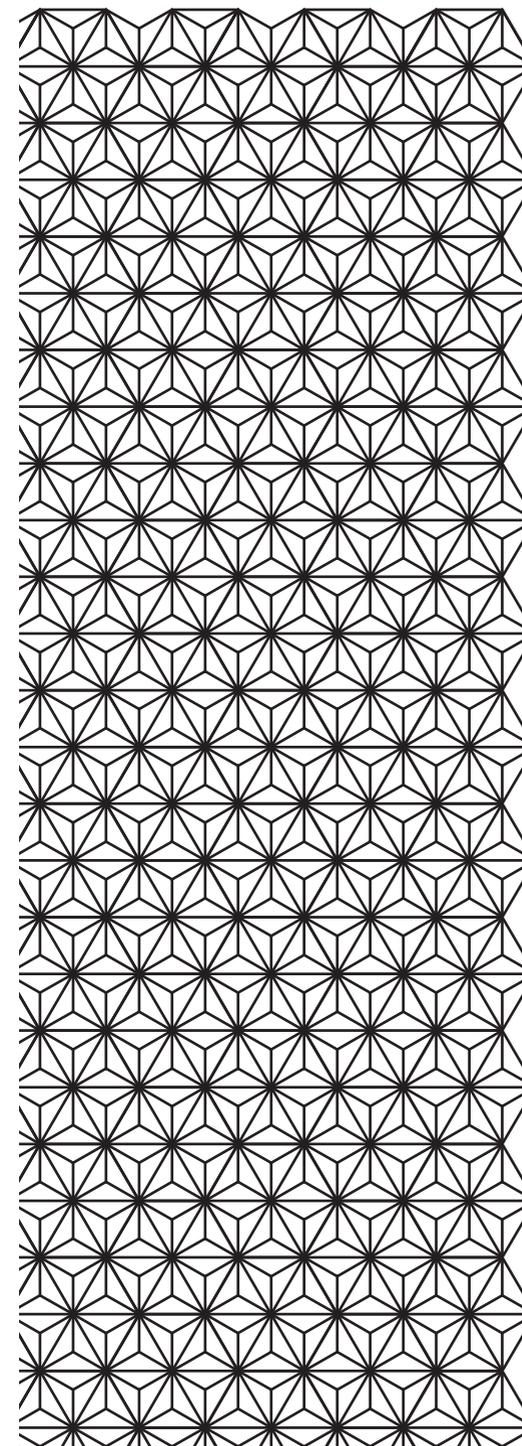
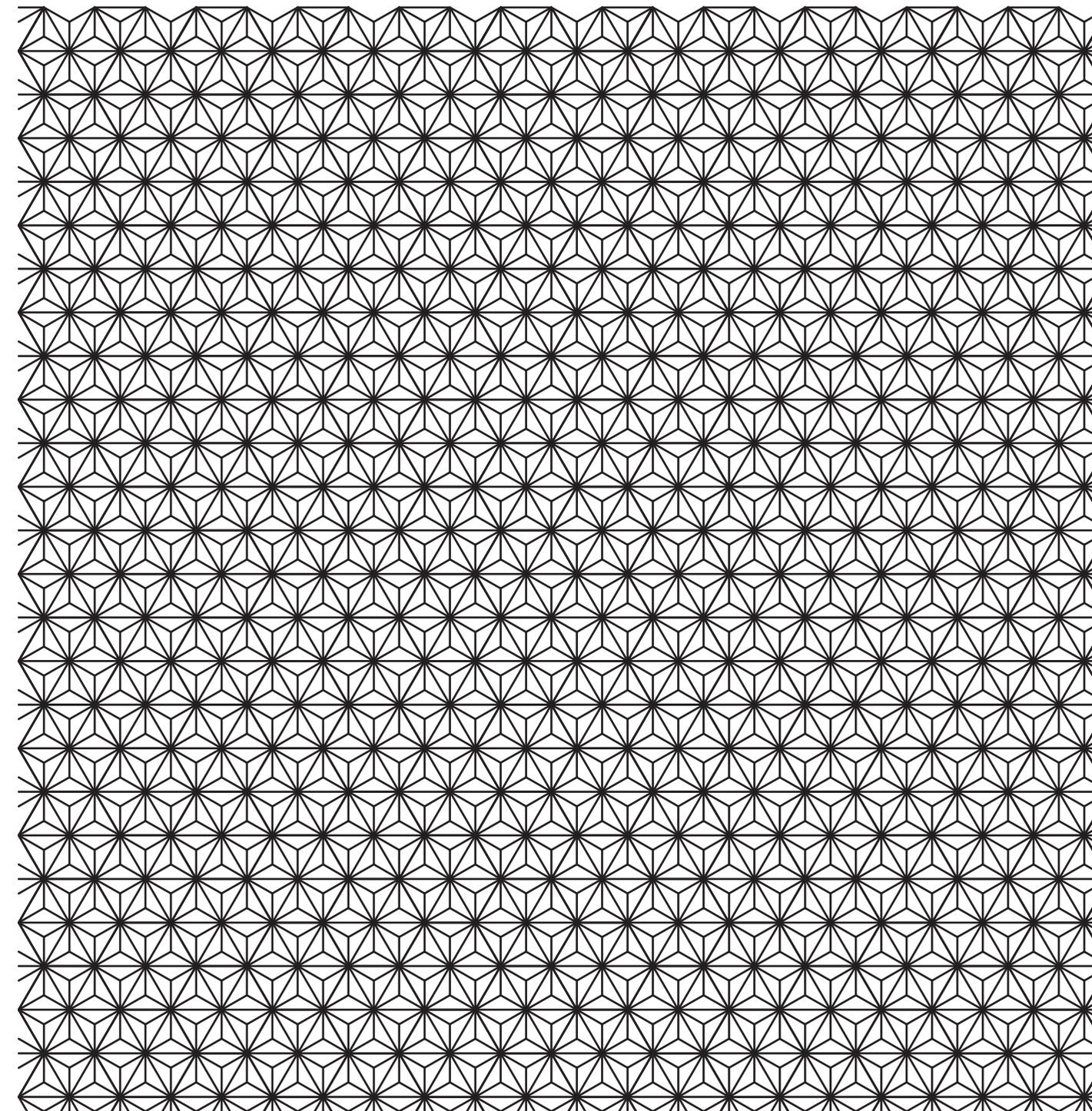
- 3.3.1 Urban scale 88
- 3.3.2 Masterplan 90
- 3.3.3 Kimono Pavilion 92
- 3.3.4 Architectural Elements Pavilion 98
- 3.3.5 Craft Pavilion 104
- 3.3.6 Bird view 110

Ogata Korin, *Red and White Plum Blossoms Kunisada*, MOA Museum in Atami, Japan, Edo period, 18th century.



PART 01

MEANING AND HISTORY OF PATTERNS



1.1 Meaning of “pattern”

1.1.1 Definition of the word “pattern”

To begin the path of this research I wanted to try to fully understand the meaning of the word “pattern”, so I looked for it on the Cambridge dictionary, and what I found is:

- Pattern: *noun* (way):
A particular way in which something is done, is organized, or happens;
- Pattern: *noun* (arrangement):
Any regularly repeated arrangement, especially a design made from repeated lines, shapes, or colours on a surface;
- Pattern: *noun* (example):
Something that is used as an example, especially to copy;
- Pattern: *noun* (drawing):
A drawing or shape used to show how to make something;
- Pattern: *noun* (shapes):
A regular arrangement of lines, shapes, or colors;¹

Therefore, the word “pattern” indicates a disposition or a sequence that according to the context can describe a drawing, a model, a recurrent scheme, a repetitive structure or other several dispositions.

In general, it is used to indicate the repetition of a determinate sequence inside a set of data or the regularity observed in the space and/or time in case of some dynamic phenomena, as the flight of the bees.² (fig.1)



Fig.1 - Bees flight.



Fig.2 - Wolfgang Buttress, UK Pavilion Milan Expo 2015, Milan, Italy, 2015.

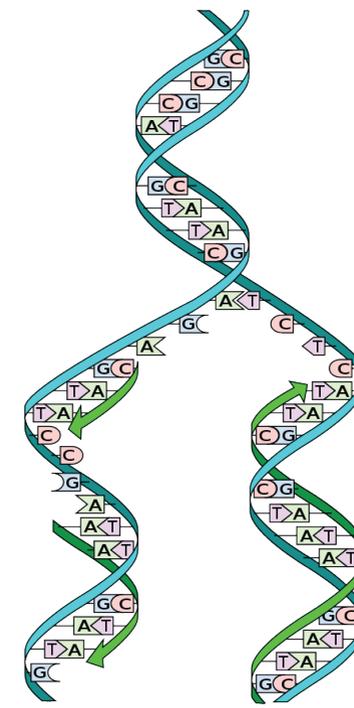


Fig.3 - DNA chain replication



Fig.4 - Leopard skin pattern

“Pattern” finds its etymology from the Latin word “*pater*” or “*patronus*”, which means *father, master or god*, from which derives the concept of model or example.

There are many synonyms and related concepts to the word “pattern”, some of them can be: habit, template, motif, configuration, organisation, arrangement, tessellation, system, sample and texture.

This shows how it has a multiplicity of roles in complex processes of creation.³

According to the studies of Ernst Gombrich patterns are a tool of communication, creation of equilibrium and generation of aesthetic pleasure if they are located in an intermediate position between the extremes of chaos and redundancy.

The theory of information defines the first one, the chaos, as a series of unpredictable data, where the sequence of messages does not have any recognisable rule nor is possible to identify any logic-organized path, activating a psychological mechanism of refuse, that makes the communication disappear.

On the other hand, the redundancy is the constant repetition of the same series of messages, perfectly predictable. Once the communicative key has been understood, the message becomes less interesting and the receiving subject loses his attention on it.

In fact, many architects, artists, scholars of any field have worked on patterns, or took advantage of them in their works.⁴

Therefore, it is not surprising that the brain activities of the humankind consist on trillions of pattern-perception and recognition tasks, that in many cases can be unintentional and unconscious.⁵

This unintentional and intuitive process of recognition and production of patterns is a part of the creative processes⁶, in fact as the American architect Richard Saul Wurman said: “I can see patterns when I understand things. I see the world as visual patterns of connectivity. I think pattern recognition is a fundamental part of a creative mind [...] I see everything as pattern”⁷.

1.1.2 Ambits of the word “pattern”

Therefore, the concept of pattern has a wide meaning, indeed patterns can be directly observed by any of 5 senses, or by analysis for abstracts ones.

This versatility in the perception and applicability of the concept of pattern makes it referable to a wide range of different fields, for example:

- Computer science: related to specific algorithms, sometimes repetitive, that follow a fixed scheme, for instance the search for functions in a string. In such a specific context, the pattern also represents the string to research;
- Psychology: Patterns refer to a configuration of stimuli that constitute a perceptive unit. The meaning is similar to that of Gestalt or form, but in this case it is focused on the aspect of the structuring;
- Biology: pattern can refer to different kind of regularity, for instance the regularity of the biological sequence of DNA, or proteins that allow the recognition and the specific link between molecules. It can also refers to the regularity in the level of expression of the cell genes that allow the experimental recognition of different cell kinds as the tumour cells, or the regularity in the events that occur during the processes as the development of an organism, or even the regularity in the behaviour of the animals; (fig.4)
- Zoology: For referring the individuation of the disposition and distribution of organs and stains on the bodies of animals, for instance the ocular pattern of a spider indicates the distribution and the disposition of the eyes; the macular pattern of a leopard indicates the distribution the stains on the skin;

- Chess: A pattern is a recurring tactics, memorize it allow to the chess players to avoid long analysis of moves on the game;

- Music: Patterns are the position that the different musical scales take repetitively on the instruments, phrases rhythm-melodic in every position, but replicated one after the other with some variation.⁸

Notes:

1. Cambridge Dictionary, <https://dictionary.cambridge.org/dictionary/english/pattern>, visited 31-10-2018;
2. Wikipedia, *Pattern*, <https://en.wikipedia.org/wiki/Pattern>;
3. Mark Garcia (ed.), *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, p. 8;
4. Ernst Gombrich, *The Sense of Order*, Phaidon, New York, 2006.
5. Mark Garcia (ed.), *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, p. 8;
6. David Bohm, *On Creativity*, Routledge, London, 2004;
7. Richard Saul Wurman, *Seeing the World as Visual Patterns of Connectivity*, in Gerlinde Schuller (ed.), *Designing Universal Knowledge*, Lars Muller, Basel, 2009, p.105;
8. Wikipedia, *Pattern*, <https://en.wikipedia.org/wiki/Pattern>, visited 31-10-2018.

Images:

1. Bees flight, Retenews24, <https://retenews24.it/author/redazione/page/376/>, visited 28-12-18;
2. Wolfgang Buttress, UK Pavilion Milan Expo 2015, Milan, Italy, 2015, Dezeen, <https://www.dezeen.com/2015/05/05/wolfgang-buttress-uk-milan-expo-pavilion-2015-quiet-structure-bombastic-architecture-the-hive/> visited 28-12-18;
3. DNA chain replication, Wikipedia, https://en.wikipedia.org/wiki/File:DNA_replication_split.svg visited 30-12-18;
4. Srikaanth Sekar, Leopard in Nagarhole National Park, India.

1.2 History and evolution of patterns in architecture

1.2.1 Concept of pattern in architecture

"Patterns provide architects with a device to connect apparently incongruent categories and synthesize a multitude of performances, project requirements and informational types in a perception-based medium. [...] Functioning both as process and image, graphic and code, they (Patterns) are able to foreground the sensual while shaping matter and behavior"¹

Regarding architecture, patterns are traditionally intended as decorations or visual motifs repeated and combined to create specific visual effects on the space designed.

Patterns, as motifs or repetitive schemes, can be applied on every scale of the designing, from the interiors to landscape passing through the architectural and urban scales.

They can be considered a fundamental tool since "the physical world and our bodies act under constraints of the patterns we design, build and use, and the patterns emerging from the interactions between these multiple systems are produced at a number of different dimensional, temporal and scalar levels, including the spectrum of natural and man-made patterns"²

Pattern has shown itself, during the course of history, under vary forms;

Pattern can be abstract, such as those in the decorative tile used on the surfaces of Moslem architecture. It can be representational, as in religious representation of the Byzantine mosaics or in the floral wallpapers of Victorian interiors.

It can be symbolically architectural, for instance in the façades of the Italian Romanesque churches whose bas-relief arcades combined with portal, rose window, or moulding, looking discordant and lyrical at the same time.³

These characteristics make patterns a potent device for the articulation of design. For example, thinking about the classic buildings, the ornamental patterns as moulding were used to emphasize the axe of symmetry.⁴

1.2.2 First patterns and evolution through the history

One of the first evidence about patterns thought to be symbolic and diagrammatic can be found in the Neolithic. These patterns had an apotropaic function to keep the evil spirits away, snaring them into the complex design of the patterns, but also as the pleasure of pattern making.⁵

But the first significant theoretical reference to spatial patterns in the West arrived around the 360 BC. In the *Timaeus*, one of the Plato's dialogues where he describes the world as filled with patterns of atom-like solids and geometric forms. Plato thought that patterns have the function of intermediation between the disordered natural phenomena and the perfection of the hyperuranium, also known as the world of the ideas.



Fig.1 - Ara Pacis, Roma, 9 a.C.

"The universe [...] is the handiwork of a divine Craftsman (Demiurge) who, imitating an unchanging and eternal model, imposes mathematical order on a preexistent chaos to generate the ordered universe (kosmos)."⁶

While Aristotle compares patterns to seeds that he calls *dynamis* (Forces in Greek), they are not to be seen just as forms, but like potential generators of form and actuality.⁷

Referring to the East, the first patterns date back to nearly 3500 years ago, they come from the observation of visible phenomena of the nature and forces that rule the universe. The entire Chinese mental architecture was created by these first patterns with the intent to catch the whole universe in a series of images. The Chinese ideograms, kanji, want to represent the laws that rule the universe, indeed ideograms are an attempt to depict the existing world through a visual representation.⁸

Patterns have always been a central part in the concept of style. In all styles pattern as ornament, decoration, detail, embellishment or structure has been profoundly influenced by religion, government power, geometry, math as well as by art, design and craft.⁹

Spatial patterns were theorized through different concepts and theories which include: order, hierarchy, organization, system, scale, proportion, symmetry, balance, complexity, beauty, unity, function, decorum, representation, symbol, joint, nature, expression, imagination and creativity.

Other pattern-related concepts as harmony, rhythm, narrative and color were influenced by other disciplines in the mechanical and liberal arts.¹⁰

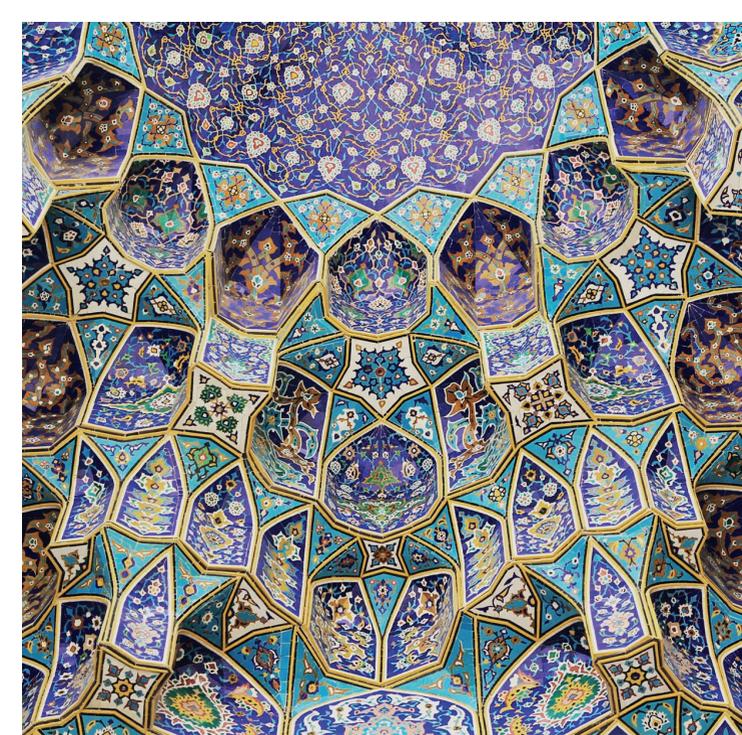


Fig.2 - Shah-e Cheraq, Shiraz, Iran, 1517.

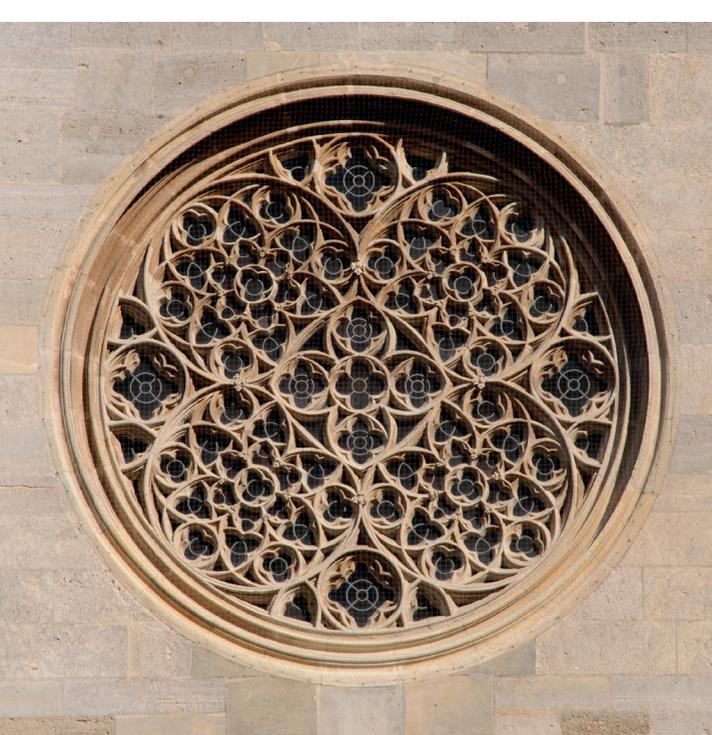


Fig.3 - Rose window of St. Stephen's Cathedral, Vienna, 1147.

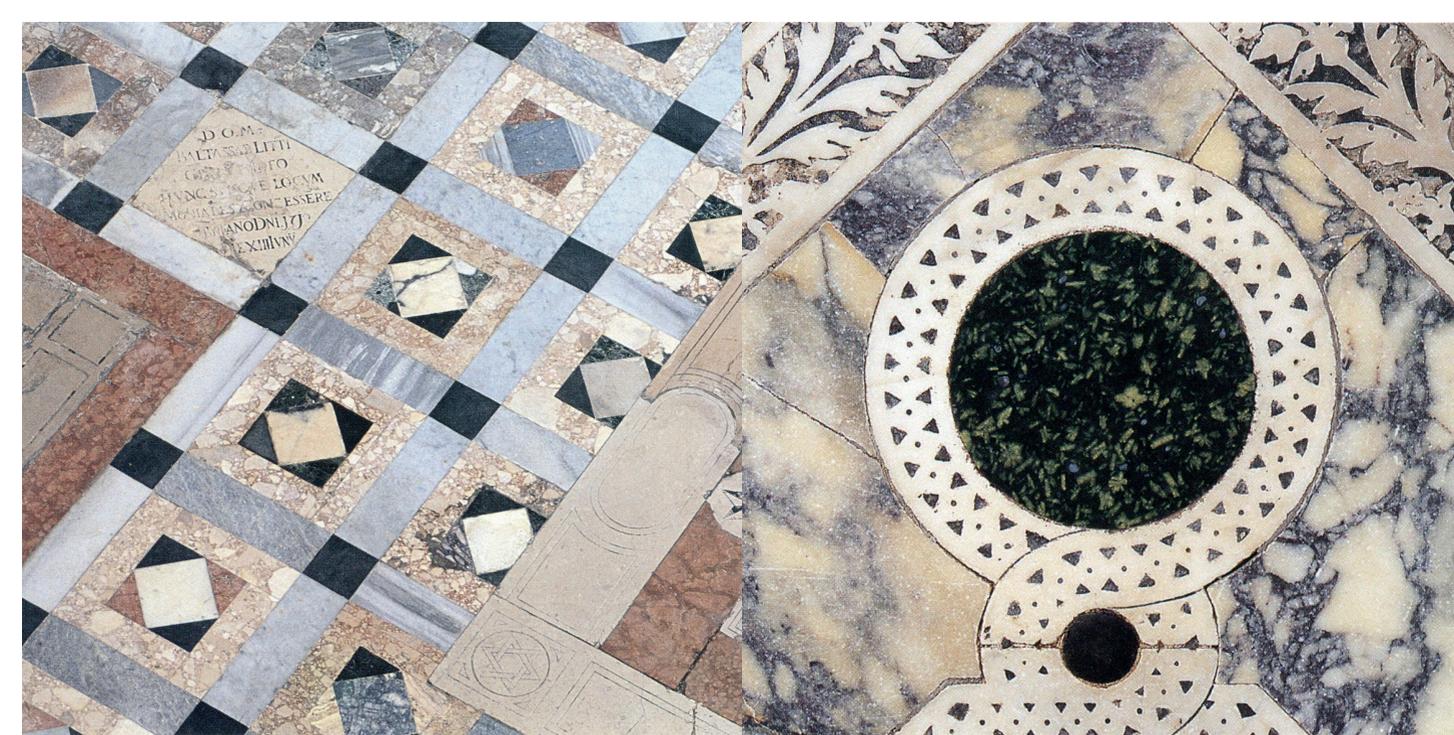


Fig.4 - Floor of the church of Santa Maria dei Miracoli, Venice, 1489.

Fig.5 - Detail of the floor of Santa Maria dei Miracoli

Therefore, patterns, during the history of architecture, have always had a fundamental role and it is possible to notice their evolution through the years. Several architects and artists employed ornaments, decorations, geometrical construction and *Trompe-l'œil*, optical illusions with the intent to enhance (or distort) the meaning, effects and aesthetics of perspective space according to symbolic, theological and philosophical purposes.

Patterns were used for the first time in architecture during the ancient times, as in the Greek-Roman one with the external decoration of the Ara Pacis built in the 9 a.C. in Rome (fig.1): the upper part presents an allegorical figurative frieze while, the lower one has a natural motif of acanthus leaves, a type of decoration used in the Corinthian order. The two parts are divided by a Meander border, this pattern, represented by a bent continuous line creating a repetitive motif, was really popular in the Greek and Roman ancient art, and it recalls the twisting river bed of the Meander river in Asia Minor and it symbolizes the infinity and unity.¹¹

Patterns are also a fundamental feature of the Islamic architectures, due to the central, metaphysical concept of *Nizam*, the aesthetic key in the Islamic philosophy.¹²

Islamic patterns had a great development because of the religion, which forbids the divine figurative representations to prevent them from becoming an object of worship.¹³

Therefore, Islamic decoration tries to represent the divine through patterns, designing complex schemes where geometrical forms are often overlapped and interlaced to form intricate patterns that feature a wide variety of tessellations. (fig.2)

From the 12th to the 14th century the Gothic style flourished in Europe, especially in the construction of churches and cathedrals.

Thanks to the use of rib vault and flying buttress, which allowed the structure to carry bigger loads, it

was possible to create greater height and wider openings and rose windows, which allowed to bring big quantities of light inside the churches.

These openings were treated with tracery motifs, stonework that was used to support the glasses, hence they are flat on the interior side and embossed on the external.

The tracteries are made by geometric models, where the stone is completely broken to form a skeleton that defines the patterns. (fig.3)

Moreover, Gothic architecture used tracery not just on the windows but also on other elements as the parapets of the triforium and matroneum or in the spire.

In the Renaissance, a remarkable example of the use of patterns can be found in the design of floors of churches and palaces.

If now, in most of the cases, it is usual to pick a design from a catalogue, before often it was the architect to design the floor considering the size of the individual room, the function and the architectural features of the space.

In Venice, this has always been a characteristic that went onward, and it was based on the taste of the period. One of the finest examples of flooring made during the Renaissance, with the triumph of colours, is the church of Santa Maria dei Miracoli (1491-94), which represents an exception to the general rule of white and red chequered patterns for floors of that period. (fig.4 and 5)

In the 1580 the architect Francesco Sansovino said about the church's cladding that it was "the finest marble, and inside was the same, both on the floor and all over".¹⁴

Going forward with the history of patterns, it should be mentioned their use in the Baroque architecture. Indeed, new use of geometries was introduced in the architectural design, such as sinuous, curved lines, ellipses, spirals or curves with a polycentric construction. Everything had to amaze the visitor with a strong theatricality.

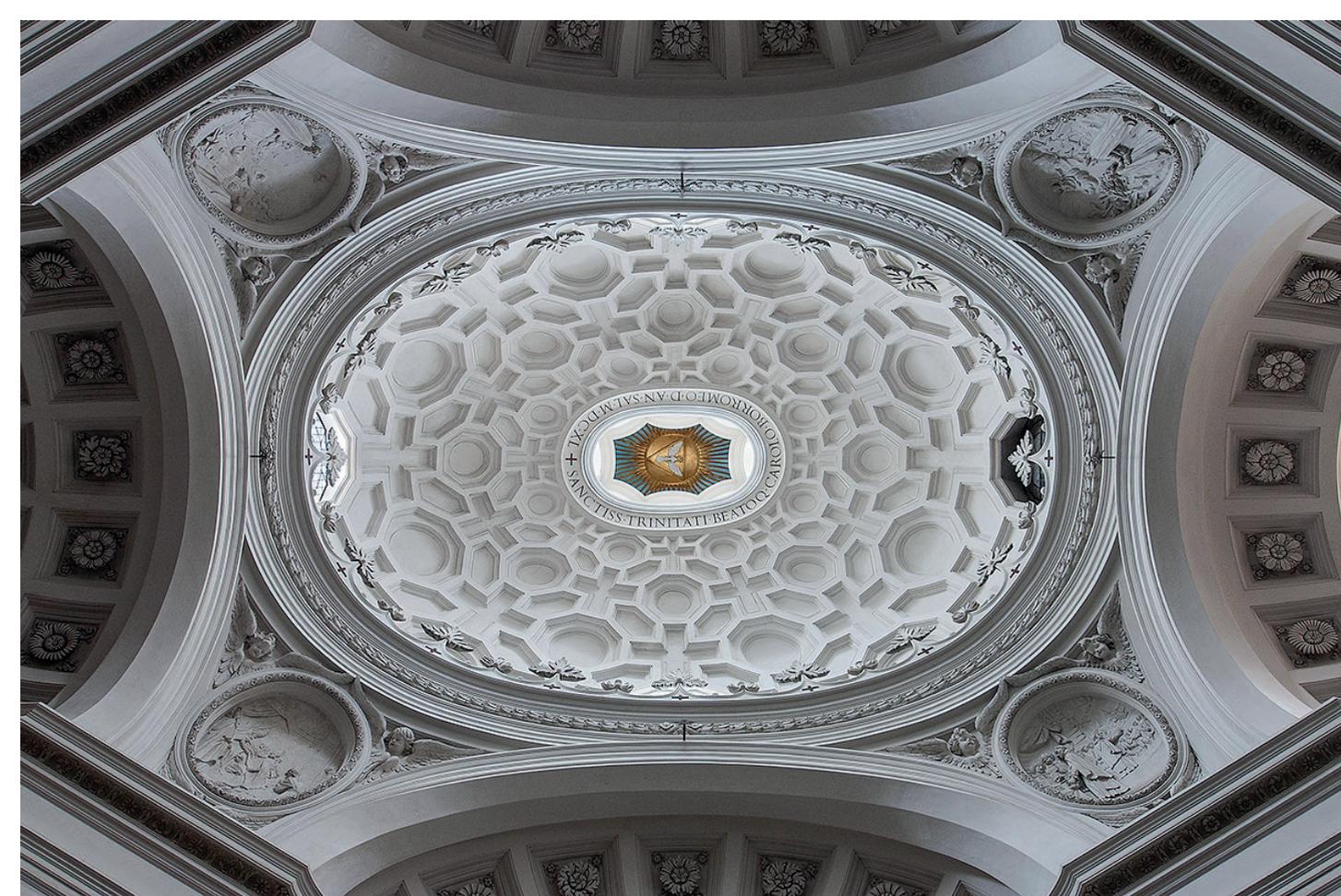


Fig.6 - Francesco Borromini, San Carlino alle Quattro Fontane, Roma, 1641.

This led the designers to an exuberant use of decorations and motifs, blending painting, sculpture and architecture in the designed space.

Considerable applications of these features can be seen in the some examples of marvellous domes designed during this period, where the structure that sustains the dome is made by complex patterns of geometric shapes. Indeed, architects as Gian Lorenzo Bernini, Francesco Borromini (fig.6) or Guarino Guarini were very skilful with a great knowledge in geometry and maths.

Between the end of 19th century and the beginning of the 20th century, the use of pattern in architecture found a great expression in Modernism and in Art Nouveau styles.

During this period, several well-known architects, began to think new ways to reach architectural solutions in order take advantage of the new technologies that came during the industrial revolution.

This new wave tried to overcome both the eclectic historicism and the industrial architecture of the 19th century, looking for new forms inspired by nature.¹⁵

Successful examples in the creation of patterns, which developed during this period from different cities are: Casa Batlló of Antonio Gaudí in Barcelona, where the façade is treated with motifs inspired to sea life and the ceramic cladding recalls the colors the corals; (fig.7)

Secession Building of Joseph Maria Olbrich in Vienna, with its white volumes surmounted by the renowned perforated dome built on a pattern of golden bay leaves; (fig.8)



Top: Fig.7 - Antoni Gaudí, Casa Batlló, Barcelona, 1877.

Top: Fig.8 - Joseph Maria Olbrich, Secession Building, Vienna, 1898.

Bottom: Fig.9 - Pietro Fenoglio, Casa Fenoglio-Lafleur, Turin, 1902.

Bottom: Fig.10 - Victor Horta, Tassel House, Brussel, 1894.

Or Casa Fenoglio-Lafleur by Pietro Fenoglio in Turin, an example of Italian liberty architecture, which follows the phytomorphic motifs from Belgian and French Art Nouveau. (fig.9)

Another important stage, which gave a considerable change to the history of western patterns in architecture, arrived with Modern architecture.

One of its main personality was Adolf Loos that with his "Ornament and crime", was attacking ornamen-



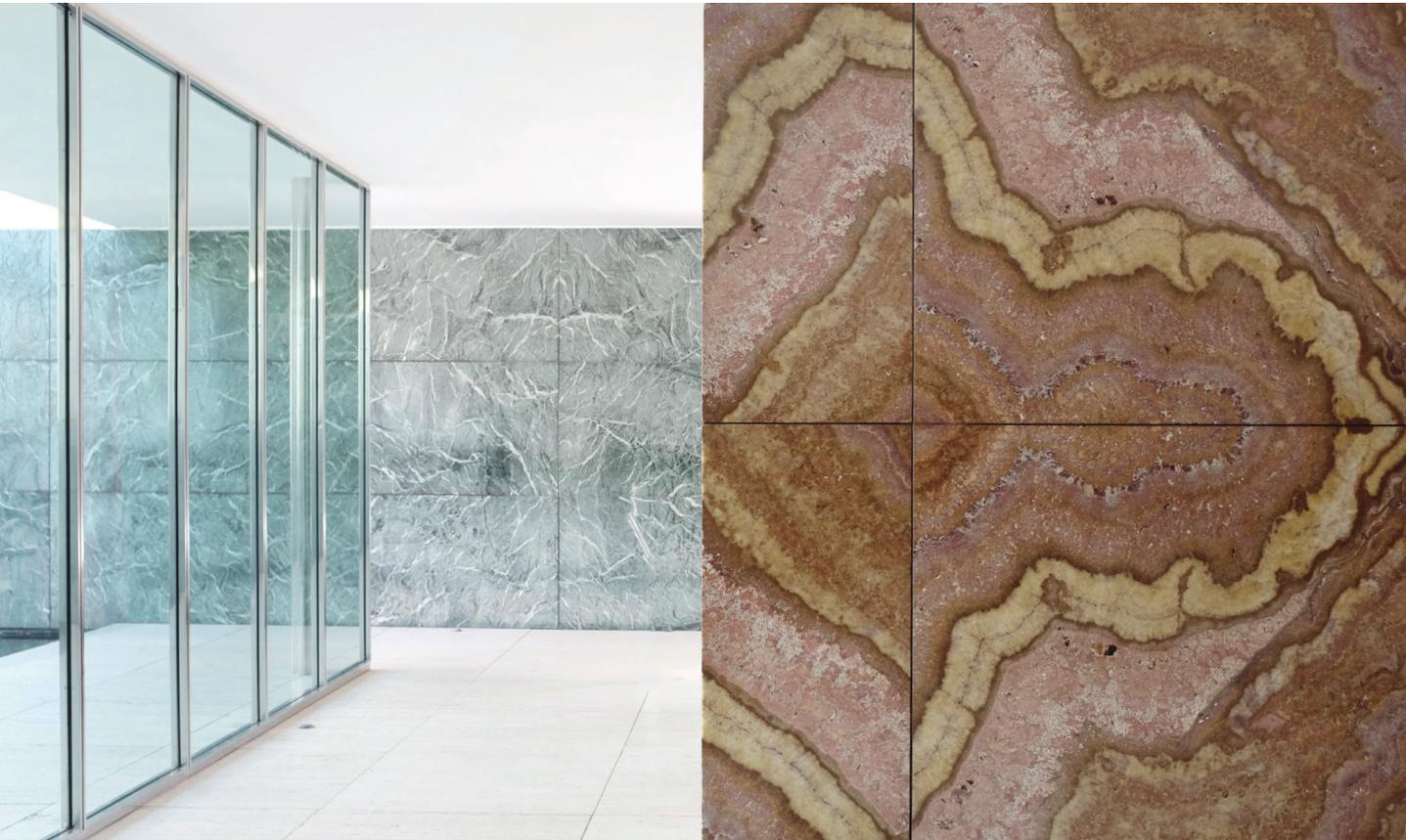
From the left: Robert Venturi and Desine Scott Brown's patterns:
 Fig.11 - Additions to the Oberlin Art Museum, Oberlin, Ohio, USA, 1977;
 Fig.12 - Best Products Showroom, Langhorne, Pennsylvania, 1978;
 Fig.13 - I.S.I. office building, Philadelphia, USA, 1979.

ts, hence patterns, as immoral, excessive and redundant. He considered the wasting of effort necessary to design the decorations to apply on building as a crime. Moreover, these would have led the building to go out of style as soon as a new style would has arrived. Hence the immorality of ornaments led to a degeneration. The ideas promoted by Loos influenced the modern architecture, with the elimination of ornaments in favor of skeletal structures.¹⁶

On the other hand, the idea of Modern architects as dogmatically antipattern, refusing any form of decoration is not totally true, indeed, there are examples of the use of patterns by those considered the masters of modern architecture. For instance, in the Mies Van Der Rohe's use of precious material with patterned surfaces, as in Barcelona Pavilion (fig.14); The Le Corbusier's patterned commercial wallpapers for Sulubra or the use of patterned tiles in the Frank Lloyd Wright's houses (fig.15).¹⁷

The last step, before the use of pattern in the contemporary architecture. is the one occurred between the 1980s and the 1990s, a period predominated by postmodern architecture. Noteworthy are the words of Robert Venturi in an article of the 1982 on Architectural Record, where he explains that when he complain about ornaments in architecture, it is about ornaments whose have an historical content. However, another way to create ornaments is possible. This way was little employed by postmodern designers, who, perhaps, were more inclined to the simplicity of the Modernists. Venturi called it the "over-all pattern", examples of his work are: the addition to Oberlin Art Museum, I.S.I. office building and Best Products Showroom in Pennsylvania. These buildings are decorated with geometric and floral patterns using masonry and porcelainized panels.

In addition, he stated "Architects too, I think, will have to recognize the impracticality of expressionist heroics, on one hand, and of Minimalist indulgence on the other, and acknowledge the potential for richness in the decorated shed, and eventually in the decorated car, the decorated anything all over our environment."¹⁸



Top: Fig.14 - Detail of the textured surface of the Mies Van Der Rohe, Barcelona Pavilion, 1929
 Bottom: Fig.15 - Frank Llyod Wright, Millard House, Pasadena, USA, 1923.

Notes:

1. Paul Anderson and David Salomon, *Architecture of patterns*, W.W. Norton & Co, New York, 2010, pp. 14, 25;
2. Mark Garcia (ed.), *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, pp. 8-9;
3. Robert Venturi, *Diversity, relevance, and representation in historicism, or Plus ça change ... plus a plea for pattern all over architecture with a postscript on my mother's house*, *Architectural Record*, June 1982, p 118.
4. Patrick Schumacher, *Parametric Design* in Mark Garcia (ed.), *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, p. 31;
5. DK Wasburn and DW Crowe, "The role of pattern in culture", *Symmetries of Culture: Theory and Practice of Plane Pattern Analysis*, University of Washington Press, 2004;
6. Donald Zeyl, *Plato's Timaeus*, in Edwrd N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, Spring, 2012, p. 11;
7. Salvator-John A. Liotta, Matteo Belfiore, *Patterns and Layering, Japanese Spatial Culture, Nature and Architecture*, Gestalten, 2012, p. 11;
8. Louise Boudonnant and Harumi Kushizaki, *Traces of the Brush*, Chronicle Book, San Francisco, 2003, p. 197;
9. Mark Garcia (ed.), *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, p. 9;
10. Patrick Healy, "Ornament Now?", *OASE 65 Ornament*, NAI Publishers, Rotterdam, 2004, pp 40-42;
11. Paul Zanker, *The Power of Images in the Age of Augustus*, University of Michigan Press, 1990;
12. See S. Akkach, *Cosmology and Architecture in Premodern Islam*, State University of New York Press, New York, 2006;
13. Malikka Bouaissa, *The crucial role of geometry in Islamic art*, in *AI Arte Magazine*, 2013;
14. Tudy Sammartini, *Pavimenti a Venezia = The floors of Venice*, Vianello libri, Ponzano, 1999;
15. Wikipedia, *Architettura modernista*, https://it.wikipedia.org/wiki/Architettura_modernista, visited 10-01-2019;
16. Salvator-John A. Liotta, Matteo Belfiore, *Patterns and Layering, Japanese Spatial Culture, Nature and Architecture*, Gestalten, 2012, p. 10;
17. Mark Garcia (ed.), *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, p. 12;
18. Robert Venturi, *Diversity, relevance, and representation in historicism, or Plus ça change ... plus a plea for pattern all over architecture with a postscript on my mother's house*, *Architectural Record*, June 1982, pp 114-119.

Images:

1. Jose Antonio, Ara Pacis Roma, 2014;
2. Shah-e Cheragh, Trover, <https://www.trover.com/d/18zmE-zandiyeh-hotel-shiraz-iran> visited 09-01-2019;
3. MrPanyGoff, St. Stephen's Cathedral - Vienna - rose window, 2012;
4. Image from Tudy Sammartini, *Pavimenti a Venezia = The floors of Venice*, Vianello libri, Ponzano, 1999;
5. ibid.
6. Francesco Borromini, San Carlino alle Quattro Fontane, Juza Photo, <https://www.juzaphoto.com/galleria.php?t=1099456&l=it> visited 09-01-2019;
7. Christian Schd, Antoni Guadi, Casa Batlló, 2013;
8. Secession building, Touristic website Vienna now forever, <https://www.wien.info/en/sightseeing/sights/art-nouveau/secession> visited 09-01-2019;
9. Pietro Fenoglio, Casa Fenoglio-Lafleur, Piemonte expo, <https://www.piemonteexpo.it/expo/8362/casa-fenoglio-lafleur/> visited 09-01-2019
10. Victor Horta, Tessel House, Varie ed eventuali, <https://varie-ed-eventuali-blog.blogspot.com/2012/04/bruxelles-lart-nouveau-di-victor-horta.html> visited 29-01-2019;
11. Robert Venturi and Desine Scott Brown, Additions to the Oberlin Art Museum, Oberlin Art Museum website, <http://www2.oberlin.edu/amam/VenturiAddition.html> visited 29-01-2019;
12. Tom Bernard on Archdaily, Robert Venturi and Desine Scott Brown, Best Products Showroom, <https://www.archdaily.com/769194/spotlight-robert-venturi-and-denise-scott-brown> visited 29-01-2019;
13. Robert Venturi and Desine Scott Brown, I.S.I. office building, Curbed Philadelphia, <https://philly.curbed.com/2018/2/20/16938652/louis-kahn-philadelphia-school-of-architecture-history>, visited 29-01-2019;
14. Gili Merin on Archdaily, detail of Mies Van Der Rohe, Barcelona Pavilion, <https://www.archdaily.com/109135/ad-classics-barcelona-pavilion-mies-van-der-rohe> visited on 10-01-2019;
15. Tristan Loper, Frank Llyod Wright, Millard House, 2014.

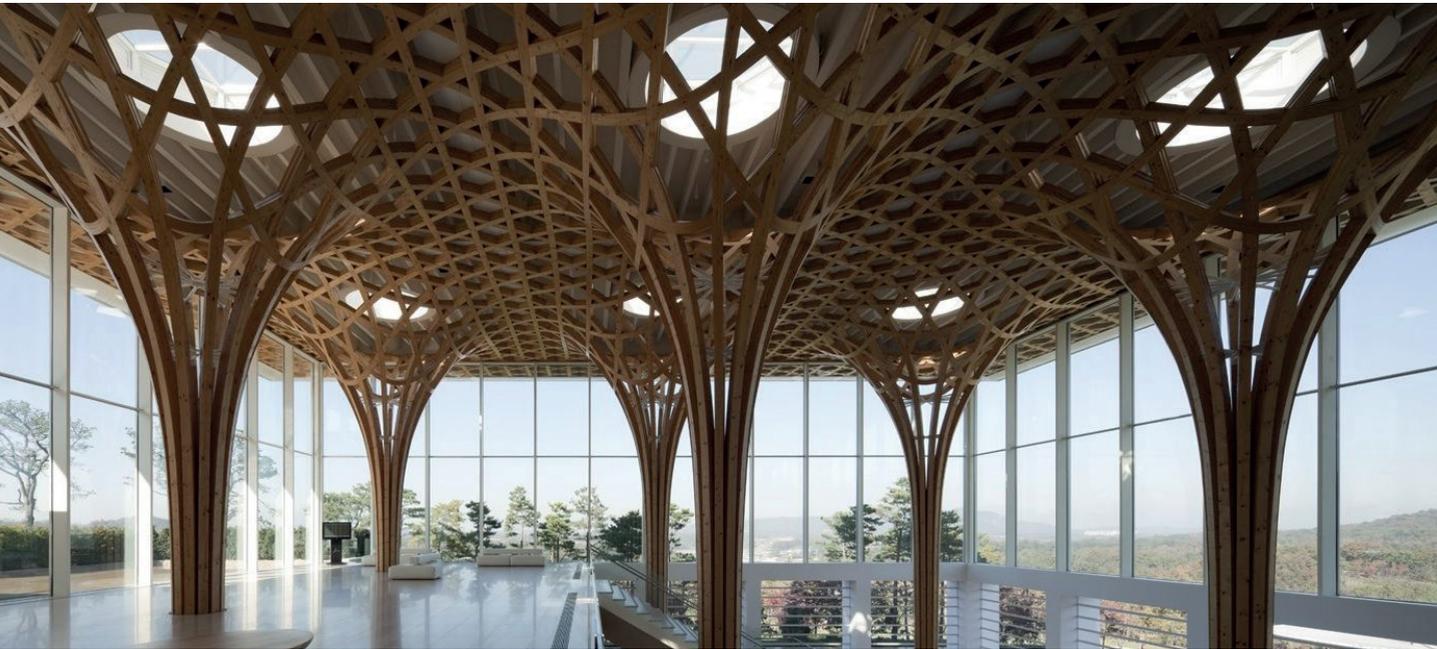


Fig.1 - Shigeru Ban, Nine Bridges Country Club, Yeosu-gun, South Korea, 2009.



Fig.2 - OMA, CCTV Headquarters, Beijing, 2012.
The structural performances of the envelope are shown on the façade creating a structural pattern.



Fig.3 - Foreign office Architects, Ravensbourne College of Design and Communication, London, 2010.

1.3 Patterns in contemporary architecture

1.3.1 New possibilities of patterns

If 20th century architecture was focused on function and form, contemporary architecture deals more with relationship, boundaries and energies. On this matter “spatial design patterns have a poetic and pertinent potential to precisely promote performances”.¹

Already during the late Modernism there was a use of textured surfaces, but now surfaces can be treated with a wide array of techniques. This enriches the formal repertoire of current architecture. Moreover, the geometry of the building did several steps forward and this led to great innovations on patterning. Indeed, in some cases, if the underlying spatial organization is simple and the surfaces are simple, patterns can result repetitive and applied like wallpaper.²

The new explorations on the geometries used in design, found resonance in the technological progress and new technical possibilities, which enabled architects to play with different tools, such as smooth geometries, tessellations and multiple layers.

These new possibilities brought new cladding and roofing solutions, like curtain walls or membranes; dismissing the use of elements such as cornices, corners and pediments. The difference between façade and roof has disappeared, as many other traditional architectural elements.³

In particular the architectural element that involved mainly the research on patterns is the building envelope.

Compared to the other elements, the envelope lends itself particularly well to geometries and tessellations that determinate its performances: environmental, lighting, iconographic.

The envelope has the most representational function among the architectural elements of the building. Since the traditional elements such as cornices and pediments became redundant, the envelope’s ma-

teriality, its fabrication, geometry and tessellation have taken over the previous architectural language. In the new complex envelopes, there is also a trend toward the polygonal tessellations, unlike the Cartesian grid division, which can have additional performances: for instance, the joints of an hexagonal tiling are shorter than a rectangular tiling in the same area.⁴

However, it was the avant-garde that followed the Deconstructivism that progressed from faceted surface to smooth nurb surface. Around the end of 20th century, patterning evolved through new techniques of texture mapping on warped nurb surfaces.

This led to what Patrick Schumacher calls *Parametricism*, where the advanced technologies shifted from the texture mapping to the scripting.

Tessellation became an opportunity of articulation, and the need to make it feasible and elegant on complex geometries, such as double-curved surfaces, brought parametric modelling and scripting to the forefront.⁵

1.3.2 Patterns of the present

The advent of digital architecture and the following set of new thoughts and tools, such as parametric design, numerical control machines and digital manufacturing, is bringing to a new cognitive horizon and a new role for patterns.⁶

Many designers and academics, such as Herzog & De Meuron, MVRDV, OMA, Jean Nouvel, Zaha Hadid, UNStudio, Reiser + Umemoto, Daniel Libeskind, FOA or the Japanese Shigeru Ban, Kengo Kuma, Toyo Ito and Jun Aoki and many more, who have recently worked and published on patterns, pushing them to more high-tech, dynamic, virtual, immaterial functions, types and effects.

Nowadays patterns can exalt cultural, social, environmental, material and structural performances in a single designed system.

“This novel ability to recognize, use and continuously re/design space with these innovative patterns is driving a revolutionary type of more accurately patterned and intelligent spatial designs that goes beyond the old notion of pattern”⁷

Today architects are free to experiment with new unseen patterns, characteristic of our times, because of the new technologies and scientific discoveries.

“Among these we find patterns of soap bubbles, Fibonacci series, hydrological and vascular systems, protein folds, cellular automata, attractors, force fields, Sierpinski cubes, skins, moirés, knots, messes, fractals, networks, swarm/flocks, atoms and molecular structures (including crystals and quasi-crystals), fluid and gas/smoke/meteorological forms and dynamics, architextiles⁸, viruses and micro-organisms, blobs, Voronoi cells, Lindenmayer systems light, fire, landscapes/geology/geography, rhizomes and various hybrids and permutations of these”.⁹

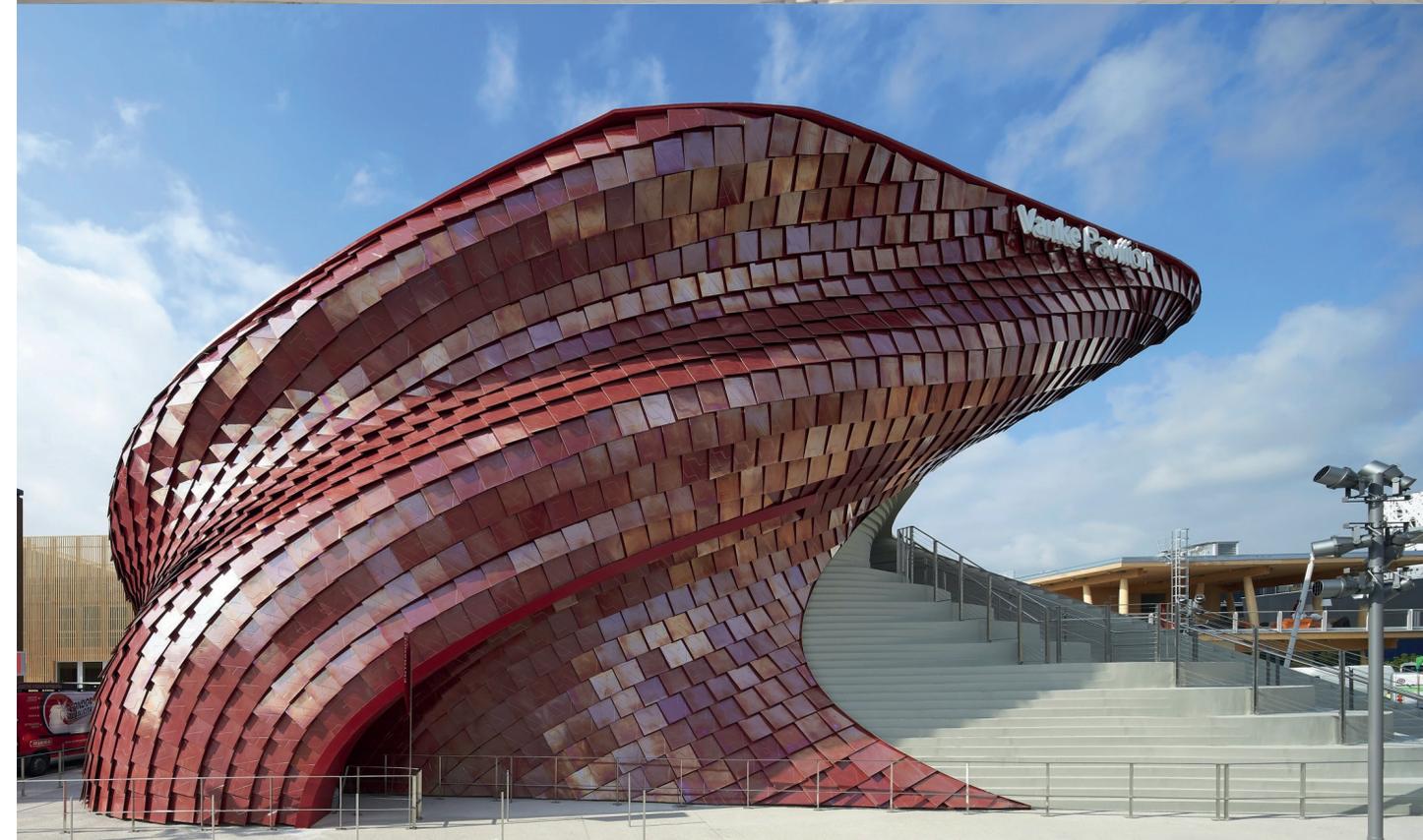
1.3.3 Patterns of the future

Concerning patterns design, it seems like there is still much to achieve.

From the new multidisciplinary patterns research about optical illusions, new advanced materials and progress on the computer’s technologies, it is possible to go further beyond, extending the array of them combining intangible, immaterial, decorative, ornamental, dynamic, material, invisible, structural, virtual, interactive, ephemeral, informed, conceptual, multidisciplinary, performative features.

These patterns will be high-resolution, real-time and dynamic, and careful in the relationship to personal, historical, social, cultural, political, psychological economic, ecological, ethical and aesthetical feature of the projects.¹⁰

Therefore, the patterns are giving and are going to give a wide array of new possibilities in the field of architecture of the future, as Kengo Kuma stated, “We can now see that completely new patterns can be generated. They will be entirely different from any pattern we have seen so far, and generate entirely different spaces and architectures [...] Pattern making holds the greatest promise for the next generation”.¹¹



Top: Fig.4 - Herzog & De Meuron, Bird's Nest Beijing National Stadium, 2008;

Bottom: Fig.5 - Daniel Libeskind, Vanke Pavilion Expo 2015, Milan.

Notes:

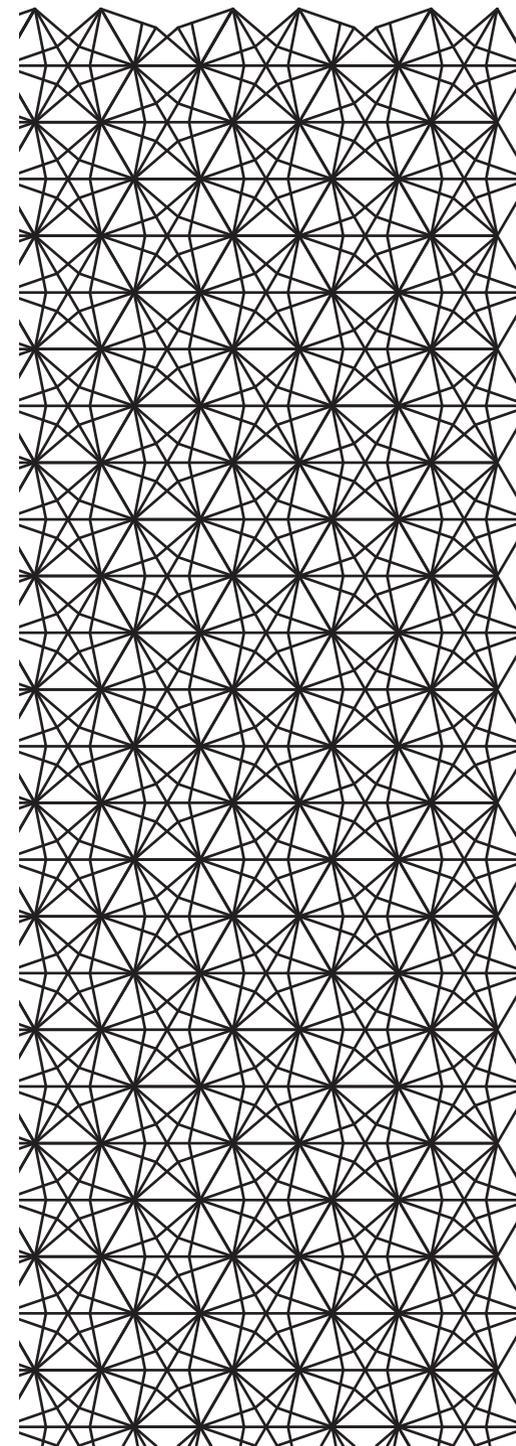
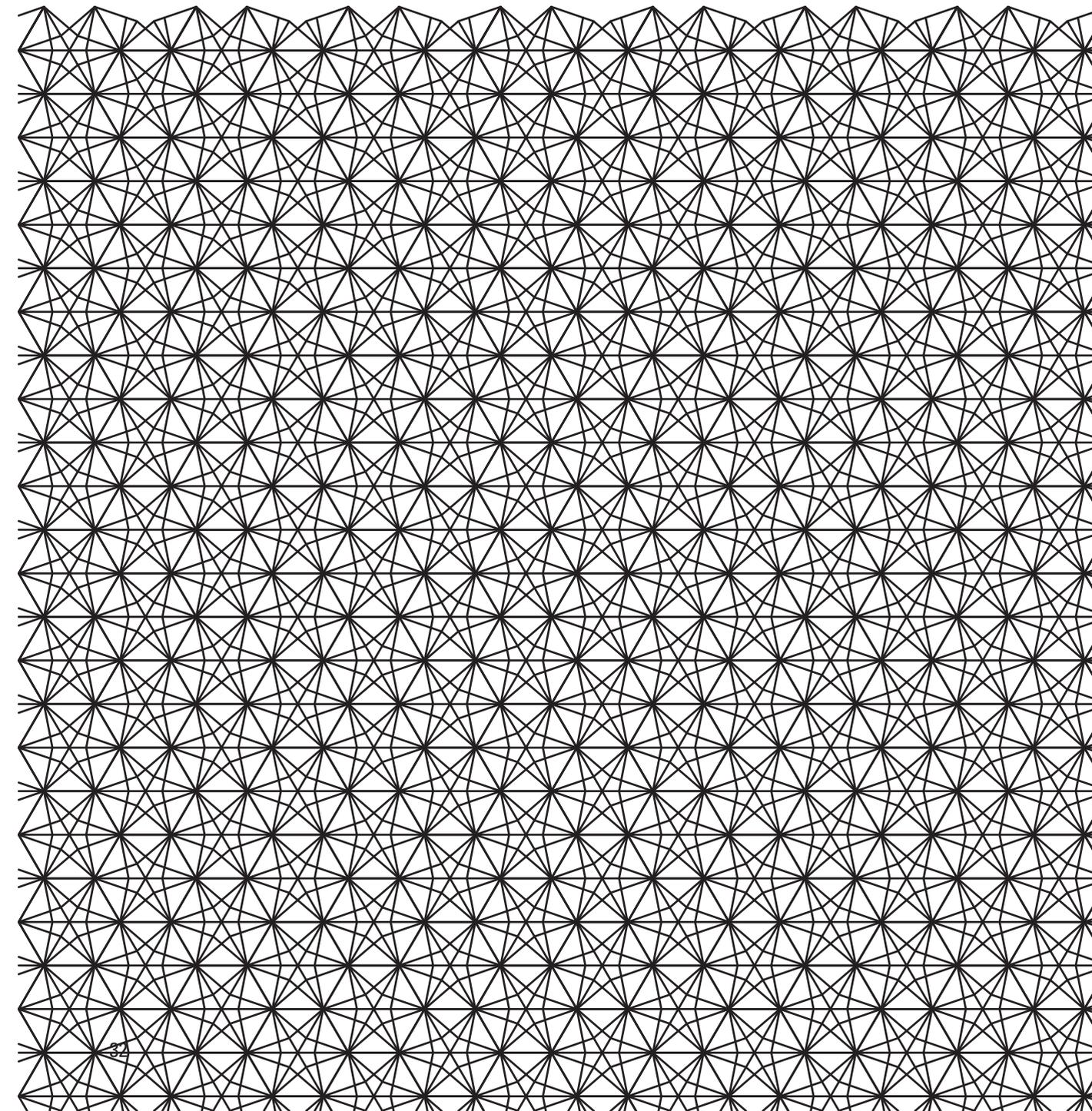
1. Salvator-John A. Liotta, Matteo Belfiore, *Patterns and Layering, Japanese Spatial Culture, Nature and Architecture*, Gestalten, 2012, p. 17;
2. Patrick Schumacher, *Parametric Design* in Mark Garcia (ed.), *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, p. 33;
3. Alejandro Zaera-Polo, *The politics of patterns* in Mark Garcia (ed.), *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, p. 22;
4. Ibid, pp. 21-22;
5. Patrick Schumacher, *Parametric Design* in Mark Garcia (ed.), *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, p. 33;
6. Salvator-John A. Liotta, Matteo Belfiore, *Patterns and Layering, Japanese Spatial Culture, Nature and Architecture*, Gestalten, 2012, p. 16;
7. Mark Garcia (ed.), *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, p. 13;
8. Mark Garcia, *AD Architextile*, vol. 76, No 6, Nov/Dec, 2006;
9. Mark Garcia (ed.), *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, p. 14;
10. ibid, pp. 15-16;
11. Alex De Looz, *Smart look: Kengo Kuma on decoration*, 306090 Decoration, 2006, p. 47.

Images:

1. Shigeru Ban, Nine Bridges Country Club, Ja+U,
<https://www.japlusu.com/news/2014-pritzker-architecture-prize-laureate-shigeru-ban>
visited 16-01-2019;
2. OMA, CCTV Headquarters, Lera Cosulting Structural Engineers,
<http://www.lera.com/cctv-headquarters> visited 15-01-2019;
3. Foreign office Architects, Ravensbourne College of Design and Communication, e-architect,
<https://www.e-architect.co.uk/london/ravensbourne-college> visited 15-01-2019
4. Herzog & De Meuron, Bird's Nest Beijing National Stadium, Architect's Journal,
<https://www.architectsjournal.co.uk/beijing-birds-nest-stadium-wins-coveted-lubetkin-prize/5205134.article> visited 15-01-2019:
5. Daniel Libeskind, Vanke Pavilion Expo 2015, Studio Libeskind,
<https://libeskind.com/work/vanke-pavilion/> visited 14-01.2019.

PART 02

PATTERNS IN THE JAPANESE CULTURE



2.1 On Japanese Patterns

2.1.1 Patterns in the Japanese culture

“Man is the only one, among the animals, to make patterns, and among men, the Japanese are probably the foremost patternmakers. They are a patterned people who live in a patterned country. A land where habit is exalted to rite; where the exemplar still exists; where there is a model for everything and the ideal is actively sought; where the shape of an idea or an action may be as important as its content; where the configuration of parts depends upon recognized form, and the profile of the country depends upon the shape of living.

The profile is visible – to think of Japan is to think of form. Patterns exist also in a social way. There is a way to pay calls, a way to go shopping, a way to drink tea, a way to arrange flowers, a way to owe money.

[...] To make a pattern is to discover one and copy it; a created form presumes an archetype [...] the original model of the patterns of Japan was nature itself.

[...] These patterns are repeated often and faithfully. Wherever the eye rests, they occur. They give the look of the land a consistency, as though a set of rules had been rigorously followed. It is these patterns, these shapes, these forms, these designs endlessly occurring, which mark the country. Chaos is vanquished; pattern prevails. They make the view more consistent than would otherwise have been possible. They create what often identifies art: style.”¹



Fig.1 Hon'ami Koetsu - Spring and Autumn Flowers, Fruits, and Grasses, 18th century, Kimbell Art Museum.

Next page - Fig.2 Ozuka Kofun, Decorated Tumuli, 3rd and 4th century AD, The megalithic portal.

Patterns, throughout the years, had different functions in the Japanese culture. Early patterns in the ancient times had a communicative or talismanic function. For instance painting in red simple figures as spirals, triangles or arc on the wall of ancient Japanese tumuli was used to take the evils away and ensuring the rest of the souls.

However, during the centuries and in the present days the main function of pattern has become decorative, with a large number of new patterns for every kind of item.²

The Japanese have always recognized China 中国 as the "central country", as the ideograms for China suggest (中 = Central, 国 = Country) and that is why Japan 日本 is also called "the land of the rising sun" (日 = Sun, 本 = Origin). This geographical decentralization can be reflected on the Japanese way to produce space, art and architecture.

Japanese were conscious of not being at the center of the world, and this led them to produce space that have "an avoidance of the appearance of symmetry while producing symmetrical effects, a suggestion rather than expression of proportion, an unobtrusive order, and in repetition of form an irregularity and changefulness, giving to it an unusual charm and freshness. [...] A Japanese artist proceeding to decorate a given space would not mark out the center and place his ornament there, nor would he divide it into equal parts, but he would most probably throw his design a little out of the center, and cleverly balance the composition by butterfly, a leaf, or even a spot of color"³

Many intellectual Japanese characters have analyzed patterns through the years.

The Japanese philosopher Soyu Matsuoka made a comparison between patterns and particles, referring to them as Kami no kehai (神の気配) that means "sign of god". He says that this set the basic tone of Japanese culture and this influenced the structures of Japanese constructions and arts, and it has developed into the typical Japanese aesthetic of stillness and motion.⁴

While the philosopher Nishida Kitaro sustains that the Japanese culture is based on absolute nothingness rather than on the being. On the intuitive grasp of the "formless and voiceless" rather than on concrete things⁵



2.1.2 History

Going through the traditional periods, which traditionally divide the Japanese history, I am going to analyse the evolution of patterns.

Jamon period (10000 BC – 300 BC):

The first patterns found in Japan date back to the pottery from the Jamon period, which name come from the characteristic pattern surface made with cords on the vase.⁶

Yayoi period (300 BC – 250 AC):

Starting from the Jamon period but still in the Yayoi period primitive figures as sawtooth shapes, spirals and arcs were found into earthen or stone vessels.

Kofun period (250 – 645)

By the sixth century new more complex patterns appear, as human or animal figures and arabesque imported from Asian mainland.

Asuka period (645 – 794)

During this period the Buddhism, arrived from the mainland, was spreading through Japan and the Horyuji temple in Nara, the oldest still existing wooden structure in the world, was built. Different patterns from the Buddhist tradition, as lotus blossom, cloud, four-petaled flower and lion, came to Japan. (fig.3)



Fig.3, 4, 5 - Traditional patterns from:
Asuka period: Honey suckle;
Nara period: Parent and child scales;
Heian period: Waves.

Jeanne Allen, *The designer's guide to japanese patterns*, Thames and Hudson, London, 1988.

Nara period (645 – 794)

Because of the envoys sent to the Asian mainland, the influence, especially from the Tang dynasty in China, during the Nara period was still strong. Many objects have been imported to Japan during this period showing several new patterns as geometric forms, figures from the sky, natural phenomena, plants, animals and human figures. (fig.4)

Heian period (794 – 1185)

In the 794 the Japanese capital was moved from Nara to Kyoto, at that time called Heian. During this period Japan quit sending envoys to China.

Absorbed the influences started to express their originality in all the arts, Japanese through their sensibility transformed the appearance of patterns with richer colouring and finer design. (fig.5)

Kamakura period (1185 – 1333)

The Kamakura period started with the development of the society and the rise of the military class of samurai. This signed the beginning of almost seven centuries of feudal government. Patterns, during this period, had two main developments. First, they began more pictorial than before. And second, different figures were combined into single patterns, traditional combination were sandbars and chrysanthemums or peonies and butterflies. (fig.6)

Muromachi period (1333 – 1573)

In the Muromachi period the artworks were still influenced by the Chinese Yuan and Ming dynasties. During this period there was a development in the lacquering technic called makie, with the application of golden and silver powders.

Momoyama period (1573 – 1603)

This period was characterized by the power of the samurai Toyotomi Hideyoshi, who, with his artistic sensibility, influenced many aspects of the Japanese culture developing unique new patterns. (fig.7)



Fig.6, 7, 8 - Traditional patterns from:
Kamakura period: Basket weave;
Momoyama period: Seigaiha;
Edo period: Sea Moss.

Jeanne Allen, *The designer's guide to japanese patterns*, Thames and Hudson, London, 1988.

Edo period (1603 – 1868)

This period takes its name from the old name of Tokyo, it was the period of the Tokugawa shogunate and it is famous for the raising of the merchant middle class and the fall of many of the old restrictions. In this socially and artistically freer society many common people has the chance to create new patterns. As the Rinpa school with Ogata Korin who developed his stylized flowers on the folding screen and the spread of the famous wood-block printing with artists as Utagawa Hiroshige and Katsushika Hokusai, this last one also has drawn a book of patterns. (fig.8)

Meiji period (1868 – 1912)

In the Meiji period, after 300 years of self-imposed isolation, the shogun dictatorship was over. The emperor came back to the power and made Japan participate to the modern era initiated by Western countries. The western culture and technologies were introduced to Japan, which became an interesting field of experimentation and mix between the cultures. At the same time Japan exported its culture influencing the modernist movement and the Art Nouveau.

Modern period (1912 – present)

In the West, in the beginning of the 20th century, patterns experienced a hard time where architects as Adolf Loos criticized ornament and patterns as excessive, redundant and immoral. These ideas influenced the modern movement, which utilized unadorned forms and decided to eliminate the ornaments in favour of skeletal structures.

Japan did not experience the same, patterns had an historical continuity. "Japanese patterns do not differ from those of the other countries because they are different in form, but because they are culturally codified, represented, and utilized differently."

The Japanese rich culture can be seen as a stream of thoughts that forms a sophisticated worldview. The Shintoism makes the base of the culture, but the entire entity is made by a confluence of Buddhism, Confucian, Taoist and Western cultures. Therefore, Japanese are able to welcome new influences that they see as compatible for an enrichment of the existing culture.

This openness led to new patterns and variations of the existing ones in a continuous way until the present days.⁷

2.1.3 Meaning

The Japanese word used to indicate pattern is *Monyou* 文様. The first ideogram 文 (*mon*) means Sentence, Literature, Decoration, Style, Art; while the second one means Way, Manner, Situation.

Japanese patterns can be conceived both on an ornamental and structural way. "But it is precisely these two categories and a binary opposition that one should go on approach the meaning of Japanese patterns. They are symbolic abstractions, human interpretation of the cosmos, and connecting agents. Sometimes they are congruent, sometimes they are not."⁸

"Patterns do not have any well-defined, unitary function. As patterns evolve they acquire new functions and lose their prior functions, or new functions are superimposed upon older ones"⁹

Despite the Japanese patterns can appear as an observation and reproduction of the nature, actually they are more than this. Patterns want to represent the essence, eliminating of all the non-essential, to keep the dense and compact essence, bringing nature to its minimal and primal truth form.

The philosopher Soetsu Yanagi stated that pattern does not want to be a scientific rendering of what can be found in nature. It wants to be a symbolic representation of a plant, not the plant itself. "It is an emblem of the bamboo, and yet the living bamboo is there in it. A pattern is a picture of the essence of an object, an object's very life; its beauty is of that life"¹⁰

In the Yanagi's opinion is the human viewpoint to give a meaning to nature, because patterns do not want to be a mere imitation of the nature, but it is through the eyes of human that nature acquire its beauty, which otherwise would be raw. According to the Japanese thought, nature can show its real essence, the universal principles, just once that it has been arranged. This happens in the popular Japanese flowers arrangement, the *ikebana* 生け花 (fig.9) or the boxing garden *hakoniwa* 箱庭. (fig.10) Indeed, "Pattern expresses a dynamic tension between nature and artifice, which are not to be seen as opposites. It does not resolve in a synthesis, but rather defines its proper subject by maintaining the tension between affirmation and negation as opposite poles or perspectives".¹¹

Therefore, this dynamic tension wants to represent an exaggeration, an amplification of the nature. Nevertheless, it is exactly in the metamorphosis from nature to pattern that one should look for the meaning; it is exactly in this transformation that lies the significance.

2.1.4 Characteristics

Japanese patterns, either created in Japan or imported and adapted, show some general characteristics that can be summarized as:

First: The central focus on natural elements, almost all of Japanese patterns represent element that come from nature, but not using an exact representation of it, but rather using their skill of reduction of forms into ideographic motifs. Pattern is not meant to explain, it leaves the interpretation in the eyes of the viewer. "Pattern is what remains. There is no wordy explanation. There must be the 'speech without words' of Zen"¹²

Second: Pattern must be simple, if it is cluttered, it is not yet a pattern. The goal of patterns is to transmit the beauty of nature and it is through them that we learn to look at nature. "Without patterns, man's view of nature would be far more vague and equivocal than it is. Pattern contains the nature of nature. Rather than say that pattern depends on nature, thus, it would be better to say that nature depends on pattern. Pattern is the nature seen in the best light."¹³

Third: Despite the simplicity, Japanese patterns have a feeling of vagueness over the clarity. It is easy to find subjects as mountains veiled in the fog or landscapes and even cities hidden behind the clouds

Fourth: There is a very wide variety of motifs represented and several variation and combination between them. Some of them have been created in Japan and some imported, initially from China and the Asian mainland, but after the opening to the Western world in the Meiji Period also from Western sources. But all of them once imported in Japan have been revised to conform with the Japanese sensibility.¹⁴

2.1.5 Family crests

A family crest is the symbol used to identify a certain family. Usually it is a stylized depiction that can have several different subjects as animals, plant, natural phenomena, tools, geometric forms, utensils, writing characters or other subjects. Crests can also be found in shrines, temples or corporations, whatever represents a group of individuals. While patterns, as decorative motifs, are present in a large amount of cultures throughout the world, family crests are used by few countries. They can be found especially in the West, but in the East the only country who developed them have been Japan.

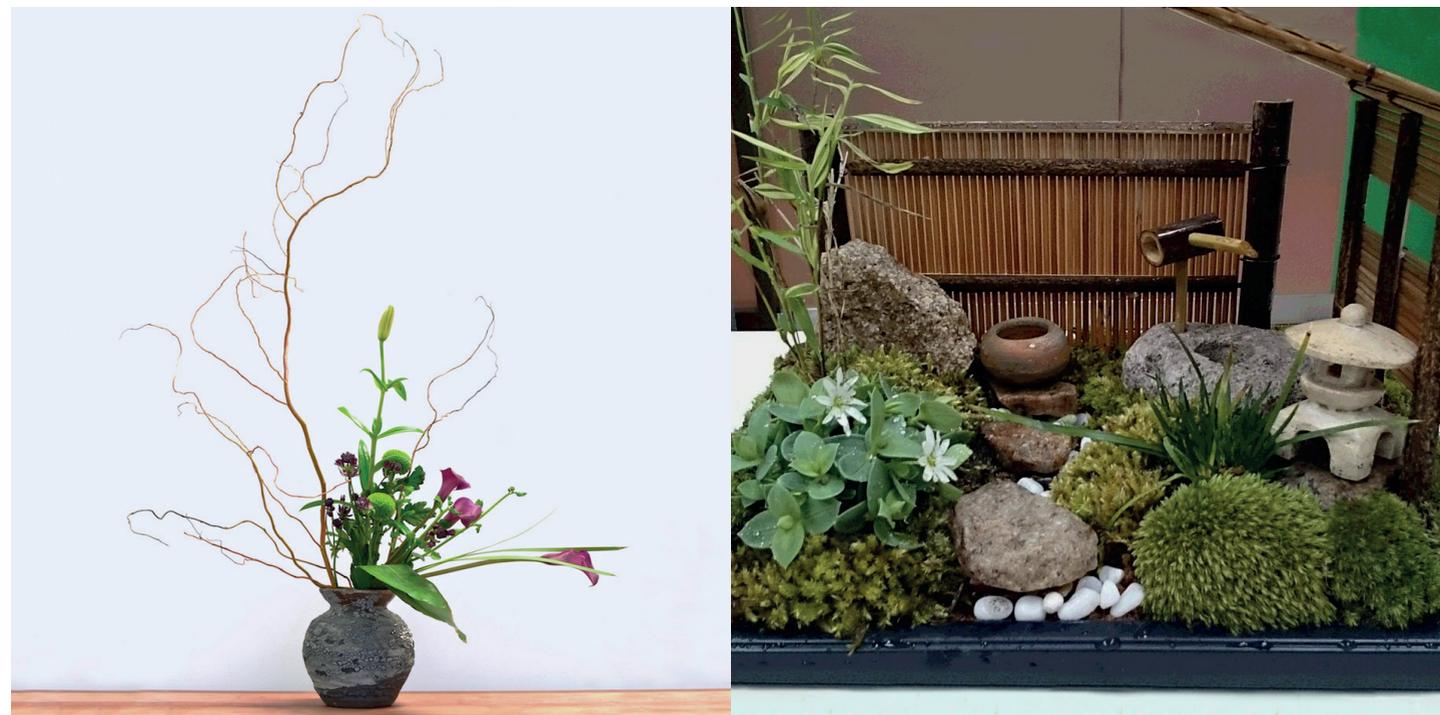
The first family crests in Japan are date back to the Heian period (794 – 1185), the noble families used to personalize their objects, furniture, clothing and carriages with patterns. Initially they had just a simple decorative function, but gradually since each family was using a personal figure to identify these objects they ended to identify the family itself. Therefore, they became property of the family.

With the end of the Heian period and the rise of the warrior class in the Kamakura period (1185 – 1333),

Previous page - Fig.9, 10 - Rearrangement of nature:

Left: *Ikebana, King Houndekpinkou,*

Right: *Hakoniwa, Jimdo.*



the samurai families started creating and using their own family crests, in their case crests were mostly used to identify the battlefield flags, armatures and equipment.

During this period the most common motif was a combination of simple geometries with the Chinese characters, kanji, of the family name.

The four most powerful families at the time, Fujiwara, Genji, Heike, Tachibana, had family crests, but since each branches of the families wanted a self-identification, each of the branches had its own crest using the popular motifs of the period such as bamboo, hawk feathers, wisteria, birds, and geometric forms. During this same period, the chrysanthemum became the pattern symbolizing the imperial family. With the raising of the middle class during the Edo period the use of family crests began a wide spread and legal stipulations were applied to them. In fact, the use of hollyhock motif, used by the shogunate Tokugawa Ieyasu, became forbidden to any other family.

In this same period family crests obtained they appearance that we are used today, refined inside a square or round shape. Family crests have been really useful in the Japanese culture, not just for the identification of the families, but since in Japan in really important the rank hierarchy and the respect of it, through the crest was possible to recognize it and use a proper etiquette.

Despite the fact that there is no relation between Western and Japanese family crests, some interesting parallel consideration to point out. Family crests appeared almost in the same period, in Japan during the Heian period, in Europe just slightly later with the Crusades (1095 – 1291). Also in Europe they were representing families and appeared on battlefield flags, armatures, clothing and carriages. But in the form of them there is some substantial difference. At first the almost all of the Japanese family crest are totally black, expect for few exceptions in light blue, while the European ones can appears in combinations of different colours. Furthermore, Japanese ones are unified by the circular outline, but the European's can be represented in different shape, the most common are the shield or the helmet, these can be divided

Fig.11, 12, 13, 14, 15, 16 - Family crests:

First row from left: Arrowroot flower, Carp, Koshiji (family name);

Second row from left: Silk handball, Reversed squared treasure loops, Long-tail whorls.

Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001.



into regular schemes, while Japanese crests not.

It can be said that Japanese crests usually use simpler design, often characterized by a symmetry, that in the European crests in not common presenting complex composition and less uniform.

The last important difference between them is that in Europe only the nobility was allowed to have a family crest and this means that beside the identification of the family they were a symbol of authority. In Japan, from the Edo period, also common people could adopt a family crest and they are not used to represent authority not even for the emperor.¹⁵



Fig.17 - Keisai Eisen, *In the Sixth Month, Hair-washing Day*, 1821-23, Museum of Fine Arts Boston.

Notes:

1. Donald Richie, *A Lateral View: Essays on Culture and Style in Contemporary Japan*, Stone Bridge Press, 1992;
2. Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001;
3. Thomas W. Cutler, "A Grammar of Japanese Ornament and Design", Dove Pictorial Archive republication of the edition by B.T. Batsford, London, 1880;
4. Salvator-John A. Liotta, Matteo Belfiore, *Patterns and Layering, Japanese Spatial Culture, Nature and Architecture*, Gestalten, 2012, p. 11;
5. Wei-hsun Fu, *Japan in Traditional and Postmodern Perspectives*, Suny Press, New York, 1995, p. 55;
6. Salvator-John A. Liotta, Matteo Belfiore, *Patterns and Layering, Japanese Spatial Culture, Nature and Architecture*, Gestalten, 2012, p. 11;
7. Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001, p 186-187;
8. Salvator-John A. Liotta, Matteo Belfiore, *Patterns and Layering, Japanese Spatial Culture, Nature and Architecture*, Gestalten, 2012, p. 11;
9. Patrick Schumacher, *Parametric Design* in Mark Garcia, *The Patterns of Architecture: Architectural Design*, Wiley, London, 2009, p 30.
10. Soetsu Yanagi, *The Unknown Craftsman*, Kodansha, Tokyo, 1990, p. 113;
11. Salvator-John A. Liotta, Matteo Belfiore, *Patterns and Layering, Japanese Spatial Culture, Nature and Architecture*, Gestalten, 2012, p. 12;
12. Soetsu Yanagi, *The Unknown Craftsman*, Kodansha, Tokyo, 1990, p. 114;
13. Ibid;
14. Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001, p 185-186;
15. Ibid, p. 188-189.

Images:

1. Hon'ami Koetsu, *Spring and Autumn Flowers, Fruits, and Grasses*, 18th century, Kimbell Art Museum;
2. Ozuka Kofun, Decorated Tumuli, 3rd and 4th century AD, The megalithic portal. The megalithic portal - <http://www.megalithic.co.uk/article.php?sid=19929> visited 08-01-19;
3. Honey suckle, Jeanne Allen, *The designer's guide to japanese patterns*, Thames and Hudson, London, 1988;
4. Parent and child scales, Jeanne Allen, *The designer's guide to japanese patterns*, Thames and Hudson, London, 1988;
5. Waves, Jeanne Allen, *The designer's guide to japanese patterns*, Thames and Hudson, London, 1988;
6. Basket weave, Jeanne Allen, *The designer's guide to japanese patterns*, Thames and Hudson, London, 1988;
7. Seigaiha, Jeanne Allen, *The designer's guide to japanese patterns*, Thames and Hudson, London, 1988.
8. Sea Moss, Jeanne Allen, *The designer's guide to japanese patterns*, Thames and Hudson, London, 1988;
9. Ikebana, King Houndekpinkou, <http://www.kinghoundekpinkou.com/ja/project/ikebana>. visited 08-01-19;
10. Hakoniwa, Jimdo, <https://tsuhan-dips.jimdo.com/>, visited 08-01-19.
11. Arrowroot flower, Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001;
12. Carp, Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001;
13. Koshoji (family name), Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001;
14. Silk handball, Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001;
15. Reversed squared treasure loops, Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001;
16. Long-tail whorls, Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001;
17. Keisai Eisen, *In the Sixth Month, Hair-washing Day*, 1821–23, Museum of Fine Arts Boston.

2.2 Typologies of patterns

The traditional Japanese patterns are a very important part of the Japanese culture and of the arts and crafts. There is a huge series of beautiful, stylized motifs that has been used, through history up to our days, to decorate a wide range of items.

Indeed, in Japan patterns continue to flourish despite the modernization and westernization. Even now, they are not used just to decorate traditional objects as kimono or wooden boxes, but they are applied on every kind of Western clothing or modern tableware (fig.1).¹

I am going to divide this rich variety of traditional patterns into two big categories: Organic patterns and Geometric patterns that are going to have different subcategories.



Fig.1 - Traditional Japanese pattern on iPhone cover

2.2.1 Organic patterns

The main source of inspiration in the design of Japanese patterns is nature.

For “organic patterns” I mean those that keep a more organic appearance, that means not creating a perfect symmetrical effect, but creating irregularities in the repetition, a non-rigid order and just a suggestion of proportion.

Plant patterns:

Patterns representing plants appeared in Japan much later than those using points and lines. Indeed, before the Asuka period (645 – 794) it is difficult to find examples of their use. During the Asuka period, the Buddhism arrived from the Asian mainland and with it a important cultural influence, which included the use of plants motifs, as used in the Chinese and Indian patterns. They arrived through items as tools, Buddhist articles, clothes and architectural elements.

Among the first imported pattern there are: lotus blossom, *hosoge* or *karabana* patterns.

However, going forward there was a development of original Japanese patterns, such as peony, plum, pine, chrysanthemum, cherry blossom, lily, autumn flowers or paulownia.

As the different techniques to create patterns improved during the Kamakura and Muromachi periods, also patterns refined themselves and by the Edo period they reached their highest level of finesse.

Each pattern has its own characteristics, meaning and history:

For instance the Chrysanthemum (fig.2), whose also stems and leaves are used to create patterns.

This plant is often combined with other patterns, such as the moon, water or hedges in order to enrich



Fig.2 - Chrysanthemums pattern on saké bottle

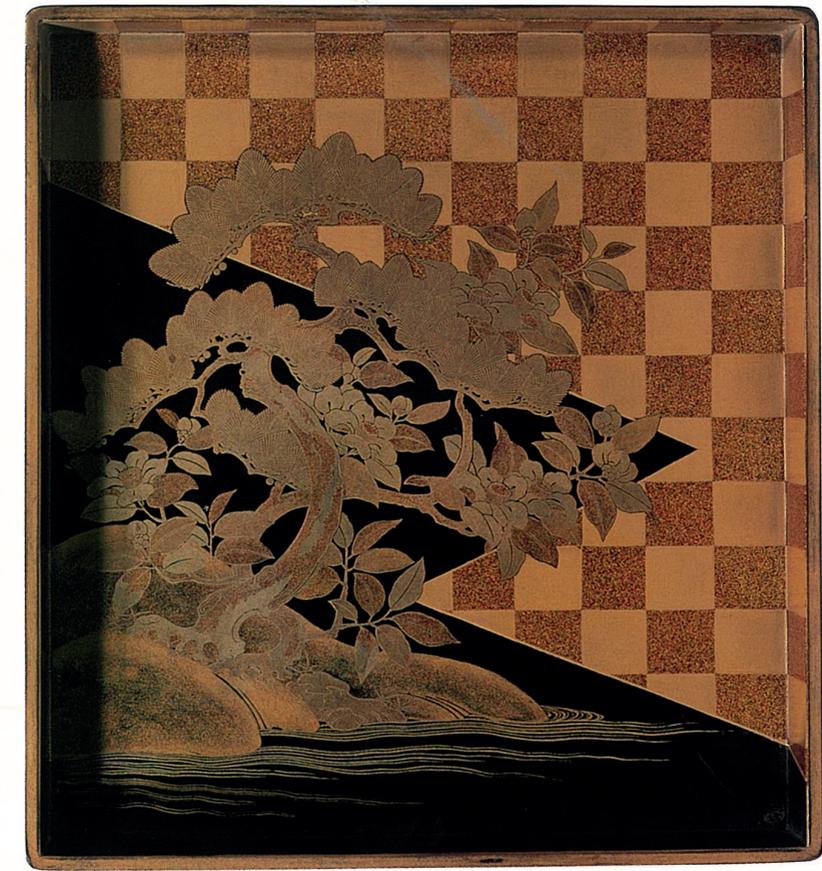


Fig.3 - Camellias and pine trees with checks on makie tray

the composition. Chrysanthemum is a “symbol of superior character, the light of the sun, long life, and virtue, the chrysanthemum has been respected since ancient times”².

This plant, represented with sixteen petals, forms the crest of Japan’s imperial household.

Or the Camellia, which has been employed for its beautiful appearance and the variety of forms it can shows: single or double petals, plain or speckled blossoms.

Nevertheless, not all the artists were using this pattern due to its characteristic of dropping suddenly from the branch, as this was thought to be a bad auspice.

Animal patterns:

These patterns are characterized not by their balance or symmetry, but rather by a great vibrancy, usually bringing a religious or narrative meaning.

Many animals are considered auspicious of good luck, such as cranes and turtles, lobsters, sea breams, plovers, and wild geoses.

Concerning animals it is also important to consider the influence from China or India since not all the animals represented in the patterns are Japanese but they come from images received of real or imaginary animals. These include lions, tigers, and peacocks among the real ones or dragons and phoenix among the imaginaries.

Tigers and dragons often appear together (fig.4), these two animals want to symbolize the sovereignty over heaven and earth. Dragons were believed to live underwater, but occasionally they could ascend



Fig.4 - Tiger and dragon pattern on yoten kabubi robe

to heaven, as a metaphor of the advancement of the world. It possible to find different variation in the representation of the dragon: with scales, wings, beard, horns or clouds. Despite not being native in Japan, tiger's representations are pretty accurate because of the many implements and books imported from the Asian mainland containing drawing and description of the animal.

Natural phenomena patterns:

Mountains, waves, whirlpools, the moon and all of the patterns depicting natural phenomena are the most recognizable as Japanese at first sight. This is probably due to the worldwide popularity of the ukiyo-e woodblock prints of the Edo period, with artist such as Ando Hiroshige or Utagawa Hiroshige, and in general the whole world of Japanese artworks that shows the love for nature. Often, there are several variations for the same natural phenomena, which can create different designs. For instance the case of flowing of water. It can be represented as the water changes forms while is flowing, sometimes creating swirls, sometimes appearing as choppy waves. Another very popular variation concerns the overlapping waves, this stylized depiction has been developed during the Edo period. For instance, once the Akita coins, from north of Japan, had this pattern on the back side.

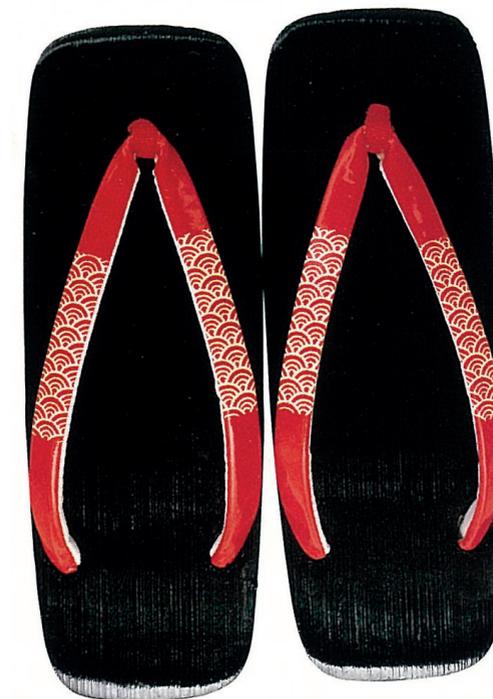


Fig.5 - Overlapping waves pattern on geta clogs



Fig.6 - Flowing water and butterflies on makie saké holder



Implements and structures patterns:

Patterns employing implements and structures are stationary, unlike the animal ones, which are dynamic.

However, there is a wide variety of subjects depicted. Implements pattern can be divided into categories which include: religious objects, everyday items, weapons, toys or musical instruments. While structures can include anchors, houses, fences or bridges.

An example of implement is the folding fan. Used as pattern, or the folding fan itself, is really popular in the Japanese culture. It is believed that the action of opening the fan is a good presage for the unfolding of the future.

Folding fans can appear in different variations as opened, closed, overlapped or scattered.

Regarding the structures, bridge patterns are appreciated because the early Japanese saw bridge as holy objects, they were the link between two worlds, therefore the construction of a new bridge was bringing enormous benefits.

Fig.7 - Tsuten bridge and maple leaves (detail of kabuki robe);

2.2.2 Geometric patterns

Geometric patterns are those created on a more rigid grid, where it is possible to find symmetries, axes and regularity in the repetitions.

In this kind of patterns, points, lines, and different shapes are mixed to create designs in various degrees of complexity.

The history of geometric Japanese patterns can be divided into three main stages:

The first stage is before the strong influence from the Asian mainland and it includes Jomon, Yayoi and Kofun periods. In this first stage, patterns were simpler, they included geometries such as points, parallel lines, mountain shapes, comb's teeth, and swirls.

It was during the second stage, that includes Asuka, Nara and Heian periods, that motifs became more intricate. They were involving: arcs, waves, leaf shapes, rhombuses and tortoise shell patterns.

During this period Japanese patterns were mixed with those coming from China. Among the patterns developed in this period

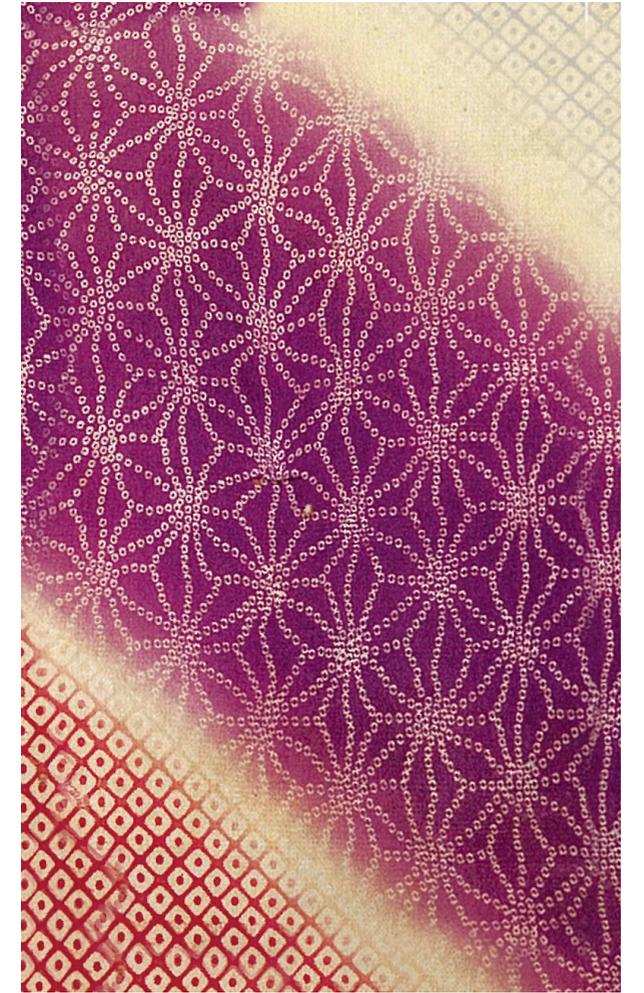


Fig.9 - Hemp leaf and dappled pattern on a dyed fabric



there are: hemp leafs, tatewaku or overlapping circles.

The last stage, the one starting from the Kamakura period onward, saw the thriving of more complex patterns, such as zigzags, pinwheel and other unusual ones. These were still under the influence of the Asian mainland and Buddhism. However, with the Edo period they acquired more Japanese features.

Recently, with the westernization on Japan, also the geometric patterns felt the influence.

An example of geometric pattern can be the *Tatewaku* pattern (fig.8), composed by parallel strips with alternated symmetrical distensions and depressions. This pattern is often mixed with other figures, such as clouds or flowers, in the distended portion;

The hemp leaf, *asanoha* 麻の葉 (fig.9), pattern is based on a regular hexagonal grid. The hemp plant in early times was used to make clothes, so the leaves formed the base for a variety of hemp patterns. The god of hemp is revered because it is said that through his hemp cultivation, which was made into clothing, he created a vital industry.³

This pattern became popular because it was originally applied on the clothing of the newborns. Since the hemp plant grows fast, parents were using it on their babies because they believed that it would have transmitted its vigour on the growth.⁴

Fig.10 - First Bath of the New Year (Yudono hajime), from the album Saishiki mitsu no asa (Colors of the Triple Dawn)



Notes:

1. Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001, p. 8;
2. Ibid, p. 22;
3. Ibid, pp. 9-122;
4. Jeanne Allen, *The designer's guide to japanese patterns*, Thames and Hudson, London, 1988.

Images:

1. Traditional Japanese pattern on iPhone cover, Unicase web store, <https://unicase.jp/iphone-goods/case/14799.html> visited 07-01-2019;
2. Chrysanthemums saké bottle, Prefectural Ceramic Museum;
3. Camellias and pine trees with checks on makie tray, Sato Teizo collection;
4. Tiger and dragon on yoten kabubi robe, Obata Kin'ichiro collection;
5. Overlapping waves on geta clogs, in Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001, p. 88;
6. Flowing water and butterflies on makie sakè holder, in Sadao Hibi, Motoji Niwa, *Snow, Wave, Pine - Traditional Patterns in Japanese Design*, Kodansha USA, 2001, p. 84;
7. Tsuten bridge and maple leaves (detail of kabubi robe), Obata Kin'ichiro collection;
8. Tatewaku with rounded waves (detail of kabuki robe), Fujimimura Board of Education, Gunma prefecture;
9. Hemp leaf and dappled pattern on dyed fabric, Tokyo National Museum;
10. Torii Kiyonaga, *Teahouse in Shinagawa*, 1783, Metropolitan Museum of Art.

2.3 Uses

2.3.1 Craft

Construct a precise history of the Japanese craft is not easy; its evolution during history presents several causes and circumstances.

For instance talking about weaving, there are different types of fabrics, as silk or hemp, but each one of them had a different development. Hence, in the thinking about craft arts as a whole it is important to consider historical and technical factors.

Folk crafts are an important mean of reading of the development of the civilization and society, since they are object created by the needs of the everyday life.

The earliest example of applied art can be considered, even if not completely properly, those in the prehistoric era, as wooden clubs and stone carvings.

Applied arts started when the small communities of primitives, led by a leader and shamans, began to develop. In the Jamon period (10000 BC – 300 BC) people did not have a proper religion, they believed in a greater force which was moving everything in the earth. And in this world ruled by magic they were trying to influence the force in the most advantageous way to obtain benefits.

The force scared these primitive people, so the earliest craft produced had a sacred function. The beauty of these objects is due to the result of a tireless work over long times inspired by magic. Later in the Jamon period, it was found that there was a distinction in the categories of artifacts between ritual and everyday use, since some of the earthenware found did not have sign of burnt or other objects, which were not adapt to rituals. To make these objects the tools used were stone implements and the materials were mostly clay, wood and bark.

In the late Jamon period arrived a big technological revolution on the production. Metal tools, which replace the stone ones, potter's wheel and lathe were invented, the ceramic technic with high fire was developed and there were the first textile crafts.

With the development of the society the separation between ruler and ruled happened. This separation signed also the craft arts, creating differences between common people's everyday use articles and nobility's ritual and everyday ones. The latter were featured by an accurate beautiful decorations and a function that was more recreational rather the practical and this led to a great improvement of the making skills.

In this development can be seen the end of the ancient times and the transition to the medieval period, which can consider the Kamakura period (1185 – 1333), the Muromachi period (1333 – 1573) and the Momoyama period (1573 – 1603). During this time, people were still living in conditions of poverty until the resentment exploded into insurrections. And it was in this age that ordinary people got over the nobility in importance. The objects of the nobility, with the help of the most advanced technologies, kept changing and become more valuable but estranged from practical use in daily life.

Although, during this era most of the commoners continued to be poor, the number of daily use articles increased such as ironware, tongs, long hooks to use over fire, dyed articles, baskets, and bentwood products, which were created in this new era.



Fig.1 - Wan bowl, Laquered wood.



Fig.2 - Andon-zara: Earthenware plate

The division that had started at the end of the ancient period, between the fine arts of the upper class and the applied arts of the lower one, became greater during the middle ages, and by the Edo period (1603-1868) there was a decided separation.

This separation fostered the applied arts of the common people, which were based on the primitive arts and crafts "The orderly and systematic beauty characteristic of the ancient period and the Middle Ages changed into a beauty redolent of the earth and of sweat."

The production on individual articles ended in favor of the mass production and the daily use articles have been called folk utensils.

From the middle of the Edo period folk craft had the biggest development reaching its peak in the Bakumatsu era (End of the Edo period).¹

Among the several different kind of Japanese craft the most popular are:

Ceramics:

Japan has a very long and successful history in the production of ceramic, indeed Japanese pottery and porcelain are one of the oldest art of the country, they can be date back to the Jomon period.

Ceramic can be divided into three categories: porcelain, glazed stoneware and unglazed stoneware.

This tradition has been handed down from generations and it is still flourishing in our days.

This is due to a still prosperous request of ceramic products because of the enduring popularity of traditions like the tea ceremony (chanoyu) or the flower arrangement (ikebana).

But also the wide use in the cuisine, because of the variety due to different dishes and the need of changing them with the seasons, because visual presentation is as important as the taste of the dishes.

Lacquer ware:

Also lacquerware has a long tradition, the oldest example of lacquer in the world was found in Japan and it is dated back to 4500 BC.

The lacquer is made of an organic substance, tree sap, in particular in Japan is used the Urushi tree,



Fig.3 - Basket Weaver in Japan.

that has been aged and refined.

This lacquer is often applied over wooden objects with multiple layers; each one must dry before next application. These layers create a tough coating with high performances, it is waterproof, resistance to breakage and easy to clean.

Lacquer ware are often decorated, this can be made by carving on different colored layers or drawing on the surface.

Wood:

In the Japanese art and history wood has always had a central role. The tradition of Japanese carpentry has very long-standing roots. Traditionally the religious buildings have been built of this material as well as many household items.

Japanese wood has a unique quality, with an unmatched warmth and responsiveness.

There are several techniques to work the wood; probably the Japanese most popular technique is the sashimono 指し物 (assembled items), it consists on the assembling of items by joining small components often without the use of metallic elements.

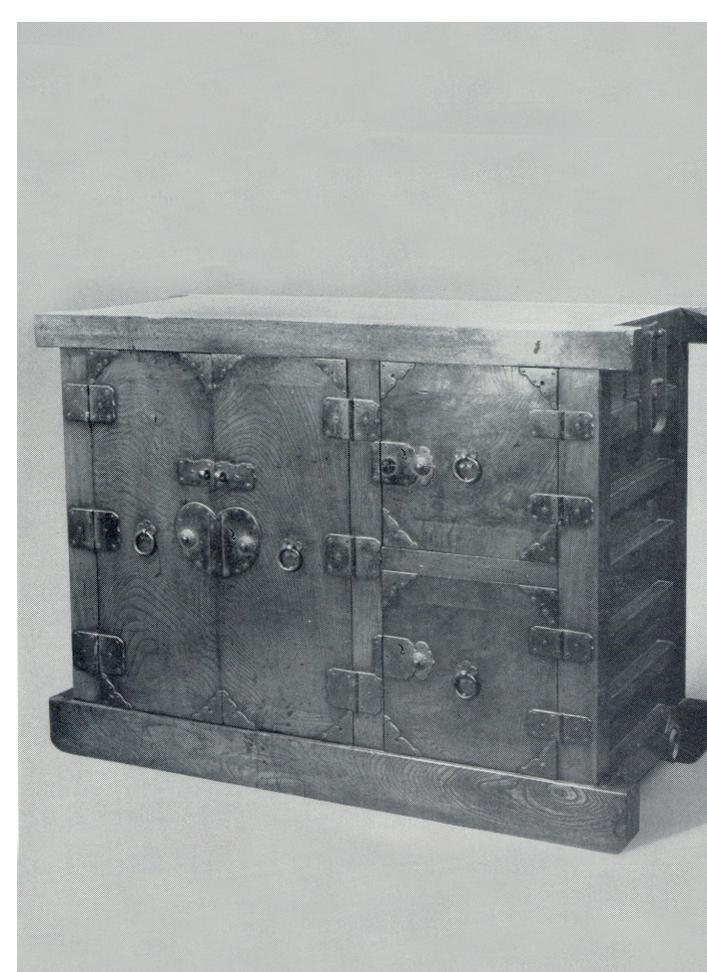


Fig.4 - Choba-dansu, Chest for account and ledger.



Fig.5 - Andon, stand lantern, paper on iron frame.

Bamboo:

Japan is a land where bamboo grows very prosperous, there are more than six hundred varieties. It is a very performing material because of its lightness, strength, extremely flexibility, it has a hard, smooth outer skin and easiness on working on it.

One of the main characteristic of the bamboo is that it is hard to work and weave by mechanical means, indeed most of the work is still handmade with simple tools.

Bamboo crafts can be made with different technics, but the one that obtained to biggest popularity is the weaving of basketry from flat, narrow bamboo strip such as kagome 籠目.

Metalwork:

Having its foundation dated back between the 3rd and 2nd century BC, metalcraft, using both precious and common material has reached a high level of refinement in Japan.

Among the Japanese metalwork craft the swordsmithing is famous for its extremely high quality. These swords obtained their popularity as the weapon of Japanese samurai.

Paper:

The traditional handmade Japanese paper is commonly called washi和紙, it was introduced from the Asian mainland in the 6th century. The principal raw material used for its production is the bast fiber, taken from the bark of different plants like mulberry, hemp or rice straw.

It is used on several articles beside the writing and painting, as for lanterns, fans, toys or in the Japanese sliding doors shoji障子.²

2.3.2 Architecture

The Japanese geographical condition of being the de-centred country compared to China, which was considered the center of the world, influenced the Japanese production of space, art and architecture. Japan recognized that China deserved the title of central country, but exactly from the acceptance of this condition they went to explore and exploit the potentialities of their condition. The awareness of not being the center of the world led Japan to create spaces characterized by the avoidance of symmetry, irregularity and changefulness.

The Japanese sense of design spaces historically cannot be considered as architecture, it is more like a temporary organization of space, in a fragile and non-hierarchical way.

For instance, in the Ise Grand Shrine, considered as the holiest Shinto shrine, is not the complex of buildings themselves that really matter, but it is the dynamic relation with the forest all around. Every 20 years the shrine is dismantled and rebuilt. The Japanese writer Yukio Mishima talking about the Ise shrine once said that the very essence of Japan is the emptiness, "Japan is nothing"³

Speaking about the Japanese traditional buildings is important to remember what the ethnologist, writer and orientalist Fosco Maraini said, "When one says 'palace' he should not associate it with the massive development of Western cities, derived ultimately from the medieval fortified house. The house in Japan has always been very light. It has no walls, railings, and turrets, but pavilions and covered walkways, gardens and kiosks, lobbies and porches all connected through filters and passages"⁴ Hence the main features of Japanese architecture are the unexpected, the asymmetric, the becoming and the nature dominated architecture. The spatiality created was absent of a central focus, how it could be in the Chinese or western architecture.

The traditional asymmetric and non-hierarchical distribution of spaces has been considered as a great value in Japanese aesthetic creating a sense of vagueness and incomplete. Likewise, the Japanese language leaves to the listener a margin of interpretation about the meaning.

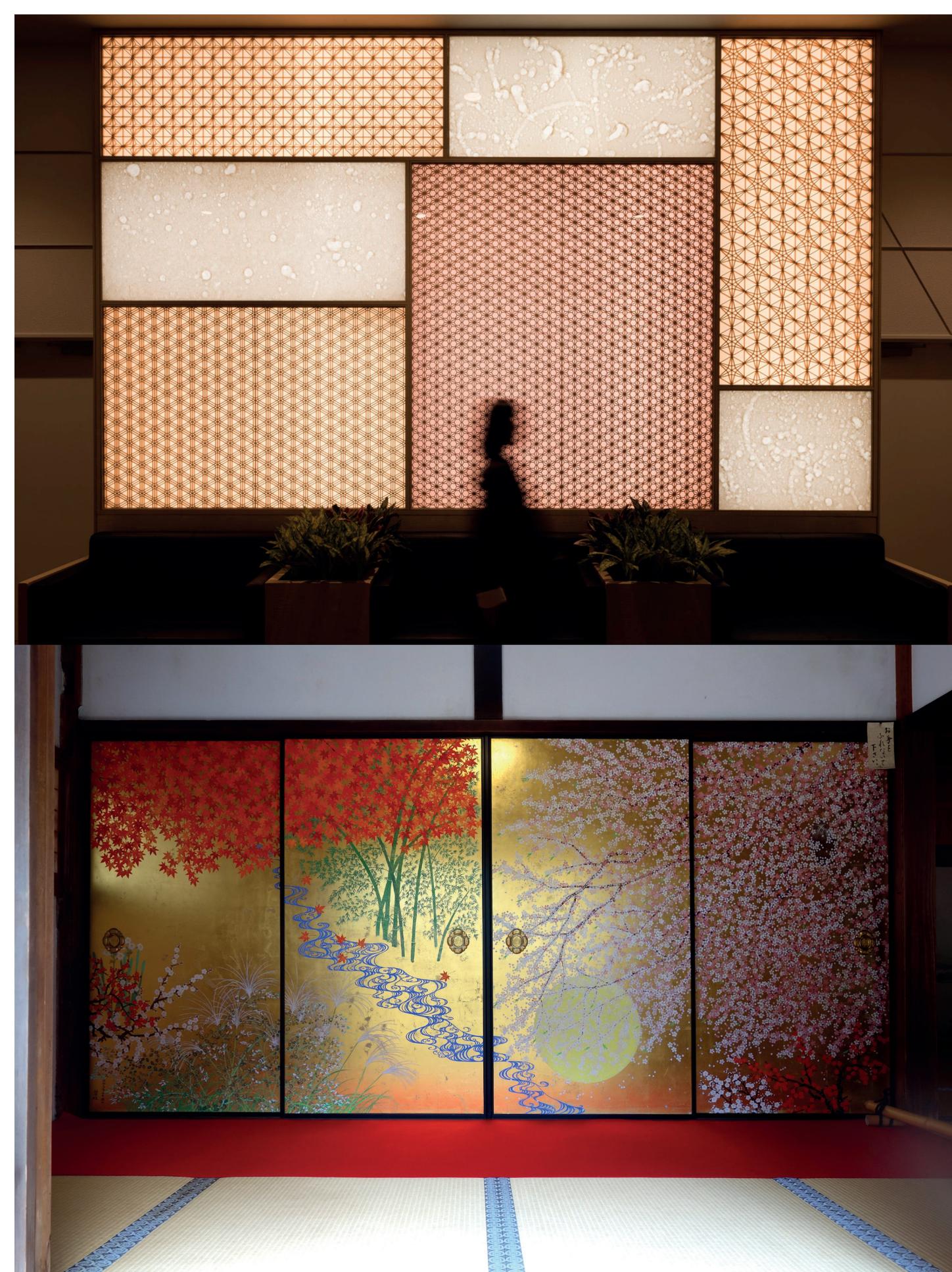
Japanese traditional architecture aims to create a space that is neither indoor nor outdoor, but neither in between. It is in the intermediation that connects the architecture with the nature creating its own atmosphere. This connection between indoor and outdoor is obtained through the use of a sequence of subtle screens, such as paper sliding doors, wooden screens, bamboo folding curtains and more.

All of these elements have a degree of transparency and permeability. Moreover, they are positioned following spatial patterns.⁵

These features create a juxtapositions of heterogeneous elements rather than uniformity.⁶

There are many elements in the traditional Japanese architecture, which feature patterns in their design. Among the most popular, there is the floor mat, tatami, a stiff rice-straw mat, with a thickness of 45-60 mm and a size of 1800 x 900 mm.

Originally, around the Kamakura period (1185 – 1333) when it appeared for the first time, it was thou-



Above: Fig.6 - Yoshihara woodworks, Aeon mall, Izumo,2012.

Bottom: Fig.7 - Rimpa painting on fusuma, Enko-ji, Kyoto.

ght to be a portable floor cover to accommodate two men sitting. However, it was in the Muromachi period (1333 – 1573) that it became the floor itself. After this step tatami became strictly related to the structure, reflecting in its placement of the floor the structural order, furthermore it is bound with a dark linen or cotton webbing at its long side, creating patterns that are both ornamental and constructional.⁷ Patterns are also characteristic of the Japanese sliding paper panels: shoji障子 and fusuma襖, both have a structural skeleton made of wooden strips arranged in a rectangular frame. However, on the shoji the traditional Japanese translucent paper (washi和紙), is pasted on one side, while in the fusuma both sides are covered with a heavy opaque paper. Hence, they show patterns in two different ways. Shoji, used both as outside wall or inside partition where light is wanted, shows patterns through the arrangement of the wood stripes that form the skeleton. In the ordinary dwelling, usually, can be found a simple arrangement with horizontal and vertical stripes in different variations of patterns, while in better houses the frame can be made with more intrigued patterns using the kumiko technic. While the fusuma, the opaque paper panel, used as room partition or door in the Japanese houses, shows its patterns not into the structure, but printed on the thick paper, as a pattern or calligraphy.⁸ Another elements, related to the sliding panels, most of time characterized by complex patterns is the ranma欄間, the Japanese word for the transom. It is used between the lintels of the sliding panel and the ceiling and it formed by a rectangular opening, with the horizontal direction longer than the vertical. Ranma often has rich decorative patterns made out the lattice or muntins that fill the transom. Despite the decoration, the ranma does not lose the function of filter the light and allow the air circulation.⁹

2.3.3 Textile

Textiles in Japan are used to create several different products, mainly clothing, such as kimono, yukata, obi, furisode, junihitoe and sokutai. But they can be used also curtains, partitions, door hanging, futon or temari. Traditionally Japanese textile used only natural fibers, except for silk all the fiber used come from plants. Silk fiber can be made from wild or cultivate cocoons of silkworms, this difference change the quality but in both case after having been dyed it obtains bright colors. Silk clothes are considered really valuable item, indeed traditionally they are used as ceremonial dresses. Among the plant origin fiber hemp and ramie are traditionally used in Japan. Hemp, from the mulberry family grows in cultivated conditions, while ramie, from the nettle family, grows wild. Apart from silk, any kind of fiber used, before the arrive of cotton, in Japan were called asa and the cloths made with these materials were called nuno. Cotton is relatively new in the tradition of Japanese textile, since it has arrived after the Hideyoshi's invasion of Korea in 1592-93. It became really popular because of its softness and people preferred it over asa. The cotton plant's ideal condition to grow is a temperate climate, in fact the cultivation in Japan started from the south, around Setouchi and the Inland Sea area, and after that spread in the rest of the country. Asa have been quickly substituted by cotton almost everywhere along Japan, also in the north part where cotton was not cultivated it was purchased and wove it.



Fig.8 -



Fig.9 - Fences among autumn flowers



Fig.10 - Scattered paulownias

Other popular fibers used were the rose mallow, daphne, arrowroot, flowering fern and banana plant. In the north of Japan the young buds of flowering fern were used as substitute of cotton. All of the different regions of Japan had to be self-sufficient in the production of textile products, hence use the raw materials available in the area. This led to have textile variations in every region of Japan. Spin fibers into yarn has different methods based on the type of fiber. The silk process is the drawn it from cocoons, while asa and cotton are spun. One of the main characteristic of the Japanese textile is the dyeing, also this can have different processes and characteristics. In Japan traditionally only natural dyestuff were used on the yarn. Safflower and madder were used to make red; Myrica to create yellow and the range of colors between grey and brown; other colors are made from kariyasu, turmeric, plums, mountain lacquer trees, walnuts, kunugi, gall nuts, sumac plants and black alder.

As in the case of the fiber, the available of these different flowers and plants determinate the different

Fig.11 - Shibori: Tie-dyed design. Silk.



colors in different parts of the country.

Cloths are woven both in solid colors or using a variety of different colors. The stripes motifs are among the most popular throughout the whole Japan because of the easy making technic, indeed striped motif cloths were woven by common people during the second half of the Edo period.

They can be vertical stripes, horizontal stripes or checks. These have a wide range of variations made through the space between stripes, width, thickness, texture and quality of the yarn.

Kasuri, had a high development in Japan. It is made by binding at a certain points the yarn and then dye it. The bound section will not absorb the colour and maintain the natural appearance of the material. The typical design are stars and crosses, characterized by the irregular edges because of the inaccuracy in the undyed sections. Moreover, involving the use of stencils is possible to create intricate representational designs. Stencil are useful in the reproduction of several pieces with the same design and for making long continuous patterns.

Using the dyeing technic is possible to create a wide array of patterns, decorations on Japanese items are really common and appreciated. Patterns of birds, flowers, arabesque and geometrical shapes in bright colours are popular in the dyeing tradition.

Japanese dyeing, or *wa-zome*, can be made through vary techniques: Freehand, starch-resist dyeing, tie-dyeing and blockprinting.¹⁰

2.3.4 Rock garden

“In an imperfect world, stone gardens represent an idealized environment, the world as it should be, all the right balances and dynamics firmly in place, nourishing the mind”¹¹

The rock garden or *karesansui* (枯山水) is a typology of Japanese garden, its main characteristic is the lack of water, indeed is often called “dry landscape garden”.

Water is represented through the use of pebbles, sand or gravel, to draw the water’s flows or ponds instead of real water. Zen priests, raking white gravel, create patterns recalling waves or ripple water. This act has an aesthetic function but it is also an exercise to focus the concentration of the priests.¹²

This kind of garden aims to recreate a miniature stylized landscape, the main elements whose is composed are rocks, carefully arranged, moss, pruned trees, hedges, shrubs, bushes and sand or gravel.¹³

As seen for other form of Japanese art, also for the rock gardens there is the intent to represent just the real inner essence of the nature, not a mere imitation, and this real essence can be seen just once that nature has been arranged.

Rock gardens have a long story, stones were already considered important to Japan’s early ancestors. In the pre-animistic time, stones were used to mark out the limits of the properties or land. But at some point, rocks obtained a more mystic function. At the time there were not temples, shrines or any religious reliquaries, it was the natural world which was providing the elements to worship.

Plants, mountains, rivers, ancient trees, waterfalls were thought to be inhabited by *kami*, native gods of Japan.

To pay a tribute to these forces and communicate with them sacred spaces were created with large rocks. These were not the gods themselves, but a vector through which reach gods. Therefore, a purified clearing was made around the stones.

A more proper concept of garden architecture arrived when stones rocks began to be brought from other sites, acquiring an archetypal function. A later development involved the addition on white

gravel or sand, this led to a really close concept of the nowadays idea of rock garden since it was used to divide the boundaries between sacred un human, divine and mankind.

Native Shintoism found an similar point of view about nature, rocks, trees, waterfall and mountains as inhabited by spirits. In the Taoism from China, indeed the Taoist paradise was made of a series of floating islands on an ocean inhabited by invisible spirits.

Hence, although a more conscious gardening as an art form in Japan is traced with the introduction of the landscape concepts imported from China and Korea during the period where envoys sent to the Asian mainland, the Asuka, Nara and Heian periods, Japan’s primitive period had already some key concept of the art of designing a rock garden.

Japan adopted the architectural forms from Korea, but they imported the practice of placing stones in the gardens as well, but the Japanese way of placing stones was following their simpler aesthetic tastes and their religious features.

The influence from the Asian Mainland wined by the end of the Heian period with the end of the envoys sent to China.

After this period there was a cultural introspection of the Japanese culture, translated into a more suited garden to its own spatial conditions and cultural characteristics.

The Taoist landscape architects studies the rocks that are going to be arranged in the garden one by one.

On each rock they try to discover their “dragon veins”, the energy that the Taoists believe connects all physical matter in the world.

The porpoise of the gardens designed during the Heian era was not just a pleasing arrangement, but

Fig.12 - Ryoan-ji, Kyoto, 1450.



the stone setting was used to promote good luck and to prevent catastrophes. Rock should have not been positioned on the linear extension of the columns of the adjacent building, or large upright stones should have not been placed on northeast, the devil's gate.

During the Kamakura and Muromachi periods there was a second wave of influence from the Asian mainland, if before it stone gardens were representing the quintessential interior nature, now with arrival of the Zen Buddhism the focus is more on the inner work of the mind.

During this period there was a change in tastes of the gardens, due to the Zen influence and to the rise of the warrior class, which preferred darker, more austere, subdued and unpretentious stones. In other words, rocks which were explicit rather than suggestive.

The Zen's Buddhism was influencing in the design of these gardens, because of its rejection of superstition it transformed the meaning of the rocks into artistic, abstract objects. The atmosphere of the Zen garden became meditative. An example of this this kind of Zen garden is the Ryoan-ji, probably the most famous rock garden, built in the 1499.

During the Muromachi period the rock gardens were characterized by a certain austerity, but with the arriving of Momoyama and Edo periods a shift to a richer design approach took place.

A lavish use of stones and the wide presence of exotic plants is seen in the new gardens, that from now are considered more for the pleasing view rather than for contemplation.

Rock gardens became even more decorative during the Edo period, a large array of ornamentations was involved to the garden, such as stone lanterns, miniature stone bridges and exotic plants.¹⁴

Fig.13 - Zen priest raking

Fig.14 - Zuiho-ji temple, Kyoto, 1535.



Notes:

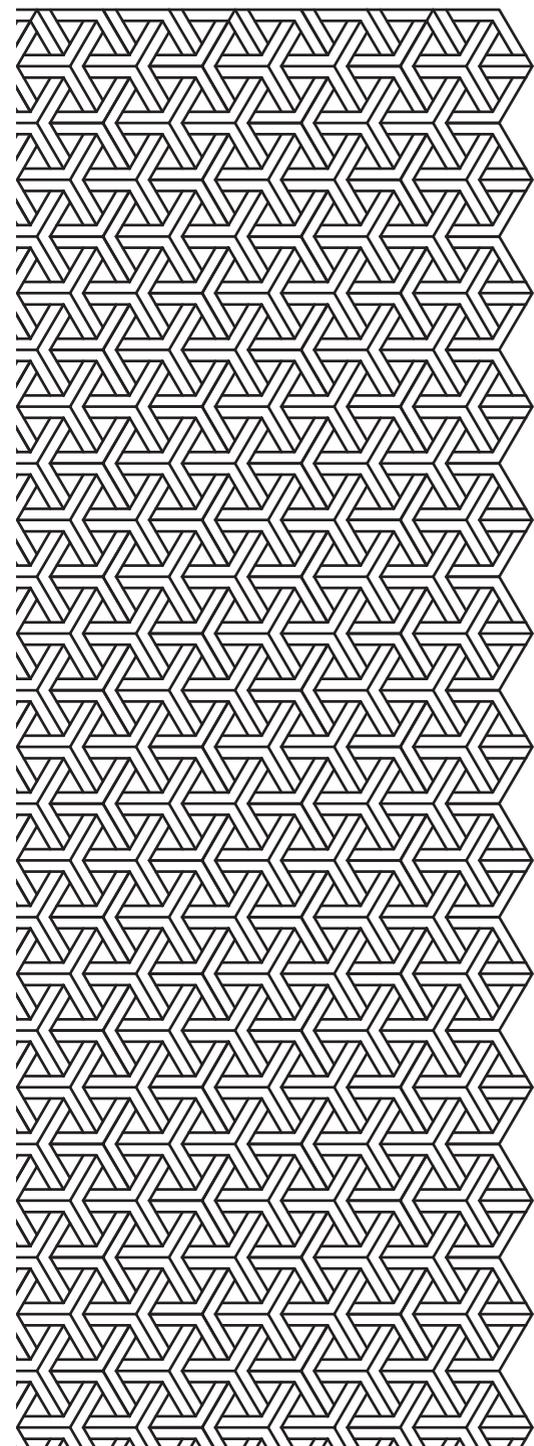
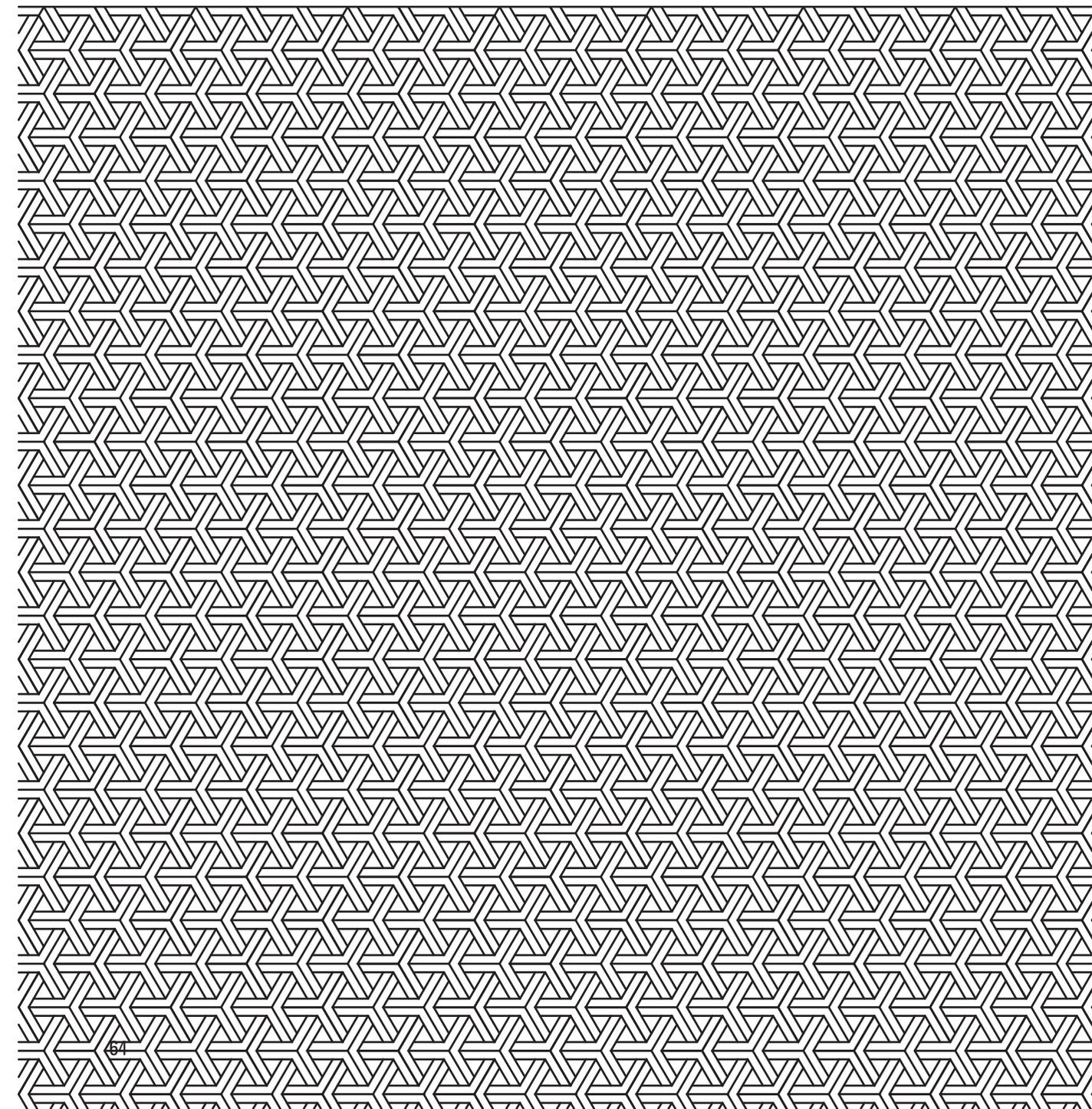
1. Kageo Muraoka and Kichiemon Okamura, *Folk arts and crafts of Japan*, Watherhill, New York, 1973;
2. The Japan Craft Forum, *Japanese crafts : a complete guide to today's traditional handmade objects*, Kodansha International, Tokyo, 2001;
3. Salvator-John A. Liotta, Matteo Belfiore, *Patterns and Layering, Japanese Spatial Culture, Nature and Architecture*, Gestalten, 2012, p. 13;
4. Fosco Maraini, *Ore Giapponesi*, 1957, reprint, Corbaccio, Milan, 2000, pp. 235;
5. Salvator-John A. Liotta, Matteo Belfiore, *Patterns and Layering, Japanese Spatial Culture, Nature and Architecture*, Gestalten, 2012, p. 14;
6. Teruyuki Monnai, *Glossario di concetti spaziali*, in Casabella, vol. 608-609, 1994, p. 14;
7. Heino Engel, *Measure and construction of the Japanese house*, Tuttle Pub, 1985, pp. 34-37;
8. Ibid, pp. 112-119;
9. *Ranma* 欄間, JAANUS, Japanese Architectural and Art Net Users System, <http://www.aist.or.jp/~jaanus/deta/r/ranma.htm>, visited on 24-01-2019;
10. Kageo Muraoka and Kichiemon Okamura, *Folk arts and crafts of Japan*, Watherhill, New York, 1973, p. 40-68;
11. Stephen Mansfield, *Japanese stone gardens : origins, meaning, form*, Tuttle publishing, Tokyo, 2009, p. 40;
12. Michiko Rico Nosé, *The modern Japanese garden*, Tuttle Publishing, Boston, 2002;
13. Kenkichi Ono, Walter Edwards, *Bilingual (Japanese & English) Dictionary of Japanese Garden Terms*, Nara National Cultural Properties Research Inst., 2001;
14. Stephen Mansfield, *Japanese stone gardens : origins, meaning, form*, Tuttle publishing, Tokyo, 2009, pp. 12-34.

Images:

1. Wan bowl, Laquered wood, 17th c. Iwate prefecture Collection of Toyotaro Tanaka, Tokyo;
2. Andon-zara, earthenware plate, 19th c. Seto, Aichi prefecture, Toyotaro Tanaka collection, Tokyo;
3. Elstner Hilton, Basket Weaver in Japan, 1915;
4. Choba-dansu, Chest for account and ledger, wood and iron, 19th c. Shoji Hamada collection, Tochigi prefecture.
5. Andon, stand lantern, paper on iron frame, 18th c. Kyoto, Kanjiro Kawai collection, Kyoto.
6. Yoshihara woodworks, Aeon mall, <http://yoshiharawoodworks.com/en/blog/works/342/> visited 01-02-2019;
7. Author, Rinpa painting on fusuma, Enko-ji, Kyoto, 2018
8. Swallows in rain, Obata Kin'ichiro collection;
9. Fences among autumn flowers, Tokyo National Museum;
10. Scattered paulownias, Tokyo National Museum;
11. Shibori: Tie-dyed design. Silk. 19th c. Narumi, Aichi prefecture. Japan Folk Craft Museum, Tokyo;
12. Author, Ryoan-ji, 2018;
13. Zen priest raking, in Michiko Rico Nosé, *The modern Japanese garden*, Tuttle Publishing, Boston, 2002;
14. Zuiho-ji temple, in Stephen Mansfield, *Japanese stone gardens : origins, meaning, form*, Tuttle publishing, Tokyo, 2009, p. 31.

PART 03

PROJECT



3.1 Introduction and concept

3.1.1 Introduction to the project

The research carried out until this point created the basis for the content and concept of the museum object of the thesis. It explains the important role of patterns in Japanese culture, how they developed and the different ways they were applied, both in tradition and in our days. They reflect what is the fascinating Japanese culture and its esteemed aesthetics.

From the experience I had in Japan I had the opportunity to visit many museums and see how the patterns in one way or another were very often present, but there is no museum that deals exclusively with this theme. So based on these principles I decided to design the Museum of Japanese patterns in Tokyo. The chosen project area is located in the Taito district, not far from important landmarks such as the Ueno park, the Asakusa temple complex, the Tokyo sky tree and the Sumita river, which flows aside the project area.

The project is divided into three pavilions, whose structures will be composed of patterns used in Japanese tradition, consequently the structure will be an integral part of the exhibition and will not function simply as a container.

The three pavilions deal with three different arts in which the patterns are featured and are correspondingly: Kimono pavilion, Architectural elements and Craft pavilion. Each of them found its concept from objects thematically related to the content and using patterns in their design.

These three pavilions will be placed inside a rock garden, famous for their sand patterns, in which they will replace the stones. These will be finally connected by a wooden deck elevated one meter from the ground whose shape will average among the basic geometries used in the pavilions: square, circle and triangle.

3.1.2 Case studies

During the study of the possibilities of design of the museum, which has to use patterns as a tool to create spaces and define the envelope of the building, based on a historical and cultural background for the concept; I made research and studied projects of other designers, which found themselves in front of a similar challenge in the use of this kind of tool to design.

Among the projects studied, I selected three projects that show interesting ways to face this challenge in three different ways, according to the different spatial, cultural, programmatic and client relationship conditions.

Atelier Jean Nouvel, Louvre Abu Dhabi, 2017.

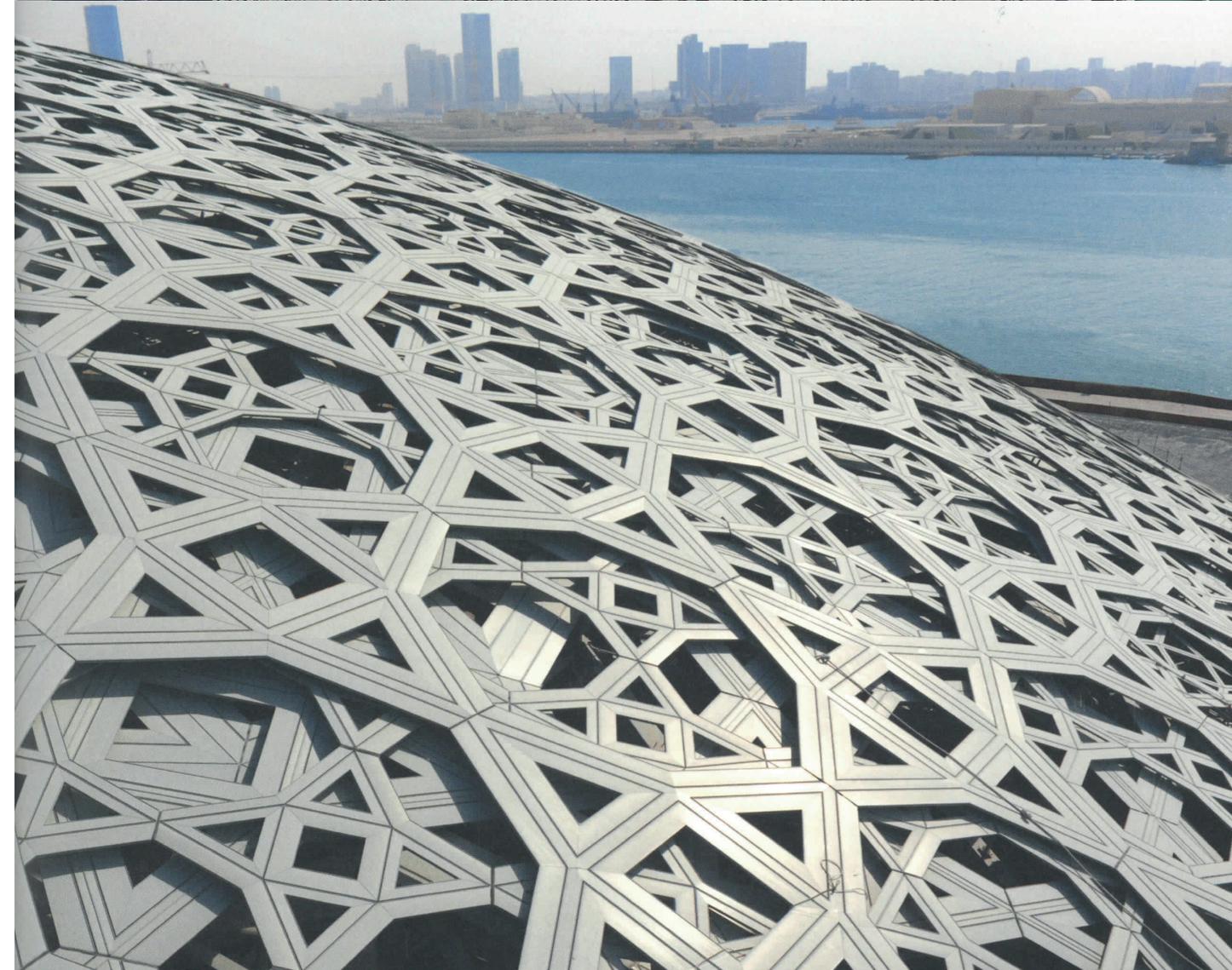
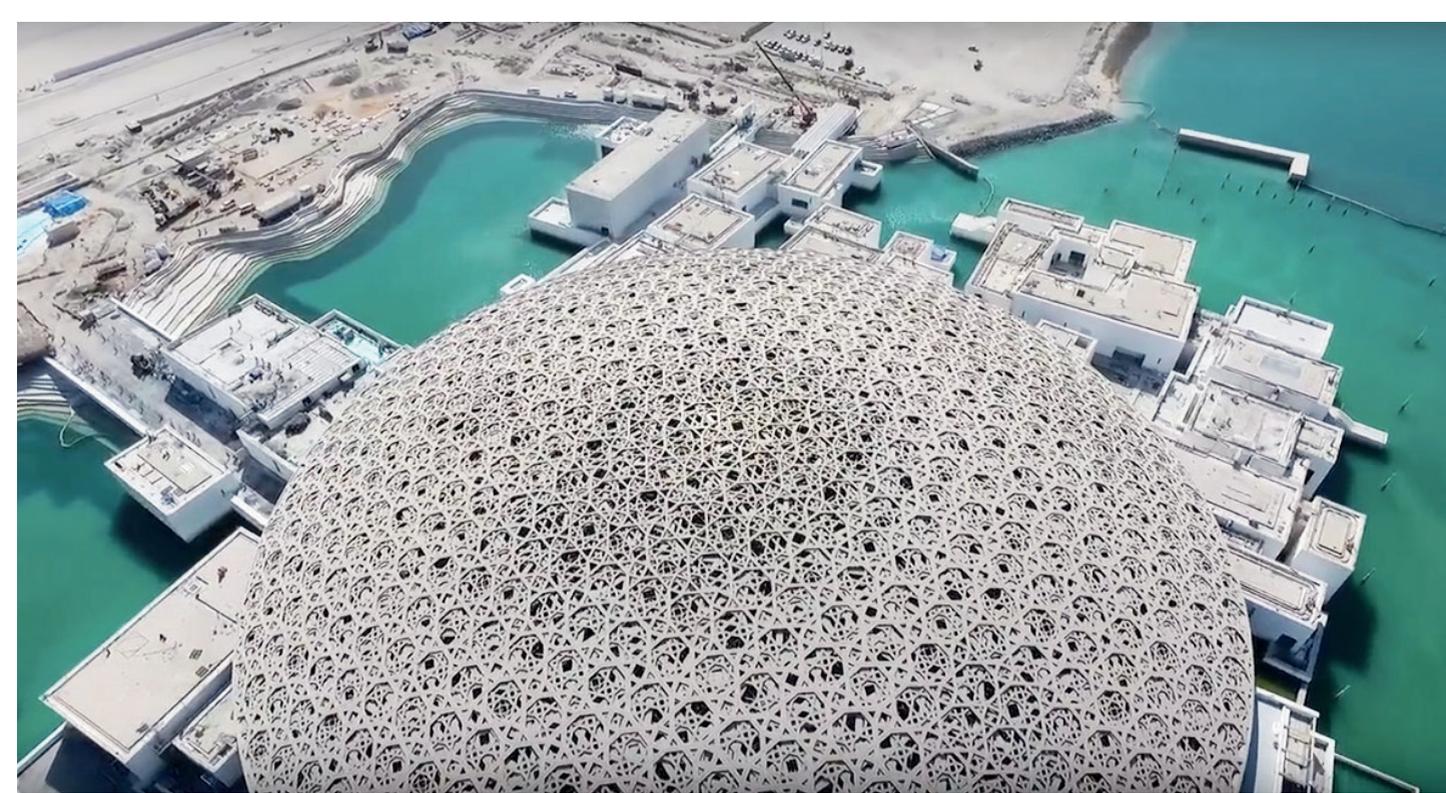
The new Louvre museum in Abu Dhabi by the Atelier Jean Nouvel is conceived as a city-museum over the sea, the complex is made of an agglomeration of 55 white buildings, inspired by the medinas and the traditional low-rise Arab settlements.

The main feature of the museum is the large dome with a diameter of 180 meters covering most of the buildings. It is supported by just four pillars, 110 meters each other apart, hidden inside the buildings to give the impression that the huge dome is floating.

The impressive structure is visible from the surrounding sea of the Abu Dhabi coast.

The dome is made of 8 layers, four external and 4 internal separated by a load-bearing structure 5 meters thick, these layers are made out of a steel structure representing a traditional Arabic pattern repeated on different scales and angles per layer. This complex geometric system of overlapping layers of patterns is studied in order to let the sunbeams pass through the layers creating a "light shower" during the day and a star light effect from the outside during the night.¹

Hence, the will of Jean Nouvel was to create a building that belong to the local history and culture and to achieve this goal, he utilized a pattern from the tradition used in a new contemporary way.



Above: Fig.1 - Overview on the Abu Dhabi Louvre.
Bottom: Fig.2 - Close view to the patterned dome.

Kengo Kuma, Sunny Hills Minami Aoyama Store, Tokyo, 2013.

The Sunny hills is a retail shop of a popular Taiwanese brand of pineapple cakes.

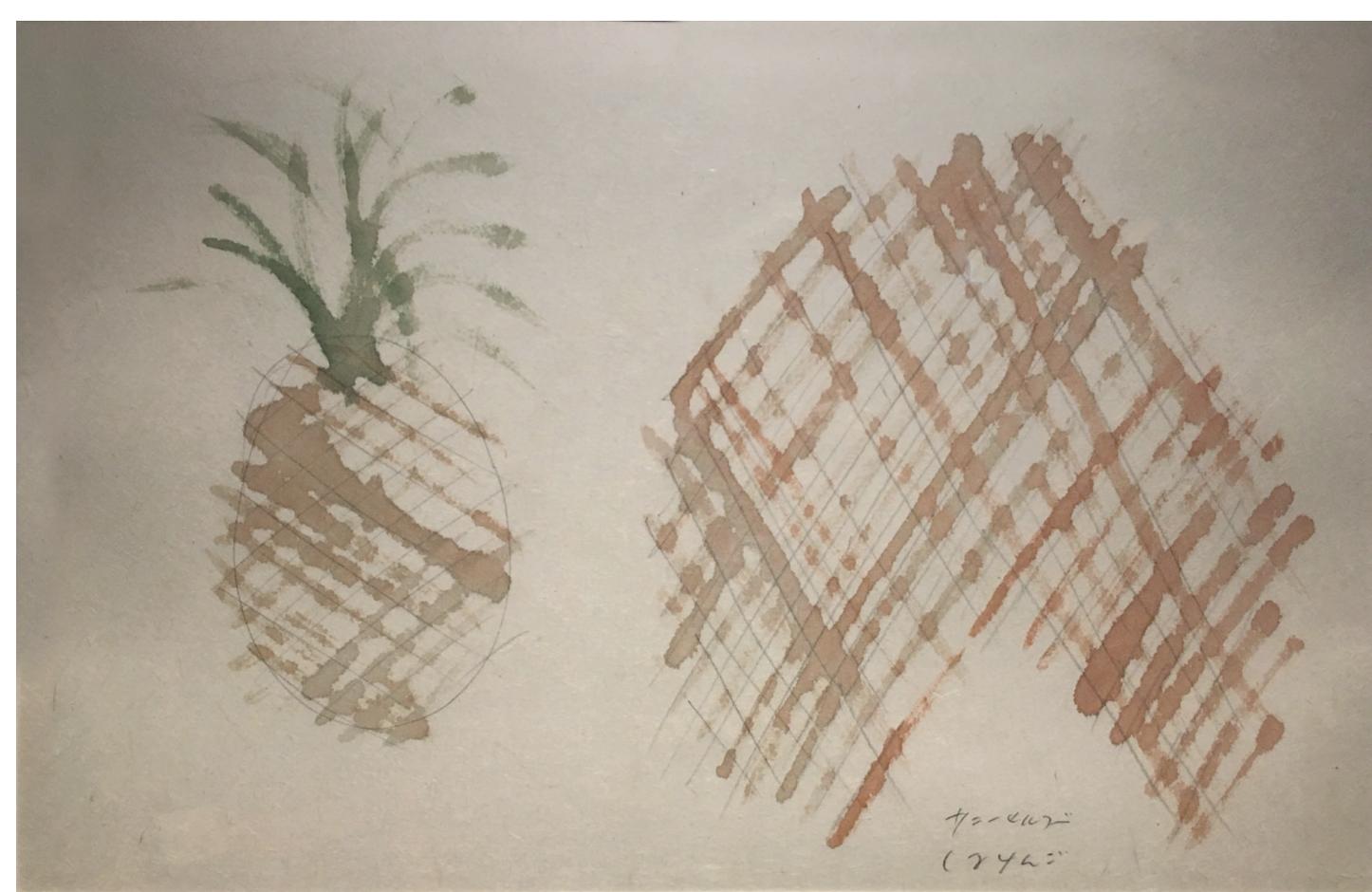
This case shows the way in which Japanese artists create patterns.

In the concept sketch, drawn by the Kengo Kuma, can be seen how the idea of the wooden structure come from the observation of the peel of the pineapple.

It is not an imitation of a pineapple; but rather a symbolic representation of it, the structure represents the real essence of it, essence shown just once that the nature is rearranged.

It is built according the Kuma's idea of "democratic architecture", using the traditional Japanese joint system "*Jiigoku Gumi*" for wooden structure, normally used in two-dimensions.

Joining several thin pieces of wood of 60x60 mm, without the use of nail nor glue, he creates a complex three-dimensional structure.



Above: Fig.3 - Concept sketch of the Sunny Hill pineapple store.
Bottom: Fig.4 - Sunny Hills Minami Aoyama Store, Tokyo, 2013.

Doriana and Massimiliano Fuksas, Armani Ginza Tower, Tokyo, 2007.

The last case study I selected it is about Western designers, in this case Doriana and Massimiliano Fuksas, who are approaching the use of Japanese patterns to make a project in Tokyo for the Italian fashion brand Giorgio Armani.

In the fast-paced world of fashion design, the architecture of the flagship store of the brand became an important statement of the quality and lifestyle of the brand.

This is particularly important in those areas of the big cities dedicated to fashion design, where the architecture represents the label of the brand.

The shopping district of Ginza in Tokyo is a notable example; in the past decade, several major fashion designers have hired prominent architectural firms to design their stores.

In the Armani Ginza Tower, to impose a powerful and luxurious image of the brand in competition with the others, they, with the direct involvement of Armani himself in the design process, decided to utilize a bamboo canes and leaves pattern made of gilded metal and backlit plexiglass.²

The use of this pattern wants to show up the parallel between the remarkable elegance of the brand and the refinement of the sophisticated Japanese aesthetics.



Fig.5 - Armani Ginza Tower, Tokyo, 2007.

The Japanese *ken* module is an outstanding phenomenon in the global history of architecture that does not have equivalents. Indeed, during the last 300 years the ordinary residences of Japan have been made based on the modular order of *ken*. Its uniqueness among all architecture measures cannot be denied.³

Starting from the 16th-17th centuries, *tatami* 畳 entered into use as a proportioning system in the design of Japanese buildings.

It was introduced to the dwellings as a portable floor cover to accommodate two men sitting, or one sleeping, hence, initially it was made on the proportion of the human size.

In time, *tatami* became the floor itself; this led the *tatami* to be subjected to the structure system, losing its previous relation solely to the human scale.⁴

However, originally the dimensions of *tatami* were not standardized, in different part of Japan different sizes were used.

This happened until the 18th century, when three mat sizes emerged:

Kyoma (1.970 x 985 mm) from Kyoto, *Inakama* (1.880 x 909 mm) used in the Kanto region and the *Edo-tatami* (1.757 x 879 mm) related to Edo.

This was due to the fact that the Japanese measurement system was not univocal, but after the Japanese adoption of the metric system in the 1886, the government decided to standardize the units in order to simplify the international trades.⁵

Once the *tatami* sizes have been standardized, it did determinate the distance between columns defining the spatial grid of the buildings.

Tatami was, and it is still, used as a standard to design rooms. A room can be said a 3 *tatami*, 4 ½ *tatami*, 6 *tatami*, etc. room. (fig.7)⁶

“With the floor completely covered in *tatami*, pillars were positioned according to the dimensions and arrangement of mats, reversing the previous procedure in which mats were lain between existing pillars. This marked a shift from a structural module to a spatial module in Japanese design”⁷

These are the traditional Japanese proportion systems.

However, it is known that in Japan, according to the studies of Ryo Yanagi⁸, the golden ratio was used, probably in conscious way, in various work of art or in the design of buildings and gardens, even before the Meiji period and the consequent opening to the Western world.

Indeed, there are really notable example of the use of it, as is the renowned *The Great Wave off Kanagawa* of Katsushika Hokusai painted around the 1830 (fig.8) or in the design of gardens, as the one of the Daitoku-ji temple in Kyoto. (fig.9)

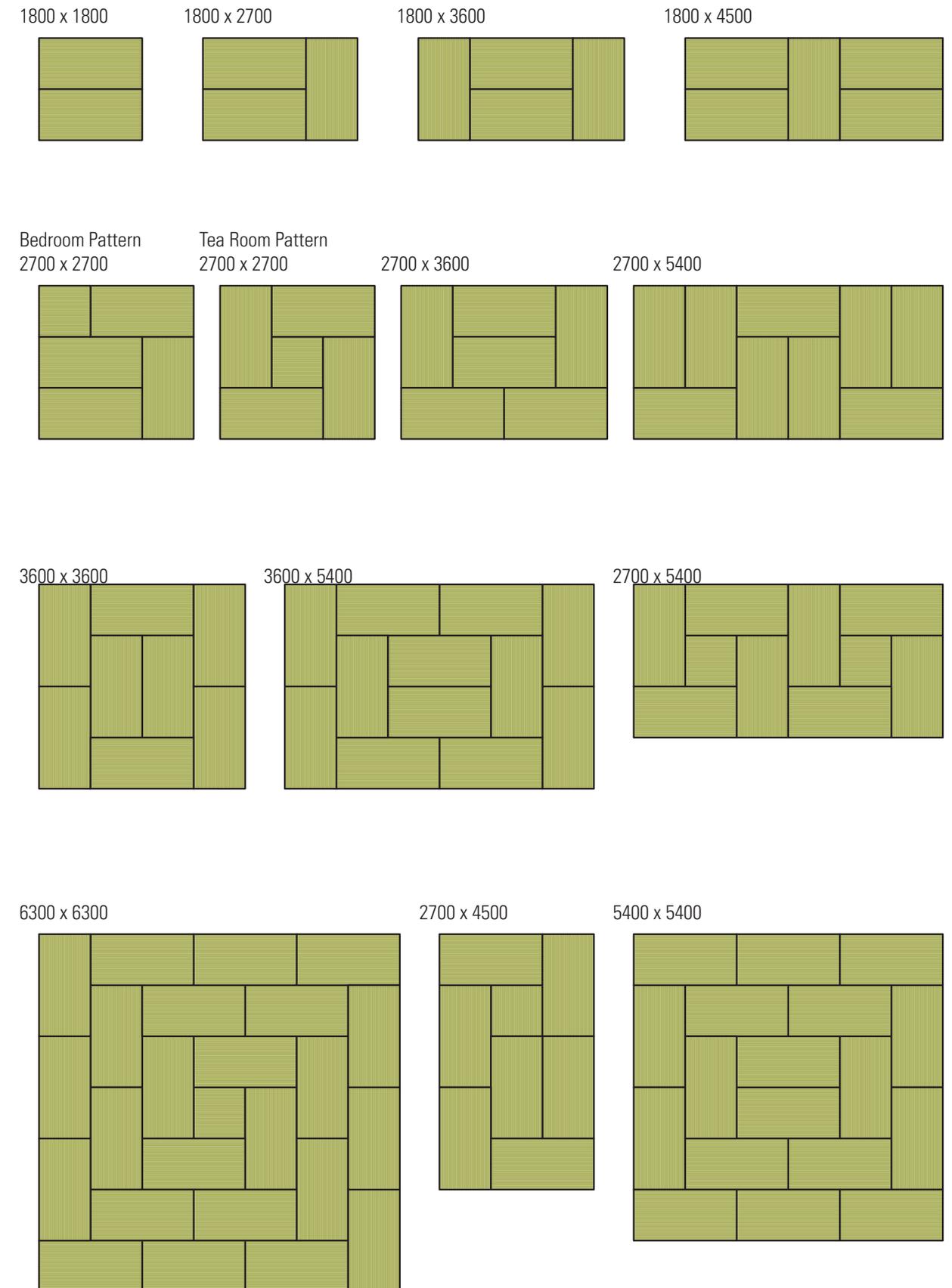


Fig.7 - Tatami scheme patterns

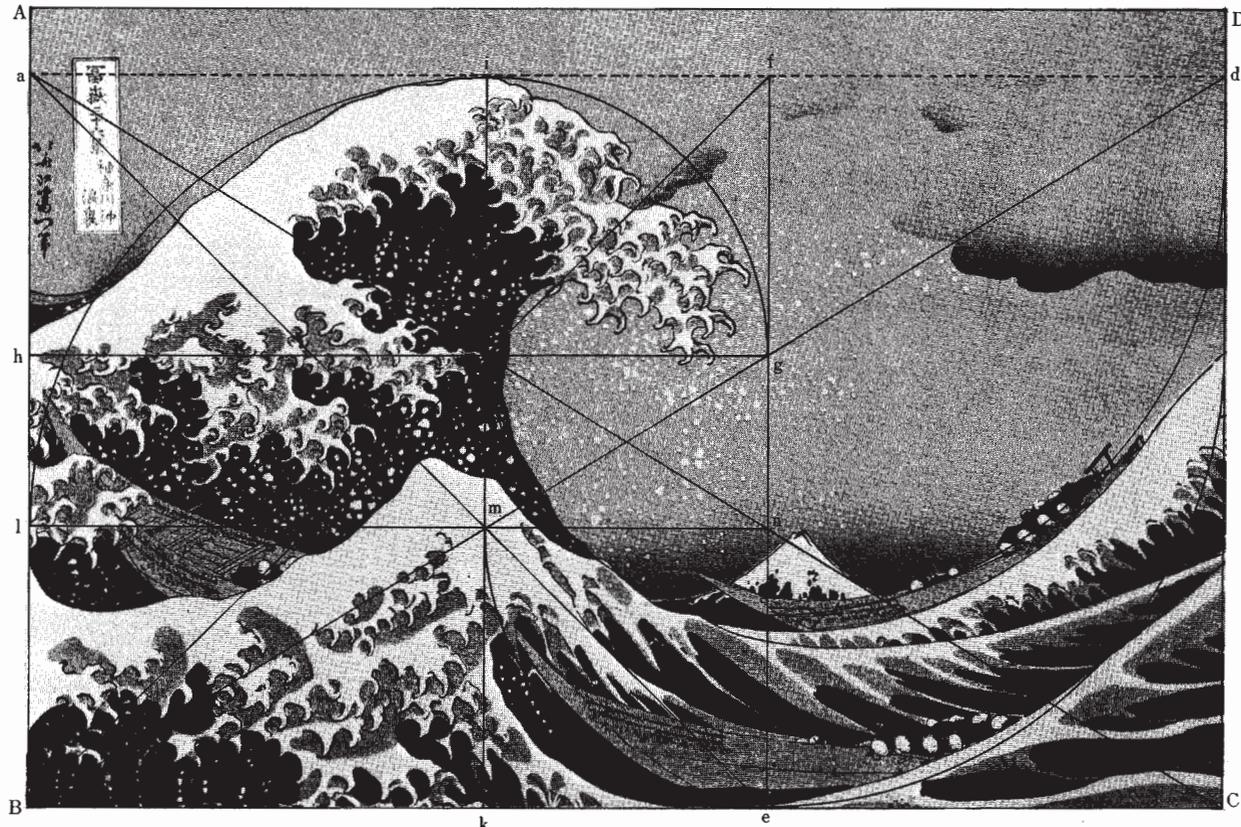


Fig.8 - Golden ratio proportion analysis on Katsushika Hokusai, The Great Wave off Kanagawa, 1830.

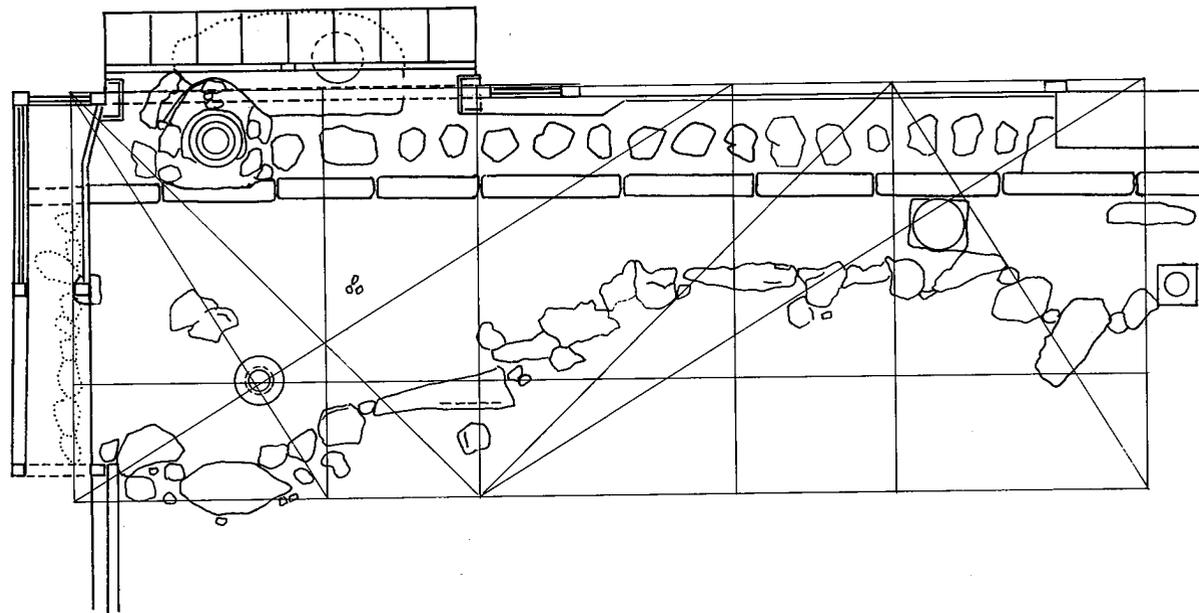


Fig.9 - Golden ratio proportion analysis on Daitoku-ji temple, Kyoto.

Notes:

1. Jean Nouvel, Luca Gazzaniga, *Louvre Abu Dhabi: un nuovo museo, concepito non come un edificio, ma come un vero e proprio pezzo di città, è lo straordinario progetto che Jean Nouvel ci regala ad Abu Dhabi. Una piccola città costruita con edifici, piazze e vicoli, resi vivibili dal grande 'ombracolo' della magnifica cupola che, al di sopra di essa, dà forma e crea una sorta di natura artificiale, per raccontare la storia dell'umanità* in *Domus*, n. 1018, November 2017, pp. 48-65;
2. Doriane e Massimiliano Fuksas: *Armani Ginza Tower, Tokio, 2005-07*. In *Lotus international*, n. 136, 2008, pp. 108-111;
3. Elizabeth Donoff, *East meets West: Asian and European motifs merge through light at the new Giorgio Armani flagship store in Tokyo's Ginza district* in *Architectural lighting*, vol. 22, n. 3, 2008, pp. 62-67;
4. William H. Coaldrake, *The way of the carpenter, tools and Japanese architecture*, Weatherhill, Weatherhill, 1990, p. 24;
5. *Shoumei* 匠明, JAANUS, Japanese Architectural and Art Net Users System, <http://www.aistf.or.jp/~jaanus/deta/s/shoumei.htm> visited on 25-01-2019;
6. Heino Engel, *Measure and construction of the Japanese house*, Tuttle Pub, 1985, pp. 22-24;
7. *Ibid.* pp. 34;
8. William H. Coaldrake, *The way of the carpenter, tools and Japanese architecture*, Weatherhill, Weatherhill, 1990, p. 25;
9. Heino Engel, *Measure and construction of the Japanese house*, Tuttle Pub, 1985, pp. 34;
10. Ryo Yanagi, *Section d'or*, Bijutsu shuppan-sha, Tokyo, 1977.

Images:

1. Overview on the Abu Dhabi Louvre, Abu Dhabi Capital Its, <https://cellcode.us/quotes/abu-dhabi-capital-its.html> visited 01-02-2019;
2. Close view to the patterned dome, in Jean Nouvel, Luca Gazzaniga, *Louvre Abu Dhabi: un nuovo museo [...]*;
3. Author, Concept sketch of the Sunny Hill pineapple store, 2018;
4. Sunny Hills Minami Aoyama Store, Interior Design, <https://www.interiordesign.net/projects/10136-from-a-simpler-time-sunnyhills-by-kengo-kuma/> visited 18-01-2019;
5. Armani Ginza Tower, in *Doriane e Massimiliano Fuksas: Armani Ginza Tower, Tokio, 2005-07*. In *Lotus international*, n. 136, 2008, p. 108;
6. Kiwari proportioning drawing, in *Kinsei kenchiku-sho - Domya hinagata*, Kawada Katsuhiro, 京都 大龍堂書店, 1988;
7. Author, Tatami scheme patterns, 2018;
8. Golden ratio proportion analysis on The Great Wave off Kanagawa, Ryo Yanagi, *Section d'or*, Bijutsu shuppan-sha, Tokyo, 1977, p. 141;
9. Golden ratio proportion analysis on Daitoku-ji temple, *ibid.*, p. 93.

3.2 Concept strategy

3.2.1 Garden and site disposition - Rock garden

In order to define how to place the pavilions on the site, treated as a Japanese rock garden on a bigger scale than how it is usually; I decided to study how the rock garden designers act to place rocks on gardens.

Watching the rock gardens from an aerial view it is possible to notice how well they are integrated into the design of the temple and how those apparently natural forms are more geometric than how they seems.

It is exactly this overlapping of natural and rectilinear forms, man-made architecture and nature randomness that give to the rock gardens their appeal. This is seen in the contrast between the man-made geometry of the viewing verandas, tile borders, enclosing walls and the natural rock organic shape. This contrast is shown also in the will of not creating a symmetry in the design but rather a balanced asymmetry, that is also one of the main difference between Japanese and western gardens. The eyes of the viewer are led to move randomly through the gardens. The individual focal point is avoided in favour to triangular shapes and odd numbers.

A typical stone arrangement is the *sanzonseki* (Buddhist triad), it forms a scalene triangle with a central stone representing the Buddha and the other two represent his attendants.

Another important feature is the placement along the northeast – southwest diagonal, in order to trap the evil spirits on their favoured way.

Moreover, the use of odd numbers are a good auspicious, in particular the number three, which represents the triad heaven, earth and humanity.

In addition, the odd numbers not being evenly divisible, do not represent that sense of completion that does not own to the wild nature.¹

According to these principles and those of the Japanese use of proportion systems, I have decided to apply them to my project site, adapting them to a more contemporary interpretation and to the jump of scale.

I am going to design three pavilions, the good auspicious number and to place them on the site I will use the *sanzonseki* arrangement to place in a scalene triangle the pavilions, which will take the place of the stones.

The position of each single pavilion is defined through the use a scheme following the golden ratio proportions, as the one resultant from the analysis of the Ryoan-ji, the most popular Japanese rock garden.

In addition, the ground will be cover with gravel showing the traditional waved patterns of the dry garden.

Indeed, the circulation will be on a 1 meter elevated wooden deck that finds its shape as intermeditation between the geometries of the pavilions.

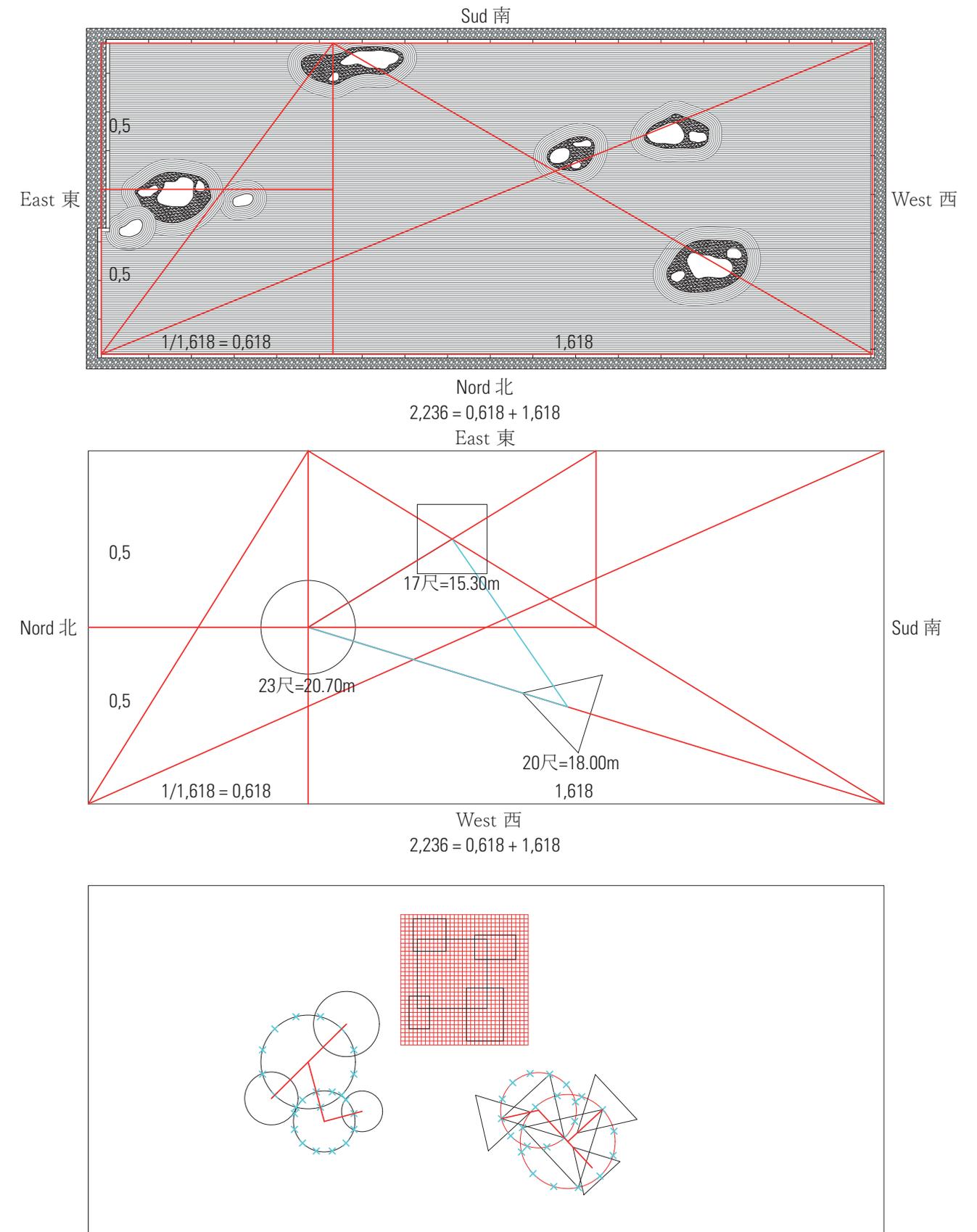


Fig.1 - Pavilion disposition scheme



Fig.2 - Temari

Next page: Fig.3 - How to make Temari

3.2.2 Kimono pavilion - Temari

The kimono pavilion will be used to exhibit the patterns used on fabric products from the Japanese tradition.

The idea for the geometric development of this pavilion take inspiration from one the fabric product that better show the use of patterns, the *temari*.

In Japan the temari is considered the symbol of perfection. It is a typical gift given to wish joy and happiness.

It, originally, comes from China, where the decorate ball has an important role in the symbolism. The Chinese dragon is often represented with a flaming sphere clutched in the claws, symbol of prosperity. Moreover, at the entrance of the traditional Chinese buildings there are often a couple of lions at the sides of the door. The female traditionally holds her paw on a cub, while the male lion has his paw on a decorated ball.

The first historical reference to ball similar to the nowadays temari can be found in the Chinese imperial court dated back to the 644. It was used as ball game to be kicked high in the air.

Eventually, it evolved into tossing ball for children. The balls evolved also in the manufacture, during this time they began to be made out of discarded kimono or other woven items.

The colors of the recycled fabric were carefully separated and applied to the surface in order to create geometrical patterns. While the core was made by rice, paper or fabric.

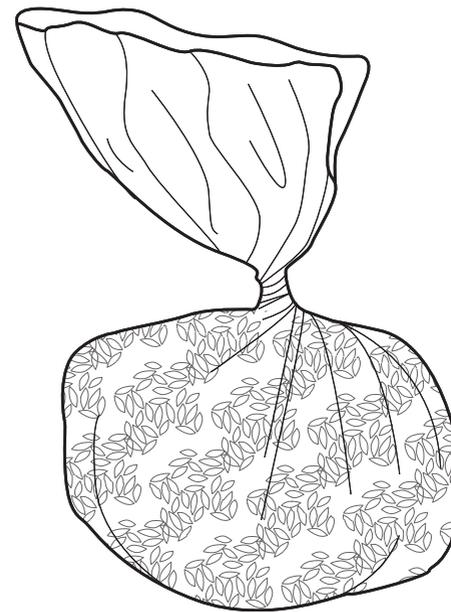
In the Japanese imperial court of the 17th century, ladies challenged each other making the most intricate and brightest ball. Ball's patterns developed using the traditional Japanese embroidery techniques, used to embellish the court clothings.

Temari after having had a glorious past at court it slowly passed to be a folk art made by mothers to make enjoy young children.²

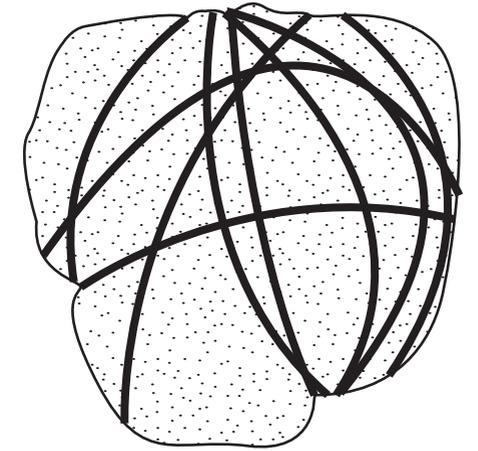
Therefore, five spheres, made out of intricate geometric patterns, will form the Kimono pavilion.

Another fundamental reference are the Buckminster Fuller's domes, indeed also these spheres are made with geodesic domes. Inside the main sphere, there is a monumental ramp. The main exhibition area will be along the ramp, furthermore, from the intersections with the sides spheres small rooms will be created along it.

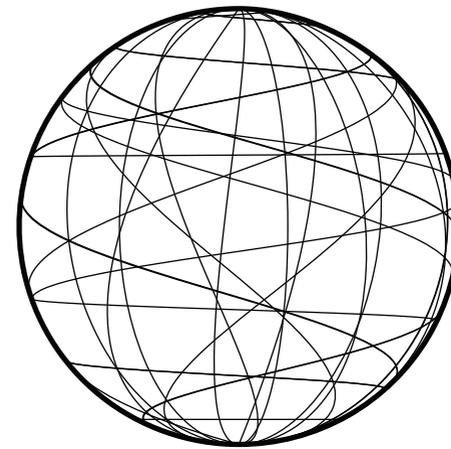
The structure of the spheres will be made with aluminium clad with carbon fiber sheets, which will give that fabric texture to the pavilion. To close from the outside the pavilion a membrane will be used.



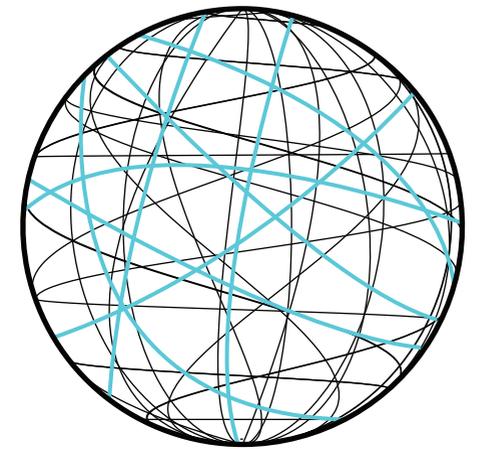
Step 1 - Create an approximate volume of the ball putting rice into a plastic bag



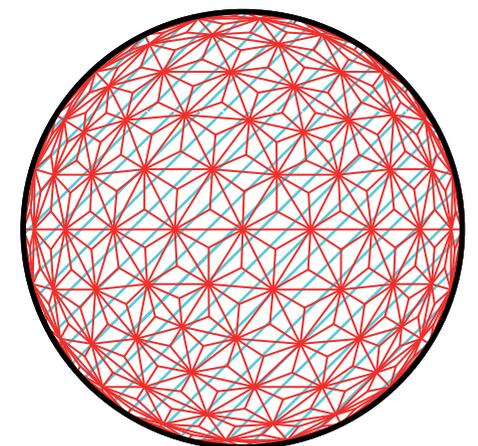
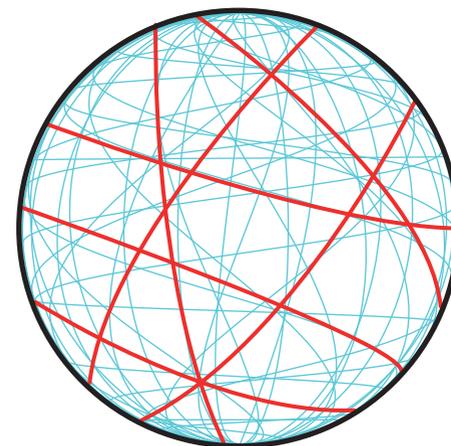
Step 2 - Wrap the bag with a layer of fabric and begin to wrap it with yarn



Step 3 - Keep wrapping in order to create the sphere geometry



Step 4 - Change the yarn color to make the base for the pattern



Step 6 - Final result of a Temari

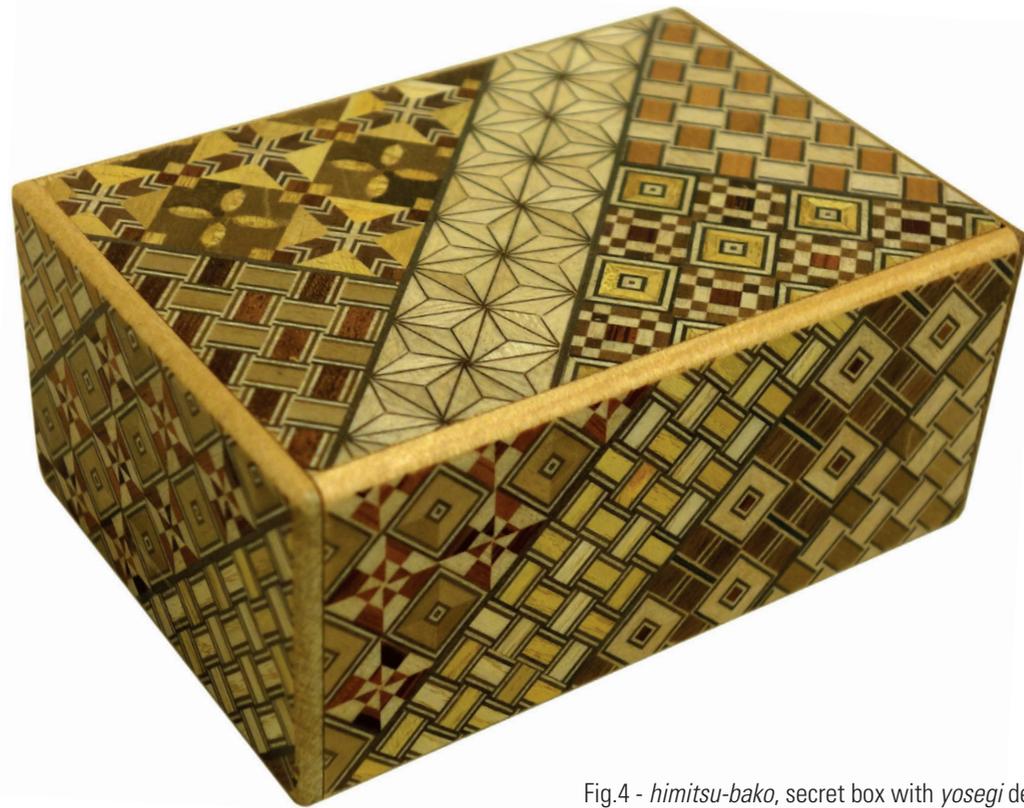


Fig.4 - *himitsu-bako*, secret box with *yosegi* decoration
Next page: Fig.5 - How to make Yosegi

3.2.3 Craft pavilion - Yosegi

For the last pavilion, the one dedicated to patterns used in the Japanese crafts, the concept idea come from the traditional Japanese secret boxes, clad with a *yosegi* decorations.

The *yosegi* is an intricate wood mosaic technique belonging to the Japanese tradition since a long time. It makes use of an array of different natural fine grains and textures of wood of different colors to create the mosaic work.

The create the white, Spindle tree and ilex macropoda are used, aged Katsura-tree for black, picrasma quassioides, mulberry and sumac for yellow, camphor tree and maackia for brown, American walnut tree for purple, Japanese cucumber tree for blue and Chinese cedar for red.

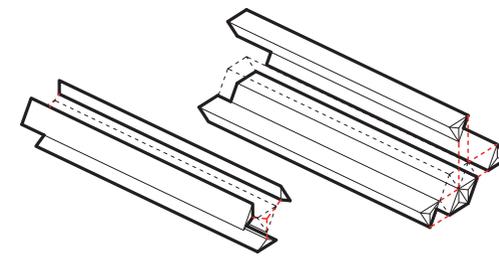
Wood is cut into oblong rods and then joint together to create the desired geometric pattern. The sectional surface of the block is sliced into thin layers, which are glued on the surfaces of boxes or other wooden works.

In the end, the surface is treated with a coating to give more glaze and resistance.

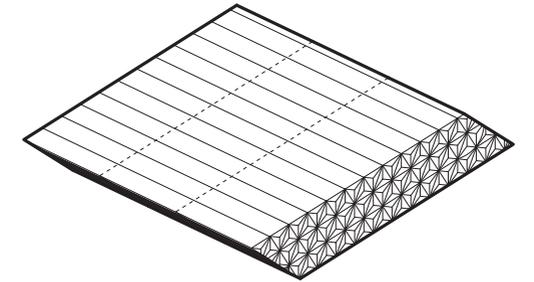
One of the most popular item characterized by the yosegi coating are the *himitsu-bako*, the secret boxes created in the Hakone region in the 1893.³ (fig.8)

While the *himitsu-bako* are wooden boxes, clad with the yosegi decoration, the boxes that compose this pavilion, because of the bigger scale, are concrete boxes, clad with the same yosegi technique. On the corners will be left a uncover frame, as the one in the puzzle boxes, necessary for the sliding of the surfaces to open it.

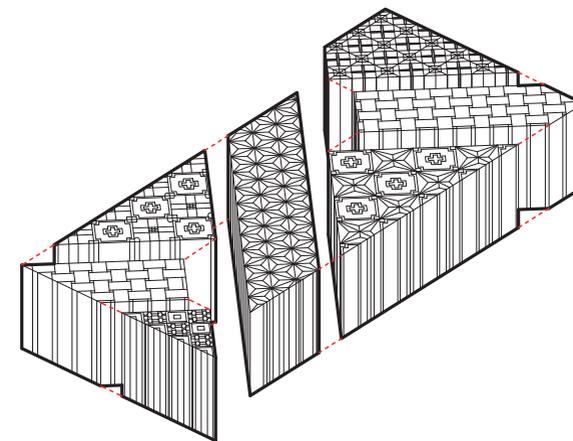
The matrix of the geometric decoration of the façade will define the openings for doors and windows, indeed, each box, which have a different pattern with a different matrix, will have openings on different shapes.



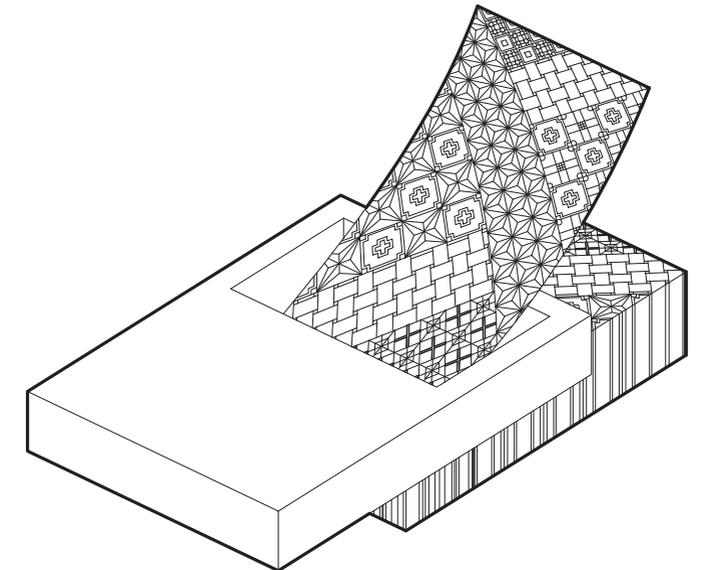
Step 1 - Assemble wooden rods to create patterns



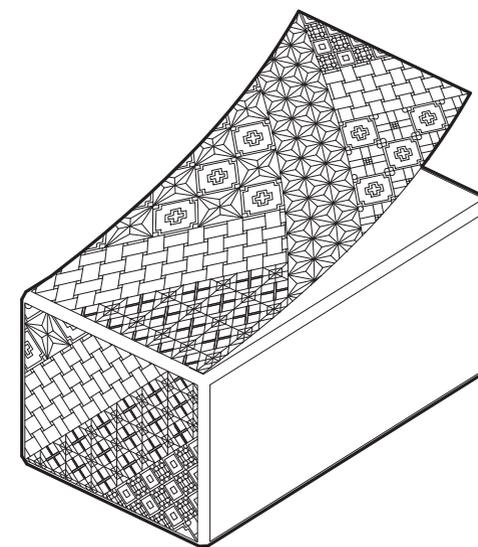
Step 2 - Bond together the patterned pieces and saw them



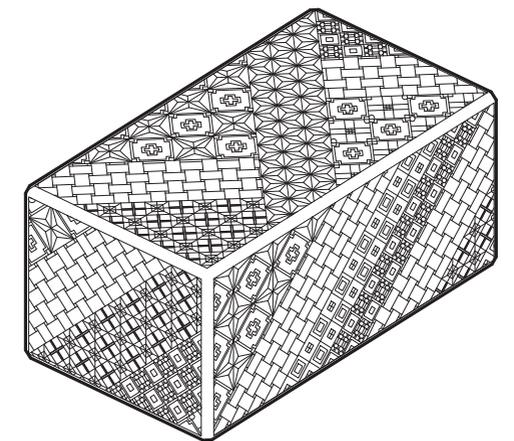
Step 3 - Join the sawed blocks to create a continuous pattern



Step 4 - Shave the surface of the block into paper-thin sheets of wood



Step 5 - Glue the shaved sheets on the box



Step 6 - Final result of a Secret box with a yosegi decoration

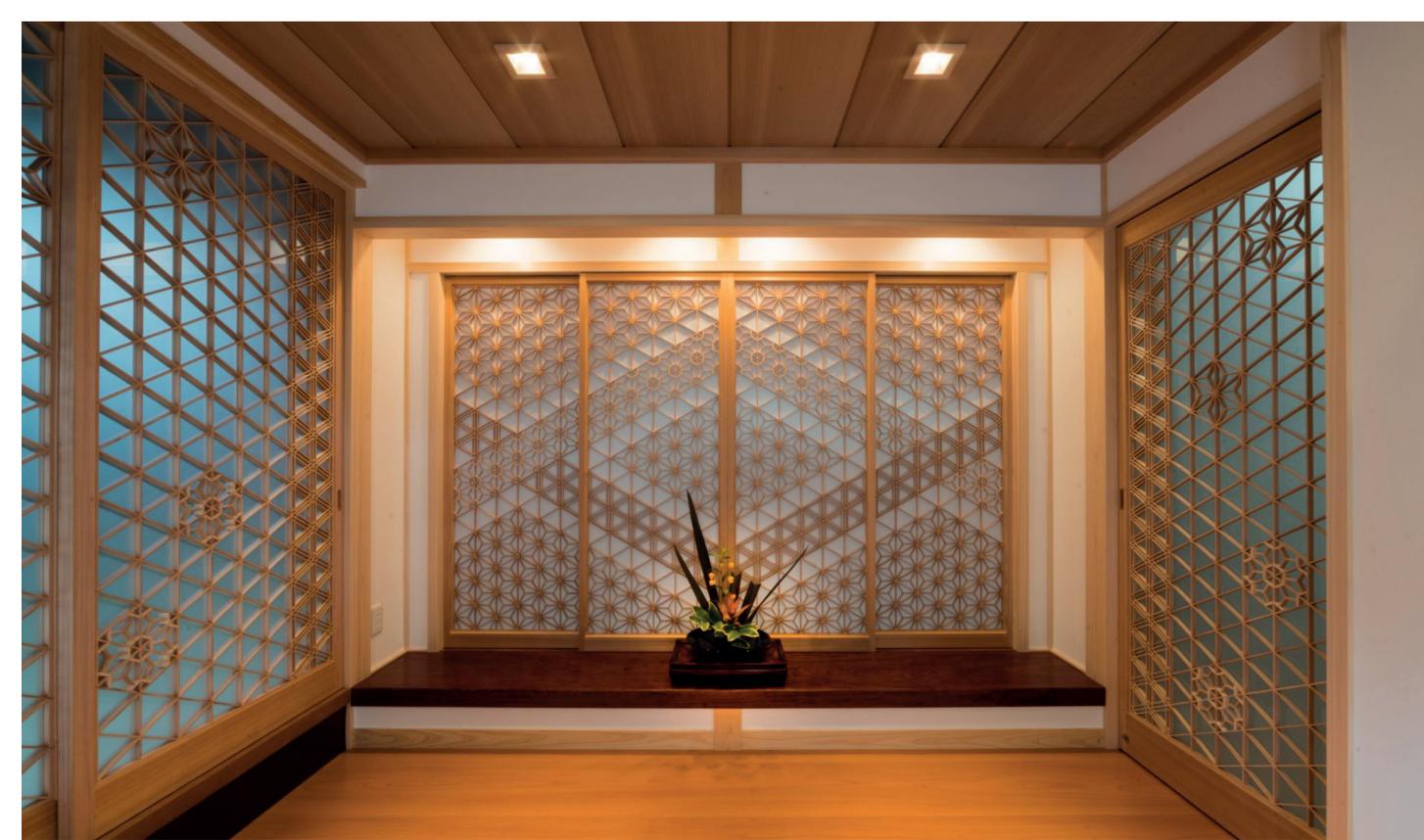


Fig.6 - Yoshihara Woodworks, House of T, Hyogo, 2017;
Next page: Fig.7 - How to make Kumiko

3.2.4 Architectural elements pavilion – Shoji and kumiko

The architectural elements pavilion takes its concept from the structure of the traditional Japanese screen *shoji*, which feature a patterned lattice made with the *kumiko* technique.

Kumiko is a technique used to join, in the traditional Japanese way, wooden muntins without the use of nails. This craft technique was developed during the Muromachi period (1333 – 1573) with the *Shoin-zukuri*, the Japanese architectural style that characterized that period.

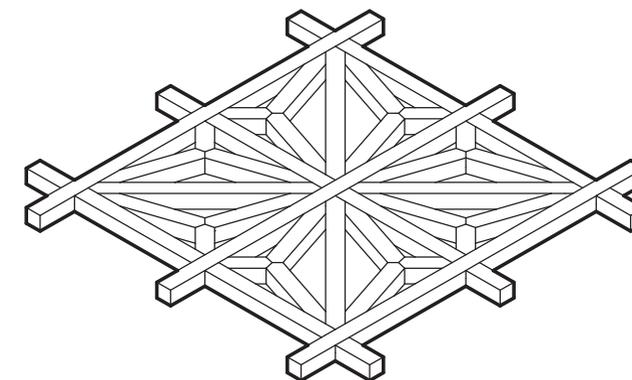
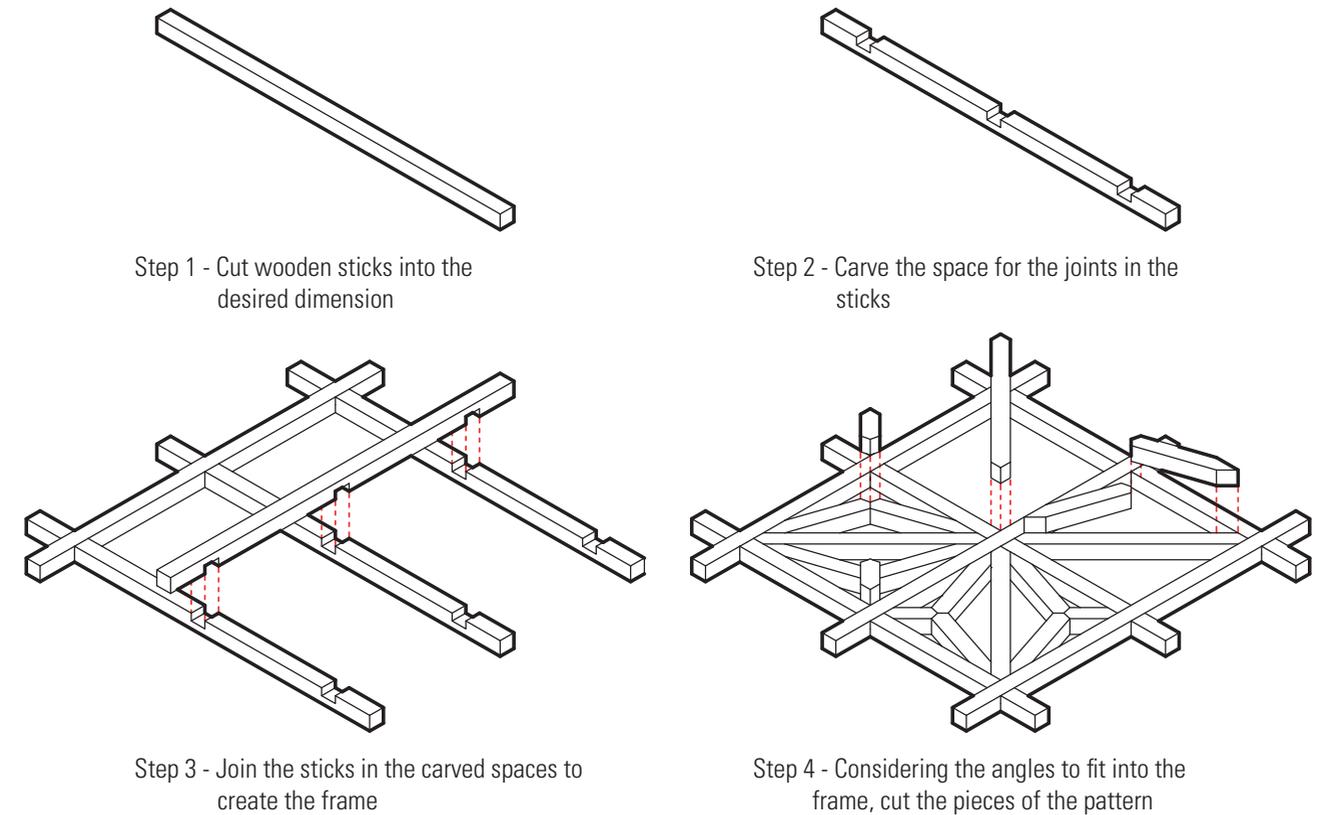
This technique was used traditionally to create wooden lattices of windows, shoji, ranma and so on. Cutting off the space for the joints, according to the angle with the next piece, to 1.5mm wooden pieces and then join them together, it is possible to create a wide array of different patterns.

For some of the most complex items even over 100 000 pieces can be join together.⁴

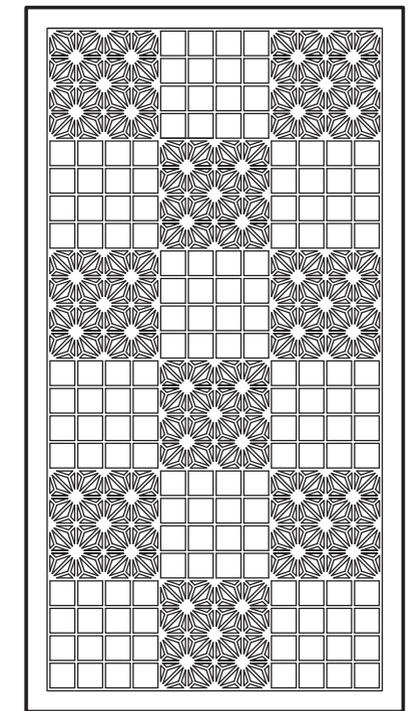
However, in the tetrahedron structures of the Architectural elements pavilion, due to the jump of scale (the biggest one has a 18 meter side length and 14,7 meters height), the frame is going to be made with a concrete structure.

As concern the walls, they will keep the kumiko technique, with the wooden joints in wider sections, supported with the help of steel elements. Instead of the washi paper to close to envelope, it will be substitute with membrane.

On the inside, the floor will be covered with the tatami, but because of the triangular shapes of the plan it not possible to fit the traditional tatami module. Hence, it will be used a modern variation of the tatami that follows the Voronoi diagram to saturate the triangular shape and create a more dynamic pattern of the floor, this will be reflected on the exhibition of the shoji and fusuma screens, which following the random joints between the mats will create a mazy path.



Step 5 - Single module of Kumiko



Step 6 - Final result of a shoji screen with a kumiko decoration

Notes:

1. Stephen Mansfield, Japanese stone gardens : origins, meaning, form, Tuttle publishing, Tokyo, 2009, pp. 49-51;
2. History of Temari in Temari.Com - The art of Japanese Thread Ball, <http://www.temari.com/history.htm> visited 28-01-2019;
3. Introduction in Japanese puzzle box and yosegi zaiku, <https://yosegijapan.com/whats-yosegi/introduction/> visited 28-01-2019;
4. Traditional Japanese muntin joiner, Sashikan Tategu Kogei, <http://www.sashikan.com/en/> visited 28-01-2019.

Images:

1. Author, Pavilion disposition scheme, 2019;
2. Temari, Playbuzz, <https://www.playbuzz.com/item/e263e808-de44-450a-b70c-66c9c99f99d7> visited 01-02-2019;
3. Author, How to make Temari, 2019;
4. Author, himitsu-bako, secret box with yosegi decoration, 2019;
5. Author, How to make Yosegi, 2019;
6. Yoshihara Woodworks, House of T, <http://yoshiharawoodworks.com/en/blog/works/333/> visited 15-11-2018;
7. Author, How to make Kumiko, 2019;

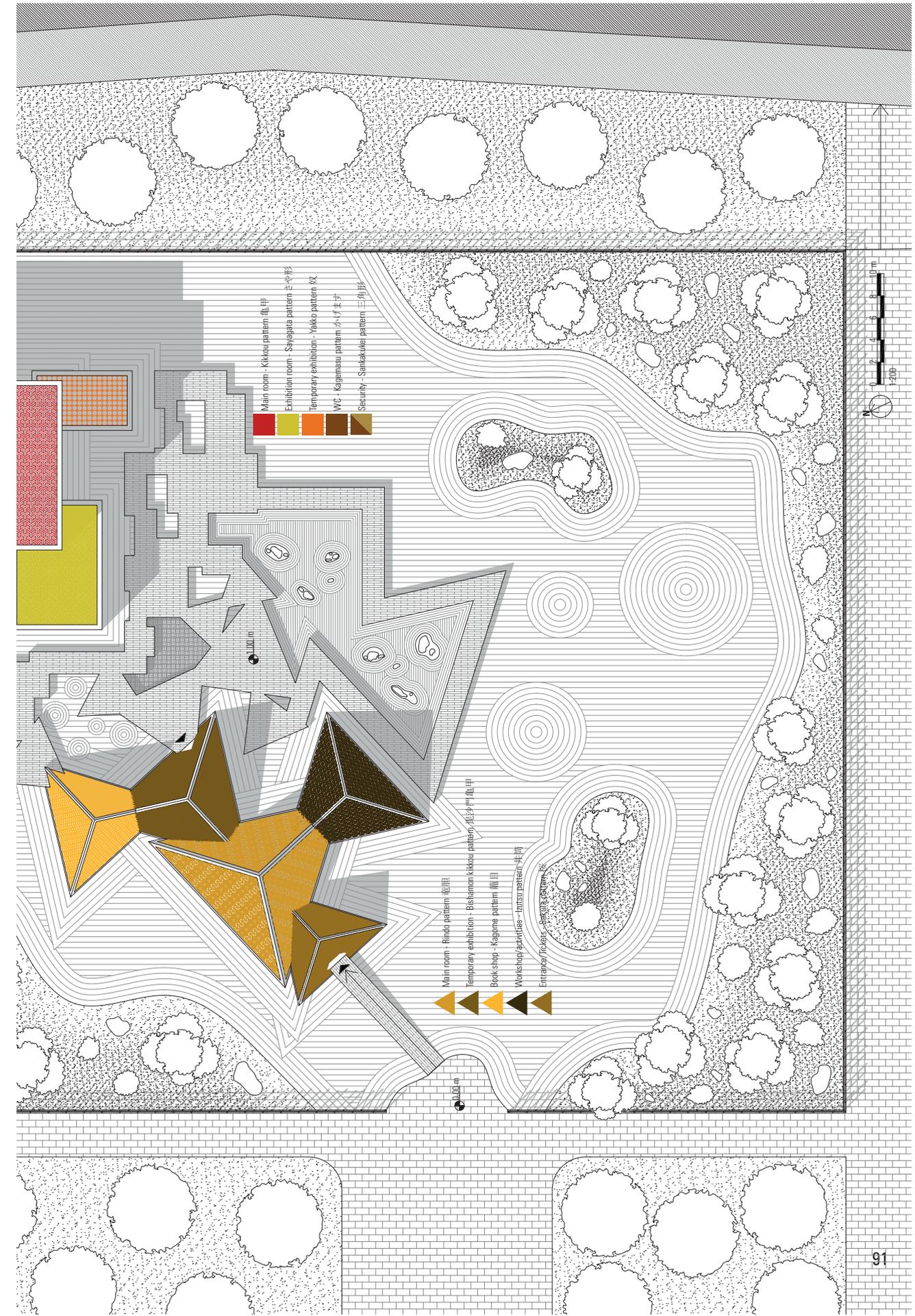
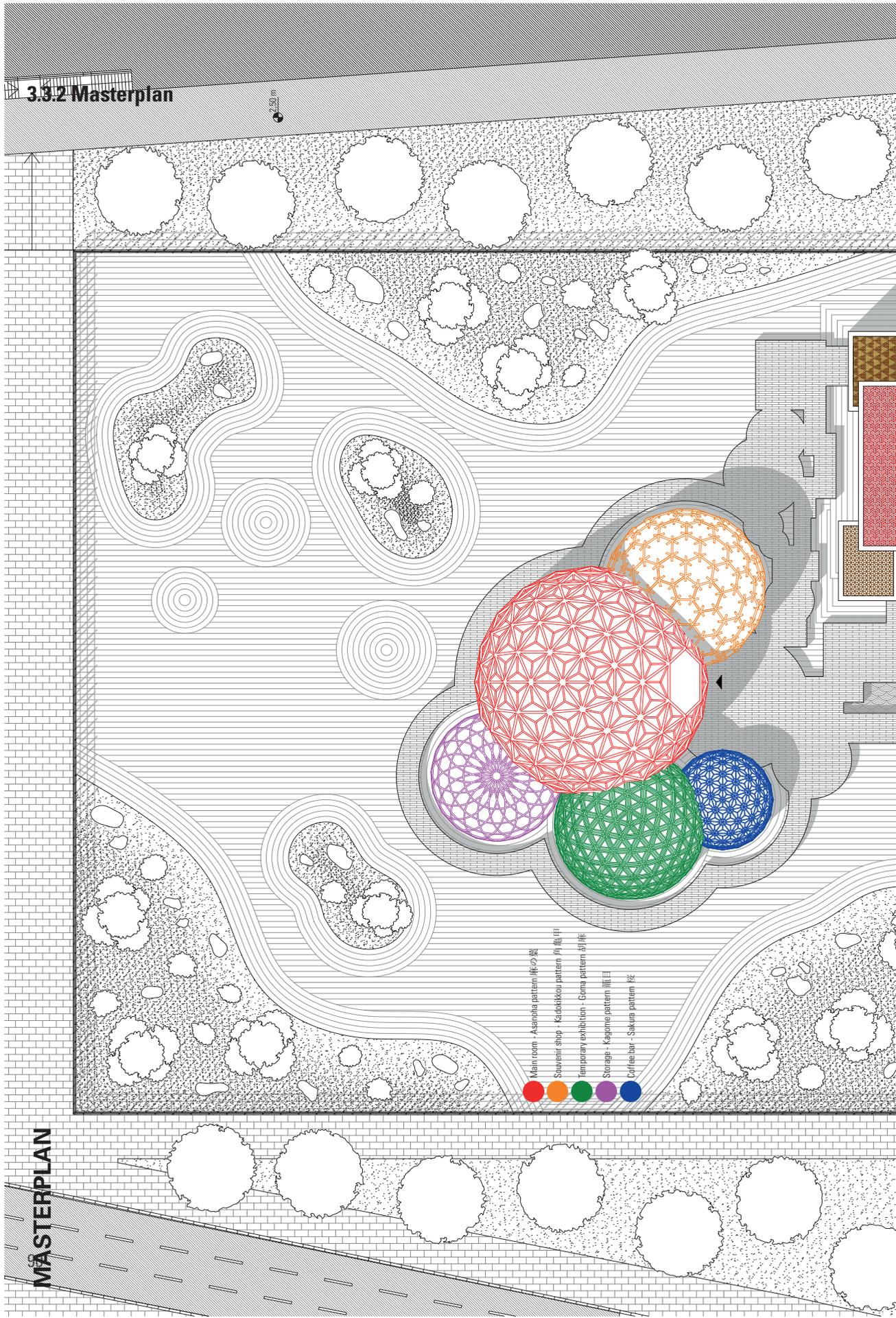
URBAN FRAMEWORK

TOKYO 東京

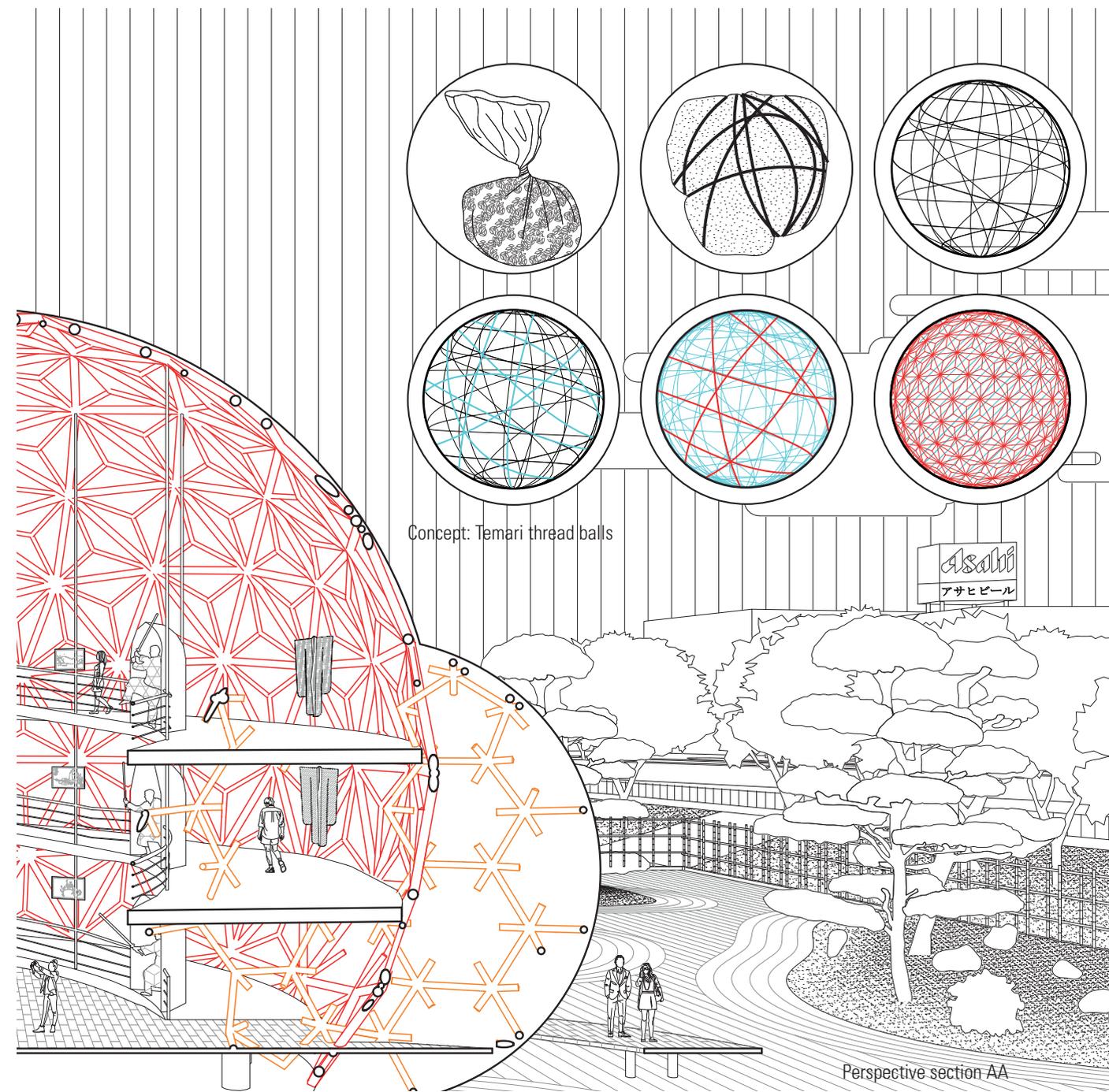
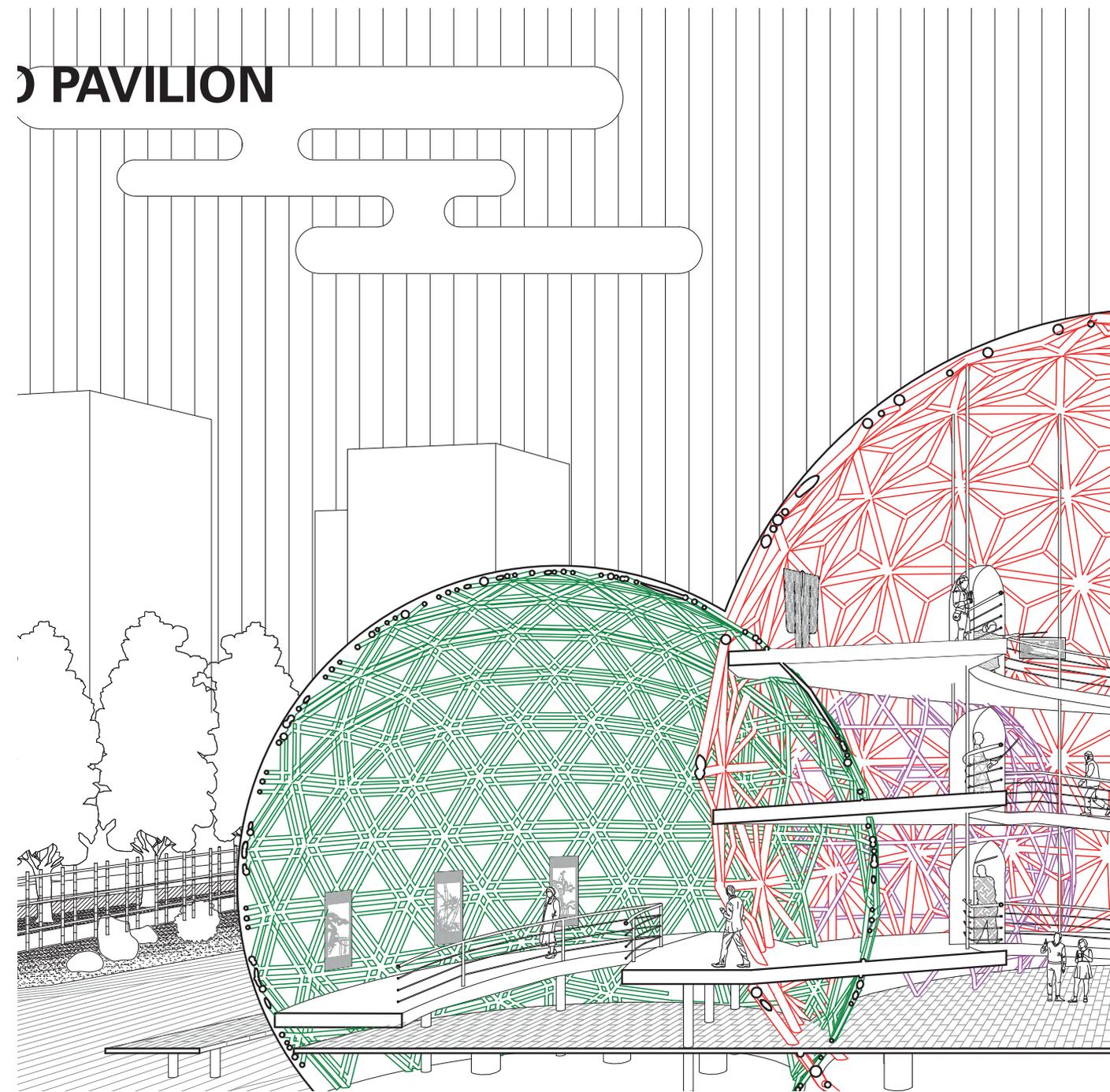


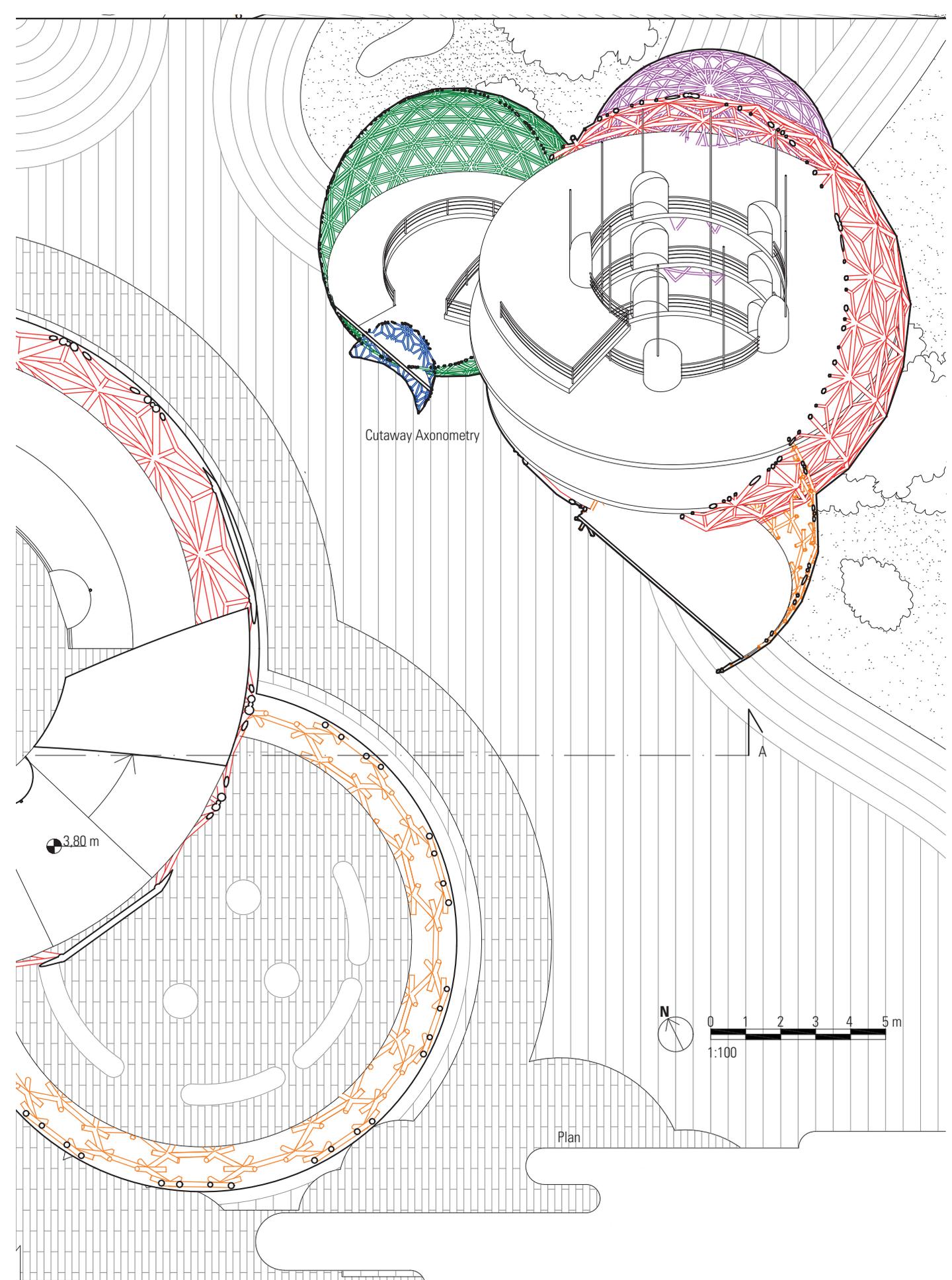
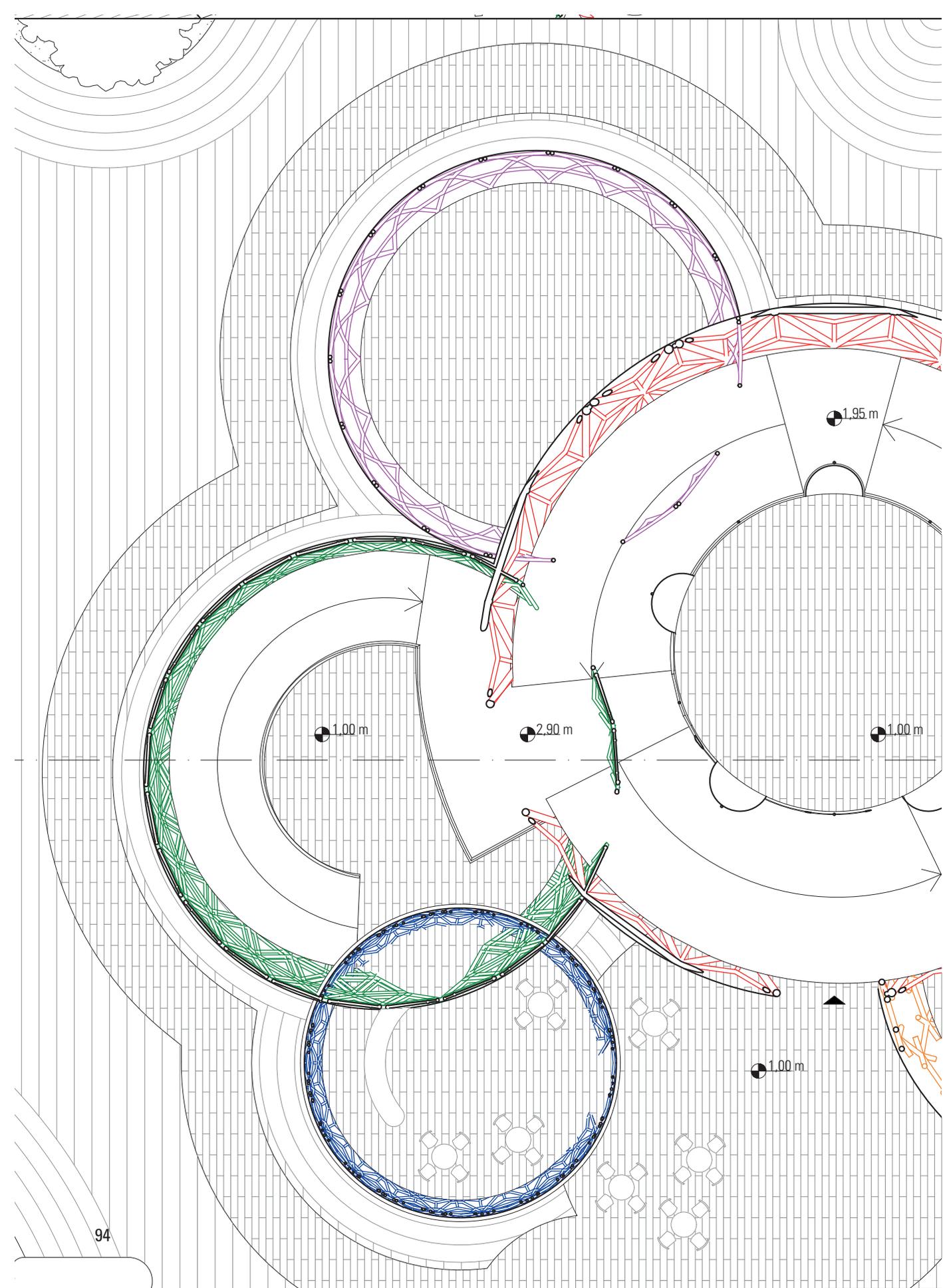
3.3.2 Masterplan

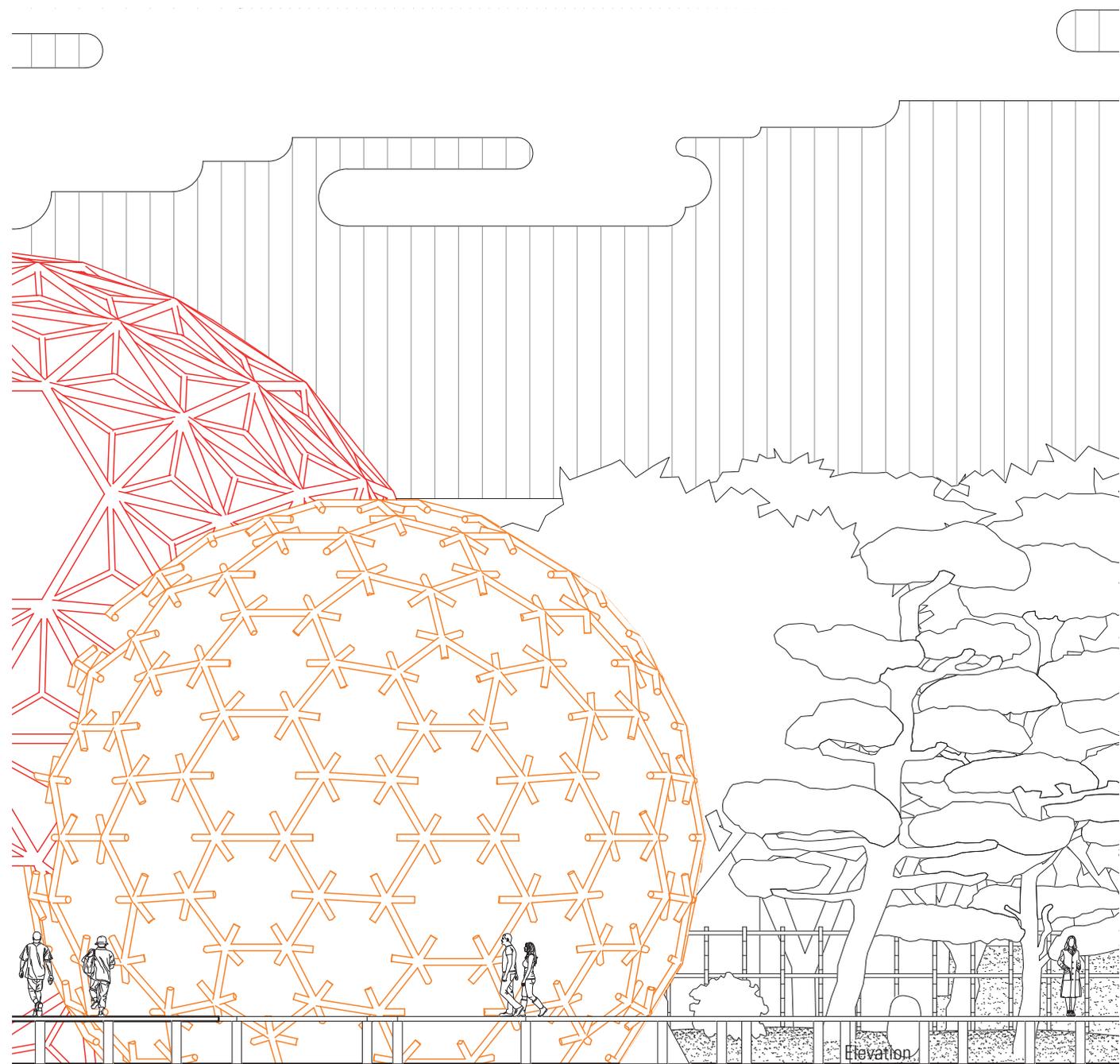
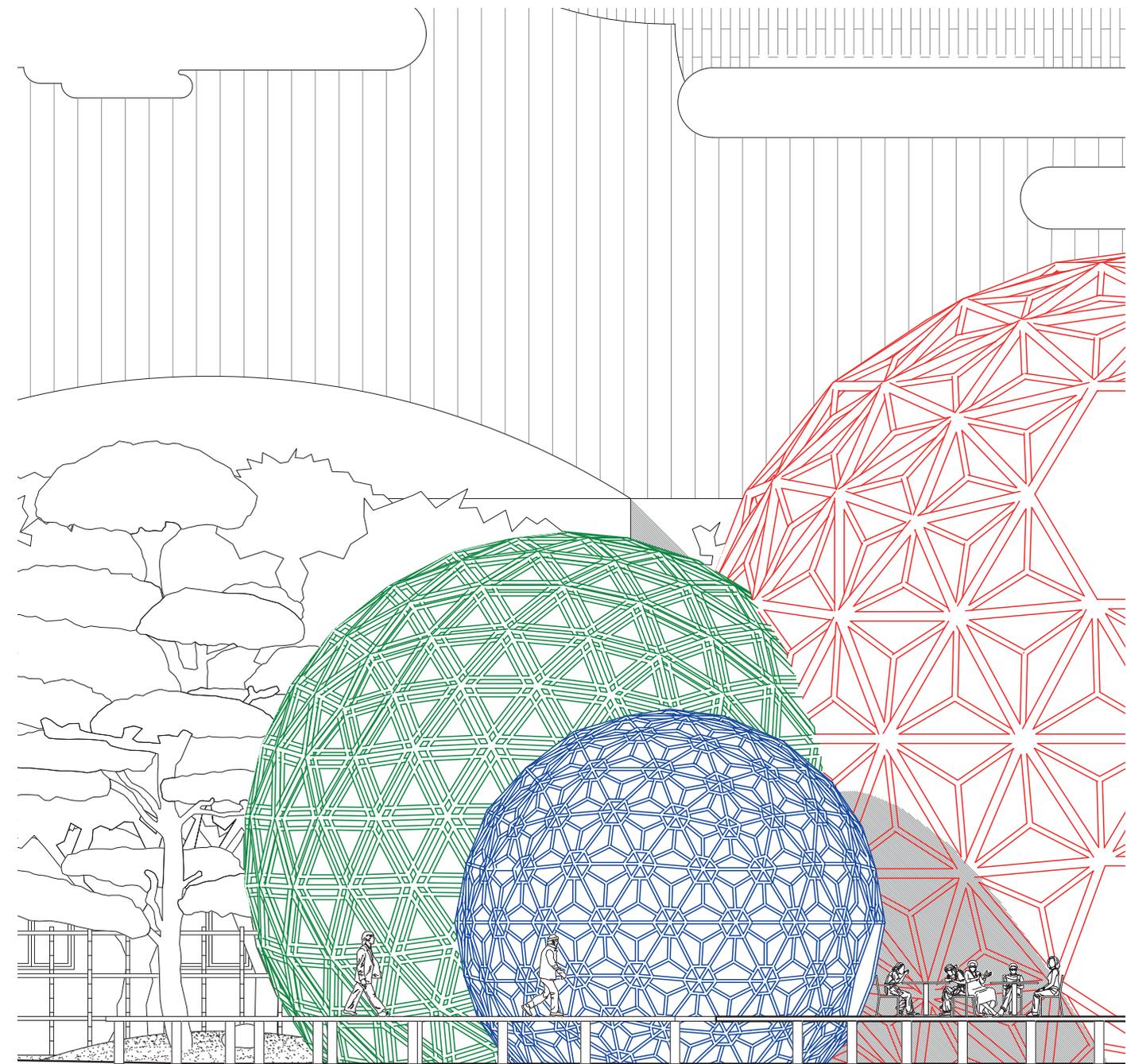
MASTERPLAN



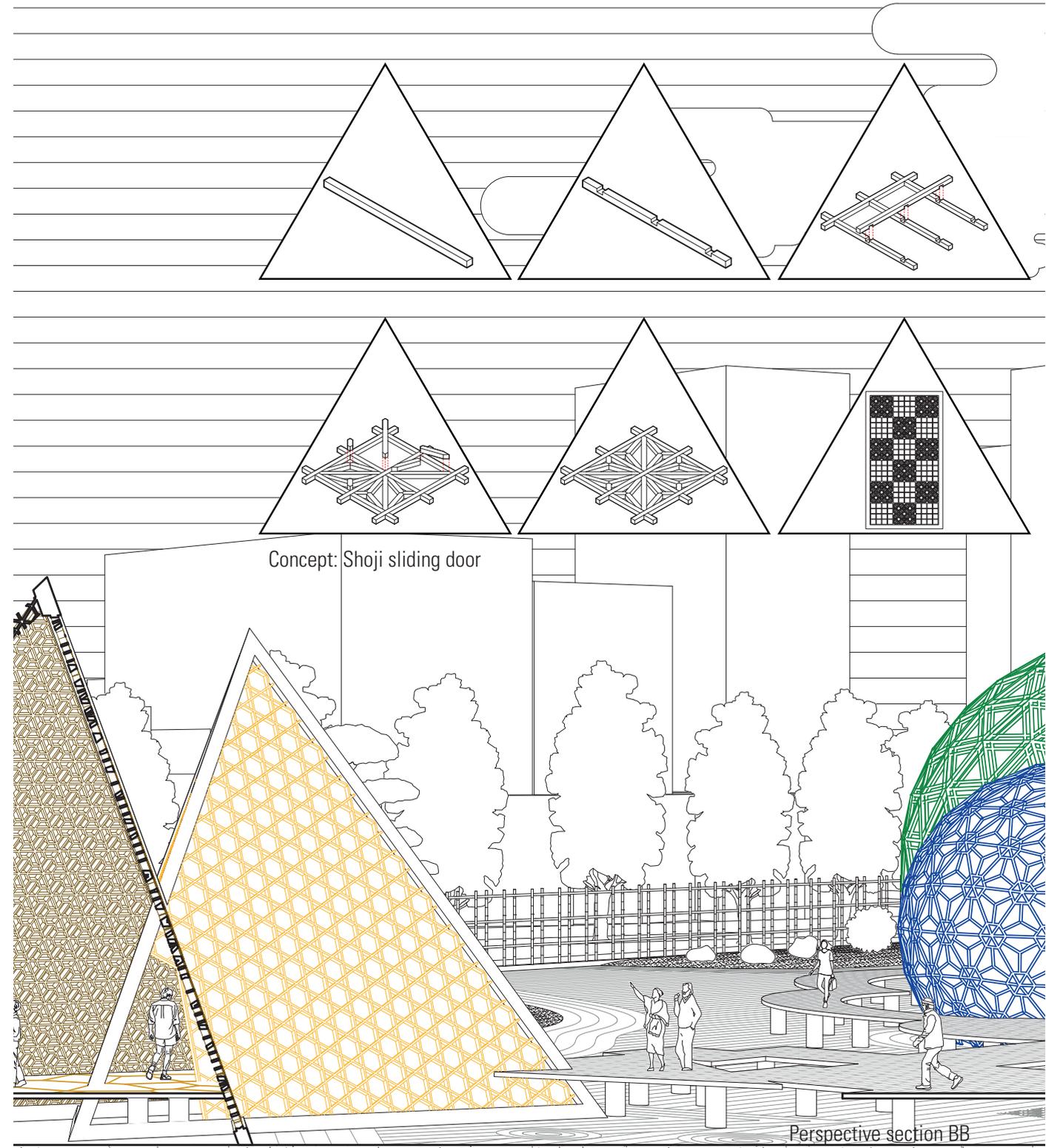
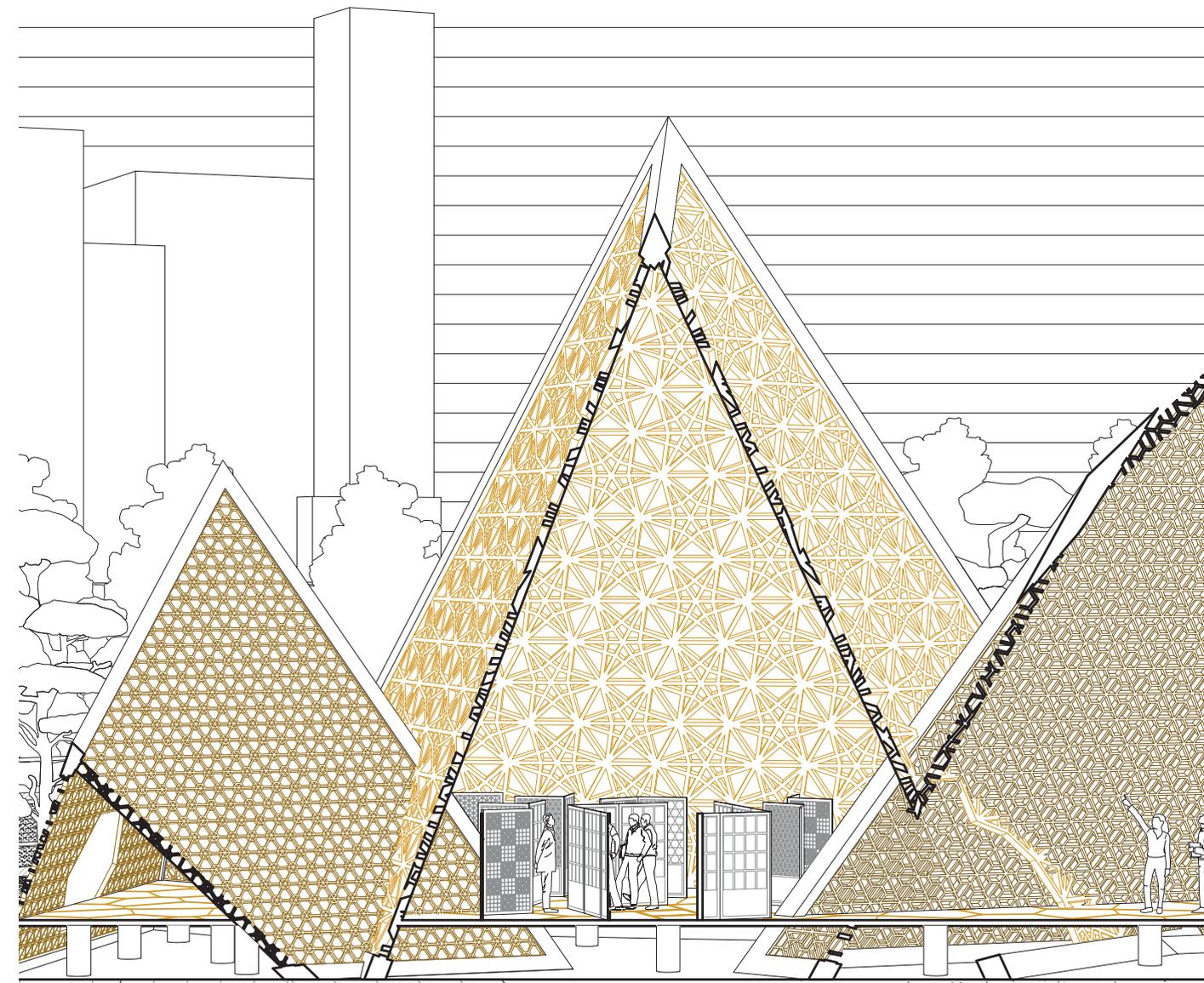
3.3.3 Kimono Pavilion

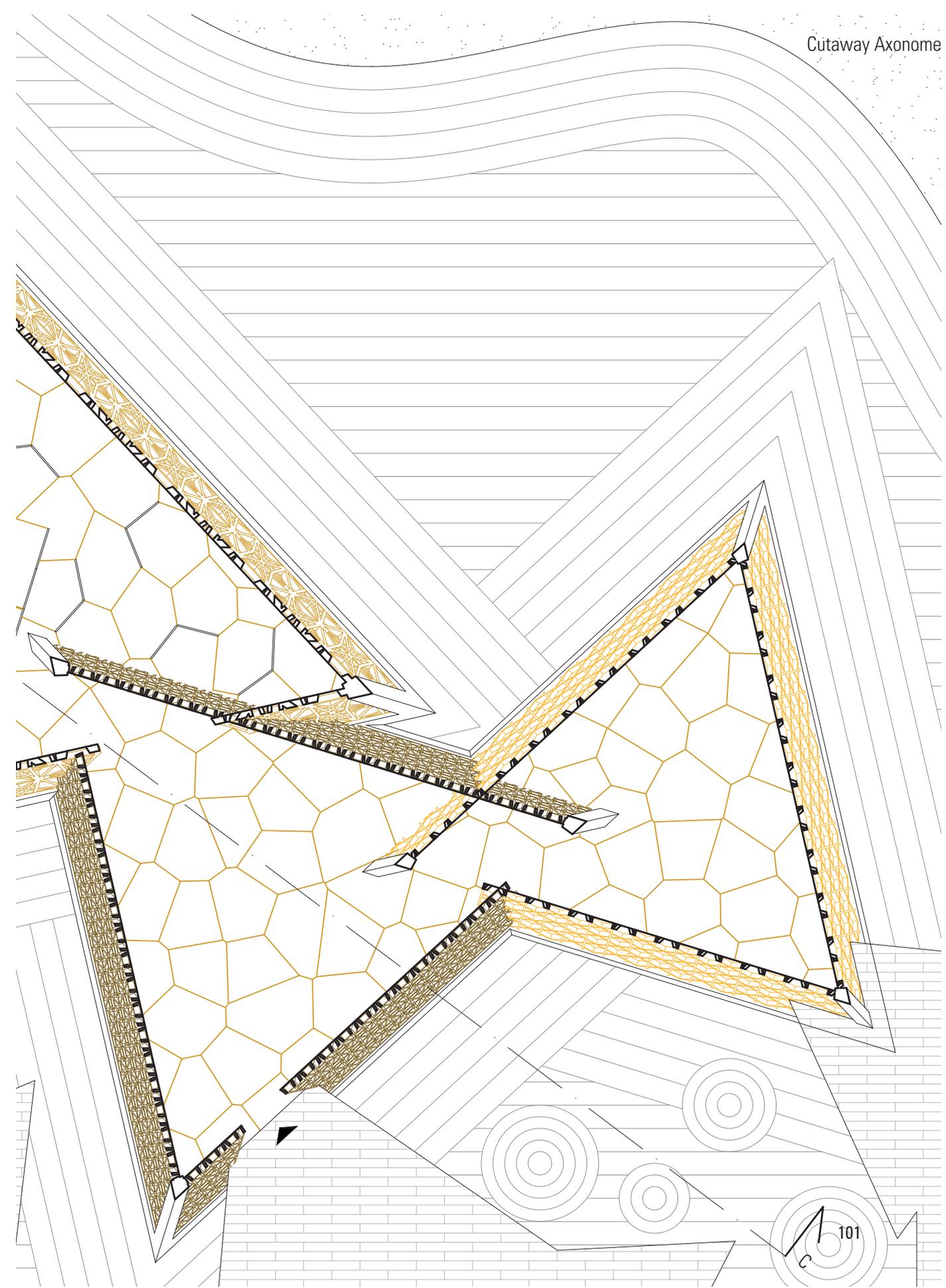
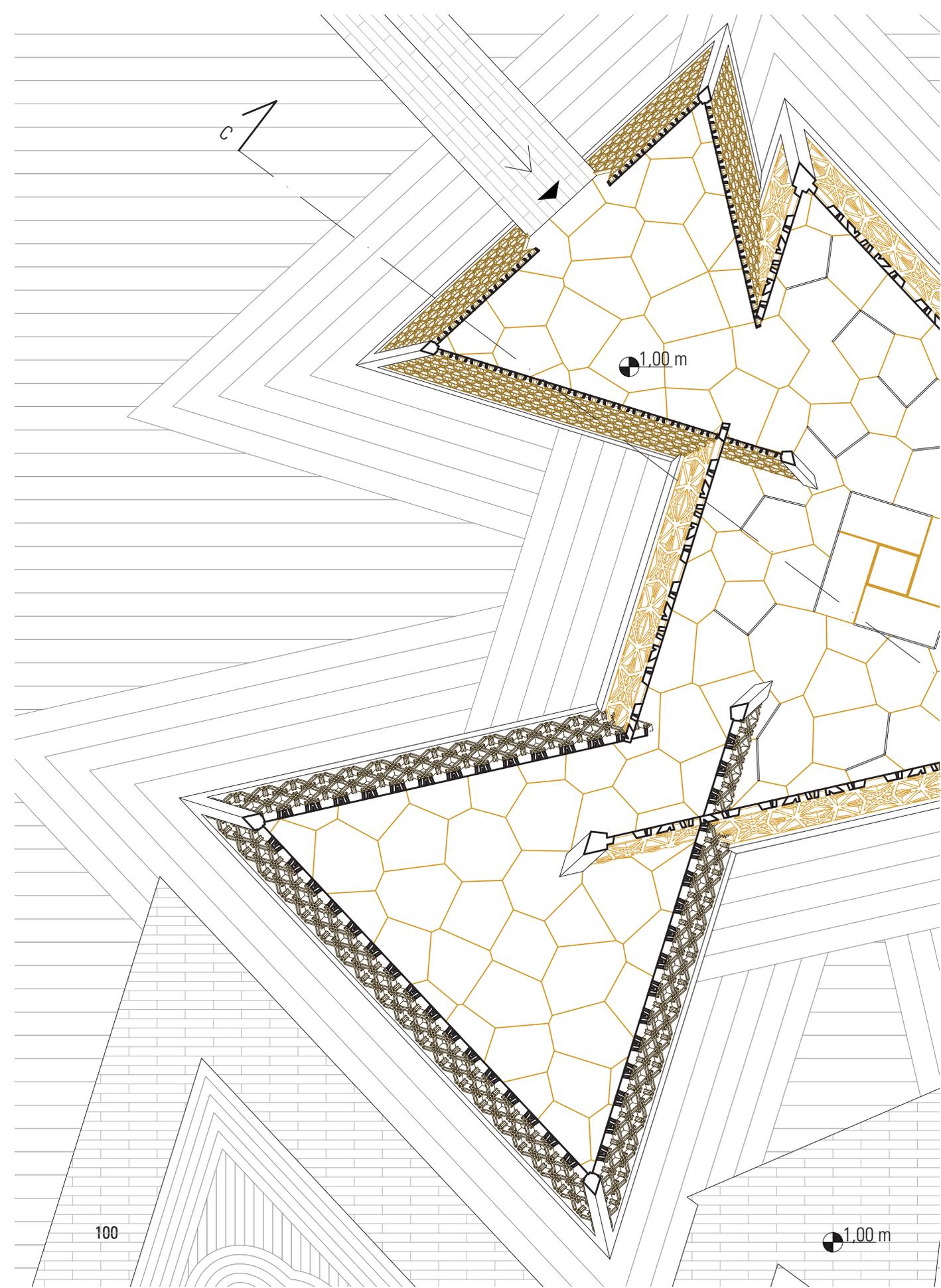


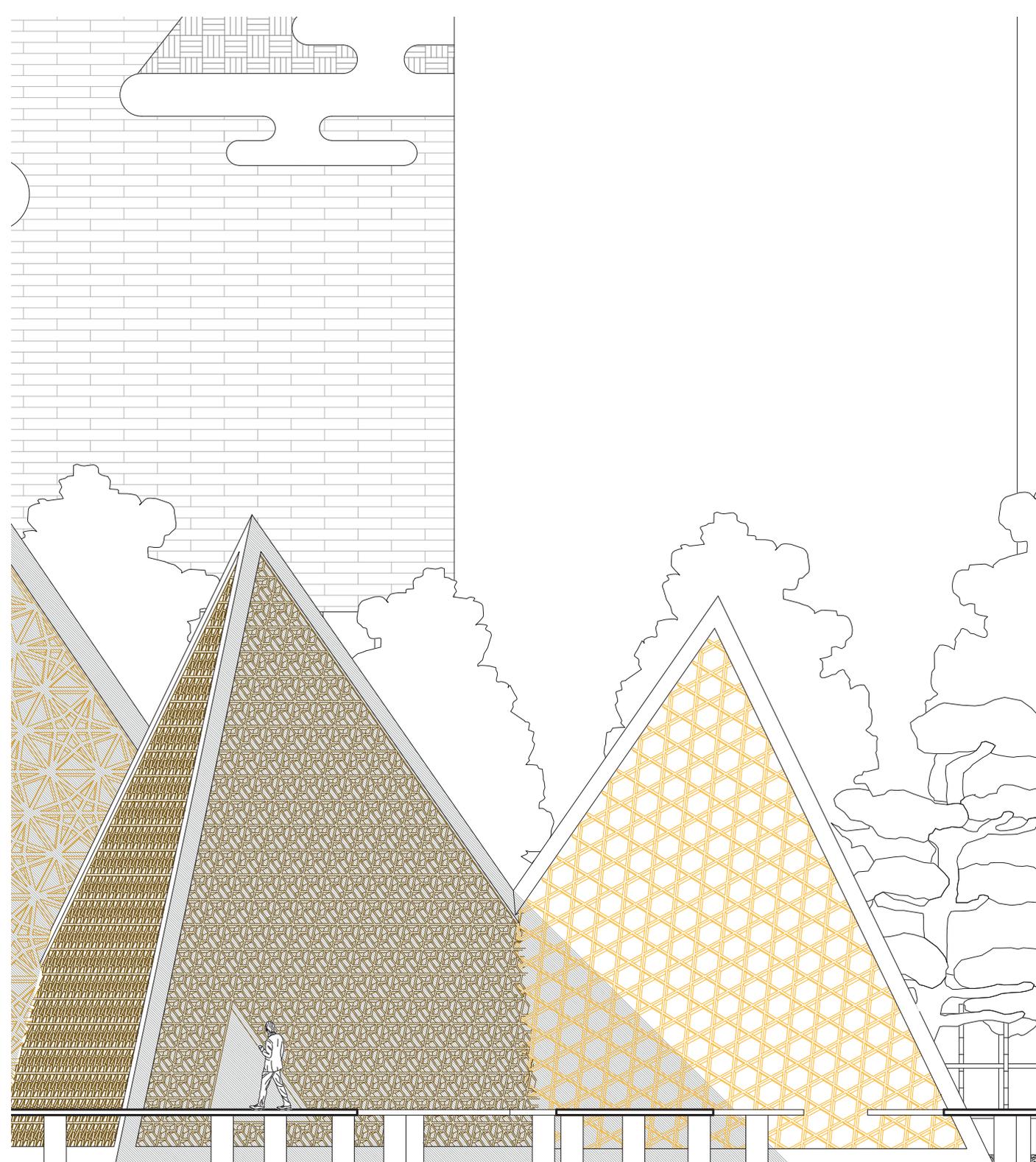
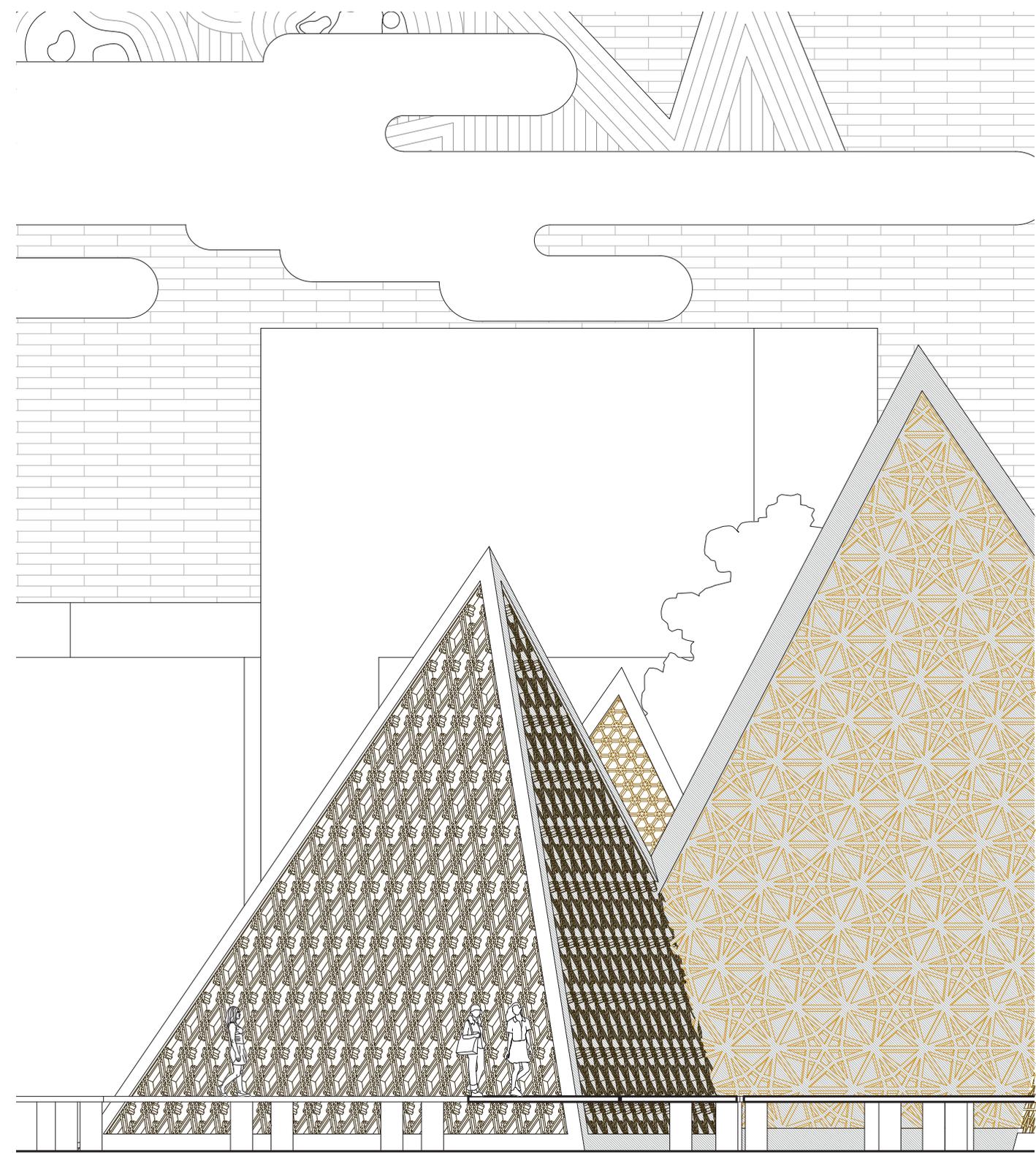




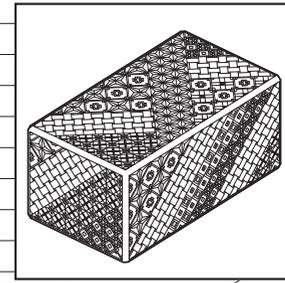
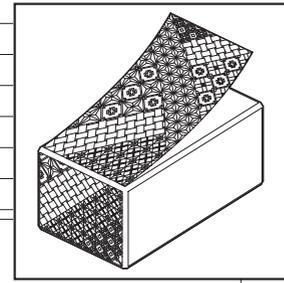
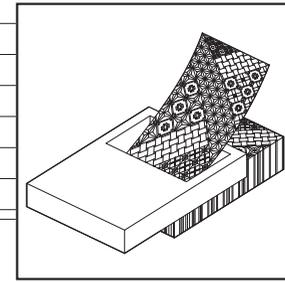
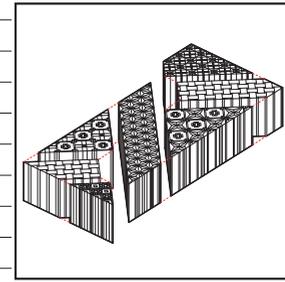
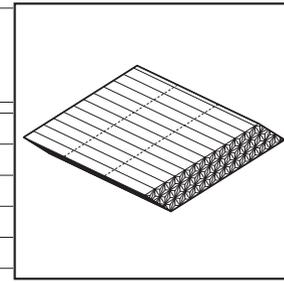
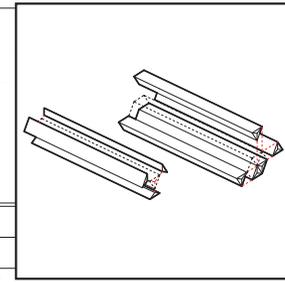
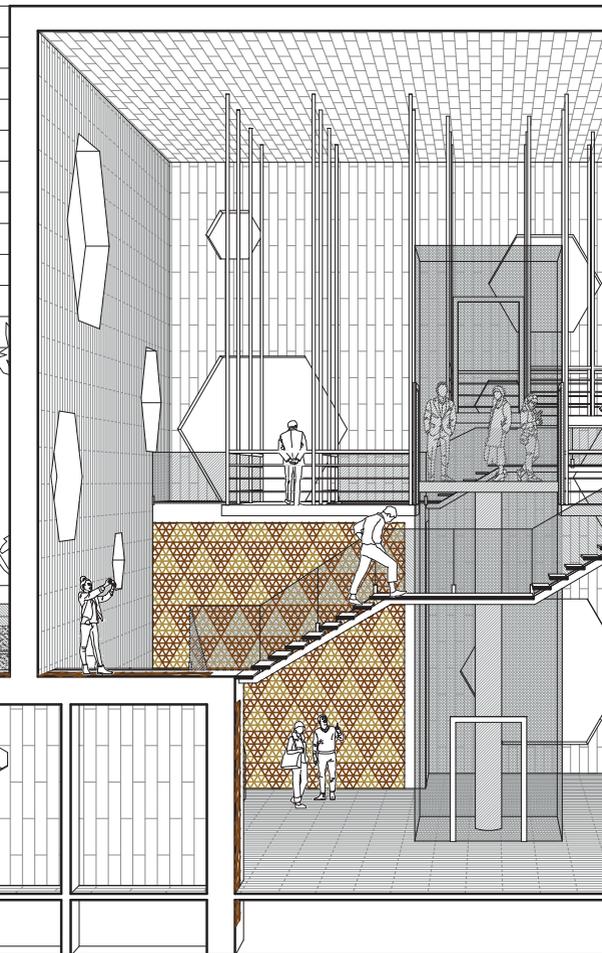
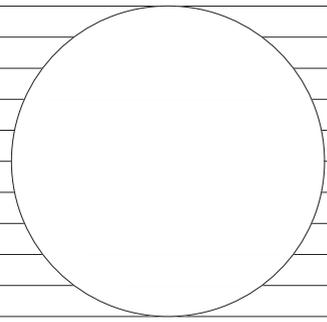
NTS PAVILION



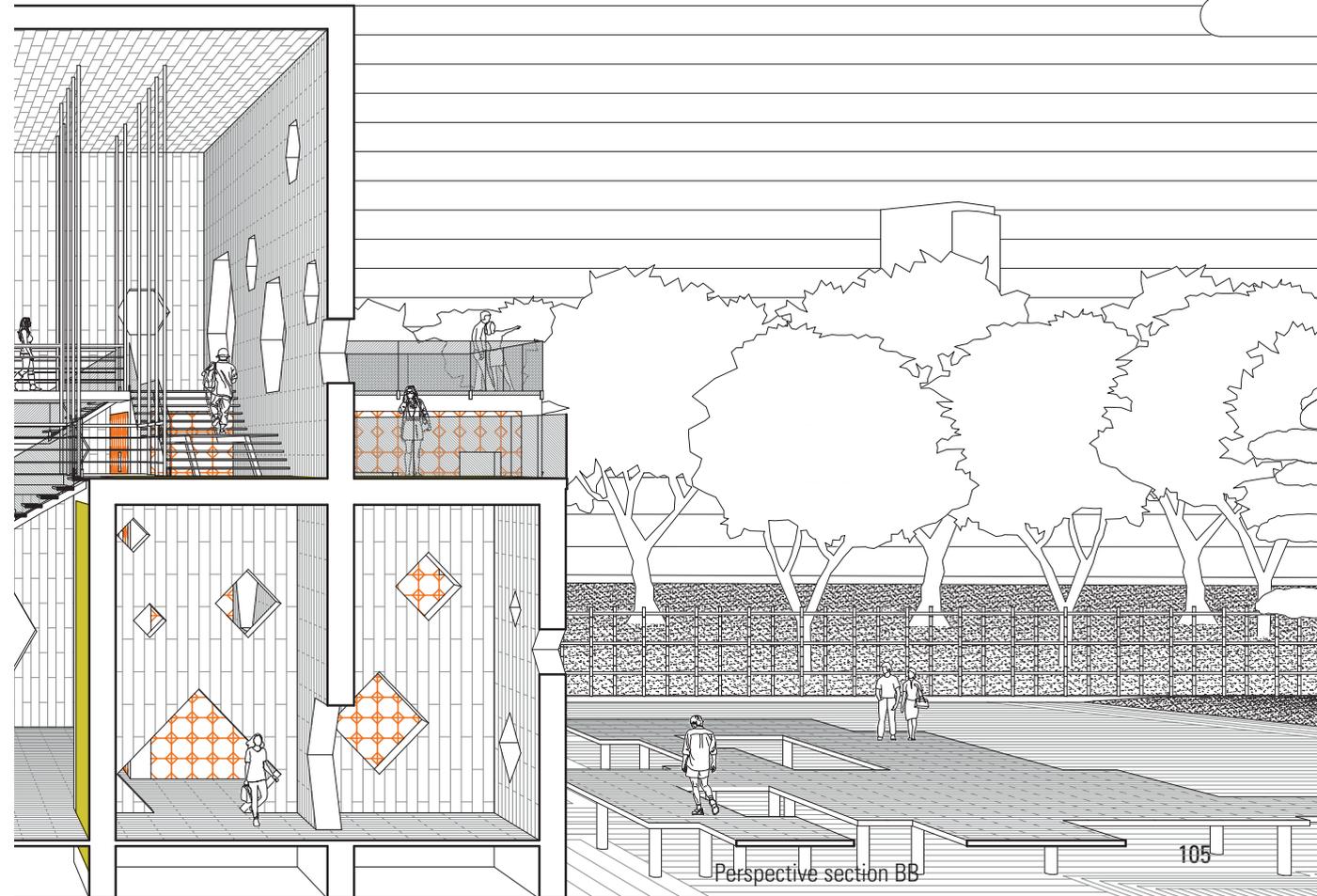


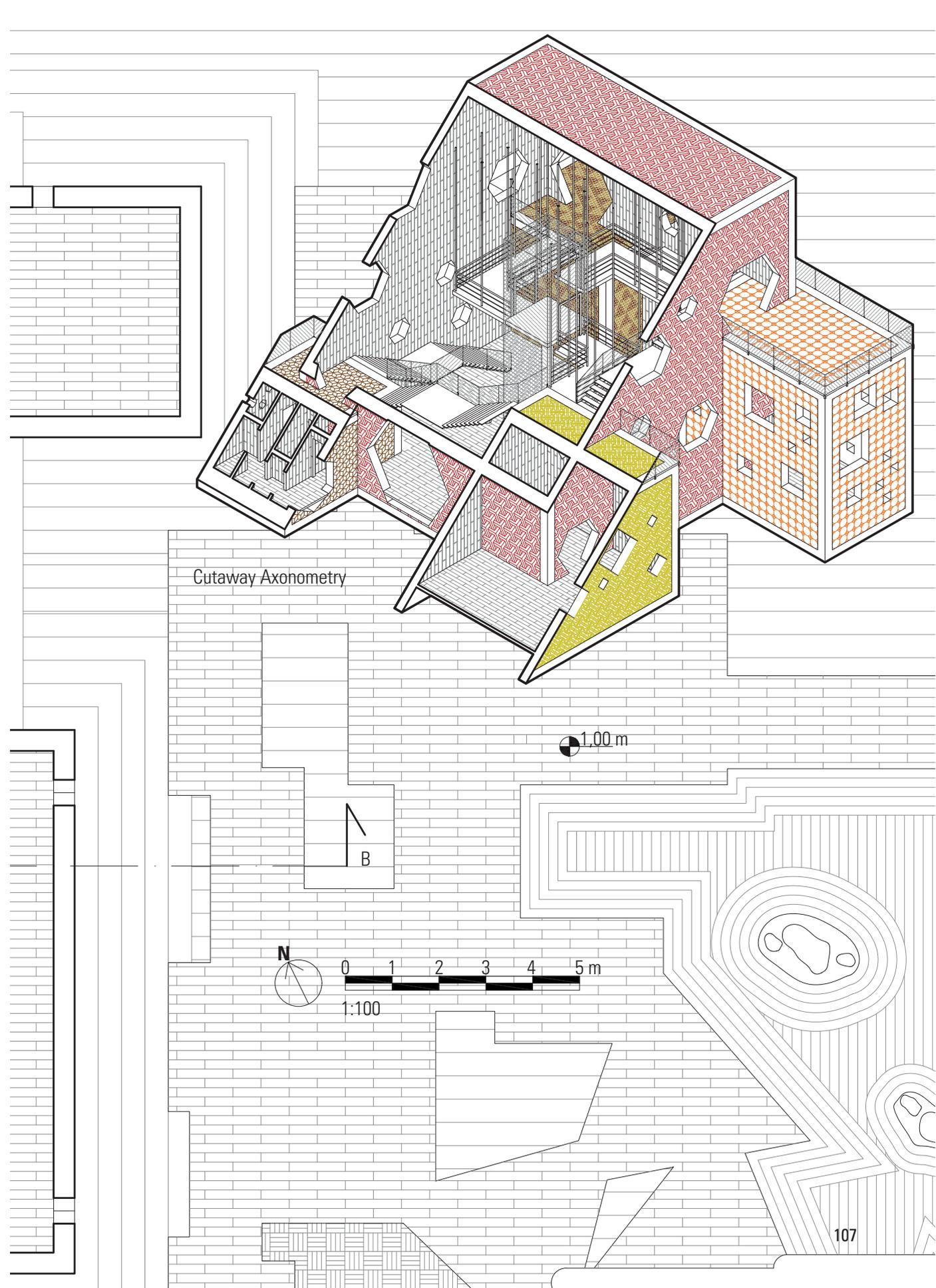
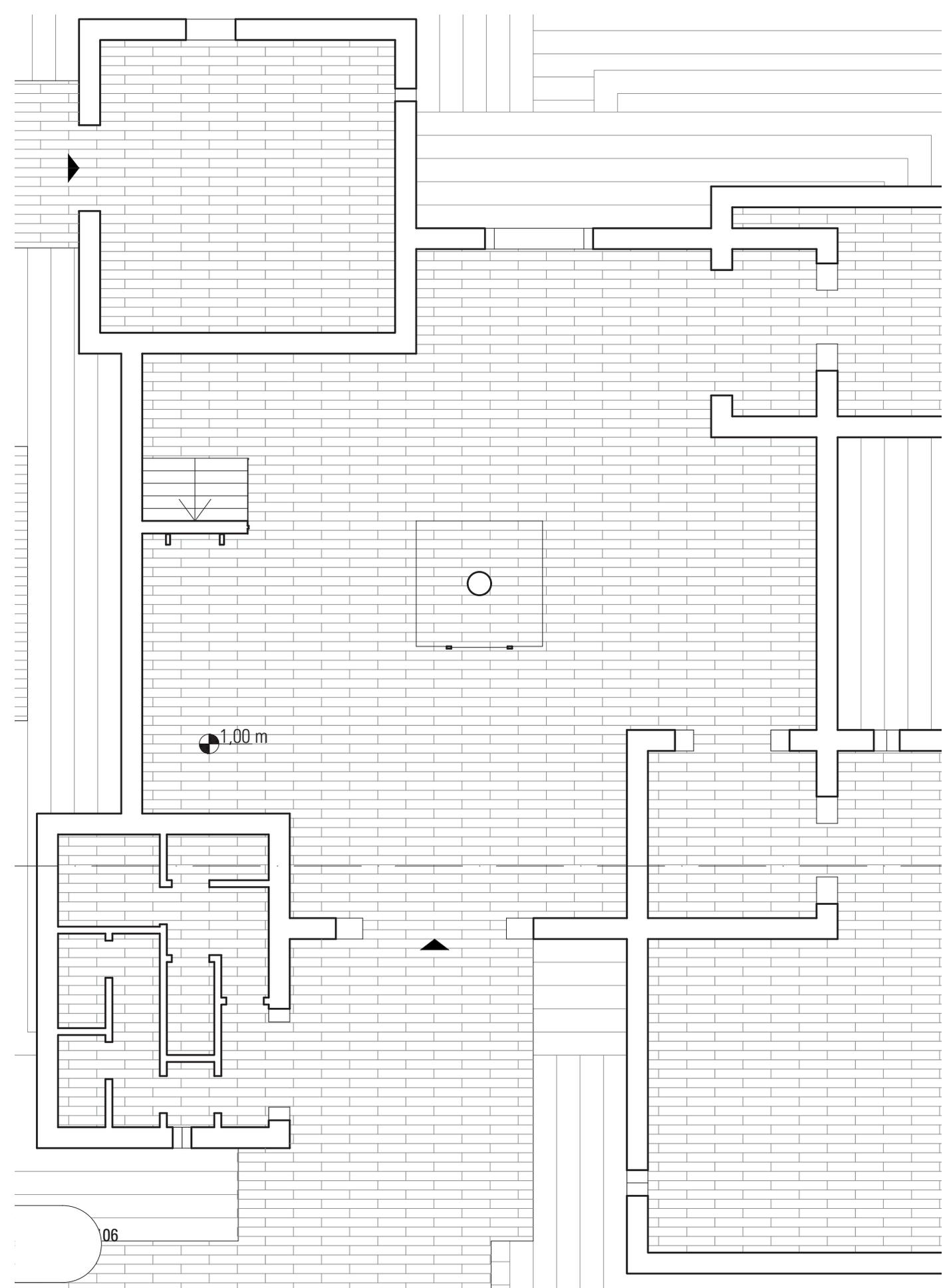


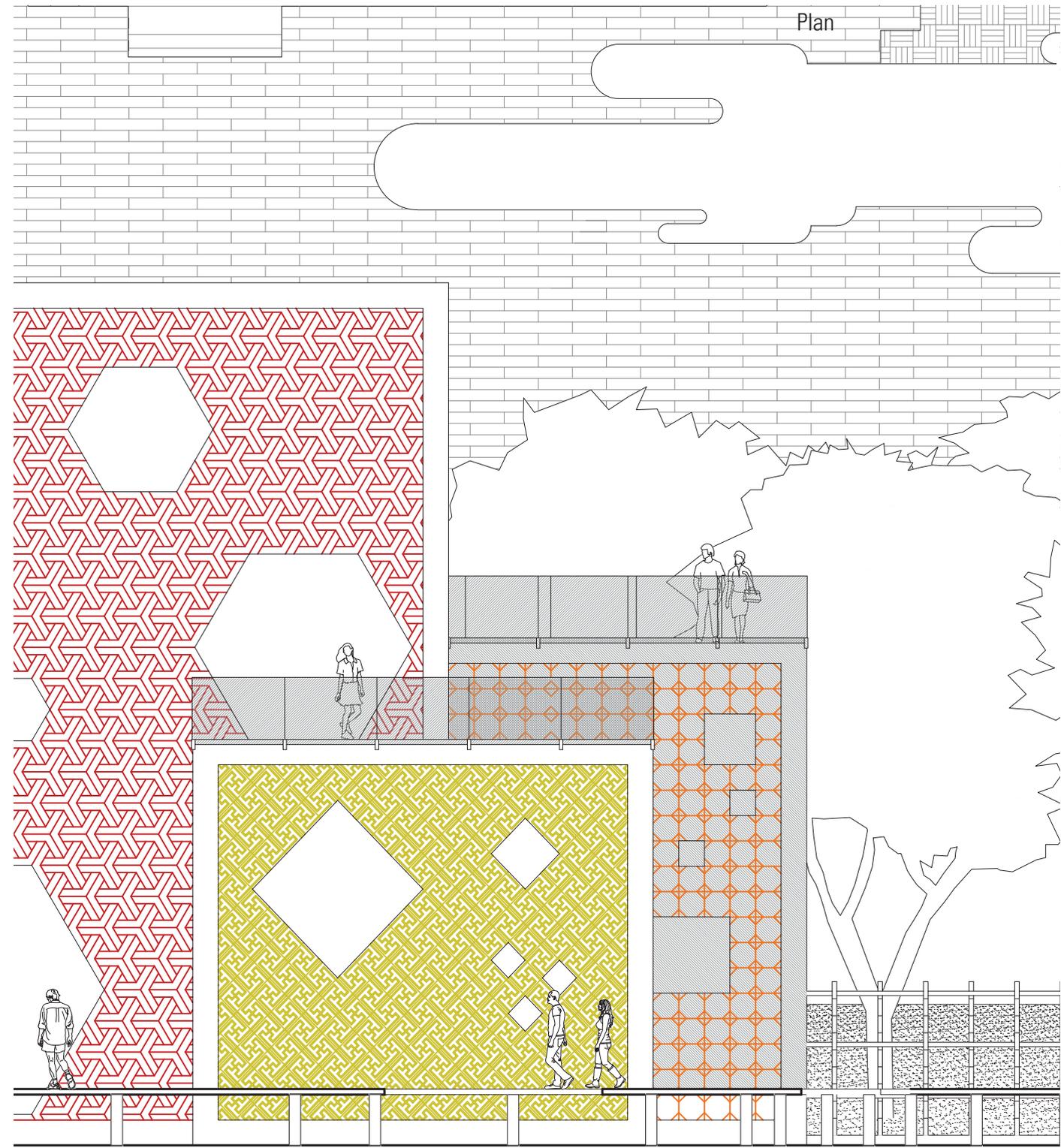
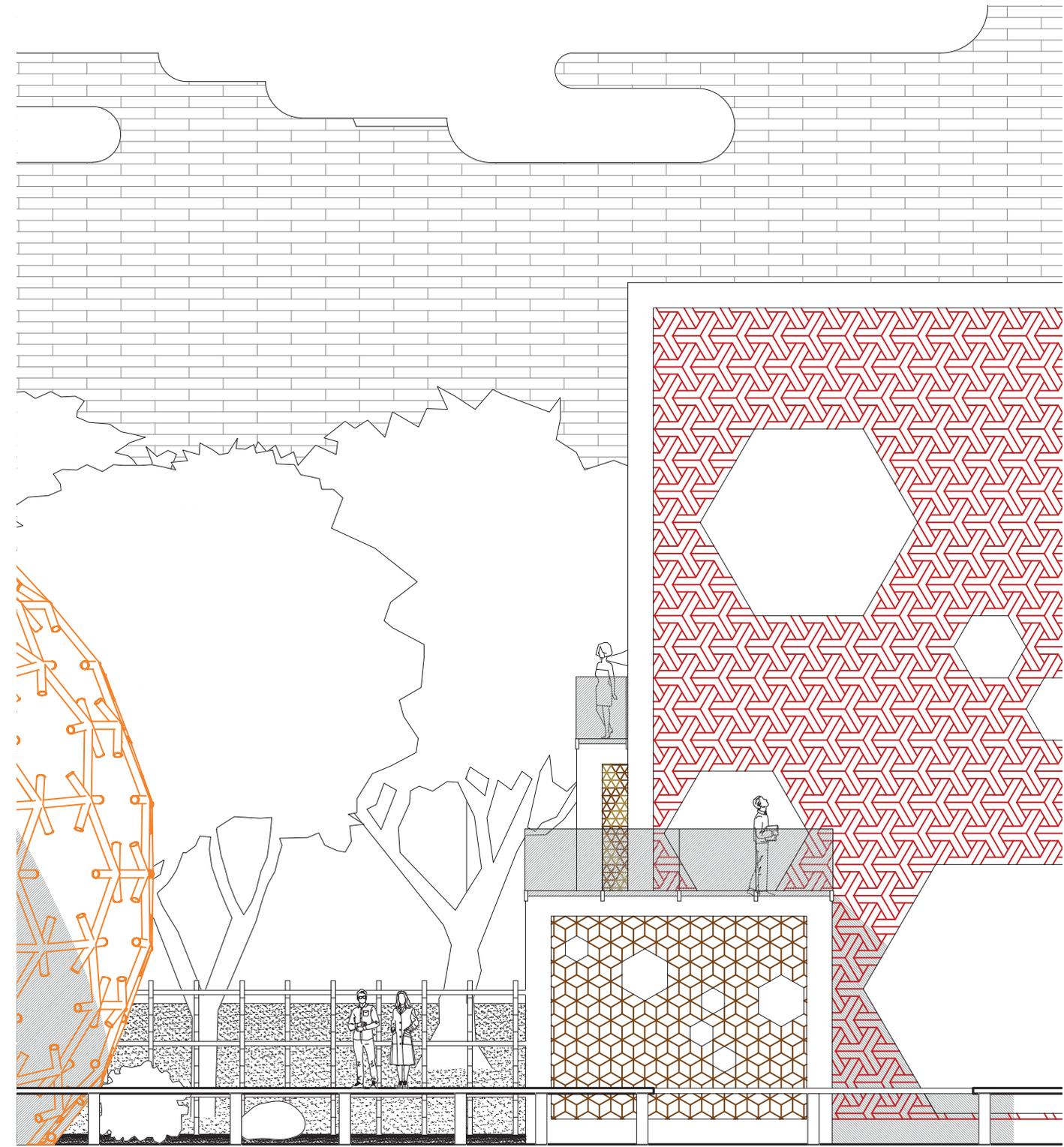
3.3.5 Craft Pavilion



Concept: Yosegi puzzle box





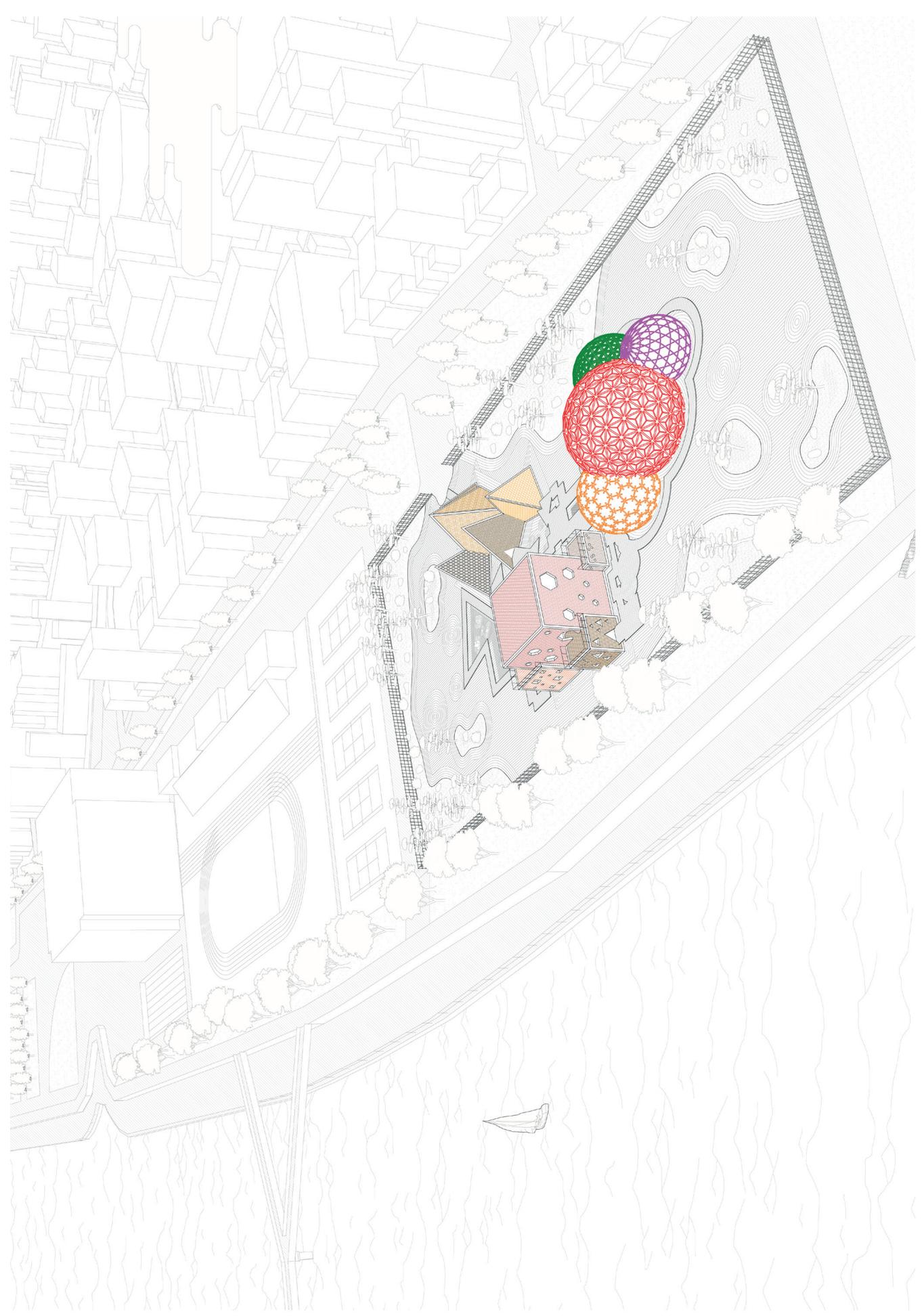


Plan

Elevation

3.3.6 Bird view

MUSEUM OF JAPANESE PATTERNS
日本の文様博物館



Alla mia famiglia: Sato, Kenta, Misao

Ai miei amici: Giovanni, Federico, Leonardo, Martina, Angelo

Per la persona che sono e quella che sarò

ありがとうございます!