Modular Spa Complex

Project: A&D Msc03/04 Arc

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Colophon

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Preface

This project was developed during 3rd and 4th semester (long master thesis) of the M.sc. program in Architecture at Aalborg Univerisity .

The main theme is study of relationships and connections betweentectonic and minimalism.

Firstly, the theoretical research was done in order to create a guidelines for a new design. Secondly, the SPA complex was designed based on the results.

The project report is a part of the master thesis project

Reader's guide

The report is divided into two parts, first is the theoretical study, focused on connections between tectonic and minimalism, done during the 3rd semester. The latter one, shows the final design of the modular SPA center, as well as the design process, analysis, and calculations.

The second part starts with the analysis, followed by the project presentation and design process, ended with the conclusions and reflections. The end features annexes and list of picture sources and references.

Attached folder with the drawings is the integrated element of the report.

The graphs, models and pictures belongs to the author, unless indicated otherwise.

References are made with the Harvard method.

Abstract

This report presents the proposal for a Spa complex made of modules for Capo Murro di Porco, Italy. The considered site is a south-eastern tip of mainland Sicily. It is a part of the Municipality of Syracuse and borders to the north the Gulfo di Noto. The place is dominated by a military lighthouse.

The report consist of a theoretical section followed by the design part. They both tied together seek to find a solution to create the architectural piece that follows the rules of tectonic and minimalism. First part of the report contain the theoretical research on terms: tectonic, minimalism, beauty and atmosphere. It is finalized as a conclusion, further translated into design parameters, which are implemented in a project proposal for a Spa complex.

Second part shows elements straightly connected with the design. Firstly, the analysis of the site, together with the conclusions, furthermore, useful analysis and information are gathered, for instance, spa design principles, Mediterranean architecture characteristic, technical aims. As a next step, final overview of the new design is presented. Finally, the design process is unfolded. Additionally, in the annex, calculations and technical aims can be found.

The architectural concept is based on using repetitive modules, combined in bigger clusters, and furthermore gathered together as a whole complex. In the design process, inspiration were taken from Jørn Utzon, who had a faith in the potentials of serial production. Additionally, modularity provides to the building a further possibility to expansion in case of needs.

The design focused on making the most of an valuable location and proximity to the sea. The units are put together in order to create an overview characteristic to the Mediterranean village.

Key words: minimalism, tectonic, beauty, atmosphere, Spa, Zen

Table of contents

Methodology

The report is divided in two main parts: first, theoretical investigation the latter one - the design part based on the conclusions made on the gained knowledge about the tectonic and minimalism.

Theoretical part is based on the research made during the first semester. Firstly, in order to get a deeper understanding of the ideas of Tectonic and Minimalism, investigations were made, based on an existing knowledge. Therefore, several critical essays related to the topic were read and analyzed. Simultaneously, the notes were taken. The main idea of this part was to prepare the selection of conclusion to furthermore help to reach the optimal solution, that answer the needs of beauty and tectonic and in the same time meets the requirement of the program.

Notes were collected in a form of graphs. Graph no 1 shows the main important ideas of each tectonic theorist, chronological. The same method was used for the minimalism research, the conclusion can be seen on graph no 2. Furthermore, gained knowledge were summarized, and the most important factors were collected in two separated groups: first one consist reflections about tectonic, the latter is connected with minimalism, which can be seen in the graph no III. Finally, the theoretical work were finalized with own conclusion, based on terms picked from the groups mentioned above. Created guidelines, combined with the analysis of existing SPA complexes were bases for preparing a design brief for a new project.

Theoretical results became a start point for the new design. It was assumed that the form must be developed regarding to the information gained during the theoretical study, to create the particular appearance. Furthermore, such parameters as overall planning and functionality, relation to the context and construction parameters have to be incorporated continuously. As a method to investigate holistic tectonic and minimalistic solution, with respect to the design brief, Integrated Design Process were used. This method provides possibility to ensure that architectural knowledge, and theoretical conclusions and engineering recognition are applied in the project phase, in order to solve and control the problems that may occur on several stages. As a result, the achieved project presents more holistic approach to the design of the architectural piece, since it gives the possibility to integrate aesthetic, construction and other engineering disciplines from the very first stage. Therefore it is possible to avoid compromises in a later stages of the design.

The IDP working method deals with the design process by dividing it into five steps and providing an interrelation between them. The blocks are: problem, analysis, sketching, synthesis, presentation, additionally there is a possibility for phases to overlap. Several loops must be taken, in order to achieve an equilibrium between ideological, aesthetic, visual, technical and functional guidelines.

The design process also include the PBL – which is Problem Based Learning, promoted at the Aalborg University. The method is based on answering the crucial question formulated at the beginning of the design process.

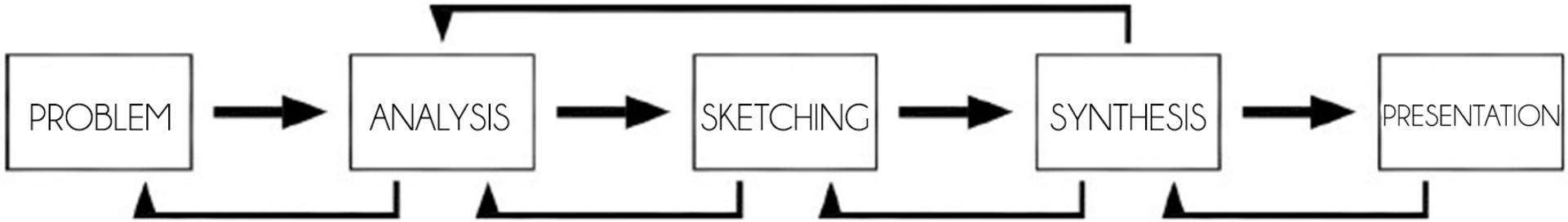


Figure 1. The Integrated Design Process diagram

Part I

Theoretical part

This project position within tectonic is based on several works and finalized with the own conclusion.

Historically buildings were created as a shelters and have essentially been used for people to control their environment, and to protect them and their property from being damaged. Over a time buildings have evolved from being just a shelter, to serving a wide variety of functions. Nowadays they are not only designed for the practical reason. Architecture became a part of landscape as well as the spatial planning. Numerous building can be assumed as being the real aesthetic masterpieces or sculptures.

The aim of this chapter is to unfold the concept of tectonic, and furthermore to examine the meaning of the related terms like construction, technology, structure.

In the next passages the study of the meaning of the word tectonic will go in first instance through the reading and understanding critical essays related to the topic. Through the time, numerous theorist, for an instance, Marco Frascari, Gottfried Semper, Karl Bötticher, Kenneth Frampton or Eduard Sekler have discussed the term of tectonics.

Chapter I

The way to create a mapping of a Tectonic discourses.
How the approach differ depending on the time and theorist?

Tectonic – general definition

From the Oxford Dictionaries the word Tectonic means firstly, from geology, related to the structure of earth's crust and the enormous-scale process "the movements of the tectonic plates areas of tectonic activity". Secondly, connected with a very significant change or development "the last decade has witnessed a tectonic shift in world affairs". Thirdly, related to building construction "a contest of tectonic quality and public attractiveness ". (Oxforddictionaries.com, 2015)

Tectonic – brief history.

The world tectonics take its roots from Greek, tekton, from tektonikos, meaning 'building or construction'. (Beim, 1999)

Historically the beginning of tectonic in architecture is regularly related to Karl Bötticher's publications from 1843-1852 on "Die Tektonik der Hellenen". (Foged, 2015) The main point from his treatise is that, all architecture pieces can be divided into Kerneform and Kunstform, which is the structural and the representational Hartoonian. According to him, tectonic is the concept or the system that ties every elements of the building together to a whole. (Ali and Brebbia, 2006)

However, it is important to notice that Frampton links to Karl Otfried Müller's " Handbuch der Archäologie der Kunst", which was published in 1830. Frampton wrote:

"Wherein he defines tektonische as applying to a series of art forms such as utensils, vases, dwellings and meeting places of men, which surely form and develop on the one hand due to their application and on the other due to their conformity to sentiments and notions of art. We call this string of mixed activities tectonic; their peak is architecture, which mostly through necessity rises high and can be [a] powerful representation of the deepest feelings." (Frampton in: Foged, 2015, p. 141)

It is significant to note the link to the Greek etymology of tekton, that means construction, which is not necessarily limited to the objective of architectural construction. As mentioned before, Bötticher in his "Die Tektonik der Hellenen" gives a different meaning to different parts of the architectural construct, he appoint the Kernform (core-form) and Kunstform (art-form), where those forms are defined by their functions. This segmentation was developed by Gottfried Semper , the German architect and theorist, in his Die Vier Elemente der Baukunst in 1851.

Gottfried Semper moved from Bötticher's dual notion of tectonics and divided architecture into four essences: earthwork, hearth, framework/roof and enclosing membrane. Furthermore, dividing it into two groups: stereotomic and tectonic. Not only for Semper but later for Frampton, the articulation of these two factors forms the quality of architecture. Furthermore, Semper became more focused on material assembly and how they are joined together, which was understood as a way to express the properties of the material. The joint seen as a fundamental aspect revealing the quality of architecture which was further developed in the Marco Frascari's writings.

Frascari uses the work of the Italian architect Carlo Scarpa to examine how the significant role has the joint per detailing, beyond its local application of connecting two or more elements together (Frascari 1984). He wrote that the articulation of the detail is the central aspect of tectonic articulation. Whereas Frampton highlights the importance of the structural integration in the joint, in order to achieve 'structural ornament' and not 'ornamented structure'. (Frampton, 1983, 1995, 2011)

In order to get a better understanding of the tectonic, several authors were analyzed, as they are presented chronologically.

Gottfried Semper

It can be assumed that Gottfried Semper more or less formulated the modern understanding of tectonic:

"Tectonic deals with the product of human artistic skills, not with the utilitarian aspect, but solely with that part that reveals a conscious attempt by the artisan to express cosmic laws and cosmic order when molding the material." (Beim, 1999, p.49)

According to Gevork Hartoonian, Semper's understanding is based on defining architecture as a cosmic art, similar to music and dance. (Beim, 1999)

Semper's theories are based among others on studies of traditional, vernacular architecture. Additionally, they were inspired by Bötticher's studies.

Semper moves from Bötticher's dual notion of tectonics and decomposes the architecture into four essences. Significant role in shaping Semper's theoretical discourse played "Die Vier Elemente der Baukunst", where he analyzed vernacular dwelling with its construction principles, and created an idea that architecture had developed from experiencing four main elements: earthwork, hearth, framework/roof and enclosing membrane. Furthermore the segmentation is divided in two groups: first, stereotomic -that contains the earthwork and hearth that belong to the topography and mass, second, tectonic – composed from the spatial and lightweight framework/ roof and enclosing membrane. (Beim, 1999)

Gottfried Semper stated that the structure is a part of the tectonic expressions, whereas for him the joint was the main essence:

"Semper's emphasis on the joint implies that fundamental syntactical transition may be expressed as one passes from the stereotomic base to the tectonic frame, and that such transitions constitute the very essence of architecture." (Beim, 1999)

The joint is the most significant tectonic element, based on the idea that it represent the meeting between elements and materials.

A straight connection to Heidegger's manifold description of techné becomes well seen in Semper's thinking, as the form, causa formalis, is not to be understood as the singular making, or imitation. Instead it supposed to be focused on the highlighting causes from which it has developed uphold the most significant value. In each material, there is a particular method of artistic representation. It is due to the fact that each has properties that distinguish it from other materials, and in the same time each demands its own technique and treatment. Under the circumstances that an idea and an artistic motive uses any kind of material treatment, as a consequence, its original type will be modified, for an instance the color can be changed. Therefore, the type is no longer in its primary stage of the development, but instead it has undergone a more or less pronounced metamorphosis. (Beim, 1999)

KEY IDEAS:

- division between the technical and the symbolic issues
- coherency between material, and method of manufacturing
- four fundamental elements of the building: the hearth, the earthwork, the framework, and the enclosing membrane
- the articulation of these two factors forms the quality of architecture
- two groups: 1. stereotomic - earthwork & hearth 2. tectonic - framework & membrane
- knot as being the oldest and most original constructional part
- division between the technical and the symbolic issues
- focus on material assembly and how they are joined together
- the joint seen as a fundamental aspect revealing the quality of architecture
- focus on potentials and limitations of materials

Eduard D. Sekler

Sekler states that tectonic can be understood as an art of arranging the space and the construction of a structure. It consists all the elements that are essential for the human perception of a building, such as details and the connection and joining of materials and elements.

"When a structural concept has found its implementation through construction, the visual result will affect us through certain expressive qualities which clearly have something to do with the play of forces and corresponding arrangement of parts in the building, yet cannot be described in terms of construction and structure alone. For these qualities, which are expressive of a relation to form to force, the term tectonic should be reserved" (Sekler, 1964, p.89).

According to Sekler tectonic is a crucial element of understanding an architectural design, but simultaneously it cannot be assumed as the only defining concept of an architecture:

"To speak of architecture in terms of tectonics alone would be as one-sided as to speak of it in terms of space alone." (Sekler, 1964, p.95)

Presently in the daily usage the difference between construction and structure is blurred, and the word tectonic is rarely used. It is crucial to understand the difference, according to the author "construction" is connected with something put together whereas "structure" links to an ordered arrangements of certain parts in rather wider sense. When following that understanding the strict relation between construction and structure appears clear. Structure is more general and abstract, it links to a principle of arrangements or a whole system. It is desired to cope with forces at a piece of architecture, for an instance dome or arch. Construction refers to the more concrete realization of a system or principle, that can be carried out in a several ways and a different material usage. (Sekler, 1964)

According to the author the term tectonic should be reserved for situations when a structural concept meets its implementation throughout construction and simultaneously the visual effect is satisfied. Additionally, the play of forces and mindful arrangement of parts cannot be described when using only one term: construction or structure. (Sekler, 1964)

Sekler states that the word tectonic links to the same Greek roots like the words technology or architecture, which remind of the elemental human's activity which is giving visible shape to something new. Originally the term was referred to the craft of the carpenter or the builder who in ancient Greek was called tekton. Tectonic was one of the discussed concepts in nineteenth century, when neoclassicism was reconsidering Greek architecture. The two German architects and theorist Gott fried Semper and Karl Böttiger around the middle of nineteenth century published books that had a word "tectonic" in the title. (Sekler, 1964)

Tectonic gives an architect a possibility to make visible experience of reality which is in the same time the artist's domain, for an instance the experience of forces related to forms in a piece of architecture.

Author debates the honesty of the material and structural use. Regarding his opinion, each element should be used for the purpose it exists. Thus, usage of elements just for aesthetic purpose was called atectonic by him. (Sekler, 1964)

KEY IDEAS:

- tectonic - art of arranging the space and the construction of a structure
- focus on: details, connection, joining of materials and elements
- each element should be used for the purpose it exists
- honesty of the material and structural use
- tectonic - situations when a structural concept meets its implementation throughout construction and simultaneously the visual effect is satisfied
- usage of elements just for aesthetic purpose he called atectonic

Marco Frascari

According to Frascari tectonic is a phenomenological concept, where the detail in the metaphorical way tells the tale, when appealing to human senses:

"In architecture, feeling a handrail, walking up steps or between walls, turning a corner, and noting the sitting of a beam in a wall, are coordinated elements of visual and tactile sensation." (Frascari, 1984, p.28).

Frascari sees the possibilities of invention and innovation in details. Through it careful workmanship architects have a possibility to give harmony to the most uncommon and difficult environment created by culture. It was assumed that architecture is a result of the resolution, substitution, and design of details. Therefore careful detailing is the most crucial factor for avoiding building failure. Furthermore, it is essential to understand the potential of the material and the possible construction method used, to create a significant unification of the aesthetical and functional qualities. (Frascari, 1984)

Putting together materials and spaces in an aesthetical and functional way through formal and actual joints is the real art of detailing. Frascari calls it the crucial field between the mental construing and the real construction, where the mental on can furnish space which allows various interpretations and in the same time an ongoing exploration. (Frascari, 1984)

"Details can be "material joints" ... or they can be "formal joints", as in the case of a porch, which is the connection between an interior and exterior space. Details are then a direct result of the multifold reality of functions in architecture. They are the mediate or immediate expressions of the structure and the use of buildings." (Frascari, 1984, p.23)

Dictionaries define the word detail as "a small part in relation to a larger whole". Frascari states that in the architecture field this definition is mainly meaningless. For instance, a column can be seen as a detail and in the same time it is a larger whole. Furthermore, a whole classical round temple can be seen as a detail as well, when it is a lantern on the top of a dome. The dictionary definition seems useless in architecture, because of this problem of scale and dimension. Simultaneously, it is possible to notice that any architectural element which is defined as detail is always a joint. Details can be divided in two groups: first is material joints- for an instance a capital, which is a physical connection between a column shaft and an architrave, the latter is "formal joints," as in the case of a porch, can be understood as a connection between an interior and an exterior space. Consequently, details can be assumed as a "direct result of the multifold reality of functions in architecture". (Frascari, 1984, 24)

Understanding of the role of detail as a generator of the character of buildings generates in Beaux-Arts tradition a very peculiar graphic means for the study of it, which is the analytique. Details play there the predominant role in the graphic representation of a building. In that manner they are composed in various scales to appoint the dialogue among the parts that creates the building. (Frascari, 1984)

From the historical point of view, it is important to notice that this graphic analysis of details had its increase at the time when architects did not have to prepare working drawings to show the idea and construction of the details. On that time the designers were almost entirely dependent on theirs craftsmans. Builders did not need drawings to show details since theirs execution was a matter of a common knowledge. (Frascari, 1984)

The production of details began problematic in a predominantly economically motivated society. On that time buildings have became an economic investments with an intentionally planned short existence. As a consequence, two totally different reactions had developed. First was that several building trades did not inferred the construction of the detail from design drawings. Each detail were designed and studied only on the drawing. Therefore, the development of the real and physical detail was replaced by only virtual and imaginary procedures. It can be assumed, that in this case the detail was no longer an inherent part of the building. Instead of being seen as a joint it was understood as a production drawing. The latter one can be exemplified by the architecture produced by the Arts and Crafts Movement. In contrast to the first one, the knowledge and the ability of making details were given back to the craftsman. As a consequence, the knowledge of detailing and all skills need was required from architect, since he was responsible for the appropriate workers for the appropriate details. ". (Frascari, 1984)

Frascari creates theory that it is possible to define

architecture as a system where is a 'total architecture', 'the plot', and a 'derailed architecture', the tale can be distinguish. Therefore architecture becomes the art of selecting a proper details when creating the tale. A plot with the mindfully created details becomes a fully developed and successful "tale". (Frascari, 1984)

Frascari debates the problem of perception of details based on the quote of Walter Benjamin:

"Buildings are appropriated in a twofold manner: by use and by perception or rather by touch and sight... .Tactile appropriation is accomplished nor so much by attention as by habit. As regards architecture, habit determines to a large extent even optical reception.". (Frascari, 1984, 28)

It can be understood as an empirical theory that regards all perception of space that depends on conventions that assume details that nothing more than signs, the meanings of which are learned only by experience.

Frascari states that the art of detailing can be learned the most from Carlo Scarpa. In his architecture each detail tells the story of its making, placing and dimensioning. The most important is that the details in his work solve not only practical functions, but social, historical and individual functions as well. He refers to Scarpa's buildings as:

"texts wherein the details are the minimal units of signification, and where the joints between different materials and shapes and spaces are pretexts for generating texts" (Marco Frascari in: Beim, 1999, p.55)

Furthermore, he developed the layered process of signification in Scarpa's detailing:

"... Scarpa was able to change the convention that asks for the background walls of a collection of gypsum, casts to be tinted. Scarpa's solution was to put the white casts against a white background wall that was washed with light, without directly lighting the casts. The problem and the solution are in the use of light . Scarpa solves it in a detail of the joint of three walls in a corner made of glass... The achievement of the effect of light occurs by a formal manipulation . The solution of the formal cause solves the final cause. He describes it as 'clipping of the blue of the sky', a formal cause, but the result was the lighting of the wall the final cause". (Marco Frascari in: Beim, 1999, p.55)

Scarpa himself claims that:

"I love a lot of... natural light: I wanted to clip off the blue of the sky. Then what I wanted was an upper glass recess... The glass corner becomes a blue block pushed up and inside [the building], the light illuminates all the four wall." (Carlo Scarpa in: Beim, 1999, p.55)

Frascari states that, the Vitruvian axiom unifies the intention with the corporal, in a process of creating results from vision. Therefore, it can be assumed that "the things signified: refers to the meaning created by intention and ideas implemented into the piece of architecture , when "that which gives significance" is the part of which the architecture is made. That is mainly the process, substance, historical and cultural settings, that can be understood as elements of the construction sharped by human practices and activities.

KEY IDEAS:

- detail tells the tale
- careful detailing is the most crucial
- material joints & formal joints
- details - predominant role in the graphic
- representation of a building
- understand the potential of the material & construction method used

Kenneth Frampton

Kenneth Frampton, historian and theorist, in the book "Studies in tectonic culture" seeks to derive the meaning of tectonics from its etymology. According to him the exact term "tectonic" can be derived from the Greek word "tekton" which means the carpenter or builder. Additionally it can be linked to another Greek word "techné", meaning the art of creating, therefore "tectonic can be understood as the art of construction". (Frampton, 1995) The word "art" can be understood as a piece which is created with imagination and that is beautiful and can express feelings or ideas. When following this understanding, Frampton's sentence can be can be understood as the way to express ideas or feelings by using the manner something is done. It is important to highlight that putting meaning into the constructive technique of the building is possible when tying both artistic and constructive knowledge.

"Tectonics is inherent to the name of the profession architect which is a contraction of the greek word archi that means master and the greek word tect that means builder and is related to the word tectonic". (Framton, 1995)"

The concept of tectonic was further developed therefore it can be assumed that today it is much more complex, consequently, can be interpreted in several ways. In the wide understanding it is not considered as a certain style in architecture or an actual action, but mainly as a method to identify the construction in relation to the spatial idea, and furthermore, to generate the atmosphere and the mood. Kenneth Frampton called this phenomenon "the poetic of construction", which echoes through the field, and tectonic architecture is a poetic understanding of construction and craftsmanship, expressed in the structural whole. According to the author, it is desired to be honest to the used material in the expression of the construction, and simultaneously to use the potentials and accept the limitations of these materials. Author said that:

"Tectonic becomes the art of joinings. "Art" here is to be understood as encompassing tekne, and therefore indicates tectonic as assemblage not only of building parts but also of objects, indeed of artworks in a narrower sense. With regard to the ancient under¬standing of the word, tectonic tends toward the construction or making of an artisanal or artistic product.." (Framton, 1995, p. 4)

which means that he sets the main focus on how the different component of the construction and materials should be mindfully put together, and consequently, to reach a logical and clear structure, that gives a possibility to understand the building as a whole. (Frampton, 1995)

According to Frampton, tectonic is an expression of the construction and engineering techniques in relation to embodiment and expression of an idea. (Frampton, 1995)

Frampton states, similarly to Semper's opinion, that the core of a building simultaneously forms both: fundamental structure and substance, additionally the skin of a building represents the composite character of tectonic form. Furthermore, author extends the idea by noting that:

"the unavoidably earthbound nature of a building is as tectonic and tactile in character as it is scenographic and visual, although none of these attributes deny its spatiality. Nevertheless, we may assert that the built is first and foremost a construction and only later an abstract discourse based on surface, volume and plan". (Frampton 1995, 2)

Frampton summarized Semper's classification of the building crafts into two basic procedures:

„Tectonic of the frame, in which lightweight, linear components are assembled so as to encompass a spatial matric, and the stereotomics of the earthwork, wherein mass and volume are conjointly framed through the repetitious pilling up of heavyweight elements." (Kenneth Frampton, in: Beim, 1999, p.51)

Furthermore, Frampton suggested in his study on the distinction between heavy and light construction, that stereotomics and tectonic also allude to ontological and representational aspect of tectonic form, In his elaboration of lightweight screens, he stated that:

"The concept of layered transitional space as it appears in traditional Japanese architecture may be related indirectly to the distinction that Semper draws between the symbolic and technical aspect of construction, a distinction that I have attempted to relate the representational and ontological aspect of tectonic from: the difference, that is,

between the skin that represents the composite character of the construction and the core of the building that is simultaneously both fundamental structure and its substance. This difference finds a more articulated reflection in the distinction that Semper draws between the ontological nature of earthwork, frame and roof and the more representational symbolic nature of the hearth and the infill wall... This dichotomy must be constantly rearticulated I the creation of architectural form, since each building type, technique, typography, and temporal circumstance brings about a different cultural condition."

According to Frampton:

"The full tectonic potential of any building stems from its capacity to articulate both the poetic and the cognitive aspects of its substance" (Frampton 1995, 26)

This double articulation presupposes that it is crucial to find a balance between technology, understood as a productive procedure and craft technique as an anachronistic but renewable ability to harmonize and coordinate different models of production and levels of intentionality.

KEY IDEAS:

- clear structure
- elaboration of joints
- poetic manifestation of structure
- tying artistic and constructive knowledge
- honesty to material in the expression of the construction
- use potentials and accept limitations of materials
- stereotomic & tectonic form quality

Information and the main ideas connected from theorist were further used on the graph in order to create a guidelines for the new design.

Jørn Utzon

Jørn Utzon was a Danish architect who had a faith in the potentials of serial production.

"My ideal of industrial prefabrication in house building is building system similar to the log-house system, in which neutral, uniform, identical components can give a shape to a variety of buildings." (Beim, 2004 p. 69)

Throughout Utzon's career he has persuaded the problem of defining ideal design systems that can be used for prefabricated building components. Therefore, in each project, he has examined the same theme in order to come up with a number of distinctive architectural answers.

One of Utzon's most thorough investigations was The Espansiva building system. Several investigations into the issues of system building, can be noticed as reflecting a genuine understanding of the prefabricated construction unit as an essential parameter for the design. The Espansiva system has always been described as crude and simple, without any importance when it comes to aesthetic appearance. Simultaneously, the architect tested there the contemporary Danish building industry. In consequence, studied its potentials and limitations and set out to define the ideal system of standards, which in the same time referred to an aesthetic appearance suitable for architecture. Therefore, the project represents a thorough study of tectonic in architecture. The idea concern the fusion of structural rationalism and richness in variation, similar to organic and mineral structures in the world of nature. (Beim, 2004)

According to Giedion 'Jørn Utzon... possess the double gift: he is able to have direct contact with the cosmic elements of nature and the past and also complete control of contemporary methods of industrialized production – especially prefabrication. As a result, he is able to detach prefabrication from its purely mechanistic attributes and bring it nearer to the organic." (Beim, 2004 p. 71)

Therefore he was able to define a flexible standard of high aesthetic quality that meets rational industrial manufacturing processes. He was able to tie two outwardly different ends: rationalism (which implies standards and homogeneity) and flexibility (which implies variation and adaptability).

Furthermore the French architect Francoise Fromonot summarized Utzon's additive principle that is:

"follows the method: definition of a basic unit reflecting the functional nature of the program, perfection of the variations, assembly of these functional elements in reference to the site and the construction schedule." (Beim, 2004 p. 71)

It could be assumed that his additive architecture is not only a sheer matter of adding a structural elements that share similar standards to another one. According to Utzon's mind building elements have to be regarded as autonomous, whole and equally significant parts. It should be applied not only in theory but also during the construction process. (Beim, 2004)

Industrially produced building components can only be used in a proper way when all those components can be easily added to a building without necessity to be cut or adapted. Therefore, a new form is a result of such a pure addition, in order to obtain a new architecture expression with the same attributes. In theory it works perfectly, whereas in practice building components that cannot be cut or adapted challenge the technical design, and the whole process of construction. Normally, several building components have to be changed or modified during the construction process. Furthermore, they are tied together to form a structural joints to transfer forces. Therefore, Utzon's idea require thoroughly planned technical details of high quality. (Beim, 2004)

Utzon used the repetitive principle not only in Espansiva but also in the Sydney Opera House, which can be understood as an architect answer to the idea of transforming prefabricated component into artistic means of construction.. The project share many similar ideas that are close to the basic nature of prefabrication. Simultaneously, the building contains more elegant features and articulates a much stronger idiom. Moreover, the notion of repetition refers to an economical way of thinking, whereas Utzon defined it as a creative tool for design by generating aesthetic qualities from technical constrains. (Beim, 2004)

"If one... passes on to nature, one will see that the elements of nature are created out of a multitude of small identical elements of very different nature and characteristics, which multiplied or combined with others sorts create an infinite richness and

grandeur – in terms of space, matter, form and color." (Jørn Utzon in: Beim, 2004 p. 130)

Utzon used to study these additive principles of nature, since he came up with this particular interpretation that the addition can be used as an architectural design strategy. By this way of thinking, Utzon could liberate the entire nation of modular system building. Therefore, it was possible to bring "purely mechanistic attributes" into "direct contact with the cosmic elements of nature". As a result, he was able to provide alternative solutions to the common methods of industrial construction. (Beim, 2004 p. 133)

Utzon's work serves a significant paradigm for a tectonic architecture – "Additive Architecture" provides the basis, for a design strategy that implements usage of a limited number of simply designed prefabricated elements, which can be put together in several combinations, in order to achieve dynamic and tectonic piece of architecture of potential complexity and beauty. His own approach to architecture is inspired by nature, grounded in understanding of making, gained especially through working with father in the building and designing boats. (Foged,2012)

Additionally in this work Utzon emphasized and enabled the design possibility to re-create, re-arrange and re-understand the project while working on it. When the elements are created in a clearly designed and spatial functioned way, design freedom and focus can be moved to the other aspect for instance holistic composition and proportioning in the landscape (Foged,2012)

Jørn Utzon and his ideas were analyzed in order to get a better understanding of the modularity systems. Several of his key ideas were further transformed to the vision for the next project.

Anne Beim

Anne Beim states that tectonic deals with the relationship between several elements, such as the building technology, the structure, the form and concept. Additionally, aesthetic and function should form a symbiosis.

"Building technology and practices of construction becomes a matter of signification - tectonics – only when they are handled consciously" (Beim, 1999, p.57)

Anne Beim uses the quote of James Strike, who says:

"The architectural design process raises building construction above the singularly physical solution, to a higher mental level, which brings together the intellectual forces and aesthetic considerations with the physical requirements." (Beim, 1999, p.19)

This sentence becomes a point of the departure for the discussion if architectural design (aesthetic) determine building construction understood as technology, or the technology determines aesthetic. In a more wide understanding the problem is to find the way how construction technology and architectural design interact and evolve. It was assumed that from this question suggest two different way of understanding. The first one is defined by architect or designers, who envision or project new sort of architectural morphologies or spaces and as a consequence, bring about or requires new technologies, for instance new types of construction, new structures or changed approach to existing materials and methods. The latter one is created by generally established process, normally characterized by development of new technologies, renewed solutions to problems or improvement in fabrication procedures. That gives the architect an extended range of design possibilities.

"If architecture can be said to have a poetic meaning we must recognize that what it says is not independent of what it is. Architecture is not an experience that words translate later. Like the poem itself, it is its figure as presence, which constitutes the means and end of the experience." (Alberto Pérez-Gómez, in: Beim, 1999, p.45)

Pérez describes architecture as a world of not only physical sensation but also a poetic representation. Therefore, building construction can be characterized in both as pragmatic means and entities charged with satisfaction. Beim idea is to unfold the concept of tectonic and furthermore to develop the related terms.

According to the author nowadays the term tectonic is commonly used , mostly refers to aesthetic question in construction of a building. Moreover, it is used to describe material nature as well as intentions in construction solutions or structural system and principles of organization.

Beim links to the Kenneth Frampton's book "Studies of tectonic culture" where he defines tectonic as "poetic of construction". Furthermore according to him the term "tectonic" derives from the Greek word "tecton" which means builder or carpenter as well as in the Greek classical literature it also links to the art of construction. Understood like that, it can be compared with the word "techné", which means "the art of bringing forth or fabrication" (Beim, 1999, p.46). Gevork Hartoonian, the American architect and scholar, notes that:

"techné, in the classical concept of work, did not significantly a means, but the unity of means and ends (work and meaning)." (Gevork Hartoonian in: Beim, 1999, p.46)

Whereas Frascari, says that the essence of techné is not technological but belongs rather to the notion of posies, which reveals or discloses the truth and links to the knowledge. Additionally, he says that the terms like technique, technical and technology have lost their initial meaning in the common language, since they were interpreted as being instrumental nature only.

Hartoonian stays in the opposite and explains that this change of meaning happened in the seventeenth century, when "techné in its classical sense was replaced by technique, or the manner in which an artist or artisan uses technical elements of an art or craft" (Beim, 1999, p.46) Additionally, he makes a reference to another crucial aspect of the technological development which is mechanization of working process. According to the author "technique provided solutions for problems without necessarily evincing any particular concern with the object of the problem or its historical values." (Gevork Hartoonian in: Beim, 1999, p.46) Which can be understood as technology formed an individual own solutions instead of finding solutions for the problems it was supposed to solve.

Beim turns back to Frascari to find additional important dimension to the definition of tectonic. He relates it to the fact that architecture rather suggest and exemplifies than imposes and determines, he wrote that:

"... technology becomes a reality acting between sensory experiences and physical expressions, being the union of the homo faber [the creating man] with the homo ludens [the playing man]. Technology is a subjective presence rather than an objective procedure to which the client and architecture must be subjective." (Frascari in: Beim, 1999, p.47)

To sum up the above according to Beim: techné represents the essence of making and bringing forth, technology the knowledge of making, technique means the method of making, whereas tectonic can be understood as poetic of making. The most important here is to notice two facts: first is that that the concepts are closely related and overlap one another, the latter is that they may be interpreted in a different way depending on the architectural and cultural context. Furthermore the full meaning of construction with its full meaning can be characterized as the collaboration of: logic – order and symbolic forms; materials – selection and properties; joints – joining of materials and primarily structure, as well as the joint between horizontal and vertical plane, and interaction of the different building elements. (Beim, 1999, p.47)

As a next step Beim analyzes Sekler's arguments, when he defines difference between structure and construction:

"The real difference between the two words is that "construction" carries a connotation of something put together consciously while "structure refers to an ordered arrangement of constituent part in a much wider sense. With regard to architecture, the exact relationship between the structure and construction now appears clear. Structure as the more general and abstract concept, refers to a system of principle of arrangement destined to cope with forces at work in a building, such as post-and-linter, arch, vault, dome and folded plate. Construction, on the other hand, refers to the concrete realization of a principle or system – a realization may be carried out in a number of materials and ways. For example, the structural system which we call post-and-lintel may occur in wood, stone and metal and its elements may be fastened together by a number of methods." (Eduard Sekler in: Beim, 1999, p.49)

Beim states that the interpretation above can be linked to Mies van der Rohe's definition of structure. According to him structure reflect the philosophical idea, and it should be based, as a whole, on the same ideas that can be find not only in the overall layout of the building but also in the detail. Therefore the structure express the idea of the construction. Beim quote Peter Carter, who worked in Mies's office to show that Mies believed that:

"In architecture, structure implies a complete morphological organism, not a merely columns and girders. An organism of precise necessity, the resulting form, which is a consequence of the structure and not the reason for the construction." (Peter Carter in: Beim, 1999, p.49)

When putting Sekler's and Mies's definition together it can be concluded that the architectural approach to the construction and structure depends mostly on the intention and knowledge of the designer. The most significant is that it requires both levels of approach at the same time: the one with the point of departure in an abstract realm and the latter an the latter related to the real problems.

Beim ascertain that Gottfried Semper formulated the modern understanding of tectonic. He defined tectonic as a "cosmic art", with similarity to dance and music:

"Tectonic deals with the product of human artistic skills, not with the utilitarian aspect, but solely with that part that reveals a conscious attempt by the artisan to express cosmic laws and cosmic order when molding the material." (Gottfried Semper in: Beim, 1999, p.49)

Beim made a research to claim that Semper's theories about tectonic have their inspiration in studies of traditional, vernacular architecture. Additionally, he was inspired by Karl Böttiger, who with similarity to Violet-le-Duc was interested in rational architectural design. Böttiger interpreted tectonic as a "signifying a complete system binding all the parts into a single whole, similar to the principles of Greek temples." (Beim, 1999, p.50)

Furthermore, Hartoonian describes Semper's ideas

as neo-avant-garde, and states that his hermeneutical understanding of the new, set him apart from the universal modernist rejection of history. He states that "as he [Semper] witnessed the disappearance of traditional forms of art, this made him formulate a theory that integrated ur-forms with the new techniques and materials." (Beim, 1999, p.50) In the book "Die Vier Elemente der Baukunst" Semper analyzed vernacular dwelling and construction principles and created the theory that architecture "had developed out of the experience of four basic elements: the earthwork, the hearth, the framework and the lightweight enclosing membrane." (Beim, 1999, p.50) Furthermore, through analyzes Semper classified the building crafts in two basic procedures, about which Frampton states that:

"Tectonic of the frame, in which lightweight, linear components are assembled so as to encompass a spatial matrix, and the stereotomics of the earthwork, wherein mass and volume are conjointly formed through the repetitious pilling up of heavyweight elements."

Additionally, Frapmton analyzes the distinction between light and heavy constructions based on traditional Japanese architecture:

"The concept of layered transitional space as it appears in traditional Japanese architecture may be related indirectly to the distinction that Semper draws between the symbolic and the technical aspects of construction, a distinct that I have attempted to relate to representation and ontological aspects of tectonic form: the difference, that is, between the skin that represents the composite character of the construction and the core of the building that is simultaneously both fundamental and structure and its substance. This difference finds a more articulated reflection in the distinction that Samper draws between the ontological nature of the earthwork, frame and roof and the more representational symbolic nature of the hearth and the infill wall. . . This dichotomy must be constantly re articulated in the creation of architectural form, since each building type, technique, topography, and temporal circumstance brings about a different cultural condition." (Kenneth Frampton in: Beim, 1999, p.51)

To sum up, it can be assumed that tectonic may be characterized as both "systems of thought" or "process of signification", and in that way related to a general or particular knowledge, for instance craftsmanship.

Tectonic conclusion

As it can be reached from the theoretical research, there are different theories about what can be considered as tectonic. Some ideas connect to each other, it can be also noticed that theorists used to develop the existing knowledge and definitions. Beside the lack of consensus about the meaning of tectonic, authors still tend to address some of the same aspects. The structure, building elements and the method of joining them are always mentioned. It can be summarized that honesty in structure and construction, founded in a rational constructions and good craftsmanship are tectonically approved. Whereas more specific elements differs from theorist to theorist.

There is a possibility to find an elements that are common for all the analyzed theorist (as seen on graph no III).

Several assumptions of the theories were chosen to be further developed in the new design. It was assumed that tectonic approach praises simplicity and honesty of the structure. Additionally, it favors all styles and does no follow the fashion or trends.

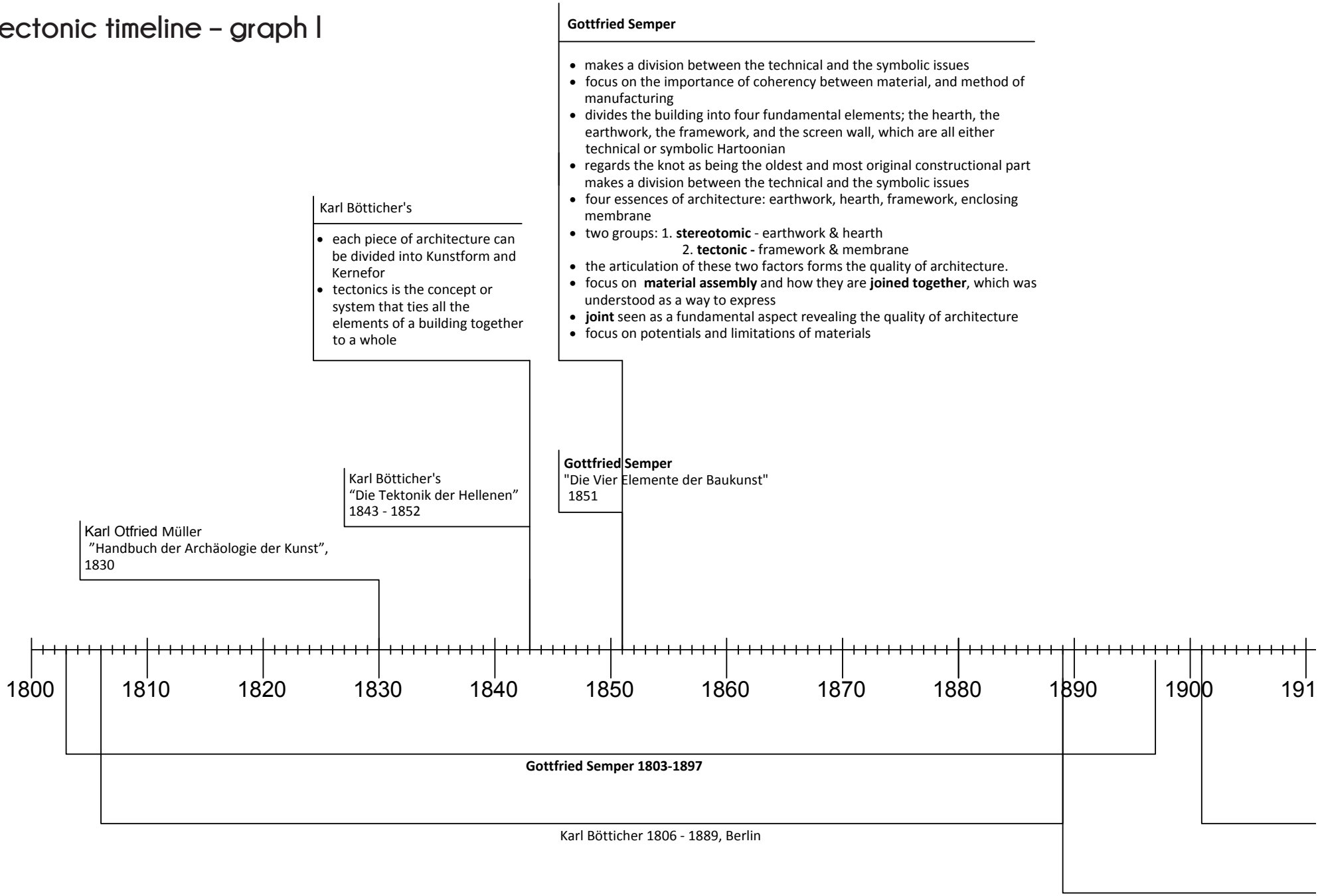
According to the theorists, a building itself is firstly a construction. Additionally, tectonic gives a possibility to express something through the way the piece is built, therefore, the technical aim of the project is to seek for the construction that simultaniously can strenghten the vision as well as is efficient from the technical point of view.

Clear structure and its poetic manifestation is also desirable. Mindfully choosing of the materials and the way of joining them is of the high importance. Furthermore, one of the key points is focusing on the quality of the relations between elements.

Since, acording to Sekler - each element should be used for the purpose it exists and usage of elements just for aesthetic purpose he called atectonic, the focus should be placed on finding the essence parts of the building and interior design.

In order to create architecture, an architect need to know how to construct and join, which means to have a particular knowledge about material properties, forces, detailing and structure, therefore during the design process stress should be placed not only on the aesthetic but also on technological and constructional problems. Tectonic ties artistic and constructive knowledge, therefore, to achieve that effect as a method Integrated Design Process will be used to combine the technical requirements with the vision.

Tectonic timeline – graph I



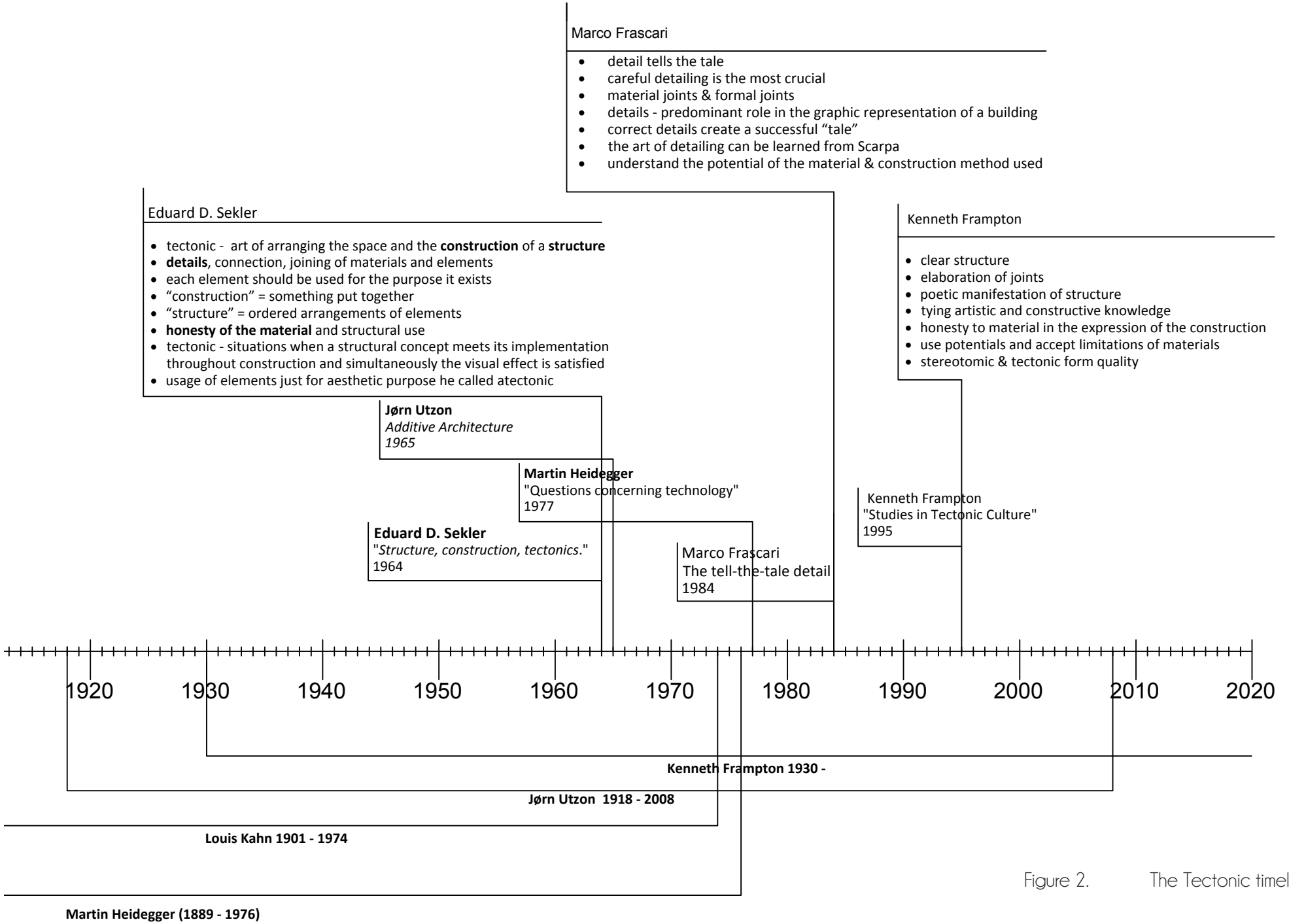


Figure 2. The Tectonic timeline

Nowadays, minimalism is defined as an aesthetic approach to navigating through several fields, for instance: art, architecture, interior design, painting or music. In architecture, it is characterized as the main focus put on the essential elements. It can be understood as a contemporary need for purity, clarity and order, which roots came from history, since this tradition belongs to different cultures. A special place here has a Japanese culture. Furthermore, Tadao Ando's architecture transmits both – his own interpretation of connecting with the nature as well as the traditional Japanese spirituality. Moreover, Bauhaus and De Stijl must be taken into consideration. Additionally, it has its roots in traditional, vernacular architecture. (Vasilski, n.d.)

Minimalist forms are designed to have a connection with the surroundings. The identity is defined by linear structures, functionalism and pure, geometric forms. (Bertoni, 2002)

Chapter II

The way to create a mapping of a Minimalist discourses
Roots. Artistic movement. Philosophy.

Minimalism – general definition

From the British Dictionary "minimalism" is:

1. another name for minimal art
2. a type of music based on simple elements and avoiding elaboration or embellishment
3.design or style in which the simplest and fewest elements are used to create the maximum effect (Dictionary.com, 2015)

Formally, minimalism is 1960s and 1970s invention. However, De Stijl, Bauhaus and traditional Japanese design could be considered predecessors of minimalism. It used to continue the trend of rejecting lavish and decorative styles from the past. According to Laufier it is the same in architecture as in all other arts: its principles can be found on simple nature, and nature's process clearly indicates its rules. (Laugier, 1977)

This new movement used to question conventional boundaries between different media and favor the cool instead of "dramatic". Therefore the sculptures were usually made of industrial materials. Furthermore, one of the main focus was to emphasize anonymity rather than expressive excess of Expressionism. The attention were put on the materiality of the pieces of art instead of being focused on emotional content and symbolism. Minimalism become very famous in in America and Europe by the end of the 1970s through several medias: art dealers, museum curators, private and government patronage. (The Art Story, 2015)

Zen philosophy

Traditional Japanese design with its clean forms and simplicity is considered as one of the predecessor of minimalism. In that culture simplicity has long been prized, therefore, only elements that are essential to the functionality are included in its design. It can be noticed in old Japanese architecture and interior design, where clean lines and forms, simple color and design choices were favored. (Metmuseum.org, 2015)

Strong connection between Japanese culture and Japanese design can be noticed. Not only design but also normal activities were influenced, for instance focus on simplicity can be seen on how the food is prepared, presented and ate, the same with the tea ceremonies. It is interesting to notice that the kimono – the traditional Japanese clothing exude simplicity. It is designed without decorations and flourishes. Each element is designed with focus on essential functionality – comfort, natural cooling, an ease on putting off and on, freedom of movement and durability. (Metmuseum.org, 2015)

It can be said that the history of Zen began in the sixth century. On that time the Indian born Bodhidharma brought a new sect to the China. The Zen came to Japan, after going through a long process in China, in the thirteenth century. It was invited by Japanese monks who had studied it in China.

Zen philosophy has significantly influenced all parts of Japanese life. It was connected not only with the social institutions, arts and government, but also with landscaping and architecture. Its emphasis on simplicity, purity and the importance of the natural world created a significant aesthetic, expressed by the words sabi and wabi. Those terms are used to explain a sense of melancholy, naturalness, loneliness and rusticity. (Metmuseum.org, 2015)

Zen is the name of a Mahayana Buddhist school of meditation, which was located in China. One of its main characteristic is the practice of meditation in the lotus position and the use of koan (statement or question used in practice to create the "great doubt" and in the same time to check a student's progress in Zen practice). Nowadays the word Zen spread into two meanings, first, is used to explain spiritual transcendence outside all distinction, the latter one, suits for preparing the entrance to an unspecified substance from outside that is the world, which is only an illusion. Additionally the Zen philosophy entered the art, painting, architecture and garden planning. It is crucial to highlight that Zen it is not a religion. It is a human idea of self-education by Spartan means.

Zen architecture

Zen Buddhists created a significant aesthetic based on the philosophical principles of the religion. It influenced all aspects of Japanese design and art, therefore writing, architecture, interior design and painting were often minimalist without unnecessary ornamentation. (People - Opposing Views, 2015)

This philosophy inspires architecture and design, therefore form, light, space, line and materials are essential elements, where simplicity and natural essence are the most favored. Significant focus is placed on reducing nonessential internal walls, in order to allow the natural flow between the rooms, as well as between the interior and exterior, additionally the space is being open up. The point here is to reduce all parts down to their essential, core quality. (Interior Design Ideas, 2015)

Traditional Japanese buildings are being compared to an outsized umbrella, which is erected over the landscape. Therefore it does not dominate the surroundings but creates a shaded space for people and living amid nature. There is a noticeable contrast between the outside – which remind a tropical hut, when in the same time the interior is highly geometrical. It is a good representation of the culmination of a long process of handling and defining inner space, using natural materials, and integrating setting and architecture. Traditional Japanese dwelling is one of the good examples where the designer focuses not only on the utilitarian aspect, but also on the inhabitant's physical comfort. (Hoover, 1977)

The classic house changed several times over the years. Close to the final version of their architecture was the sukiya house. It reflected numerous of architectural and aesthetic ideas embodied in Zen-inspired house, additionally it gave the possibility for experiments with design and materials. It is important to notice that the traditional Japanese house is not held up by walls, but by columns instead. The outer walls, which do not serve for the structural purpose, are are sliding latticework panels called shoji. They are covered with the with translucent white rice paper in order to give the interior rooms a soft daytime light.

The main purpose of using the shoji is to unite the interior and exterior rather than dividing it. Additionally, it is possible to slightly open it during the summer time, to provide the fresh air and the direct connection with the outdoors. Similar walls can be also placed between the columns, inside of the house. Their white color and silken texture creates a magnificent contrast with the with the exposed natural structure of the columns.

In order to provide some privacy, interior rooms are separated by modules made of wooden frames covered in heavy opaque paper.

The tokonoma is the aesthetic focus of the room, it is set into one of the walls. It has a small shoji-covered window on one side – to illuminate a hanging scroll, additionally there is always a simple flower or incense burner on its floor. Near to the tokonoma there is a shelved storage hidden behind the sliding panels. They may be used for storing bedding or kimonos.

Additional significant part of the design is the roofless garden of the inner courtyard. It is the result of the private imagination of the owner, whereas most of the time the flowers are absent, instead there are tiny shaped pines and a small pond with the rocky pathways. (Hoover, 1977)

Undoubtedly, all the aspects of the traditional Japanese building are inspired by Zen philosophy. The most significant are the clean lines, which create the boundaries of the inner space. They separate different floor areas, brought out by the dark bindings of the tatami, and are the visual aspect of the construction made of horizontal beams and columns. Curved lines were completely excluded, as a result the building gets a geometrical overview which is pure and elegant.

The idea of free space is further developed by the elimination of the elements that are just for ornamentation. Additionally, all essential furnishings are placed in the middle of the room, rather than around it.

It is also crucial to notice that the natural structure and color of the materials is exposed. Finally, the indirect lighting provided by the shoji mellows the visual properties of the materials – harsh colors are being softened to pastels, highlighting the internal feeling of the naturalness.

Figure 3. The traditional Japanese building

Internal and external removable partitions create a sense of flexible and independent space. This concept is derived from one of the most significant philosophical presumption that freedom is mostly appreciated when it works within a rigorous framework of discipline.

Another characteristic of Zen concept is shibui, which is hard to exactly define. One can say that it can be described as "knowing when to stop". (Hoover, 1977) In a wider understanding it means several things, among others, the absence of what is not essential, the absence of the ornate and explicit and replacing it with what is sober and suggestive. Additionally, the concept focuses on the significant elegance, which can be achieved when the purest of natural materials are mindfully integrated. It is also crucial to notice, that one of the characteristic of the design is the impression that what is done seem effortless.

Ralph Adams, traveler, well described the Japanese housing:

"There is something about the great spacious apartments, airy and full of mellow light, that is curiously satisfying, and one feels the absence of furniture only with a sense of relief. Free from the rivalry of crowded furnishings, men and women take on a quite singular quality of dignity and importance." (Ralph Adams in: Hoover, 1977, p. 104)

This "singular quality of dignity and importance" can be assumed as one of the main characteristic of the Zen interior design. When the decorative distractions are removed, one has to focus on his own mind. When receiving visitors in this kind of characteristic space, hos as well as the guests focus on each other, each gesture and word is perceived with a higher significance.

Heinrich Engel explained this phenomena as:

"[The individual interior room] provides an environment that requires man's presence and participation to fill the void. Room in the Western residence is human without man's presence, for man's memory lingers in the multiple devices of decoration, furniture, and utility. Room in the Japanese residence becomes human only through man's presence. Without him, there is no human trace. Thus, the empty room provides the very space where man's spirit can move freely and where his thoughts can reach the very limits of their potential." (Heinrich Engel in: Hoover, 1977, p. 104)

This restrictive discipline of Zen ideology can be noticed in many of the architecture and interior design in the West. For instance, Frank Lloyd Wright were inspired by the Japanese integration of the environment and the house, additionally, one of the main ideas of the Bauhaus was the lack of ornamentation. Furthermore, the Japanese principle of modular architecture is now being developed in the West. Interest has grown recently in the possibility to create spaces for the multiple uses, combining all living functions from sleeping to eating in a single room is widespread. It is also interesting to notice, that finally the selection of the materials started to be chosen in order to provide the visual warmth, and that there is an interest in integrating the living areas with the gardens. Additionally, the reduction of decorations and focusing of open space, clean lines and the sensibility for light can be noticed. (Hoover, 1977)

Conclusion.

To summarize the research it can be stated that Zen architecture favors simplicity, therefore it reduces all elements down to their essential quality. Conscious design decisions must be taken in order to reduce all unnecessary elements and achieve a pure and elegance space, which means that everything that was not crucial to the functionality is not included in its design. It is also significant to notice, that absence of unnecessary internal walls gives a possibility to create a wider open spaces. It I further highlighted by placing all necessary furnishings in the center of the room.

One of the main characteristics of traditional Japanese architecture is using geometrical delineation, clean forms, and simple, natural colors. The play with natural light has a significant role in the whole design, as well as usage of natural materials. Zen buildings are known for having significant relationship with the site and embracing the nature. Characteristic building manner is also worth noticing: Whole construction is based on columns and beams, the walls do not carry the loads, they are used just to create the shelter from the site as well as to divide the inner space.

This restrictive discipline of Zen ideology can be noticed in many of the architecture and interior design in the West. For instance, Frank Lloyd Wright were inspired by the Japanese integration of the environment and the house, additionally, one of the main ideas of the Bauhaus was the lack of ornamentation. Furthermore, the Japanese principle of modular architecture is now being developed in the West. Interest has grown recently in the possibility to create spaces for the multiple uses, combining all living functions from sleeping to eating in a single room is widespread. It is also interesting to notice, that finally the selection of the materials started to be chosen in order to provide the visual warmth, and that there is an interest in integrating the living areas with the gardens. Additionally, the reduction of decorations and focusing of open space, clean lines and the sensibility for light can be noticed.

Figure 4. The tokonoma is the aesthetic focus of the room

Bauhaus

In order to get a better understanding of the Buhaus movement, it is crucial to get the knowledge about the time before it. During the history every object used in the normal life – tables, chairs, fabrics, pots – was handmade, one-by-one by a qualified person. Most of the time it was beautiful and functional, since it was prepared and considered individually. About 1850 as a result of the industrial revolution, the things changed. The main focus became not the quality, but the speed production. As a result, all products were cheap, therefore in order to keep costs down, they used to be of poor quality, unattractive and easily-broken. First movement against the poor design was the Arts & Crafts (1860-1910). The idea was to emphasize the time consuming decoration which the factory-made products could not reproduce. A typical Victorian-era interior design were clumsy and full of the different textures, patterns and colors.

The Bauhaus was a response to this approach. The main idea here was to create cheap but beautiful and functional products. In order to lower the costs of production, simple forms were favored. (SitePoint, 2014)

The school - Das Staatliche Bauhaus was founded by Walter Gropius and operated in Germany from 1919 to 1933. During that time it changed the location two times, originally it was settled in Weimar, then moved to Dessau, finally placed in Berlin. The academy was obliged to close by a Nazi regime. The mission of the school was to provide a new, plain, clear utilitarian and affordable design, that can be used by a regular person. (SitePoint, 2014)

Its mission was to provide a new, affordable, plain and utilitarian design that could be used by every kind of person and in every area. Thus, the school had such a huge influence on the history of design and style that easily discerned to this day. Therefore, the school has a significant influence on the history of design, and was one of the influences for the minimalist movement. (SitePoint, 2014)

The most significant rules of the Bauhaus school was "Form follows function" which was a quote of Louis Sullivan, that highlighted the futility in excessive ornamentations. Furthermore, Mies van der Rohe, the Bauhaus's final director pledged the school to "honesty of construction, death to decoration". As a result it was stated that form had to reflect the function of the product, therefore the Bauhaus designer realized geometrical and linear works, avoiding decorations. Clean and geometric forms were used to produce new common tools that could highlight the difference from the old trends of the Art Nouveau. (SitePoint, 2014)

Figure 5. The Bauhaus Dessau.

De Stijl

De Stijl in English means: The Styl. It was an artistic movement founded in 1917 in Netherland. . It lasted till the early 1930s. It included sculptors, architects, painters and designers. The Most recognizable was the painter Theo van Doesburg and the architect Gerrit Reitveld. (SitePoint, 2014)

The movement is well known as favoring abstraction and the ultimate simplicity and expressing an Utopian idea of harmony and order. Those factors were achieved through a reduction of elements to their primary colors and pure, geometric forms. (Flask, 2015)

This movement focused on simplicity and reducing the unnecessary elements and using only: rectangular forms, vertical and horizontal lines, primary values – grey, black and white, primary colors – yellow, blue and red. Additionally, frequently the elements and layers do not intersects, therefore it is possible to create the independency and flexibility. (Mokhov, 2011)

De Stijl is regarded as being one of the influences to the minimalist design. (Mokhov, 2011)

Figure 6. Gerrit Thomas Rietveld, Rietveld Schröder House

Constructivism

Constructivism was the artistic movement, the most influential in 20th century in Russia. It was developed after the Bolsheviks came to power. From one hand, it took the ideas from Cubism and futurism, from the other hand it was an entirely new approach to design objects – the traditional composition was replaced with construction. The main idea of the constructivism was to analyze the possibilities of the new materials in order to formulate the new ideas about the mass production, that would be very useful for the Communist society. Constructivism is characterized as a movement that tried to found the connection between factory and art. Objects were designed not to express the beauty, but to manifest analysis of the forms and materiality that leads to create a high functionality. "Truth to the materiality" can be noticed here, since many Constructivists assumed that material should be used only in the accordance with its own capacities. High focus on materials can be seen in the idea that the form of the design is dictated by the used materials, and their possibilities and limitations. The core of the Constructivism was expressing the ideas of the modern life – dynamism, wide possibilities, time and space. Additionally, following the Russian Revolution, the desire was to develop a new art, which is affordable for people and suitable to new democracy. The movement was straightly connected with a new society, where the culture of workers and making usage of the new technologies and solutions were prized. Constructivism was widely spread in Europe. In Russia it was declined by the mid-1920s, whereas, it continued to be an idea for German artists till 1950s. (The Art Story, 2015)

Minimalism – the term.

The term "Minimalism" was not used from the very beginning of the movement. Several names were created to characterize it, for instance: "Reductive Art", "A.B.C. art", "systemic painting", "Art of the Real" or "literalism". Finally the term "Minimalism" became permanent, since it described the way the artists reduced art to the minimum number of shapes, colors, textures and lines in the most clear way. (The Art Story, 2015)

Minimalism as a term was formulated, above all, as a way of describing in laudatory terms or in a strongly critical manner the works by protagonists of the American art scene in in the late Fifties and Sixties. The artists like Richard Serra, Robert Morris, Donald Judd and Dan Flavin can be mentioned here. They are well known for using reducing on expressive media, especially in comparison with Pop Art. Furthermore, the same term was used to describe this phenomenon in different fields, for instance literature, architecture, design, graphic, cinema, photography and even fashion. In architecture the term was fully recognized and labeled in the mid-Eighties. Those examples outline the phenomenon as a progress rather than a movement defined by precise dates or manifestos. (Bertoni, 2002)

Artist John Graham in 1937 states that:

"Minimalism is the reducing of painting to the minimum ingredients for the sake of discovering the ultimate, logical destination of painting in the process of abstracting." (John Graham in: Bertoni, 2002, p. 8)

Which was assumed as a first time of using the word minimalism as an artistic term.

Carl Andre in 1959 wrote: "Art excludes what is not necessary"; afterward, in 1971 he added "This is the only meaning that 'minimalism' has to me." (Carl Andre in: Bertoni, 2002, p. 8)

Raymond Carver confess that:

"It's difficult to be simple. Every story I write goes through up the fifteen drafts.". (Raymond Carver in: Bertoni, 2002, p. 8)

According to Carver it is a long process to pare down and as a consequence, reach not only the bones, but the very narrow of the story.

In architecture, term Minimalism pursues the essential quality as a prime objective. By repressing everything around that is not authentic, the architecture of simplicity, or in other words minimalist architecture, tries to draw us back to a different way of feeling and living. The one that is calmer and more worthy. Minimalist architecture is often characterized by a formal vacuum and expressive silence. (Bertoni, 2002) Minimalist artist were interested in Russian Constructivism. This kind of approach favors using modular fabrication and industrial materials more than traditional craftsmanship.

It can be stated that the social and historical basis for the claims presented by minimalist art and architecture is the dissatisfaction generated by contemporary consumer society, which sees the possession of material goods and their exaltation, totally unrelated to the needs. Furthermore, Minimalism became finding its goals in going further than pure, simple motive of denunciation. Instead it move towards concrete attempts, to introduce a life which is more imbued with spirituality, clarity and harmony. (Bertoni, 2002)

Author states that one of the links that join various manifestation together under a minimalistic label is the general need of creating a mental, spatial and almost a temporal void

Late Modernism

Early influences were further developed and gave the possibility to reassess the the Surrealist-influenced world of Abstract Expressionism. The artist who decided to follow the minimalist's ideas were focused on creating an art that was more substantial and less personal, with a strong believe that the piece of art should not refer to anything more than itself. Therefore, by the early 1960s several artists decided to quit painting and replaced it with creations that seemed neither sculpture nor painting, understood in the conventional sense.

For instance the Black Paintings created by Frank Stella in 1958-60 are characterized as highly influential. Those pieces of art were significantly different from the classical paintings, made of concentrically striped canvases, stretched on a wooden chassis, that dig them out from the wall. As a result the painting can be seen as a purely abstract, additionally they paintings extended the idea of painting beyond simple, framed rectangles, that were made just to hang on the wall. Those pieces of art simultaneously got the characteristic of sculpture and architecture, which was a strong contradiction to all previous examples of painting. Stella's paintings was echoed in the work of several artist who were creating paintings based on geometric ideas, for instance Josef Albert, Kenneth Noland or Robert Mangold. (The Art Story, 2015)

The "real" Minimalism

There were several theorist in the next generation who became significant specialist for the movement of Minimalism, who helped to create the critical and aesthetics reception of it.

- Donald Judd – wrote "Specific Objects" which was published in 1965, and were the start point to define the aesthetics of Minimalism. It is significant that he denied to use the form "Minimalism" as a way to characterize the art. Instead he decided to use the term "specific objects" which were desired to describe the phenomenon of rejecting traditional division between art forms and blending the sculpture with painting.
- Robert Morris – wrote the three-part "Notes on Sculptures", published in 1966, where he described the use of simple forms as the pieces of art that can be understood individually by the viewer.
- Sol LeWitt – wrote "Paragraphs on Conceptual Art", published in 1967, which was considered several times as a movement's manifesto. He wrote there that: "What the work of art looks like isn't too important. It has to look like something if it has physical form. No matter what form it may finally have it must begin with an idea. It is the process of conception and realization with which the artist is concerned." (Sol LeWitt in: The Art Story, 2015) LeWitt until his death in 2007, worked as a painter, sculptor and photographer, additionally, he was recognized as the leader of the Minimalist artists after Judd and Flavin's death.

In consequence of publishing all those theoretical publications, the Minimalism found its setting to expand.

Minimalism in different fields

Nowadays in the evolved contemporary world, which is significantly more on the vacuum of meaning and verge of dis articulation far reaching effect might be reached by a reconsideration of the idea of simplicity by using courageous reduction. (Bertoni, 2002)

Minimalism and its simplicity has shown the ability to attract numerous of trends, influences and artistic movements by rebuilding successfully the whole into a concise form with significant clarity and flawless simplicity. (Bertoni, 2002)

Minimalist Architecture and Interior design

Minimalism found its followers also in architecture and interior design.

"The most profound claim of minimalist architecture is its propensity to listen, not to the entire universe, but to a small portion. Through its relationship with the whole, it represents that portion [. . .] in its entirely. Minimalism reveals the invisible [. . .], everything that lies at a depth which words cannot reach. Listening architectures are architectures of places and they draw strength from the invisible web that is already present in reality but is waiting to be revealed to the light." (Bertoni, 2002, p. 21)

Minimalistic architecture changes the meaning of the words light, sun, nature, sky, earth ground from its typical business and town-planning understanding to being simultaneously sky and the sky, light and the light, etc. one of the main factors that define that architecture are searching for essence and attention to detail. The connotation to Aristotle can be seen since the understanding of the essence is that "explains why something is what it is" (Bertoni, 2002, p. 21), and which is contained in things, materials, and the profound quality of the favored natural materials and in the most elemental functions for instance, sleeping, cleaning, which become conscious rituals. A significant attention to detail, which can be understood as the place, the material, the client, the joint is strongly attempted by a minimal architecture that knows "how to listen figures" (Bertoni, 2002, p. 21) with a pyre and fresh eye in order to understand how many universal qualities are enclosed in the most simple and most commonplace objects. those examples should not be understood literally, since minimalism has serious sensitivity in search an equilibrium between matter and spirituality , between the everyday and absolute and between physical qualities and abstraction. (Bertoni, 2002)

According to the author the most visible aspects of minimalist architecture are "The use of primary structures, immunity from all organics contamination, ergonomic indifference, elimination of the superfluous and the search for "timeless" forms allow a perspective and relation complexity, over and beyond the easy criticism aimed to many minimalist designs and architecture and a plurality of functions that exceed the limits of a design for a 'single-dimension-man'" (Bertoni, 2002, p. 22)

One of the principal characteristic of minimal architecture is the elimination of contemporary noise and the search for the essential of nature of things. Additionally, it can be characterized by extreme and difficult simplicity, achieved in the process of reducing the settings to the essentials. John Pawson stated that "The idea of simplicity is a recurring ideal shared by many cultures – all of them looking for a way of life free from the dead weight of an excess of possessions. From Japanese concepts of Zen, to Thoreau's quest for simplicity, minimal living has always offered a sense of liberation, a chance to be in touch with the essence of existence, rather than distracted by the trivial. Clearly simplicity has dimensions to it that go beyond the purely aesthetic: it can be seen as the reflection of some innate, inner quality, or the pursuit of philosophical or literally insight into the nature of harmony, reason and truth. Simplicity has a moral dimension, implying selflessness and unworldliness." (John Pawson in: Bertoni, 2002, p. 26)

Nowadays, architect characterized as minimalist still use the arts of expressive clarity and reduction, as well as elementary and formal simplicity. Among all several significant authors and buildings can be mentioned, for instance: the Greek temple, the Alhambra in Granada, Louis Khan, Adlof Loos, Donald Judd, Hans van der Laan, Hans Wegner, Tadao Ando, Peter Zumthor.

Minimalist Paintings

The most famous Minimalist painters were Ellsworth Kelly, Robert Ryman, Agnes Martin and Frank Stella. They used to create a simple canvases that were considered minimal because of their bare bones, mostly geometric compositions. Furthermore, it can be said that those artists were well known for using only solid color, line, sometimes geometric forms and shaped canvases. They were able to combine painting materials and question dichotomy between artistic media by creating paintings that could be considered as object on their own, because of the enormous canvas support and the futuristic shapes of the paintings. (The Art Story, 2015)

Minimalist sculpture

Several minimalist were focused on making three-dimensional objects, since it was considered as a most experimental and radical facet of the movement. Strong emphasis could be seen on eliminating signs of the authorship from the piece of art, by using geometric, simple forms together with industrial materials which as a result ted to works that reminds simple objects more than traditional sculpture. Additionally, the innovative way of displaying them in the galleries were also remarkable: instead of using pedestals they were usually placed on the floor.

The more significant here was the viewer's interaction with the object. Therefore, the main meaning of the piece of art was not seen as inherent to the object itself. (The Art Story, 2015)

Minimalist Light Installations

Additional factor that distinguished the Minimalist move from traditional art forms were the usage of light tubes. One of the most significant examples can be Dan Flavin who used color and light made by commercially available tubes to divide space into color zones.

The significant difference between the light installations and the traditional art is that normally the viewer's attention is turned to the piece of art, whereas here people are focused on the light emitted, but not on the tubes themselves. (The Art Story, 2015)

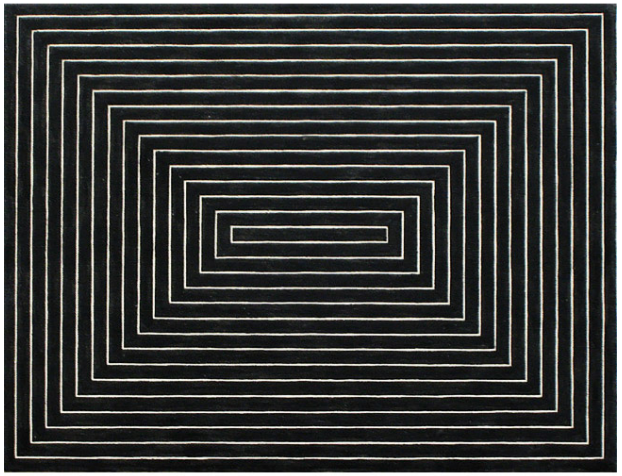


Figure 7. Frank Stella from series called Black Paintings

Figure 8. Robert Morris, Untitled 1965/71

Figure 9. Bruce Nauman, South American Triangle

Relationship between art and architecture

Several critics and historical singled out the relationship between impressionism and modern architecture. Leonardo Benevolo states that:

"Since each shape was reduced to the chromatic element which made up immediate perception, all interest in the content disappeared, all sentimental associations which might disturb the immediacy of the depiction were renounced, also so was all involvement which went beyond pure contemplation." (Leonardo Benevolo in: Bertoni, 2002, p. 42)

The representation of abstraction was one of the crucial moment in the development of modern art and architecture. It was connected with the action of abandoning well know building typologies and reducing the number of elements to stark geometric divisions as well as making symbolic use of a pure white color, which is far from functional. Modern Movement, including Bauhaus, was in close contact with some of the leading figures of the abstract movement. According to the Bertoni in minimalist architecture significant emphasis is placed on the level of abstraction to which individual functions are reduced. It can be noticed that the privileged use of right angles and lines produced furniture that were to geometric to be used or the baths shaped like parallelepipeds. The need for abstraction in the minimalist space can find a contemporary reason in the call to free ourselves from aesthetic and consumerist superfluity.

The programmatic manifestos for minimal simplicity do not exist. Only a few written works drafted by a handful of architect for precise occasions can be mentioned, here the works of Alberto Campo Baeza, Tadao Ando, John Pawson or Claudio Silvestrin can be mensioned. Baeza wrote that:

"The Architecture, born of an IDEA, shaped by ESSENTIAL spaces and tensed by LIGHT, allows people to find in it the BEAUTY that only Architecture is capable of offering them. That BEAUTY which is always the final stop on this long journey towards LIBERTY, which is CREATION." (Alberto Campo Baeza in: Bertoni, 2002, p. 57)

Nowadays, the contribution made by Massimo Vignelli seems definitive in the attempt to achieve an overall definition of the minimalist phenomenon in architecture:

„Minimalism is not a style, it is an attitude, a way of being. It's a fundamental reaction against noise, visual noise, disorder, vulgarity. Minimalism is the pursuit of the essence of things, not the appearance. It is the persistent search for purity, the search for serenity, for silence as a presence, for the thickness of spaces, for space as immensity. Minimalism is beyond time – ¬it is timelessness, it is noble and simple materials, it is the stillness of perfection. It has to be the being itself, uncovered by useless crusts, not naked but completely defined by itself, by its being." (Massimo Vignelli in: Bertoni, 2002, p. 57)

Vignelli states about a difficult way of being at this chaotic word and using it as a point of departure for a new step, where words like calm, harmony, silence, spirituality and clarity seem to have scarce value. According to Bertoni, minimalism is a way of being in peace with the history, satisfied with the very few simple things that everyday life can offer, but which simultaneously encapsulate the sense of miracle and the mystery of absolute. This architecture simplifies residential and living spaces and presents them in their pure essence. The most significant factors are: changing light, space, nature, spatial of the changing sea, the immensity of the sky, the warmth of the ground. Architecture of simplicity is well known for its attempt to bring about pacification with the world and with ourselves, which is supposed to be achieved throughout its ideas of simple life, simultaneously aware of its narrowness and its immensity.

„A way of being.
A way of being that today more than ever before feels the urgency and the need to break from the endless, stupefying spiral motion that envelops us. A way of being that first and foremost, calls for a halt, a pause which is necessary to re-evaluate the situation and what needs to be done; a pause which, in many different ways, has already been needed over the course of history, but which now seems more compulsory than ever. [. . .]

The need to find, at last, a place in the world where to live and enjoy the extraordinary luxury, the invaluable calm and the extreme pleasure of mysterious and miraculous simple object with the melancholic awareness of only being able to answer the great questions that our worldly condition has posed and always will pose, with an extremely natural 'Upon my honor and conscience, I don't know'." (Bertoni, 2002, p. 58)

Well known minimalist architects

Mies van der Rohe (1886 - 1969)

Ludwig Mies van der Rohe, used the immaterial and transparent characteristics of glass and steel, is considered as an important initiator of modern minimalist architecture. (Shih, Huang and Kuo, 2011)

One can understand that among the early minimalist architects, Louis I. Kahn and Ludwig Mies van der Rohe represent two different architectural fields. Whereas they both link to simplicity. Kahn uses material constructions composed of stone, brick, and concrete to present ontological tectonic features. Whereas, Mies employed immaterial constructions made of steel and glass to present ontological and representational tectonic features. (Shih, Huang and Kuo, 2011)

When developing the material and immaterial characteristic of structural elements, it can be seen that contemporary minimalist architects have transferred the tectonic form from the ontological to the representational aspect. Additionally, they extended the expression of form from space to skin with multiple layers, which exhibits the tectonic complexity of minimalist architecture hidden behind the simplicity of its form. (Shih, Huang and Kuo, 2011)

"Life is what matters" was the phrase that Mies van der Rohe used to conclude an essay in 1927. (Mies van der Rohe in: Bertoni, 2002, p.13) His "skin-and-bones" architecture is based on a synthesis of technique and spirituality, and it is intended to overcome the modern subjectivity and materialism and simultaneously to attain the new unity that recalled the unity of classic antiquity in form as well as medieval unity in spirit (Bertoni, 2002)

Mies van der Rohe tres to give an answer to the concerns of a world weighed down with loss o meaning, pointless materialistic burdens and a consequent loss. His answer is founded on a search for the essence: the essence of materials, of light, of the human condition and of place.

His Barcelona Pavilion from 1929 represents the constructed synthesis of three ideas: first and foremost a solid, a solid pedestal similar to the Greek temple, furthermore, the cruciform pillars encased in sheaths of metal sheet which allude to the gothic polystyle pillars and the grooves of a Doric column, simultaneously being indicators of the reference coordinates in the larger space. The intentional contrast was achieved by using strong wall panels of onyx and very antique panels juxtaposed with the lightness of the structure and the glass walls. It gave a significant opportunity to affirm the eternal value of time and natural purity of the materials. In the pavilion Mies gave tangible expression to the modern possibility of simplicity and naturalness. (Bertoni, 2002)

According to Mies van der Rohe "Architecture begins when two bricks are put carefully together" (Mies van der Rohe in: Beim, 1999, p.52) Which can be understood as construction practice and building technology become a matter of signification and in the same time tectonic, only when these issues are taken intentionally and consciously.

Figure 10. Mies van der Rohe, Pavilion Barcelona

Tadao Ando(1941 – now)

Tadao Ando, Japanese architect, is well known as being a translator of the Zen concept through the use of geometry, nature and materials in order to achieve a significant relationship between the site, the building and the nature. His essential furnishings keep the designed spaces from feeling cluttered or cramped, in the same time letting the beauty of the natural materials to reflect. (Interior Design Ideas, 2015)

Tadao Ando was born in Osaka, Japan in 1941. Hi is a self-taught architect that traveled extensively in Europe, Africa and United States which was a source of inspiration. He started to work professionally in 1969. In 1972 he made a first of a long series of single family residences. In 1976 he designed the Azuma House which gave him the attention of international criticism. Ando was awarded the Pritzker Prize in 1995, and the Royal Gold Medal by the RIBA in 1997. (Bertoni, 2002)

Ando spent several years in the West, and from there he drew inspiration and elemental constructive and philosophical knowledge. Furthermore, he combined ancient and modern Western request for simplicity with a redefined and innovative interpretation of the values of ancient Japanese architecture.

It can be assumed that Tadao Ando is a contemporary minimalist architect. His work manifests the material tectonic form of architectural reinforced concrete. The architect does not focus on presenting the structural mechanics of different materials, his works mad of reinforced concrete at first glance appear as massive stone-like images.

He undertakes a silent battle against superfluity and aesthetic noise.

Bertoni states that Ando's houses offer the extreme luxury of not following a standardized way of life and choosing to accept a self-imposed discipline.

Significant interpretation of Ando's architecture was provided by Francesco Dal Co:

"The architectural poetic of Ando "the minimalist" is supposed to be able to resolve the conflict between earth and world, no less... Obviously, these critics find it impossible to say anything at all about the complex and contradictory meanings which make up the very nerve-system of Ando's so-called minimalist architectural language: the intertwined truths and sleights of hand, the conciseness and the echoing allusiveness, the occasional gravity and the frequent severity, the fastidiousness and (at times) the imprecision... In the middle of all this Ando, just occasionally... hits on something that reaches the very highest level of serious and tragic discourse, crossing the line beyond which there is nothing but life itself, in all this emptiness." (Francesco Dal Co in: Bertoni, 2002, p. 96)

Ando's structural and apatial kind of nudism, which is mainly grey, as a result of the exclusive use of concrete, may be read as disenchanted reflection of mankind's "miserable condition, whereas it cannot escape commitment to an architecture which "contain living spaces conducive to the physical and psychological development of the individual human being... create buildings that reveal indications of human life". (Francesco Dal Co in: Bertoni, 2002, p. 96)

Tadao Ando – Azuma House, Osaka, 1975

In Azuma house he introduces compositional elements, spatial solutions, materials, and attention to the detail which later became typical to all his projects.

Azuma house has no openings, solid walls made of reinforced concrete insulate and protect the whole architectural piece and makes it completely enclosed. There is no dialogue with the surroundings. Air and light come only from the inner court, where, similar to medieval cloisters, constantly changing sky can be seen. The house is peremptorily closed to the outside, and only looks into its central void where only natural elements can be seen.

The expert use of the material can be seen on the facade, where the reinforced concrete that reveals the marks of the form work fixings were placed. It can be noticed, that the light geometric pattern, a mixture of squares and dots, is not rigid, but traces slight curves and bends. Architect uses concrete as an abstract and contemporary material, but simultaneously recovering the process creates a blend of article and naturalness.

Ando states that he "try to use a modern material – concrete and, specifically, concrete walls – in simplified forms to realize a kind of space that is possible because I am Japanese. This rest on a simple aesthetic awareness cultivated in me as a Japanese person. It seems to me that, at present, concrete is the most suitable material for realizing spaces created by rays of sunlight. But the concrete I employ does not have plastic rigidly or weight. Instead, it must be homogenous and light and must create surfaces. when they agree with my aesthetic image, walls become abstract, are negated and approach the ultimate limit of space. Their actuality is lost, and only the space they enclose gives a sense of really existing. Under these conditions, volume and projected light alone float into prominence as hints of the spatial composition." (Tadao Ando in: Bertoni, 2002, p. 96)

Ando states himself that:
"This small house was the point of departure for my subsequent work. It is memorable building for me, one of which I am very fond.[. . .] My intention was to insert a concrete box and to create within a microcosm. A simple composition but with the deserved spaces, closed but dramatized by light – such was the image I sought to develop. [. . .] The house completely closes itself from the street. Light from the sky enters the opening and illuminates the entrance. The light which is reflected onto the street by the vertical and horizontal planes of the recess acts as the mediator in relating the inward-looking house to the street. (Tadao Ando in: Bertoni, 2002, p. 97)

The final simplicity is the result of calculated complexity, which also has an echo in Ando's later works.

Figure 11. Tadao Ando , Azuma House

Tadao Ando - Chapel on Mount Rokko, Kobe, 1985

This small church is located on a verdant slope near the summit of 1000-meter Mt. Rokko. The building consist of a chapel and bell tower, additionally there is a free standing garden wall and colonnade. The far end of the colonnade is open to a picturesque view of forest and distant ocean [connection with the view], its construction is enclosed in frosted glass walls, where the sunlight is softened. After passing the soft ambiance of the colonnade, people enter the chapel where, in contrast, light is rendered as sharply directional. Ando states that "The chapel's theme is progression through shadow and light – the contrast of light and darkness. [. . .] This monochromatic space, restricted in its materials to concrete, stone, steel, and glass, draws the exterior greenery inside to become an interior scenery, and underscores nature's depth." (Tadao Ando in: Bertoni, 2002, p. 104) The large window is divided by the post and beam that create an inverted cross. As a result, they create a distinct cruciform shadow on the floor. [sensitivity to the sunlight] (Bertoni, 2002)

Tadao Ando - The church of light, Ibaraki, 1987-88

The building is located in a quiet residential suburb of Osaka. The church consist of a regular volume sliced through at a fifteen-degree angle by a free standing wall, that separates the entrance from the inside of the chapel. The cross that is cut out of the altar wall allows the light to penetrate. A rough scaffolding planks were used as a material for the floor and pews, which are ultimately suited to the character of space and in the same time are low cost. Ando states that "I have always used natural materials for parts of building that come into contact with people's hands or feet, as I am convinced that materials having substance, such as wood or concrete, are invaluable for building, and that it is essentially through our senses that we become aware of architecture. [using natural materials] Openings have been limited in this space, for light shows its brilliance only against a backdrop of darkness. Nature's presence is also limited to the element of light and is rendered exceedingly abstract. In responding to such an abstraction, the architecture grows continually purer. The linear pattern formed on the floor by rays from the sun and a migrating cross of light expresses with purity man's relationship with nature." (Tadao Ando in: Bertoni, 2002, p. 106)

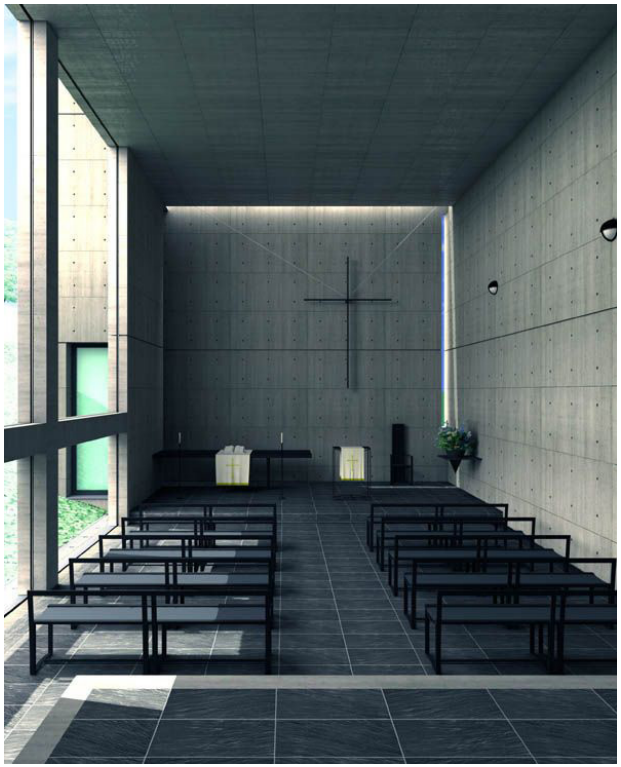


Figure 12. Tadao Ando, Chapel on Mount Rokko

Claudio Silvestrin (1954 – now)

Claudio Silvestrin was born in Zurich in 1954. He is an Italian architect and designer, and a British citizen. He studied in Milan under AG Fronzoni, then he continued his education at the Architectural Association in London. From 1986 to 1988 he worked in collaboration with John Pawson. His Neuendorf villa in Majorca received international acclaim. Afterwards, Giorgio Armani and Calvin Klein commissioned him to design their most prestigious show-rooms. (Bertoni, 2002)

Claudio states himself that " Claudio Silvestrin's integrity, clarity of mind, inventiveness and concern to details [connection to tectonic] are reflected in his rigorous minimal style; austere but not extreme, contemporary yet timeless, calming but not ascetic, strong but not intimidating, elegant but not ostentatious." (Claudio Silvestrin in: Bertoni, 2002, p. 112) The statement was extended by Massimo Vignelli who added that: "Thanks to a lyrical sense that reminds me of Montale, and a serenity that is reminiscent of Piero della Francesca and the strength of medieval architecture, the essence of Silverstrin's work is Mediterranean, noble and pleasant, intellectual and sensitive, solar and silent." (Massimo Vignelli in: Bertoni, 2002, p. 112)

One of the central theme of his work is searching for equilibrium, coupled with others including the void, abstraction, a sense of space and ground, the value of silence and light. [sensitivity to the sunlight] Silvestrin stated that he "always try to find a balance. A balance where, for example, there is no more friction between materials or between vertical and horizontal elements. A balance where there is no contrast. The final objective is always to find a balance between lightness and weight, between voids and solids. To find a balance that is abstract but not too much, natural but not organic, to find balance and harmony." (Claudio Silvestrin in: Bertoni, 2002, p. 112)

His harmony and balance go beyond purely formal aspects and involve broader themes. Pure, unconditioned perception is the only indicator for observing the world and the only expressive possibility that beat the confines of codified, and therefore coercive languages inadequate of seeing what is evident but obscured.

Silvestrin's significant aphorisms are "The resistance of materials freezes the fashions of time", "Timeless and unsigned", Time suspended in stillness". They clearly illustrate his idea for "a site configuration in which all forms of conflict cease, the eye is calmed, the cogito gives up doubting, the direction becomes clear." (Claudio Silvestrin in: Bertoni, 2002, p. 112)

Bertoni states that Silvestrin's understanding of classical principles is not only in formal terms, but mostly as a way of being, that is not conditioned by contingent circumstances and contemporary noise, the one that takes place in timeless surroundings in which an everyday activity finally achieve dignity and meaning. Therefore, his minimalism can be traced back to the try to create scenarios for human live where, having eliminated what is superfluous and noisy, and anything that hinders a complete perception, can be understood as classic serenity in the sense of the basic eternal value. (Bertoni, 2002)

Quoting Martin Heidegger: "Living is to be in peace in place, to remain in peace and to preserve peace by taking care of those things that disclose the sense of communication between the earth and sky, between divinity and mankind." (Martin Heidegger in: Bertoni, 2002, p. 112) Silvestrin highlights his separation from today's intellectualists debate on architecture, for him the true values are ageless. [not following the fashion] One of the main characteristic of his architecture is the silence enveloping it, time is unmoving and is only marked by the change of natural light. [sensitivity to the sunlight] Architect prefers solid walls (rather than the large walls characteristic for Modern Movement) that enclose an internal space and protects it from the vulgarity and noise of an external world. Mostly limited number of small, qualifying openings are provided. The light plays a significant role, is accurately measured as in the medieval ages: shade and light. [connection with the medieval ages] (Bertoni, 2002)

Claudio Silvestrin – Neuendorf House, Majorca, 1989

The structure was made of the local materials [connection with tectonic] the rendering is made from local earth-colored pigments mixed with lime, local "Santanyj" stone paves the floors inside and outside, benches, basins and forms solid immovable tables. To the house leads a 110 meters long, straight, stepped path. The 9-metre-high outer façade is a blank, plastered wall, interrupted by a vertical gap, which is the entrance leading into the courtyard. The patio is an empty square 12 x 12 m, which vividly frames the sky. A large square opening leads from the courtyard to the pool. Everywhere here architecture and nature are contrived to interact and enhance one another.

Figure 13. Claudio Silvestrin, Neuendorf House

Well known minimalist artists

Donald Judd (1928 - 1994)

Donald Judd was an American artist. His works belong to the Minimalist movement, therefore, his desire was to rid art of the Abstract Expressionists' dependence on the self-referential trace of the author, and instead to create the piece of art that were free from emotion. In order to get this effect, he designed works made of single or repeated geometric forms which were produced from machine-made, industrialized materials, without any artist's touch. His works used to be criticized for a seeming lack of content, whereas the main idea is to presence the process of beholding, and create an object of contemplation.

His idea was to create object that are able to stay on their own as being a part of an broadened field of image making that did not mention anything beyond their own physical presence. Therefore, his works are often called literalism.

What differs Judd's works from the traditional art is that they are not displayed on the pedestals, therefore the viewer has to confront them personally. He was well known of using industrial materials for instance plastic, iron, steel and Plexiglas in order to give his works an raw, factory and impersonal aesthetic to separate his pieces of art from the Abstract movement.

One of the Judd's main characteristic was that he used to present his pieces of art in a serialized manner. This idea was related not only to the consumer culture and the reality of postwar but also to the standardization of identical, multiple systems or forms. Additionally, this method could be seen as a part of significantly tendency toward the democratization of art, the idea was to change art into more accessible for common people, due to being made of fabricated parts. (The Art Story, 2015)

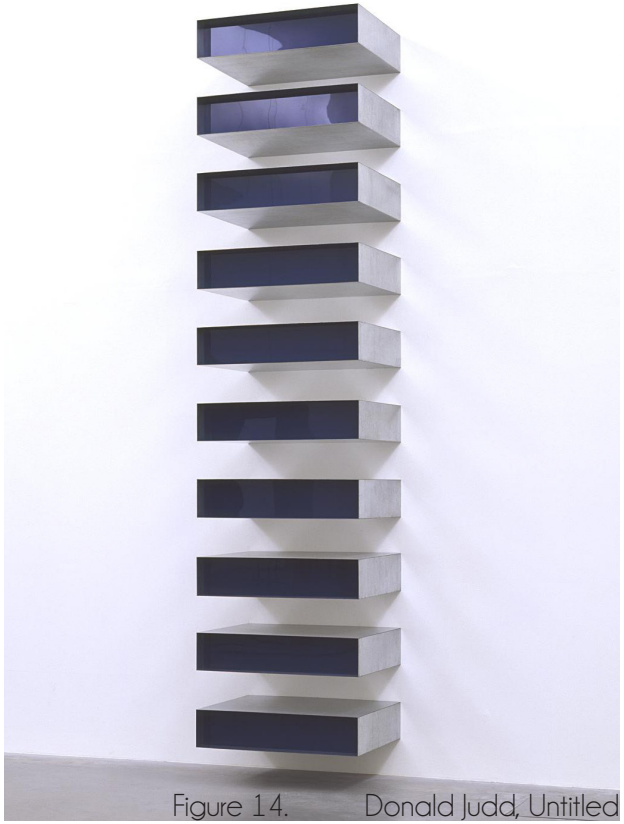


Figure 14. Donald Judd, Untitled

Frank Stella (1936 – till now)

"I like real art. It's difficult to define REAL but it is the best word for describing what I like to get out of art and what the best art has. It has the ability to convince you that it's present - that it's there. You could say it's authentic... but real is actually a better word, broad as it may be." (Frank Stella in: The Art Story, 2015)

Stella got his immediate famous because of the series of impersonal black striped paintings series, made of parallel black stripes produced by smoothly applied house paint. This way was used to highlight the flatness of the canvas and incline the viewer's awareness of painting as a two-dimensional surface covered with paint. In the same time to change the notion of painting as entrance onto three-dimensional space. As a consequence, several artist inspired by Black Paintings created their abstract works based on the use of repeated geometric, industrial-appearing shapes. Therefore, this series can be understood as an important catalyst for Minimalist art of the 1960s.

Furthermore, he went on to deign highly complicated pieces of art that seemed to follow a natural progression of tactility, dynamism, and scale. He achieved this effect due to expanding his monochrome palette to bright colors, additionally he moved painting into the third dimension because of using non-painterly elements onto the canvas.

Finally he decided to create architectural structures, large-scale freestanding sculptures, and the most complex work that has ever been realized in the medium of printmaking. In his works, he used to create a nonrepresentational painting, as an early practitioner of it, therefore, his works do not consist emotions, narratives or underlying meanings.

Stella put a significant attention into getting a better understanding of three-dimensional illusion-ism. Several Baroque artists, for instance Caravaggio, were well known for using techniques that made an illusion for the viewer, that the subjects emerged out of the canvas, therefore it looks like it was three-dimensional. He took it one step further and literally extended painting into the third dimension.

Figure 15. Frank Stella, The Fountain

Mediterranean Minimalism

The nature of Mediterranean vernacular architecture can be defined as an attempt to be built in simply and harmony, combined with the significant material on the site. Additionally, the significant lack of noise and excess coming from a complete environment can be noticed. Simplicity in this vernacular architecture can be assumed as an archetype, adapted in minimalism "the mediterranean... is the void in which things were generated, it is the original place of our cultures. Modernity has always been here, in the capacity to keep differente cultures together, without standarising them, in the white houses, in simple complexity of things." (Bertoni, 2002, p. 48) In several cases, many architect were inspired by the Modern Movement in Mediterranean, for instance K. F. Schinkel, A.Loos, Le Corbusier, Alberto Campo Baeza or Souto de Moura, it can be noticed in their geometric forms, perfect rigor, and the whiteness of the architectural pieces. J. Hoffmann stated that "with architectonic sensivity, in the brilliant clarity of those elementary volumes and in the geometry of some groups of houses, the message of a 'concept of a building' that ' speaks a language open and understandable to everyone' and whose values were founded on 'pure simplicity' unconstrained by artifice". (J. Hoffmann in: Bertoni, 2002, p. 48) which can be assumed as a strict Mediterranean minimalism conclusion. Additionally, Bertoni in his book assumes that minimalist architect revived the lost meaning of the vernacular, traditional architecture, the one that has independently evolved over the years, without the architect's collaboration.

Figure 16. 2L Atelier, Banking Branch

Minimalism the artistic movement - conclusion

Painter Frank Stella stated that: "What you see is what you see". (SFMOMA, 2016) which can be an accurate characteristic of minimalism.

Nowadays, simplicity affected several consumer product, for instance, Dieter Rams used minimalist design in the Braun product, furthermore Ikea, where the furniture is so simple that each person can assemble it with ease, often without the instruction. (Mokhov, 2011)

Summarizing above, minimalism in art, architecture and other fields can be characterized as the art of simplicity. Therefore searching for the essence was crucial. Essential quality was a prime objective, significant attention to the detail, which was understood as a as the place, the material, the client and the joint can be noticed.

Minimalism favored natural materials, showed sensitivity for the natural light, and the surrounding. Primary structures and constructions were widely used. It is also significant to notice excluding from pieces of art all suggestions of biography and metaphors. Additionally, the traditional differences between sculpture and painting was blurred. As a result of interests in Russian Constructivism usage of modular fabrication and industrial materials were favored.

Minimalism focused on spirituality, clarity and harmony as well as on elimination of contemporary noise.

Minimalism Conclusion

One of the main ideas in minimalism is how to create a quality design with a minimum ingredients. Historically, the term existed in sixties in America, whereas nowadays is widely used in numerous fields: music, paintings, literature, architecture, design and fashion. Minimalist expression's simplicity is understandable, transparent and rational. It is not a design where something is missing, but in contrast, is the project where there is a mindful decision when to stop. For a contemporary man, minimalism gives a possibility to create a place of harmony, based on silence and purity, where he can rediscover his own energy and harmony.

Additionally, minimalism can give a possibility to create an architecture that creates maximum effect with a minimum of needs, for instance: maximum quality of life with minimum expense on resources, or maximum functionality with minimum area.

Listed movements and philosophies has several elements in common. It can be assumed that the core is about searching for the essence, and the highest potential quality. Simplicity is understood as an art, as the ultimate sophistication, not as the lack of some elements. Primary structures were favored, combined with the technical knowledge.

Natural materials were favored, as well as the colors. Significant sensitivity for the natural light, and the surroundings can be noticed. Architects focused on relationship between the natural environment, the site and its buildings. Natural light was used as an additional instrument to expression, and to highlight the colors and material's characteristics.

The form is strongly connected with the function. The design is pure, and elegant, rectangular, clean forms, horizontal and vertical lines are favored. Honesty of construction is desired, as well as elimination of the decoration. At the same time significant attention to detail can be noticed, which is understood as a joint, material, user or place.

Minimalistic design is about conscious decisions, about eliminating what is not crucial to the functionality in order to reduce all elements down to their core essential quality. Spirituality, clarity, harmony and elimination of contemporary noise is favored.

When analyzing the graph no III about the geography it is crucial to notice, that analyzed theorist, artist and architect were mostly based in North America, West Europe and Japan. First two might be connected with the economic position of the countries as well as with the level of development and affordability of new materials. The latter one is mainly a continuation of Zen philosophy.

Geographical conditions – graph III

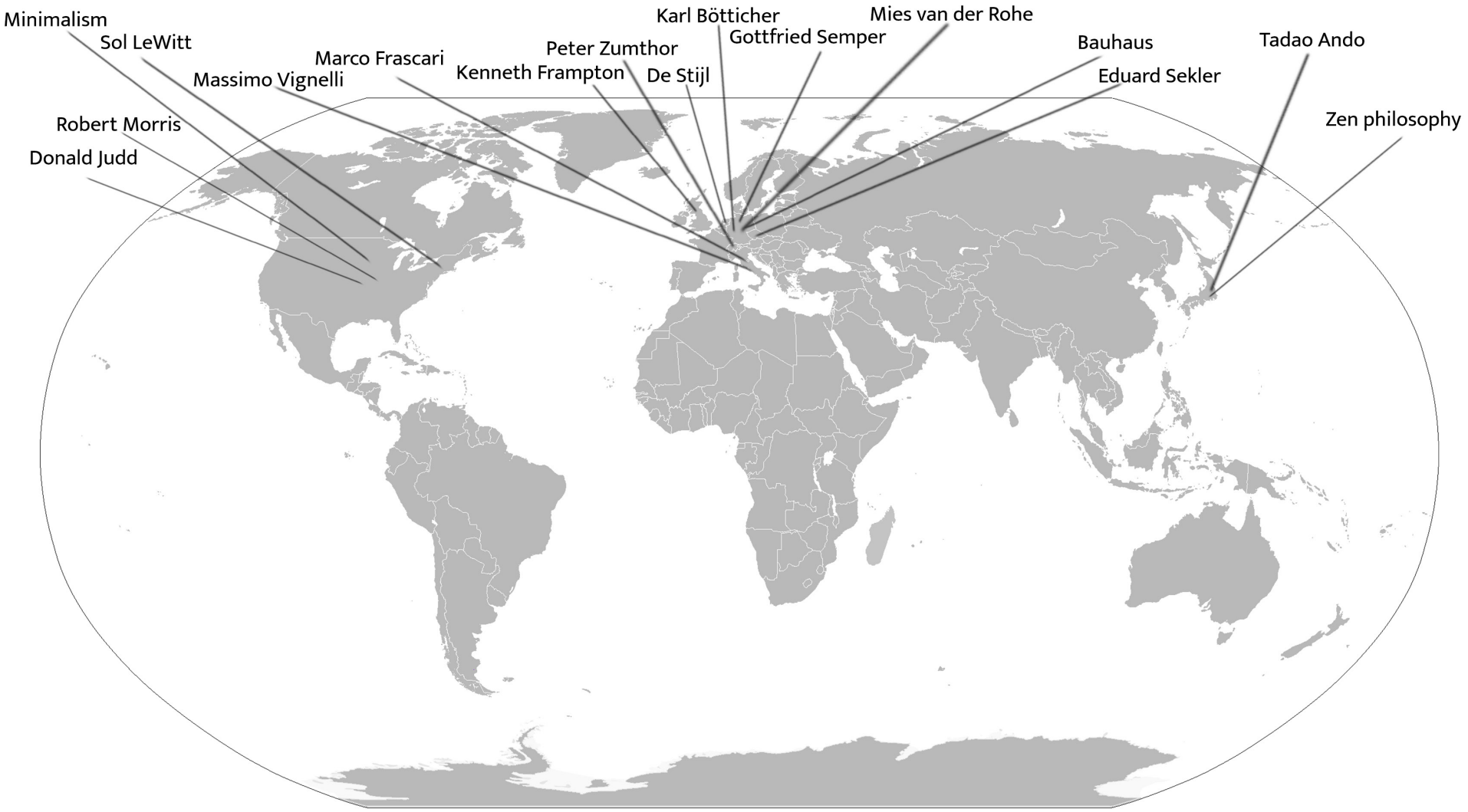
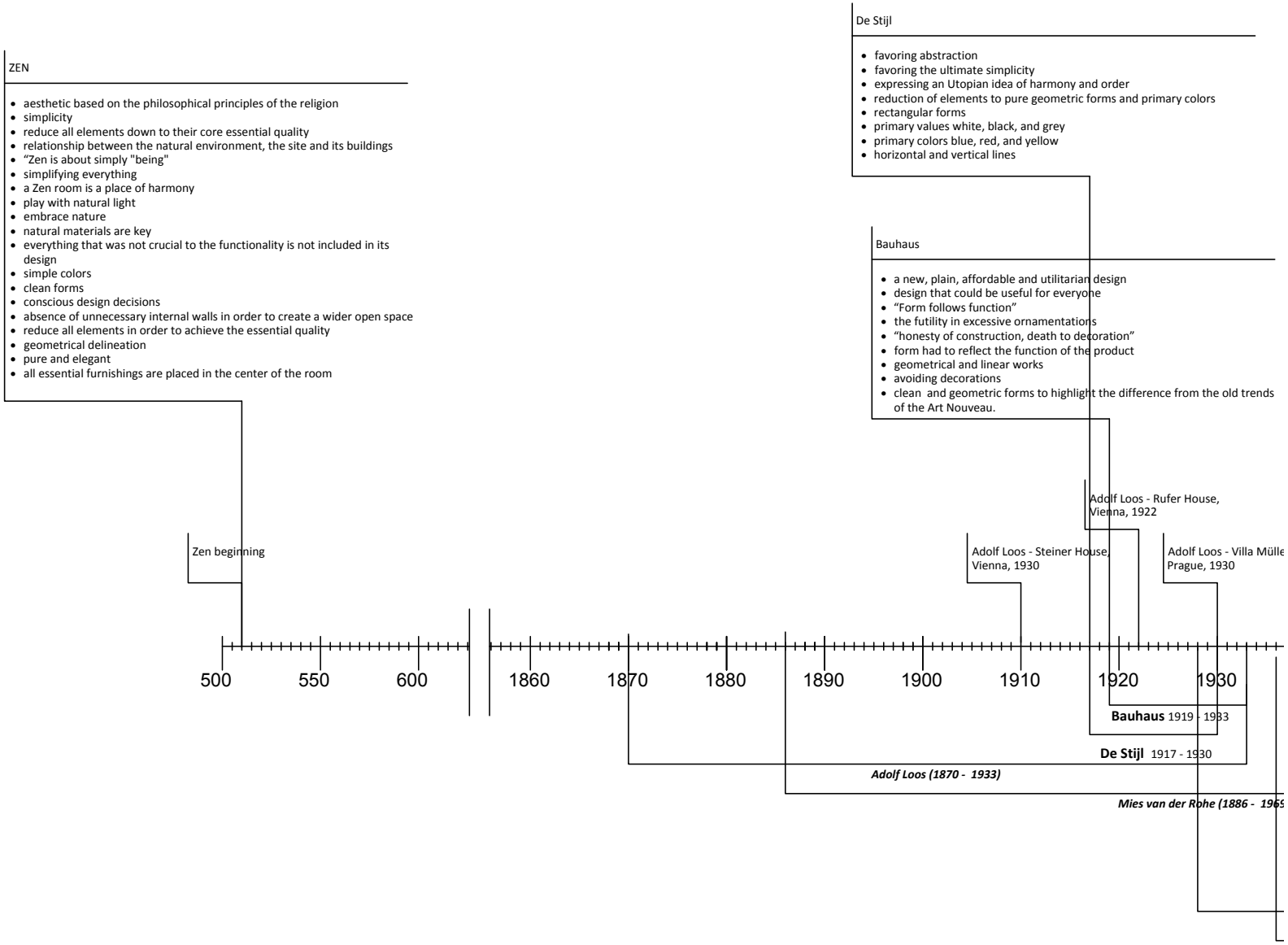


Figure 17. Geographical conditions

Minimalism timeline – graph II



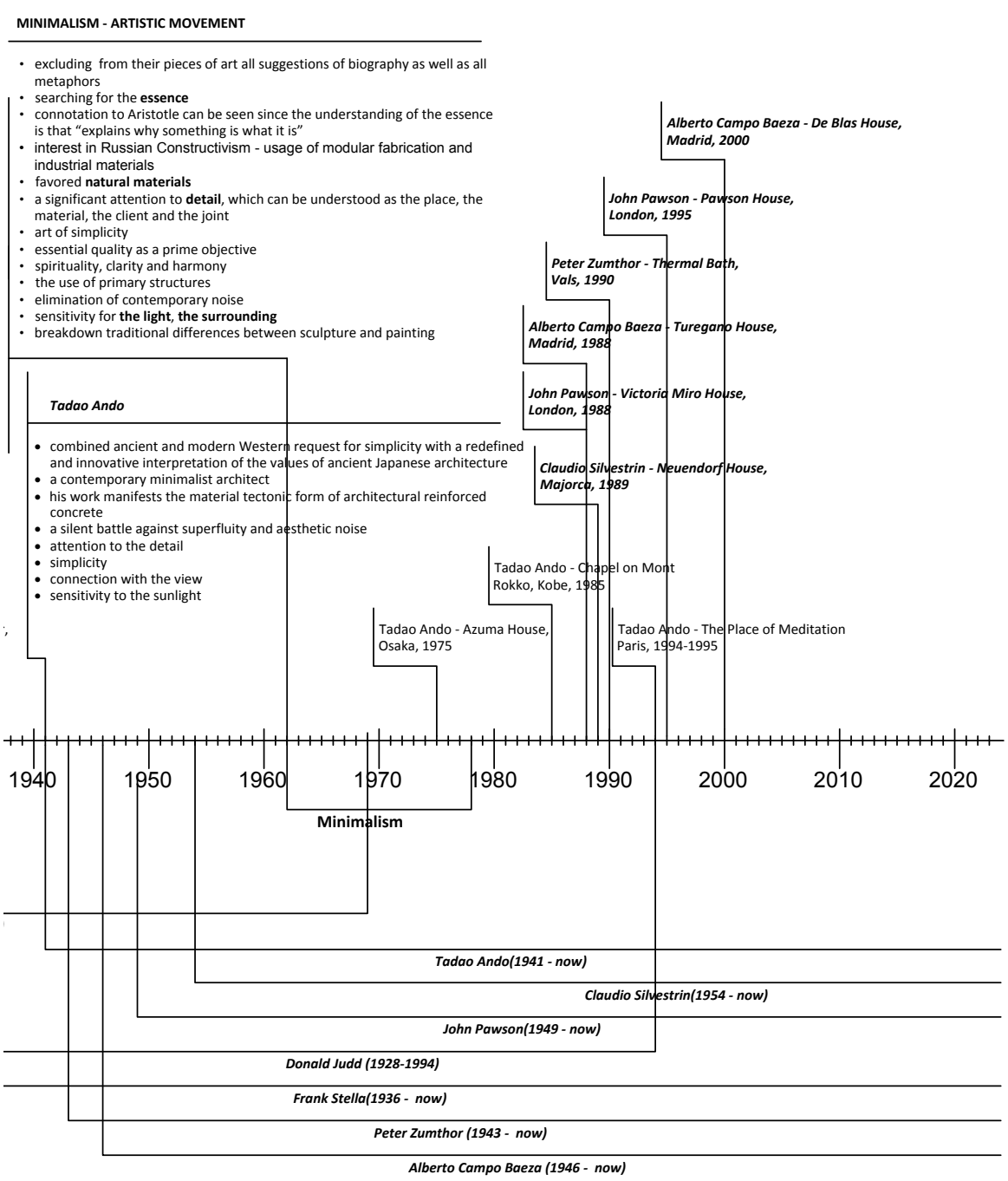


Figure 18. The Minimalism timeline

Theoretical Conclusion

Theoretical conclusion will be further developed and used as a suggestions for the new design. Graphically presentation of the outcomes can be seen o graph no IV. Subjective selection were used in order to create a guidelines for the project.

It was assumed that the art of simplicity and searching for the essence is crucial. Arranging the space and the construction of a structure should be based on conscious decisions. Everything that is not crucial to the functionality should not be included in its design, each element should be used for the purpose it exists. Therefore, clean forms, primary structure, rectangular forms and horizontal and vertical lines are favored. Additionally, sensitivity for the natural light, surrounding and nature is desired.

The project must tie artistic and constructive knowledge. Natural materials should be favored, together with the honesty in it, and respect to their possibilities and limitations. Furthermore, artificial decorations should be replaced with careful detailing and honesty in structure and construction. Structural concept should meet its implementation throughout construction and simultaneously the visual effect would be satisfied.

It is also desired to experiment with the modular fabrication and the idea of adding and repetition, in order to achieve the impression of harmony and order. Therefore primary module should be mindfully designed, with the consideration of function, material possibilities, and human scale.

Conclusion

Gottfried Semper

- division between the technical and the symbolic issues
- coherency between material, and method of manufacturing
- four fundamental elements of the building: the hearth, the earthwork, the framework, and the enclosing membrane
- the articulation of these two factors forms the quality of architecture
- two groups: 1. stereotomic - earthwork & hearth
  2. tectonic - framework & membrane
- knot as being the oldest and most original constructional part
- division between the technical and the symbolic issues
- focus on material assembly and how they are joined together
- the joint seen as a fundamental aspect revealing the quality of architecture
- focus on potentials and limitations of materials

Eduard D. Sekler

- tectonic - art of arranging the space and the **construction** of a **structure**
- **focus on: details**, connection, joining of materials and elements
- each element should be used for the purpose it exists
- "construction" = something put together
- "structure" = ordered arrangements of elements
- **honesty of the material** and structural use
- tectonic - situations when a structural concept meets its implementation throughout construction and simultaneously the visual effect is satisfied
- usage of elements just for aesthetic purpose he called atectonic

Marco Frascari

- detail tells the tale
- careful detailing is the most crucial
- material joints & formal joints
- details - predominant role in the graphic representation of a building
- correct details create a successful "tale"
- understand the potential of the material & construction method used

Kenneth Frampton

- clear structure
- elaboration of joints
- poetic manifestation of **structure**
- tying artistic and constructive knowledge
- **honesty to material** in the expression of the construction
- use potentials and accept limitations of materials
- **stereotomic & tectonic** form quality

TECTONIC

- importance of coherency between material, and method of manufacturing
- joint seen as a fundamental aspect
- focus on potentials and limitations of materials
- tectonic:
  - art of arranging the space and the construction of a structure
  - structural concept meets its implementation throughout construction and simultaneously the visual effect is satisfied
- focus on: details, connection, joining of materials and elements
- each element should be used for the purpose it exists
- honesty of the material and structural use
- careful detailing is the most crucial
- usage of elements just for aesthetic purpose he called atectonic
- details - predominant role in the graphic representation of a building
- correct details create a successful "tale"
- clear structure
- poetic manifestation of structure
- tying artistic and constructive knowledge
- tectonic gives a possibility to express something through the way the piece is built
- in order to create architecture, an architect need to know how to construct and join; which means to have a particular knowledge about material properties, forces, detailing and structure
- tectonic support all the senses

GUIDELINES

- careful joining of
- focus on potentials and limitations of materials
- connection between construction and structure
- each element should be used for the purpose it exists
- honesty of the material and structural use
- careful detailing
- clear structure
- tying artistic and constructive knowledge
- searching for the essence
- simplicity
- essential quality as a prime objective
- spirituality, clarity and harmony
- the use of primary structures
- elimination of contemporary noise
- sensitivity for the light, the surrounding
- reduce all elements down to their core

MINIMALISM - ARTISTIC MOVEMENT

- excluding from pieces of art all suggestions of biography and metaphors
- searching for the **essence**
- interest in Russian Constructivism - usage of modular fabrication and industrial materials
- favored **natural materials**
- attention to **detail**, which can be understood as the place, the material, the client and the joint
- art of simplicity
- essential quality as a prime objective
- spirituality, clarity and harmony
- the use of primary structures
- elimination of contemporary noise
- sensitivity for **the light**, **the surrounding**
- breakdown traditional differences between sculpture and painting

ZEN

- aesthetic based on the philosophical principles of the religion
- simplicity
- reduce all elements down to their core essential quality
- relationship between the natural environment, the site and its buildings
- "Zen is about simply "being"
- simplifying everything
- a Zen room is a place of harmony
- play with natural light
- embrace nature
- natural materials are key
- everything that was not crucial to the functionality is not included in its design
- simple colors
- clean forms
- conscious design decisions
- absence of unnecessary internal walls in order to create a wider open space
- reduce all elements in order to achieve the essential quality
- geometrical delineation
- pure and elegant
- all essential furnishings are placed in the center of the room

Bauhaus

- a new, plain, affordable and utilitarian design
- design that could be useful for everyone
- "Form follows function"
- the futility in excessive ornamentations
- "honesty of construction, death to decoration"
- form had to reflect the function of the product
- geometrical and linear works
- avoiding decorations
- clean and geometric forms to highlight the difference from the old trends of the Art Nouveau.

De Stijl

- favoring abstraction
- favoring the ultimate simplicity
- expressing an Utopian idea of harmony and order
- reduction of elements to pure geometric forms and primary colors
- rectangular forms
- primary values white, black, and grey
- primary colors blue, red, and yellow
- horizontal and vertical lines

MODERN MINIMALISM

- searching for the essence
- favored natural materials
- a significant attention to detail, which can be understood as the place, the material, the client and the joint
- art of simplicity
- essential quality as a prime objective
- spirituality, clarity and harmony
- the use of primary structures
- elimination of contemporary noise
- sensitivity for the light, the surrounding
- breakdown traditional differences between sculpture and painting
- reduce all elements down to their core essential quality
- relationship between the natural environment, the site and its buildings
- play with natural light
- embrace nature
- everything that is not crucial to the functionality is not included in its design
- simple colors
- clean forms
- conscious design decisions
- reduce all elements in order to achieve the essential quality
- pure and elegant
- "Form follows function"
- the futility in excessive ornamentations
- "honesty of construction, death to decoration"
- form had to reflect the function of the product
- idea of harmony and order
- rectangular forms
- primary values white, black, and grey
- primary colors blue, red, and yellow
- horizontal and vertical lines

FOR THE NEW PROJECT

essential quality

- relationship between the natural environment, the site and its buildings
- play with natural light
- embrace nature
- everything that is not crucial to the functionality is not included in its design
- simple colors
- clean forms
- conscious design decisions
- pure and elegant
- "Form follows function"
- the futility in excessive ornamentations
- "honesty of construction, death to decoration"
- form had to reflect the function
- rectangular forms
- primary values white, black, and grey
- primary colors blue, red, and yellow
- horizontal and vertical lines

Figure 19. Graph IV - Conclusion

Architecture is not only about geometry and form, but there are several additional factors, that create the whole overview of the building. Among others beauty and atmosphere can be mentioned.

The question is if it is possible to identify an universal sense of beauty. Or it differs from one to other? Additionally, it is also worth to consider if that definition does not transform themselves in different spaces and time.

Atmosphere can be defined as the special feeling that place, or event create. Whereas, it is worth answering if there is a possibility to define what the "atmosphere" actually is an how it is created.

Chapter III

Beauty and Atmosphere in architecture.

Gernot Böhme

Gernot Bohme, German philosopher and author, contributing to the philosophy of aesthetics goes through the understanding of beauty among centuries, because there have constantly been attempts to determine what beauty is since the ancient Greeks. According to the author, beauty was once the main or even exclusive topic of aesthetics.

Since the ancient Greeks there have constantly been attempts to determine what beauty is. Plato stands at the beginning of any aesthetic theory. For him "beauty was that which shines forth most strongly". According to the ancient philosopher true beauty, lies in the Forms, which are beautiful in being simply what they are. He states that mathematical objects and, especially geometrical ones, are the most beautiful. Therefore regularity, harmony and proportionality can be understand as a beauty. Since the 18th century the aesthetical experience has changed dramatically, therefore the concept of traditional beauty differed. Whereas, it is crucial to understand that beauty cannot be completely objectified, since it is not a property which a scene, thing or person simply has.

Bohme states that it is the aim of the artist, the designer, the architect, to create by means of the object the conditions in which people are able to experience beauty. The effect supposed to be achieved by establishing vistas, shaping objects, arranging scenes etc. He states that the beauty cannot be objective since it is not a property which a person, a thing or a scene simply has. Different people can judge the same thing differently.

"We are able to experience beauty in the ephemeral, the transient, in the light glinting on a pewter vessel or in the play of shadow on a white wall. Because we ourselves are transient beings, we encounter beauty in the lighting-up of appearances which assure us of our existence. Beauty is that which mediates to us the joy of being here. "(Böhme, 2010, p. 33) The author states that we are all touched by beauty. (Böhme, 2010) Nowadays, it cannot be longer understood as only the belonging to the museum and there should not be a difference between popular and "serious" art. People expect and look for a beauty everywhere, therefore it can be found not only in art but also in regular life, for instance in nature, design, architecture, fashion or advertising.

Peter Zumthor

Peter Zumthor, a Swiss architect, defines atmosphere as the immediate form of the physical perception. Therefore, spaces are sensed by the entire body and emotionally recalled as an atmosphere of a place. Furthermore, atmosphere is determined by both not only visual but tactile qualities, such for instance smell or sound. Therefore, it is valuated due to the ability to stimulate the senses.

Peter Zumthor in his book "Atmospheres" states strongly that for him quality architecture is when the building is able to move him, and it can do it when has a particular and significant atmosphere. Author compares the atmosphere of a building to the first impression of a person. One can enter the room and have feelings about it immediately. (Zumthor, 2006)

Atmosphere is perceived through our emotional sensibility, which is a form of perfection that works incredibly quickly and therefore helps us to survive, since not every situations give us a time to make up our minds on whether or not we like something. For that purpose we, as a human, have something inside us that tells us an enormous amount straight away. Zumthor states that every time he tries to generate a certain atmosphere in his buildings. He creates several highly personal, sensitive and individual answers to the question how to achieve the "Magic of the Real". Firstly, he examined "The Body of Architecture", which can be defined as the material presence of things in a design, its frame. Secondly, there is a "Material Compatibility". Since the materials react with one another and they have their individual radiance, the material composition

gives rise to something unique. Thirdly, "the Sound of a Space". Author states that interiors are like a grand instruments. They are capable to collect sound, to amplify it and to transmit it elsewhere. Therefore, during the design process, it is important to focus on the shape of the rooms and the surfaces of the materials, as well as on the way that materials can be applied. Forth, "The Temperature of a Space", not only physical but also psychological, "It's what I see, what I feel, what I touch, even with my feet." (Zumthor, 2006, p. 35) Fifth, "Surrounding Object" that creates a background. Sixth, "Between Composure and Seduction", which is connected with the way architecture involves movement, in that understanding architecture is not only the spatial art but also a temporal art, therefore it is important to think about the way people move in the building. Seventh, "Tension between Interior and Exterior" which consist all transitions between the inside and the outside and creating a public and private spaces. Eighth, "Levels of intimacy" which according to the author is something more bodily than scales and dimensions, it refers numerous aspects – for instance size, scale, dimensions, and the building contrast with the human. The final, ninth is "The Light of Things", it is about when and how one can see the light fell and where the shadows were.

Furthermore, Zumthor provides three elements in "appendix". First case is about taking "Architecture as Surroundings" to the different, transcendent level. Which is about the idea of creating a piece of architecture that it becomes a part of its surroundings. Whereas surrounding is understood as being a part of people's lives. Second one is "Coherence", it is the idea of all designed parts coming into their own, of finding themselves, since they have become the thing that they actually set out to be.

"Architecture, after all, is made for our use. It is not a free art in that sense. I think architecture attains its highest quality as an applied art. And it is at its most beautiful when things have come into their own, when they are coherent. That is when everything refers to everything else and it is impossible to remove a single thing without destroying the whole." (Zumthor, 2006, p. 69)

Additionally, author states that the body of architecture, in the first stages is anatomy, understood as construction, which is about putting things together in a logical manner. Whereas in the same time it is crucial to remember that the form should not only be coherent but also beautiful, which often needs several loops of starting from the beginning to achieve. Therefore, the final chapter is about "The Beautiful Form". (Zumthor, 2006)

Zumthor states that the method to discover the nature of things is to understand that the materials not just awake memories but also make people to will to interact with the space

"Architecture is not abstract, but concrete ... All design work starts from the premise of this physical, objective sensuousness of architecture, of its materials. To experience architecture in a concrete way means to touch, see, hear, and smell it." (Zumthor, 2010, p.66)

Zumthor highlights the impression about the work of Joseph Beuys where the sensuous and precise of the way they use materials it is visible.

"I beliefe that they [materials] can assume a poetic quality in the context of an architectural object, although only if the architect is able to generate a meaningful situation for them, since materials in themselves are not poetic." (Zumthor, Oberli-Turner and Schelbert, 2006, p. 10)

It can be assumed that it is crucial to be sensitive for the materials used for the building.

Zumthor puts attention towards the works made by artists of the 1960s and 70s. Numerous of them relay on the most obvious and simple methods of joining. They used loose settings in folds, coils, spaces and layers in order to develop a whole piece from numerous individual parts. The way the elements are put together is interesting:

"Every touch, every join, every joint is there in order to reinforce the idea of the quiet presence of the work." (Zumthor, Oberli-Turner and Schelbert, 2006, p. 15)

Analogical method supposed to be use when designing buildings. The difference is that the architecture in opposite to sculptures has to face with the challenge of developing a whole piece of architecture from innumerable details, where all of them have different forms and functions, as well as dimensions and materials.

Juhani Pallasmaa

The Nordic architect and theorist, Juhani Pallasmaa writes that:

"In creative work, both the artist and craftsman are directly engaged with their bodies and their existential experiences rather than focusing on an external and objectified problem. A wise architect works with his/her entire body and sense of self." (Pallasmaa 2012, 13)

The author states that the vision dominates over the other senses, and that it was noticed by many philosophers. Furthermore, he quote some of the philosophical essays entitled "Modernity and Hegemony of Vision" to emphasize that Western culture has been dominated by an ocular centric paradigm which means a vision-centered interpretation of reality and knowledge. Therefore it seems crucial to survey critically the role of vision related to the other senses not only in human understanding, but also in the architectural practice.

"Architecture as with all art, is fundamentally confronted with questions of human existence in space and time; it expresses and relates man's being in the world. Architecture is deeply engaged in the metaphysical questions of the self and the world, interior and exterior, time and duration, life and death". (Pallasmaa 2012, 19)

In the book it can be also found that according to Lucien Febvre's view "the sixteenth century did not see first: it heard and smelled, it sniffed the air and caught sounds. It was only later that it seriously and actively became engaged in geometry, focusing attention on the world of forms with Kepler (1571-1630) and Desargues of Lyon (1593-1662)." Additionally Robert Mandrou states similar argument "The hierarchy [of the senses] was not the same [as in the twentieth century] because the eye, which rules today, found itself in third place, behind hearing and touch, and far after them. The eye that organizes, classifies and orders was not the favored organ of time that preferred hearing." (Pallasmaa 2012, 28) As a conclusion author states that the increasing hegemony of the eye seems to grow parallel with the development of Western ego-consciousness. Furthermore, it increases separation of self and the world, whereas the other senses unite us with it.

It is also crucial to examine the architecture of traditional cultures to understand that it was essentially connected with the wisdom of the human body, which is nowadays replaced with being visually and conceptually dominated. Pallasmaa uses highly significant metaphor to explain that in traditional cultures construction was guided by the body, in the same manner as bird shapes its nest. When the building lose its plasticity and its connection with the body's wisdom, it become isolated in the cool and distant realm of vision. Architecture when it losses measures, tactility and details designed for the human body, in particular for the hand, becomes sharp-edged, plat, immaterial or even unreal.

According to the author, the flatness of today's standard construction is a result of a weakened sense of materiality.

"Natural materials - stone, brick and wood - allow our vision to penetrate their surfaces and enable us to become convinced of the veracity of matter. Natural materials express their age, as well as the story of their origins and their history of human use. All matter exists in the continuum of time; the patina of wear adds the enriching experience of time to the materials of construction." (Pallasmaa 2012, 34).

Author states that natural materials are able to express nature's cycles and time of the year. Moreover, they preserve the history of their origins and their history of human use. Whereas machine-made materials are criticized for creating a faked sense of materiality, because of being scaleless and synthetic, and do not expressing the even the essential properties of age or origins. Cities and building should instead allow human to "experience the slow, healing flow of time", when providing human measure to the otherwise limitless.

Palasmaa states that the empowering the sense of sight over the rest of senses is inarguable theme in Western thought, therefore it is also evident in the architecture. The negative development of the it is supported by isolation of the eye outside its natural interaction with other senses. This increasingly reduce and restrict the experience of the world into the sphere of vision.

Normally the city should be confronted not only with eyes but especially with the whole body. Pallasmaa states that:

"my legs measure the length of the arcade [. . .] my

body weight meets the mass of the cathedral door [. . .] I experience myself in the city and the city exists through my embodied experience. The city and my body supplement and define each other. I dwell in the city and the city dwells in me. " (Pallasmaa 2012, 43)

It can be understood that all sensory experiences are integrated through the whole body, since our bodies and movements are in constant interaction with the environment. Therefore, numerous contemporary public spaces would become significantly more enjoyable when lowering light intensity and its uneven distribution.

Pallasamaa takes into consideration the great value of a shadow, since the imagination and daydreaming are stimulated not only by dim light but also by shadows. According to the author :

"In our time, light has turned into mere quantitative matter and the window has lost its significance as a mediator between two worlds, between enclosed and open, interior and exterior, private and public, shadow and light." (Pallasmaa 2012, 51)

Author highlight the difference between the sense of sight and hearing. The first one is based on exterior, since the eye reach. The latter creates an experience of inferiority, the ear receives. Normally we are not aware of the significance of hearing, whereas sound frequently creates the temporal background in which visual impressions are embedded. The best example is that when the soundtrack is removed from the film, the scene loses its plasticity and sense of continuity. It is necessary to be aware that every building or space has its own characteristic sound, which can bring the sense of intimacy or monumentality, invitation or rejection. Therefore, it can be assumed that the space or the building is understood and appreciated not only through its visual shape but also through its echo. Moreover, every single one city has its own echo which depends on the pattern and scale of the streets as well as on the architectural styles ad used materials. (Pallasmaa 2012)

One of the most interesting observation of the author is that architecture may connect us with the dead. Buildings that survived give us the possibility to imagine for instance the medieval streets.

"The time of architecture is a detained time; in the greatest of buildings time stands firmly still." (Pallasmaa 2012, 56)

Pallasma suggest that the most persistent memory we have about the space is its smell:

"I cannot remember the appearance of the door of my grandfather's farmhouse in early childhood, but I do remember the resistance of its weight and the patina of its wood surface scarred by decades of use, and I recall especially vividly the scent of a home that hit my face as an invisible wall behind the door. Every dwelling has its individual scent of home." (Pallasmaa, 2012, 59)

Not only dwellings but also the whole cities have their particular smell, for instance fishing towns are especially memorable because of the certain smell. It can be assumed that every city has its own spectrum of tastes and odors, therefore it is a special joy of travel to acquaint oneself with the microcosm of tastes and smells.

It is said that the hands are the sculptor's eyes. But not only the skin of a sculptor can read the texture, density or weight of material. This tactile sense connect humans with time, history and tradition. "A pebble polished by waves is pleasurable to the hand, not only because of its soothing shape, but because it show the slow and gentle process of its formation, "A perfect pebble on the palm materializes duration, it is time turned into shape." (Pallasmaa, 2012, 62) There is also a strong identity between naked skin and the sensation of home, since is essentially an experience of intimate warmth.

There is also a direct connection between tactile and taste experiences, as well as the vision becomes transferred to taste. Pallasma quote Jun'ichirō Tanizaki to show that the fine architectural space opens up and presents itself with the same fullness of experience as a wonderful bowl of soup. It can be assumed, that the well-designed architecture brings the whole world into the most intimate contact with the human body. (Pallasmaa, 2012)

Architecture has a possibility to direct and organize behavior and movement of people. A building is never the end in itself. "it frames, articulates, structures, gives significance, relates, separates and unites, facilitates and prohibits". (Pallasmaa 2012, 68)

Martin Heidegger

Martin Heidegger was a philosopher, famous for his texts "the nearness", "building dwelling thinking" and "the thing" where he analyze the importance of nearness and human experience. He states that, human imagination as measure of space is more important than mathematic and scientific measurements. (Sharr, 2007)

Martin Heidegger in his book Questions concerning technology links to the Greek terminology and the etymology of the early thinkers. The highest importance were placed when referring to Plato and Aristotle's thoughts on the process of making (Heidegger, 1977).

The most important is to understand technology in relation to culture and society in order for humankind not to be suppressed and chained by technological processes. Furthermore, he states that technology is not equal to technological, since technology relates to causality and instrumentality. According to the Aristotelian philosophy there are four causes exist. First is the causa materialis – that consist the material, and the matter out of which something is made, second is causa formalis – that states about the shape and the formation, third is causa finalis - the end and the way how something is related to its requirements, and fourth causa efficiens – which states about the effect. (Heidegger, 1977).

Heidegger states that, we have only been interested in the result, the effect of things, causa efficiens. This is the main cause why there become a reduction to one of the four unified causalities that makes something appear. In contrario, with reference to Plato, Heidegger states that when all the causes are taken together, the result is that every occasion for whatever passes over and goes forward into presenting from that which is not presenting is poises, is bringing forth. (Heidegger, 1977).

Furthermore he states that:

"It is of utmost importance that we think bringing-forth in its full scope and at the same time in the sense in which the Greeks thought it. Not only handcraft manufacture, not only artistic and poetical bringing into appearance and concrete imagery, is a bringing-forth, poises." (Heidegger, 1977, p. 5)

It is of the high importance to bring forth and make something appear based on the unison of the four causalities above. As a consequence, a broader scope of causes can be achieved, which is better than just the current custom of simply making towards an end. (Heidegger, 1977)

It is important to notice that the roots of of techné belongs to making in terms of the skills and activities of craftsman and in the minds of the fine arts, by bringing forth, resulting in poesies. Heidegger puts some stress to the aspect of techné that is linked to episteme, which refers to a twofold of knowledge, such as knowing and making. (Heidegger, 1977)

According to Heidegger architecture is placed between the culture and nature, the building is simultaneously part of the landscape and a created form. Therefore, it is important to focus on the relation culture – nature in order to create a tectonic architecture. The surface of earth can be modified, but with the focus on taking care of it. Architecture is not only a building, but also a place-making. (Frampton, 1995)

For Heidegger an atmosphere is somebody's subjective and imaginative borderline of a space. According to him, a place is defined by human feelings, experience and use. It can be understood as moving buildings from physical boundaries to atmospherically defined of spaces. (Sharr, 2007)

Beauty and Atmosphere Conclusion.

It can be assumed, that the building is not only walls and ceilings but also, or even especially, the atmosphere and the feeling that it creates. During the design process it is crucial to think about the feelings that can be connected with the architectural piece and the space. Different effect can be achieved for instance, when studying the importance of the natural light and shadows, views from the windows, correlations between the building itself and the space.

Additionally, the question of the beauty in the design is worth consideration, since nowadays people expect beauty not only in museums, but also in the regular life.

Part II

Design part

Chapter I

Analysis

Theme analysis - Spa complex

Spa is a place of serenity, rejuvenation and solace. Originally, the spa means a place where water, that contains some minerals, which are considered as good for health, comes up naturally from the ground. Nowadays, it is a building, where people can improve their health and relax. (Tandy, 2010)

The word "spa" may be derived from the Walloon word "espa", which means "fountain". It is also possible that it originate from the Latin word "spagere" translated as sprinkle, scatter, moisten. Additionally, it may be an acronym of the Latin phrase "sanitas per aquas" which can be under¬stood as "health through water". (van Tubergen, 2002)

In order to design a spa complex the ba¬lance between functionality and aesthetic issues must be found, simultaneously, the project have to meet the needs of the owner, stuff and the guests.

Therefore, programming is the process of firstly, defining the activities that will be conducted within a complex, secondly, allocating the defined spaces, and establishing relationships between them. Furthermore, it is intended to experiment the way the building should be placed on site, accor¬ding to the pedestrian flows and car parking, as well as the connections to the external world.

The lobby was understood as a as a cen¬tral gathering point that serves both: the public areas and the back-of-house. Since this relationship is established, there is a possibility to allocate other activities and spaces. (deRoos, J. A. 2011).

Interior design of a Spa complex should provide a non-institutional feeling, therefore, the residential one is desired. In order to make clients feel welcome and important, personalized spaces, such as change rooms and lockers should be inclu¬ded. (Peccarelli, 2003)

It is crucial to incorporate some special elements, for instance, symbols, murals, unique furnitu¬re and other pieces to create a memorable expe¬rience. Additionally, pleasurable details, such as, reading materials, soft carpeting, low light, tranquil music and scents will help to create the mood of relaxation. (Peccarelli, 2003)

Furthermore, reflecting the environment and surroundings can help creating a significant mood inside. (Peccarelli, 2003)

The entrance is a very significant place of the whole canter. Metaphorically it can be un¬derstood as a boundary between the "normal life" and the treatment reality, it must signify that there is a special environment behind. Therefore, there should be a special attention to the interior archi-tecture, lighting and other design elements. (Pecca¬relli, 2003)

Mood and atmosphere

Based on the previous investigations, It was assumed the building is not only the physical construction but also the atmosphere, which, in that case, affects the whole perception of the spa.

It is desired to achieve inviting, warm atmosphere, providing an aura of calmness and comfort. The atmosphere is perceived with all senses, therefore the spa design must be well though through in order to stimulate them. When it is done successfully, people will be impressed and will come back again. It is important to focus on each room and all the details. The start point can be a reception or whole lobby which has to provide an atmosphere of welcoming, as well be the bonduary between the normal word and the spa interior. The changing room should provide a feeling of being not only visitor, but also a special guest. Finally, the treatment rooms should be the places of significant, individual experience. (Peccarelli, 2003)

The most important thing that must be taken into consideration when designing the spa complex and creating the atmosphere is main concept, structure, and interior design with details. Therefore, the light, sound and odor as well as all views must stimulate the senses. Picturesque views from the windows as well as the outdoor areas (if possible) are very important, which is strongly connected with the localization. Every room should have a special and significant atmosphere, for instance during the treatment, the quest should get the feeling that everything in the room is only for him. The design and the details should distinguish from the ordinary life, for instance bath tub is an item that people commonly have at home, therefore the one in the spa must be very special.

Materials and colors are also of the high importance. It is intended to achieve the environment that is conducive to relaxation. According to the environ¬mental psychology, in the Spa complex the walls should be neutral and the lights low. (Peccarelli, 2003)

Technical aim

The main technical focus of the design is the constructional issue. It is desired to create modules that are easy to move and arrange. Inspired by the Japanese traditional architecture, it was desired to design modules, where whole construction is based on columns and beams, whereas, walls serve as a covering. Additional, issue is to find out a satisfying solution for joining different modules in order to achieve flexibility for further organization the space.

As a method to investigate the satisfying solution, firstly the decision were made about the usage of materials, secondly, hand calculations were made to estimate the loads inside of the module. Finally, Robot Structural Analysis were used to calculate the minimum cross-section of the beams. Since the design is expected to have two floors as a basic model for the program two modules standing one on the top of the other were created.

In order to detail the construction, significant focus were placed on joining the columns and beams which is further elaborated in the design process. Additionally, the connections with modules, as well as with the modules and wall panels were developed. Corners - the meeting points of the wall panels were also specifically designed.

Users

One of the main idea of the spa center is to give the people a possibility to calm and relax. Those factors are mostly desired by adults. Since the treatments are relatively expensive, the users will be rather wealthy. There is a possibility that some of them may have health or mobility problems, there¬fore the design for wheel chairs must be taken into consideration.

It can be assumed that there are 2 groups of clients:

• People who came just for several treat¬ments. They came only for few hours, therefore they do not need accommodation.

• People who came for a longer visit, therefore the accommodation is needed. Since, some people used to come alone whereas the others for instance would like to stay with the family, different accom¬modation possibilities must be provided. It is desired to create various sizes of accommodation, to provide space for: singles, couples and families.

User's impact on the design

It is crucial to take into consideration that there are two different types of clients: first group are those who are using the accommodation, the latter one are temporary guests who are coming just for a few hours.

Therefore, it is desired to create a room scheme that gives a possibility to get into treatment waiting area from both ways: main lobby and hotel rooms.

Similar rules must be applied for the dining area – it must be possible to reach it straightly from outdoor, as well as from lobby and hotel rooms.

Room program

The initial spatial program is based on the case studies of the existing spa centers,

In the "functional diagram"(on the right) it was investigated how the different spaces should be connected in order to create a functional space.

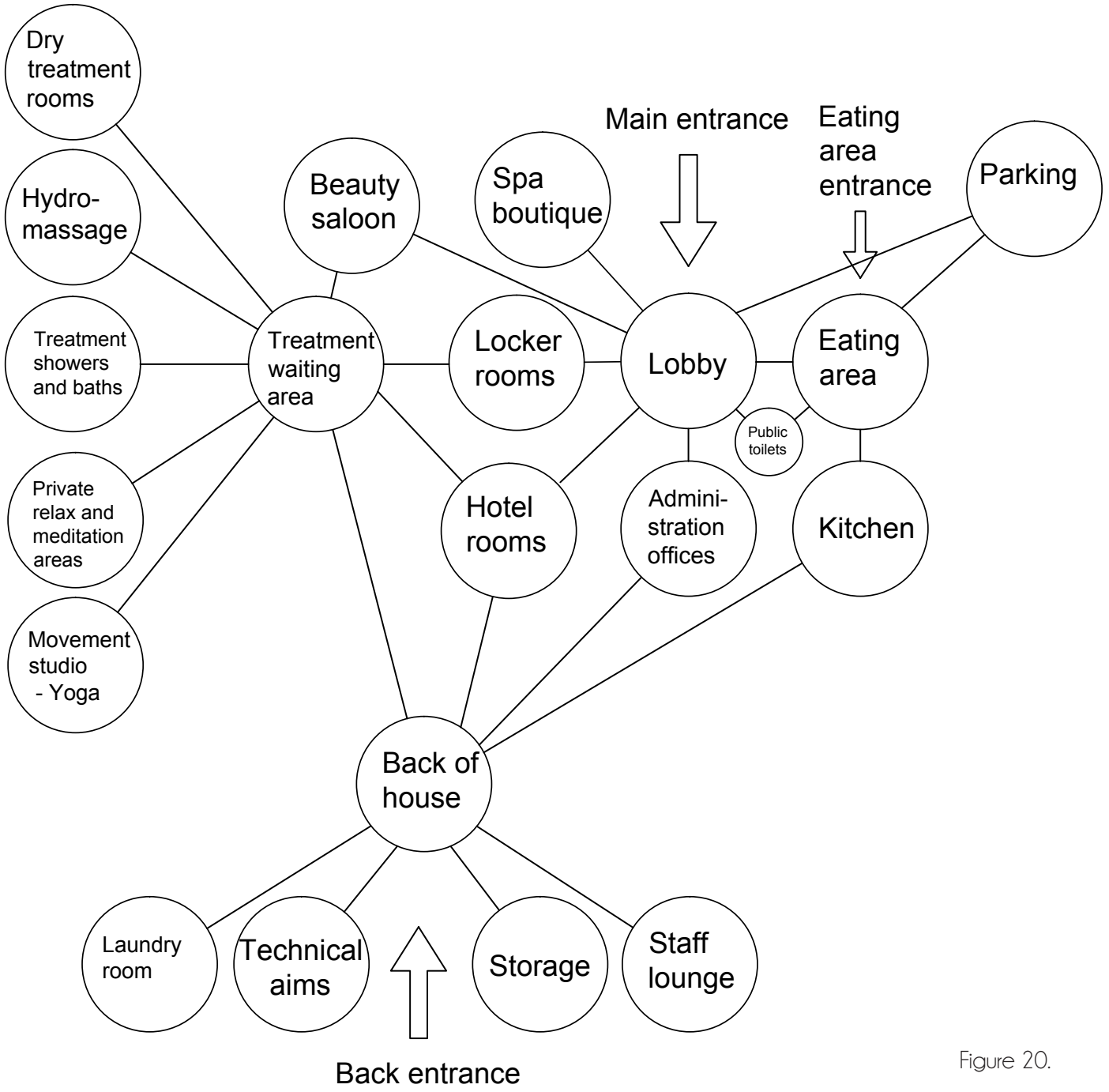


Figure 20. Graph - room program

Room program

Entrance and public spaces

Public spaces	m^2	number	Total	Light	Additional information
Lobby and Reception desk	200	1	200	Direct light, large glazing	It can be understood as a border between the "normal" life and the interior of Spa complex. Welcoming atmosphere is required.
Spa boutique	50/60	1	50/60	Large glazing for exhibition, preferably on the same façade as the entrance	It should be visible from the lobby, in order to be economically efficient. It is a place where clients can buy cosmetics, books, CDs, etc.
Eating area	500/600	1	500/600	Direct light	Picturesque view is desired. Additionally, division into different zones (heavy meal, juices, coffee) should be considered.
Administration offices	35	4	140	Direct light, small glazing	The office area should contain 8 offices. It should be in a close connection with the lobby, toilets and staff lounge.
Public toilets	30	2	60		It should be placed to be visible from the lobby, and also have to be in a close connection to eating area.

Health and beauty

Health and beauty	m^2	number	Total	Light	Additional information
Rest rooms	60	2	120	No special requirements	According to the traffic flow in the building changing area and lockers are the first and the last places for people to visit, therefore they must be placed close to the entrance zone.
Dry treatment rooms	20	10/15	200/300	Direct light, large glazing	Massage rooms should have a small sink and linen cabinet.
Hydromassage	7-10	10/15	70-150	Direct light, small glazing	
Treatment waiting area	12	5/8	60/100	Direct light,	
Beauty saloon	100	1	100	Indirect lighting	Creating different functional zones should be considered.
Yoga studio	100/150	1	100/150	Direct light,	Additional entrance and connection with courtyard to give a possibility to exercise outside should be considered.

Accommodation

Hotel	m^2	number	Total	Light	Additional information
Single rooms	30	32	960	Direct light	Room for one person. Consist one bed, place to read or relax and bathroom.
Double rooms	70	15	1500	Direct light	Room for a couple. Consist double, king size bed and place to read or relax and bathroom.
Family apartments	70	5	350	Direct light	Room for a couple with children. Consist double, king size bed and place to read or relax and bathroom. There is a possibility to add 1-3 single beds for children.
Twin rooms	70	4	280	Direct light	Room for 2 people. Consist 2 single beds, and place to read or relax and bathroom.

The rooms should be sound proofed, therefore sound proofed doors might be used.
Spa bathrooms should go beyond the standard functionality of a traditional bathroom. Nowadays is closer to the sanctuary and retreat. Therefore the significant attention to the detail is desired. The rest of the bathroom should be separated from the toilet at least by a privacy wall. (Fox, 2014)

Back of the house

Public spaces	m^2	number	Total	Light	Additional information
Laundry room	30	1	30	no special requirements	It's a place equipped with the washing machines and dryers. There should also be a possibility to storage laundry.
Staff toilets	30	1	30	no special requirements	Should be placed in close connection to the offices and staff lounge.
Staff lounge	50	1	50	no special requirements	This room should be in close connection with offices and lobby. It should contain small kitchen and place to eat.
Storage	30	1	30	no special requirements	It is a special room where additional equipment can be stored. It should be connected with treatment waiting area.
Technical aims	30	1	30	no special requirements	Additional entrance from the outside.
Clean beddings and stuff storage	60	1	60	no special requirements	no special requirements
Kitchen	100	1	100	no special requirements	no special requirements
Fridge and storage	30	1	30	no direct light	Additional entrance from the outside.

Three existing buildings were analyzed, I order to get a better understanding of tectonic, minimalism and modularity not only in theory but also in practice.

Analyze of each building were divided in three sections: Minimalism, Tectonic, Modularity. Based on the existing knowledge about the buildings, as well as using photos and own conclusions and speculations, it is desired to find if those buildings fulfill all the three criteria in the same time.

It was assumed that t is easier to learn and to understood when the existing knowledge and the theory is transformed to the real buildings.

Chapter I

Analysis of the existing buildings.

Children's Center for Psychiatric Rehabilitation

Figure 21. Sou Fujimoto, Children's Center For Psychiatric Rehabilitation

- Architects: Sou Fujimoto
- Location: Hokkaido Prefecture, Japan
- Year: 2006

The treatment center for mentally disturbed children, that offers a place where they can live together and simultaneously regain their mental health. The building remains a small village which provides a variety of activities in an intimate context.

According to the architect the idea was to create a building with "the method of being random: Precise planning vs Accidental landscape" (Archinnovations.com, 2016)

Figure 22. Interior

Minimalism

Sou Fujimoto follows the Japan tradition of simplicity. Space in Japan is greatly valued in their culture and precious, therefore the architecture should be developed to make the best use of it. White is the predominant color here, since it was assumed as a neutral and as a source of calmness and relax. (Peccarelli, 2003)

Interior architecture follows traditional Japanese design, which is characterized by clean forms and simplicity. Essentially furnished interiors can be noticed here as a way to create spaces far away from being cluttered. Simultaneously, the beauty of its white and wood pieces bounce and reflect the natural light. (ArchDaily, 2008)

Figure 23. Exterior

Tectonic

Although the building may appear as designed without being carefully planned, "it has an order, it has a structure, but it looks really random" (Weltgebraus.com, 2016)

The idea of the structure was to create the piece of architecture which reminds a small city, therefore the layout of boxes seemed accurate. Each piece and its placement were planned carefully, every corner has a different size. Some of them are rather opened, other more hidden, there are also connected or more separate ones. The differences were made in order to achieve the "small city effect". (Weltgebraus.com, 2016)

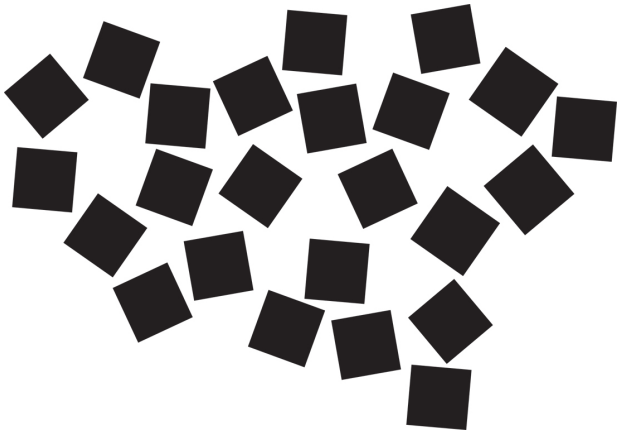


Figure 24. Modular system

Modularity

Firstly, several functions of the building were planned precisely. Secondly, they were organized together in a series of boxes. As a result, it was possible to adjust the complex, according to the client's need, since there was a possibility to move the modules. The plan became flexible, therefore the architect was able to fulfill a series of strict design directives. The whole concept gives the patients a sense of freedom, simultaneously respecting several rules that had to be applied to the project. Between the boxes an irregular alcove-places were produced, used as a playgrounds still connected to the living area.

The design combines both: a fully functional space for the staff and a place understood as a big playground for the children. "He manipulated boxes while thing well outside the box." (Archinnovations.com, 2016)

Rokko Housing complex I

Figure 25. Tadao Ando, Rokko Housing Complex I

- Architects: Tadao Ando
- Location: Kobe, Japan
- Year: 1981-1983

The three sets of houses are located on Mount Rokko, on the slopes of the city of Kobe, in neighboring plots to each other. They are built on the hill, following the slope.

The first set (analyzed in thesis) is at the foot of the mountain. From here it is possible to see the panoramic view of the port of Kobe and Osaka Bay.

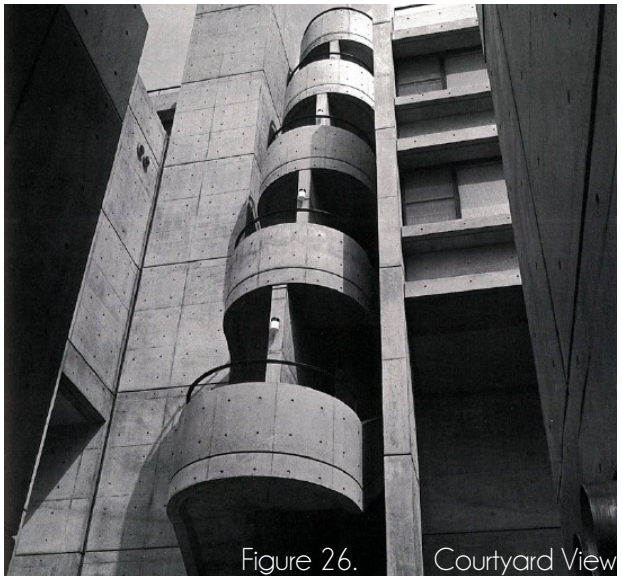


Figure 26. Courtyard View

Minimalism

As a material concrete was used, its color is not acting against the area. The whole design is based on geometric shapes, which intentionally creates a high contrast to the natural environment.

Prefabrication, modular design and construction waste minimization are one of the most important characteristic of the whole complex. As a result, the whole complex appear as a rigid and repetitive structure, whereas it provides a wide variety of layouts and vistas. Additionally, the stepping terraces which are the results of following the terrain, serves as an elements that break the plain sense of high-rises. (En.wikiarquitectura.com, 2016)

Figure 27. Elevation

Tectonic

The site of the building is a south-facing hill¬side in the foothills of the Rokko Mountains in Kobe. The whole complex makes a maximum use of the existing landscape – the spatial composition follows the shape of the slope. Additionally, compositional shifts are achieved by adjusting the symmetrical composition to the natural slope of the terrain, therefore, marginal spaces are produced. These continuous, deeply shaded spaces become direct, special routes to units, in the same time, they take a role of public spaces which foster inhabitants. (I et al., 2016) The post-and-beam structure were used here, which can be understood not only as a construction but also as a structural system for the complex. (I et al., 2016) The grid system provides control over the whole complex, as being a rigid structural framework where the units and spaces are fitted. (Foundationsakc.com, 2016)

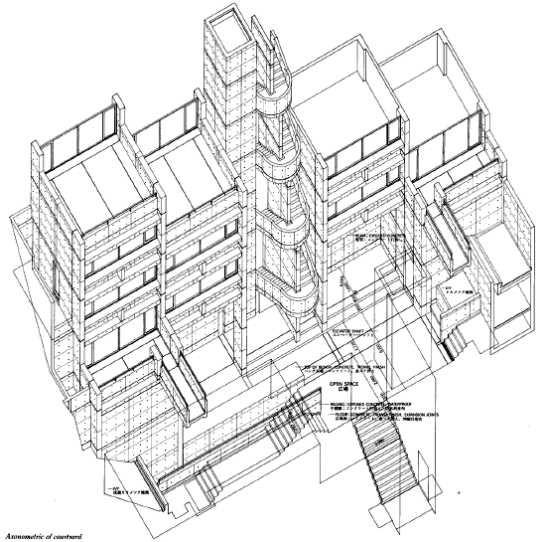


Figure 28. Axonometric view

Modularity

The complex is based on a three-dimensi¬onal grid, made of units 5,4 meters by 4,8 meters in plan. All modules are following the slope. Each ele¬ment step back on the hillside, therefore, the roofs of lower levels can be used as a terraces. The whole structure is based on a rigid grid system, where modules are fitted in. As a result it was possible to arrange independent units, and organize them in a bigger complex. (Foundationsakc.com, 2016)

Whole complex is divided in three phases, here the first one is analyzed. Since the modular construction were used here it was possible to divide the building process in phases without any problems. (Architect Boy, 2014)

Fazenda Boa Vista – Spa

Figure 29. Isay Weinfeld, Fazenda Boa Vista - Spa

- Architects: Isay Weinfeld
- Location: Porto Feliz, Brazil
- Year: 2012

Fazenda Boa Vista is a hospitality and residential complex located in Porto Feliz, 100km away from São Paulo. The complex includes not only a Apa but also private villas, hotel, sports center, kids club and petting zoo.

Figure 30. Interior swimming pool

Minimalism

White is the main color used. It is under¬stood as a way to highlight purity, relaxation, quiet and peace. Other colors are used very sparingly, such as deep blue as a glass mosaic at the swim¬ming pool, bright yellow at the main door, various shades of green can be found in gardens and wood that surround the complex.

The building is completely blind to the vie¬wer, the-re are only openings onto small enclosed patios or the adjacent greenery.

Lack of ornamentation as well as elimination of the elements that are not crucial for the design can be noticed. (ArchDaily, 2014)

Figure 31. Elevation

Tectonic

The Spa itself is a low-rise construction that follows the land contours. The structure of the building is highlighted, since it is based on longitudinal walls.

Lack of the ornamentation can be easily noticed. Sensitivity for natural light is of the high importance, even when the rooms are located partly underg-round, they are still designed with windows that pro-vides enough sun light. (ArchDaily, 2014)

Figure 32. Elevation

Modularity

Walls that define each room are extended lengt-hwise from both ends of the building. They are visi-ble from the roof as a vertical blades, which gi¬ves a clue about the internal order of the building.

The rooms are divided according to the functi-ons. On the ground level Hair Saloon and gym is placed on the right side of the reception whereas massage rooms to the other. On the level below there are wet treatments which, surprisingly, still al-lows for a natural light to come in.

The system of the modules based on longitudinal walls provides a possibility for further development, which is expected in the upcoming year. (ArchDaily, 2014)

Figure 33. The site

Site

Capo Murro di Porco, Italy

Site I Capo Murro di Porco Italy

Figure 34. Localization

Figure 35. The site

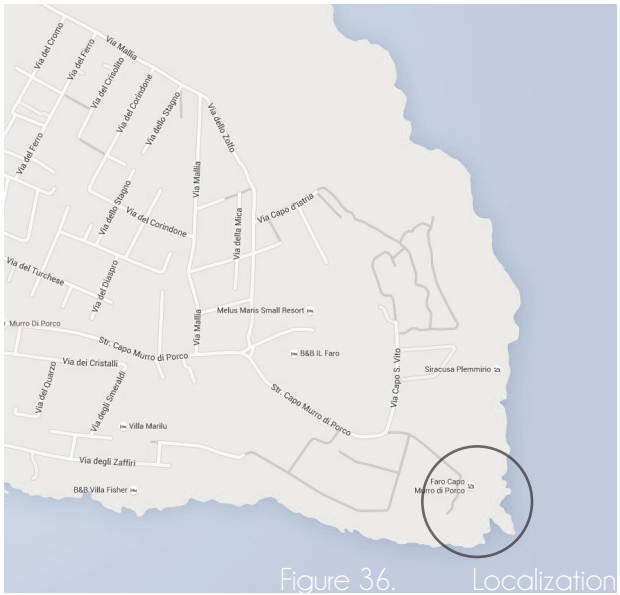


Figure 36. Localization

Localization

The cliff of Capo Murro di Porco is localized in re-gi¬on called Sicily in Italy, a few kilometers from the historic center – Syracuse. Sicily is an island located in the Mediterranean Sea.

It is the largest island in the Mediterranean.

This area every year welcomes sea and water sports lovers who can find there everything they are looking for.

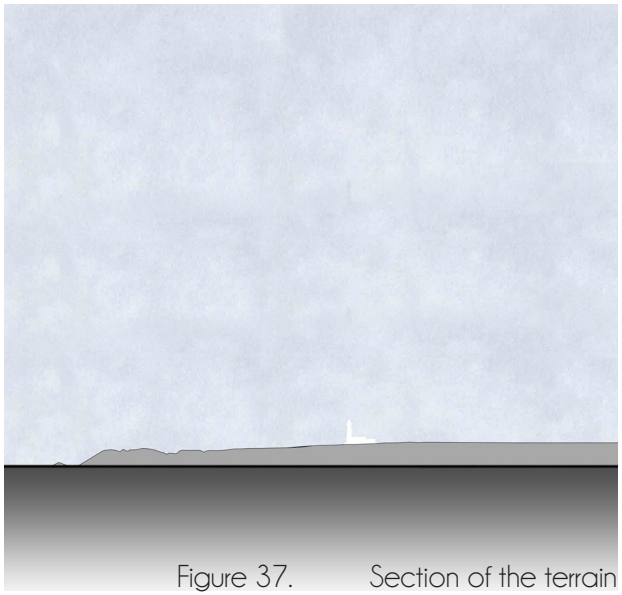


Figure 37. Section of the terrain

Topography

The island is known for its rugged, volcanic topo¬-graphy. The economy of Sicily is relatively strong due to its very fertile, volcanic soil.

Most of Sicily's topography his hilly to rugged and where ever possible, the land is dominated by ag-riculture. The main part of the site is nearly flat, the high difference between the site and the sea level is about 13 meters, whereas the high differen-ce can be mostly noticed on the seaside.

Figure 38. Main road to the site

Access and infrastructure

The site is placed on the headland of the Sicily. Nowadays the only possible way to reach the place is a dirt road. Furthermore, this road is con¬-nected to the local one called Str. Capo Murro di Porco. The lack of the infrastructure is noticed, because the place is no longer inhabited – histori-cally the lighthouse was lived-in, but simultaneously with the arrival of new technologies it was gradu-ally abandoned. (Young architects competitions, 2016)

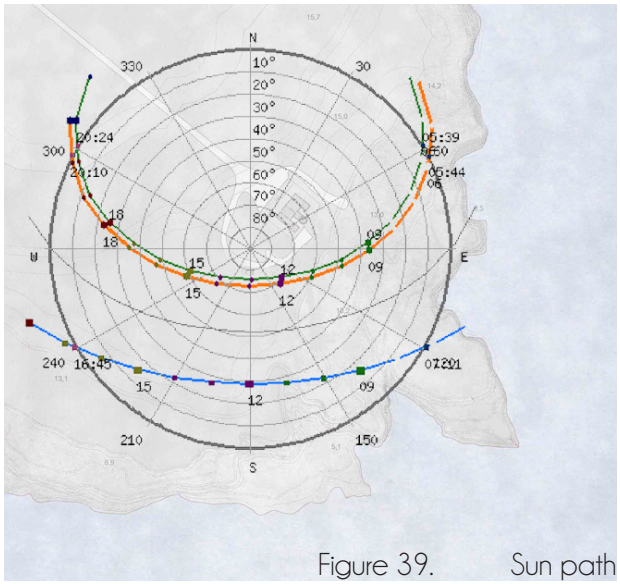


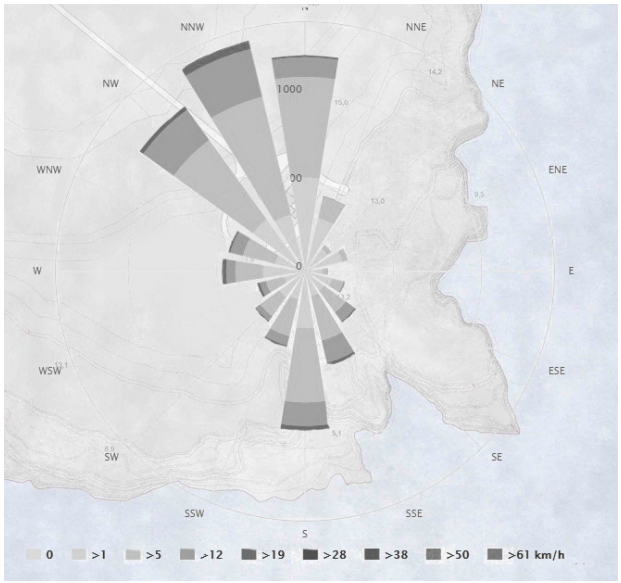
Figure 39. Sun path

Sun path

Mean hours of sunlight is between 3:58 in January and 10:17 July. The longest day of the year is 14:35 long and the shortest day is 9:24 long. As an average, there is 2492 hours of sunlight per year, whereas even 4383 is possible. Almost 60% of daily hours it is sunny.

At midday the sun is on average 52.9° above the horizon.

According to Louis Kahn "Sun never knows how great it is until it hits the side of a building or shines inside the room" [Sørensen, Haug and Garnert, n.d.], therefore the task is to use the sun to create a significant mood inside. Additionally, places hidden from the sun light, with shadows, especially during the summer should be provided, therefore inner courtyards can be considered.



Wind rose

The wind rose shows how many hours per year the wind blows from the indicated direction. For instance: NW: Wind is blowing from North-West (NW) to South-East (NE). The majority of the wind blows from South-East to North-West, and from South to North. The wind speed is mostly from 5 to 20 km/h.

The side is located nearby a coast area, therefore, the wind has a great impact on the climate and temperature.

Figure 40. Nature on sit

Nature

The site is situated in the "Capo Murro di Porco e Penisola di Maddalena" natural reserve, which is one of the most significant and natural are¬as in Sicily. As a result of the protection, valuable ecosystem can be found there: the Crystal clear waters of the Caine river- habitat for rare fish spe-cies, the salt pans of Pirolo, the Monello cave, the Pantalica gorges- with its canyons and prehistoric necro polis. The site is characterized by a steep cliff and harsh vegetation. In Syracuse it is possible to find the most beautiful beaches of Italy, which are characterized by rocky cliffs, solitary bays with fine-sanded bea¬ches and marine caves with exquisite seabeds.
The site is not rich in vegetation, but according to tectonic way of designing, it should not be dramatically changed. Using the rocky advantages and its calm presentation is preferable.

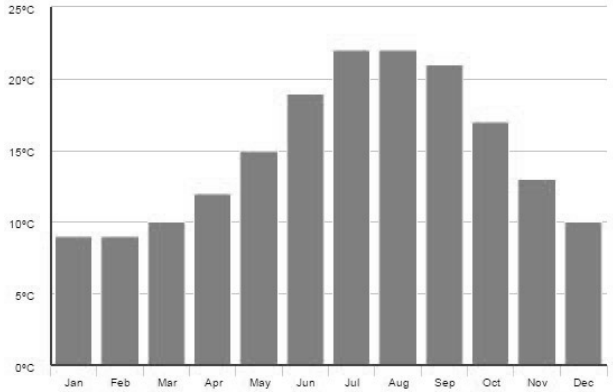


Figure 41. Temperature graph

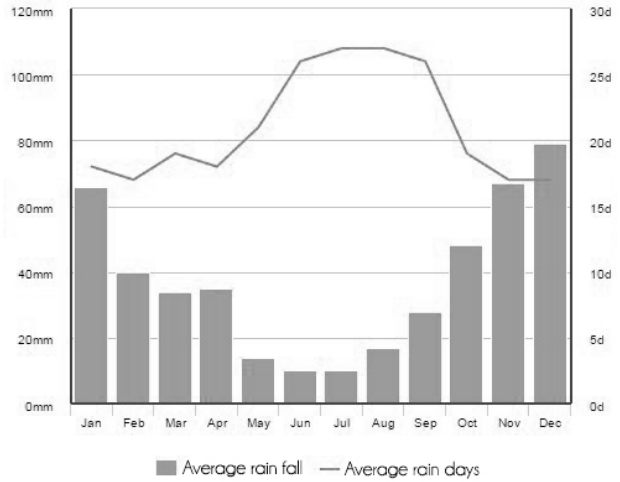


Figure 42. Precipitation graph

Climate

The climate is mild in winter and hot in the summer months. Annual average temperature is about 15 °C. This region is an subject to the influ¬ence of African winds and very hot summers. The warmest month is August, with the average tempe¬rature of 22 °C, whereas the coldest is January, with temperatures averaging 9 °C. Temperatures under 0°C are not noticed.

This region has a long, hot growing season, therefore, agriculture tis the he primary industry. The main agricultural products of the island are oran¬ges, citrons, lemons, almonds, grapes, olives and olive oil.

Since the temperatures are not going beyond 0°C, there is no need to consider ground frost, neither the snowfalls.

Precipitation

The winter months are much rainier, most of the precipitation falls in December, averaging 70 mm. The driest month is July, with 4 mm of rain. About 605 mm of precipitation falls annually. The snow is not noticed here.

It can be assumed, that draining rainwater from the roof must be considered. Therefore, roof angle is required as well as the roof drainage system.

Since the climate is mostly dry during the summertime, additional water ponds can be considered to improve the microclimate, especially in courtyards.

Conclusion

The analyzing process gives several conclusions that influence the design process.

Picturesque views, should be considered, to make the best usage of them.

The integration with the landscape and te scenery should play an important role. There is an existing infrastructure, that should be used and extended in case of needs.

Most of the site area is plain, therefore it does not affect the design.

Climate also influences the design, high temperatures and huge amount of sun hours during the summer time must be considered.

Architecture in Sicily

Sicily is an island with rich history, beautiful architecture and natural elements. Several dominations present on the island have influenced numerous cultural aspect. In order to understand the architecture which is characteristic to the Sicily, rural architecture from XVII to XIX should be analyzed, since it present the most technological, and typological aspect of the building as well as materiality. It can be noticed, that main focus in this building was given to usage of local materials, which can be understood as one of the main sustainable element, that shows the connection between the traditional housing and the climate.

Nowadays only few of this historical buildings are inhabited, most of them are abandoned, since the new technologies has come together with using concrete and providing thousands of new built summer houses.

Historical, vernacular houses were build all around the island, mostly as the houses of the owners of the property connected with cultivations, since majority of the inhabitants were connected with the grape's and wine production.

The common elements of all the buildings were absence of ornaments and simplicity of the structures. Mostly the houses had a compact, geometrical form, with some geometrical decorations made by using different colors of the materials. The only different between the house and the productive part of the building were the number and the frames of the doors and windows.

There are three main groups of the buildings:

- One level building

The simplest type, only one level and rectangular form. On the front there were entrances for the owner, and of the people working with cultivation and of the productive part of the building. All walls were made of lava stones, sometimes in mortar, which creates a heavy stricter. The wooden roof was placed on it, covered by tiles rested.

- House on an embankment

Here the house was placed on an embankment, which used the slope and the landscape to contain the wine cellar. This structure was used mainly in the hilly lands. The building itself had a simple, square form, and a pavilion roof. In the border to embankment there was a terrace, that permitted the entrance to the building.

- Two levels building

This type was build since the middle of the VIII century. It has two levels, the ground floor was organized as the little house, inhabited by people working on plants, additionally there was a wine millstone and a cellar. On the first floor there was a house of the owner, with the balcony all around that, the entrance was realized through the staircase. At the beginning, the balcony had only a functional use as a distributive way, later it transformed to the additional open room of the house.

Figure 43. One level building

Figure 44. House on an embankment

Figure 45. Two levels building

Materiality in Sicily

The main material used was the local one – lava stone. It was used for all the purposes: walls, stairs, frames of the doors and windows, cisterns, wash tubs and seats. Another significant material was the white stone from Syracuse, more expensive than a lava, so used by the reaches families. The geometrical decorations on the facades were made by white and black stones. In order to provide better impermeability, the buildings were plastered with the mix of local earth and lime. Another significant material was wood, used for doors, staircases, windows, balconies, as well as for the structures and floors. When the price of the wood raised, it was replaced by the iron. Traditional Sicilian iron craft was famous in XIX century, can be found especially in railings and gates. Furthermore, the iron was used also as a structural element for roofs and reinforced walls. Additionally, backed clay was used for roof tiles, gutters and tiles for the floor.

Traditional construction

There was several different methods for using the lava stones. Simple dry-stone wall with natural pieces can be found as well as perfectly squared stones linked with mortar. The thickness of the walls was about 50-90 centimeters. Wooden scaffolds were used to build them. Lime was expensive, therefore poor people were using dry-stone walls, whereas the richer ones had houses mad of cut lava stones and mortar.

It is important to notice that the buildings were places in Etna's area, so buildings has to resist seismic activity. Therefore, the best stones were used for the corners of the building, but in many cases the dry-stone houses were to wick to survive, so they had to be rebuilt after the earthquake. In order to provide a better static resistance, lava stones foundations were added, with a depth about 90 centimeters. Additional improvement were made by adding iron chains.

Roofs were based on wooden structure, with the tiles directly on the construction. In the two floors buildings wooden beam floors were created. From XIX century vaults were made of pumice stone. As a way to divide the building and organize rooms, wooden frames covered of canes and then plastered were used. (Caltabiano, 2006)

Figure 46. Traditional buildings

Figure 47. Traditional buildings

Figure 48. Traditional buildings

Vision

The complex takes departure from the guidelines derived from theoretical research. It is desired to design a spa and hotel complex based on the idea of modularity. It stays with a close connection to the idea of minimalism, where the modularity, prefabrication and repeatability is favored.

A complex of modules should rise out of the rough stone ground. It is desired for the building design to have a simple expression, in order to be a part of the landscape, not the dominant. The complex should relate to the picturesque site and its context in a humble and respectful way.

The modules should be organized in a complex in a manner that provides a possibility to create semi-private outdoor spaces, evokes the intimacy and social functionalism similar to the Mediterranean traditional townscapes. Additionally, the plan should be considered in a manner to provide a shelter from the sun. Moving from the inside to the outside should be freely.

It is desired to achieve significant atmosphere inside the building. The design philosophy is to provide priva¬cy, quietness, and a unique experience for those who are visiting the SPA complex. It is intended to create connection with the surroundings, especially with the nature. Bringing the nature in, not only with the views but also with materials is favorable. Significant focus should be placed on views, materiality and light.

Fol¬lowing the Japanese tradition the idea is to create spaces far away from being cluttered or crumped. The main focus is to let the beauty calm colors and wood pieces bounce and reflect the natural light. Furthermore, using the natural light to create the atmosphere and the mood should be crucial. Mindful design of the artificial light is also of the high importance, since it has a significant impact on the mood.

The design of each module should be based on ergonomic, technical and visual aspects. Therefore it is crucial to analyze all the necessary functions and furthermore provide them an approp¬riate space.

According to the tectonic approach construction and structure should complement and strengthen each other. It is desired to focus on de¬tailing, especially on the way of joining the modules.

Based on the gained knowledge and the design guidelines, the design process should be based on finding the core, the most essential parts of the building. As a result the piece of architec¬ture should gain the timeless character and pure aesthetic.

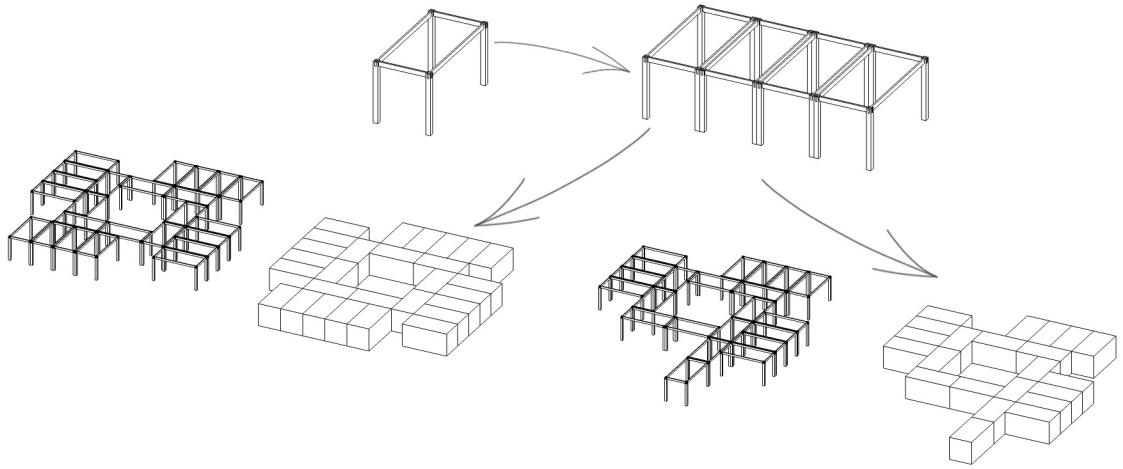


Figure 49. Vision of modularity

Concept

Following the idea of prefabrication and Japanese building techniques, it is desired that the whole construction of the module would is based on the columns and beams. Wall panels are additional, the purpose of them is not to follow the forces but to create and divide the inner space. The idea of creating independent modules will give a possibility to create a flexible design, possibility to combine the elements in different configurations according to the needs, sizes of the site or lands-cape. Basic modules will be designed, based on the ergonomic and the knowledge gained from the graphs.

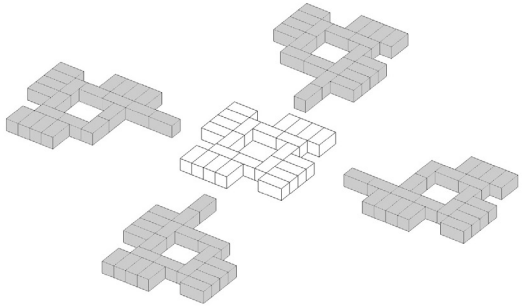
In order to humbly follow the landscape, natural colors and materials will be used.

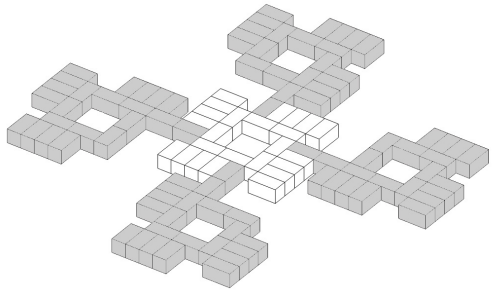
The contact with the inner space and the nature and surroundings may be achieving by using spacious glazing areas and providing the indoor gardens and courtyards. Additionally the outdoor utility surfaces will be de¬signed to provide the better contact with the na¬ture, for instance the places for the yoga outdoor classes or as an extension to the restaurant. The scheme of the modules should be based around a series of inner courtyards, providing a semi-private space.

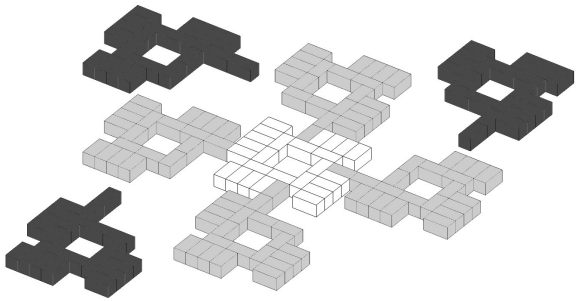
Following the idea that structure and construction strengthen each other, several loops will be taken in order to achieve result that ties both – functionality, ideology and aesthetic with the technical and construction demands.

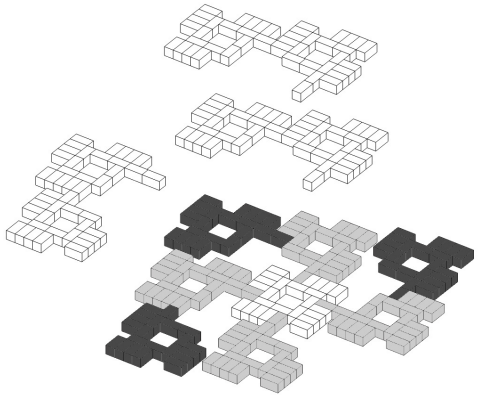
When designing the complex, individual modules will be gathered to create a bigger clusters.

Furthermore the clusters will be organized in a whole design, which according to the additive ideology, can be further developed.









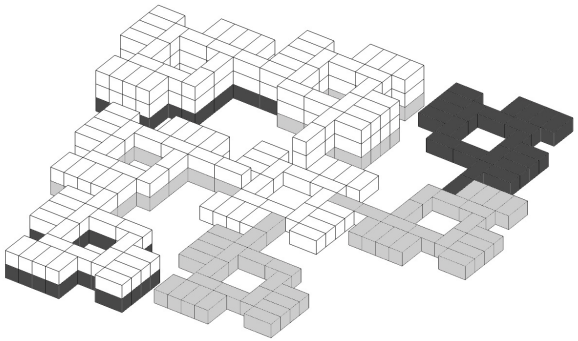


Figure 50. Modularity concept

Chapter II

Presentation

One of the main ideas when developing a master plan was to use existing paths. One of them was extended an finished with a small parking for the disabled people. Regular parking was not further developed in order not to destroy the natural surface. Parking is allowed in the vicinity of the building, as well as close to the roads and paths.

Building was paced to be parallel to the existing lighthouse. Additionally the point was to avoid the entirely South façade, as a result the South-West and South-East was designed, to hide the building from the strong, direct sun through the windows.

Figure 51. Master plan

Organization of the floor plan is based on the room program and room scheme. People flow was considered with dividing people to the: beauty salon guests, yoga class guest, hotel guests and people who came to the restaurant. Additional entrances for technical rooms and storage were considered. Evacuation plan was also provided.

Second floor is only fulfilled with the hotel rooms.

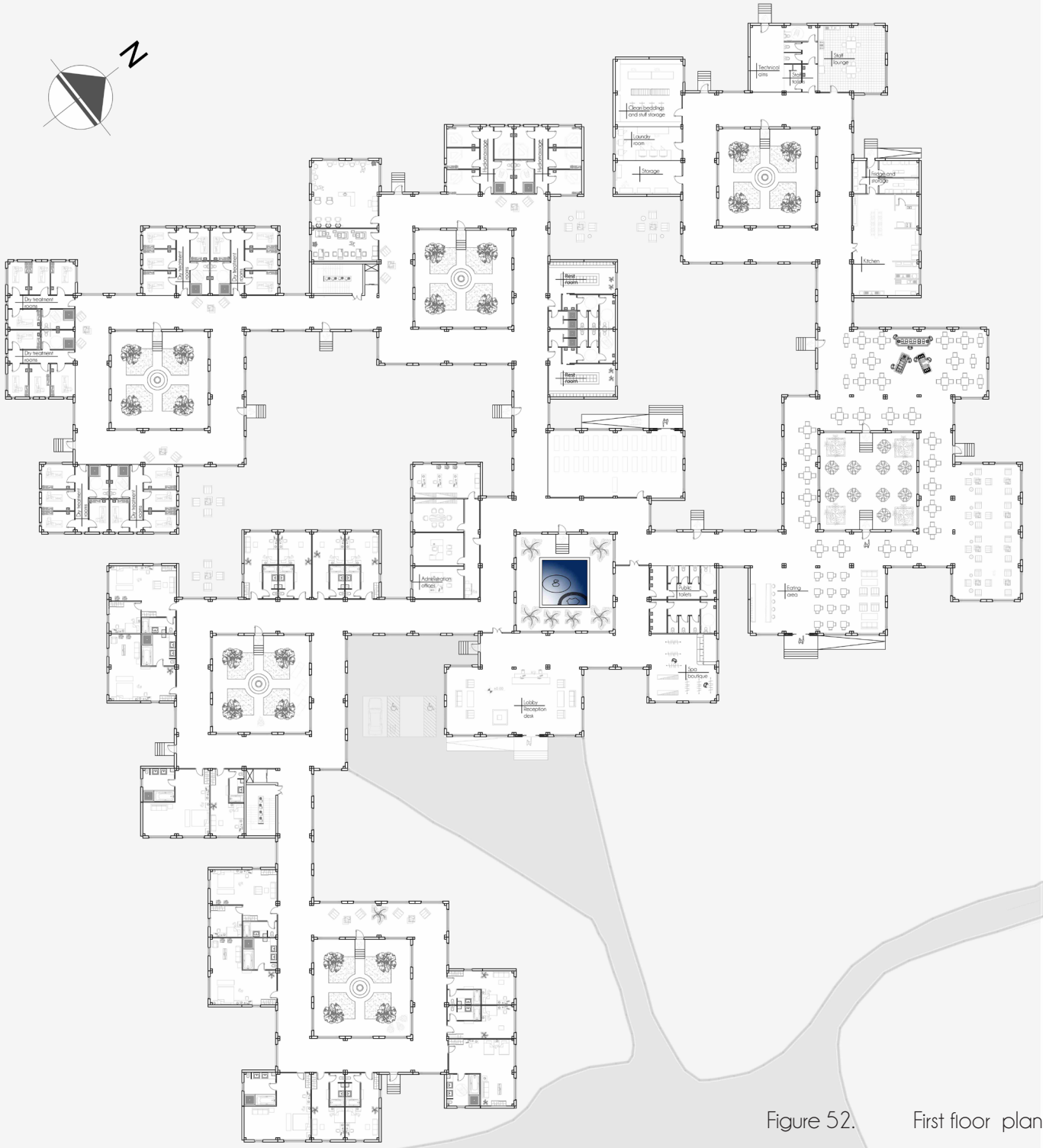


Figure 52. First floor plan

Public spaces:

Lobby and Reception desk - 204 m2
Spa boutique - 68 m2
Eating area – 680 m2
Administration offices – 136 m2
Public toilets – 68 m2

Health and beauty:
Rest rooms – 68 m2 m2
Dry treatment rooms – 408 m2
Hydromassage – 136 m2
Treatment waiting areas - 5x30 – 150 m2
Yoga studio – 136 m2

Accommodation:
Single rooms 32x34 – 1088 m2
Double rooms – 15x70 – 1050 m2
Family apartments – 70x5 - 350 m2
Twin rooms – 70x4 – 280 m2

Back of the house:
Laundry room – 34 m2
Staff toilets 34 m2
Staff lounge – 68 m2
Storage – 34 m2
Technical aims – 34 m2
Clean beddings and stuff storage – 68 m2
Kitchen – 102 m2
Fridge and storage 34 m2

Total (together with communication): 5236 m2

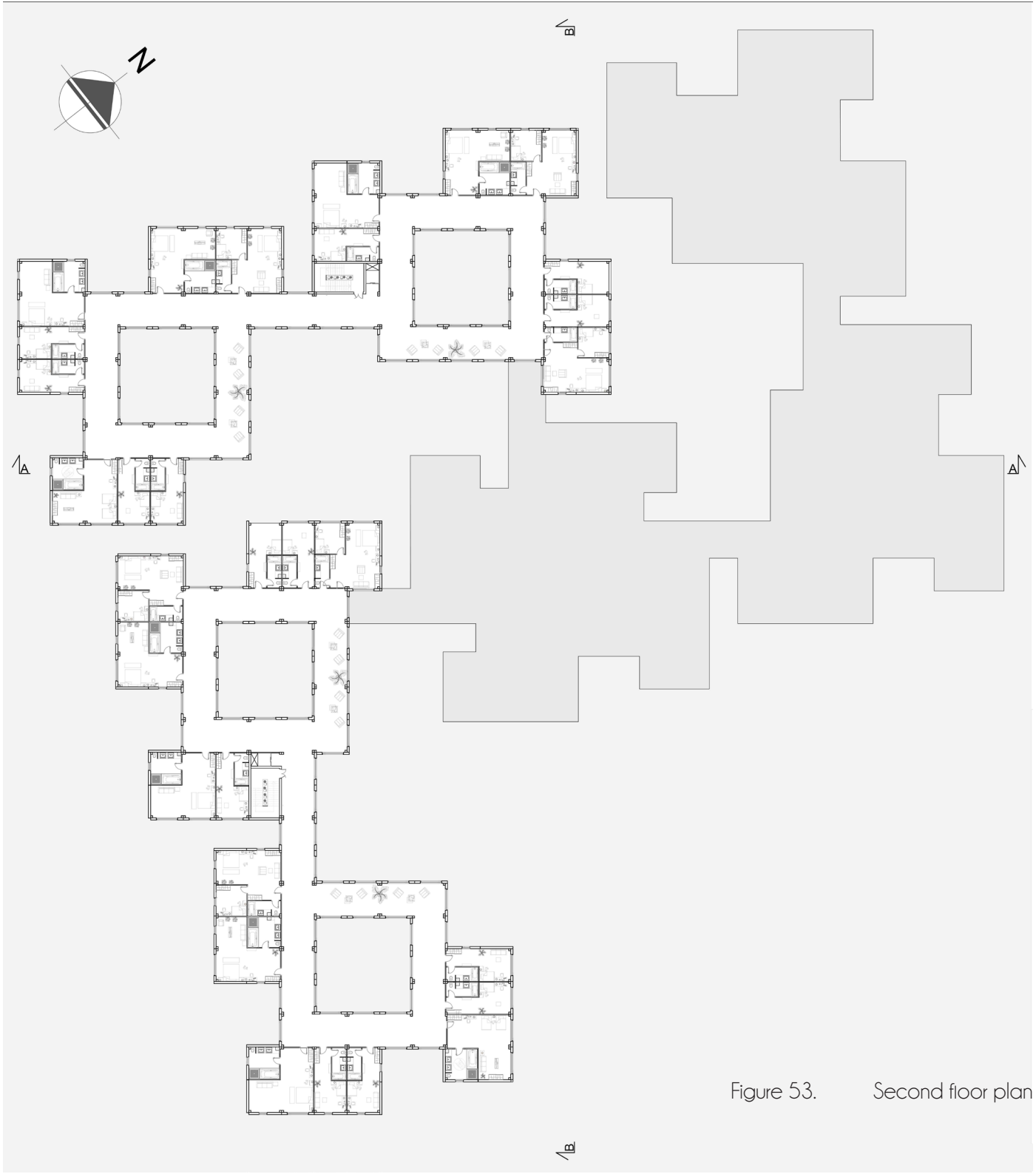
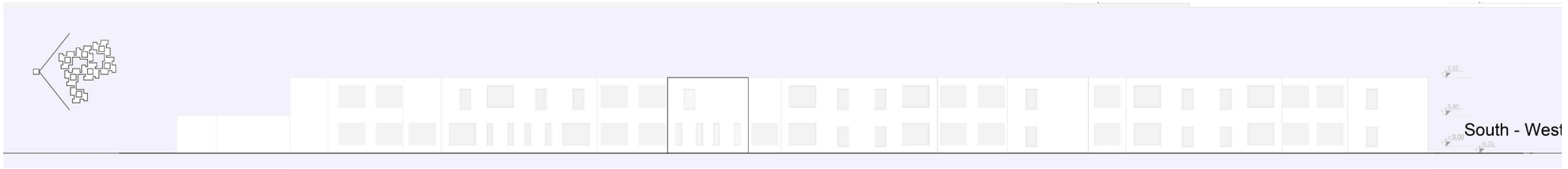


Figure 53. Second floor plan



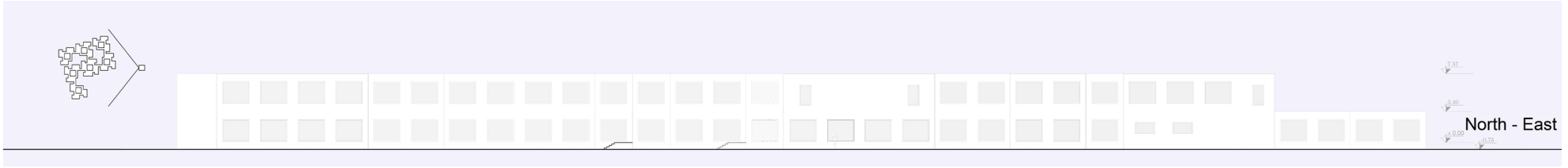


Figure 54. Elevations

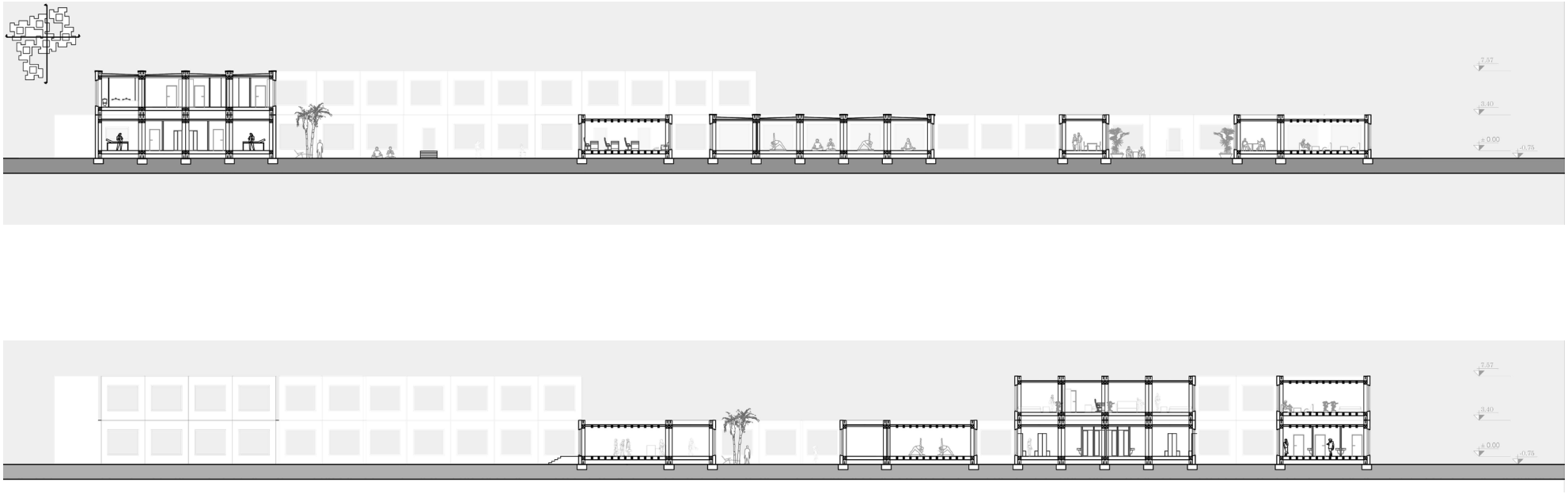


Figure 55. Sections

Figure 56. Render - relation to the lighthouse

Figure 57. Render - view from the entrance

Figure 58. Render - hotel lobby

Figure 59. Render - hotel room

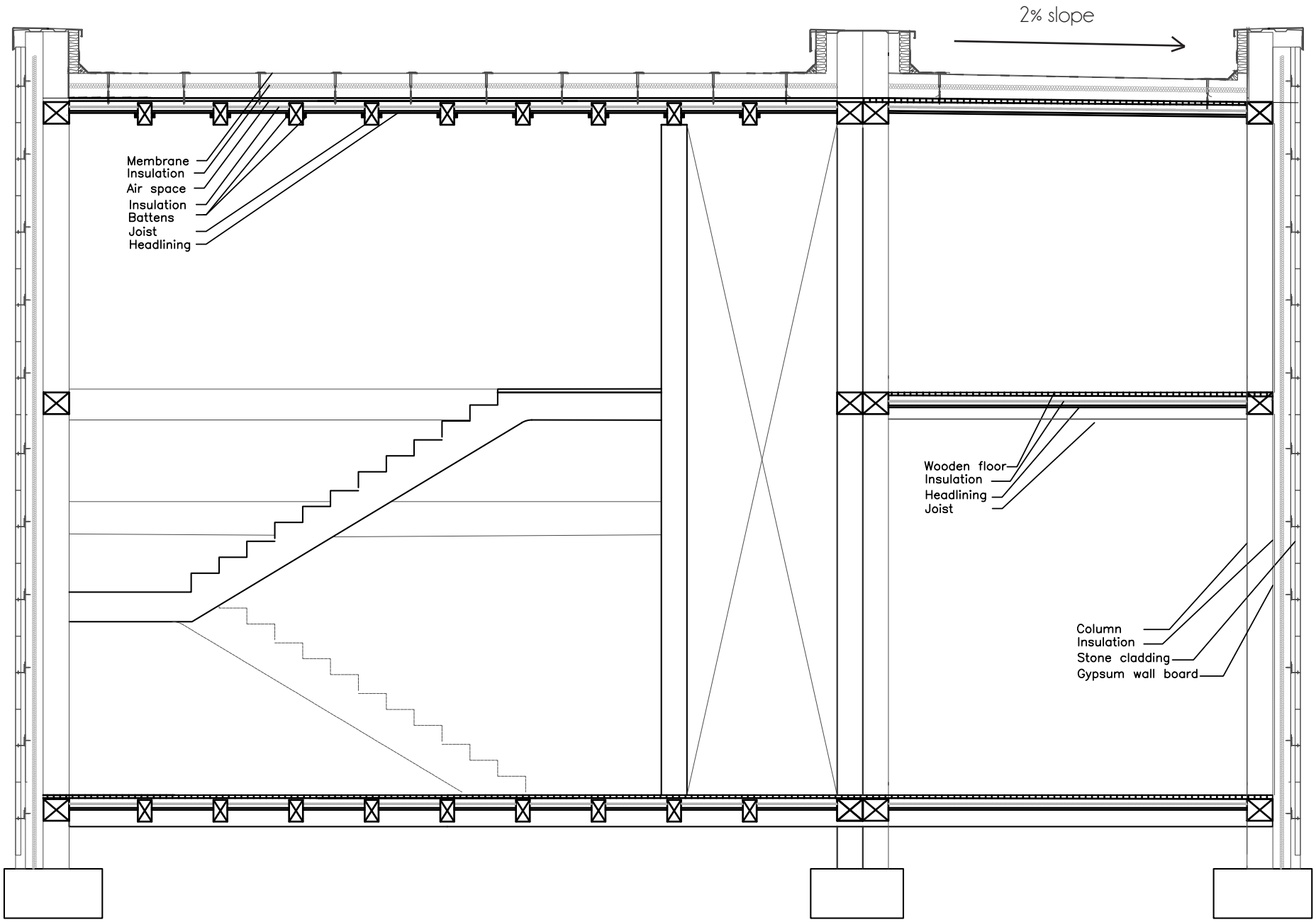


Figure 60. Technical drawing – Technical drawing – section with the details

The modules was deeply detailed in order to tie both – theoretical knowledge and idea with the technical knowledge.

All drawings in a bigger scale can be find in the additional folder attached to the report.

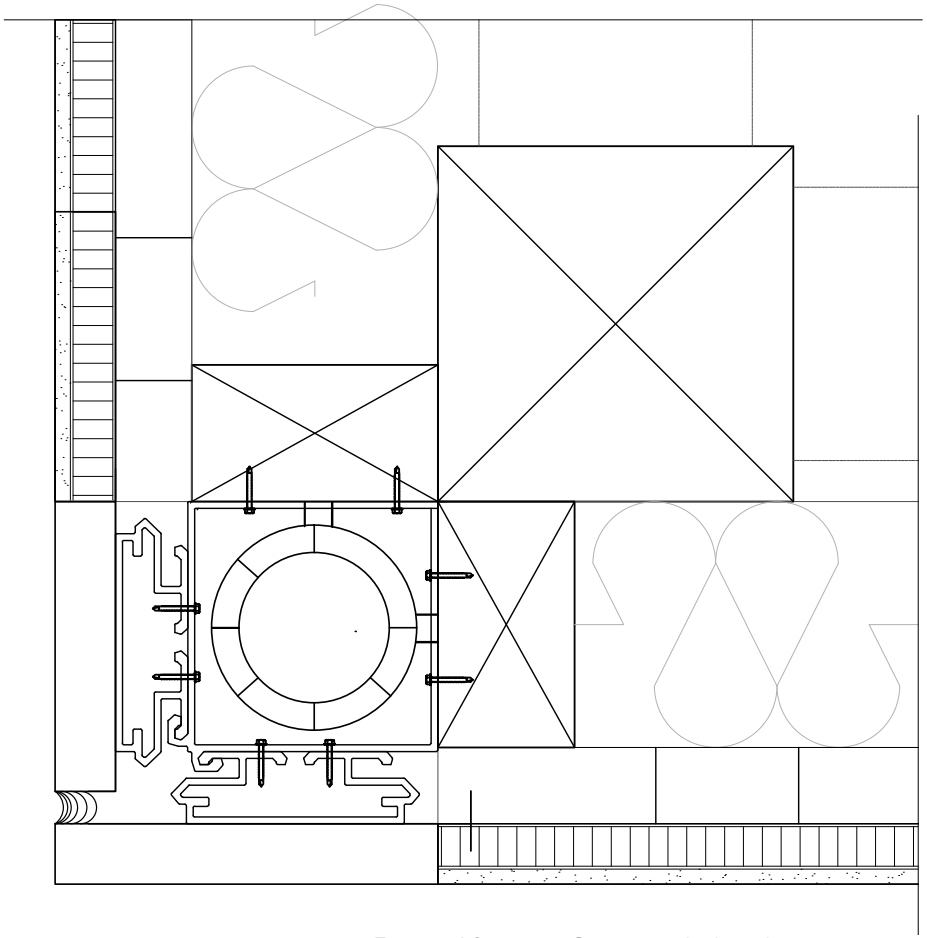


Figure 62. Corner with the drainage system.

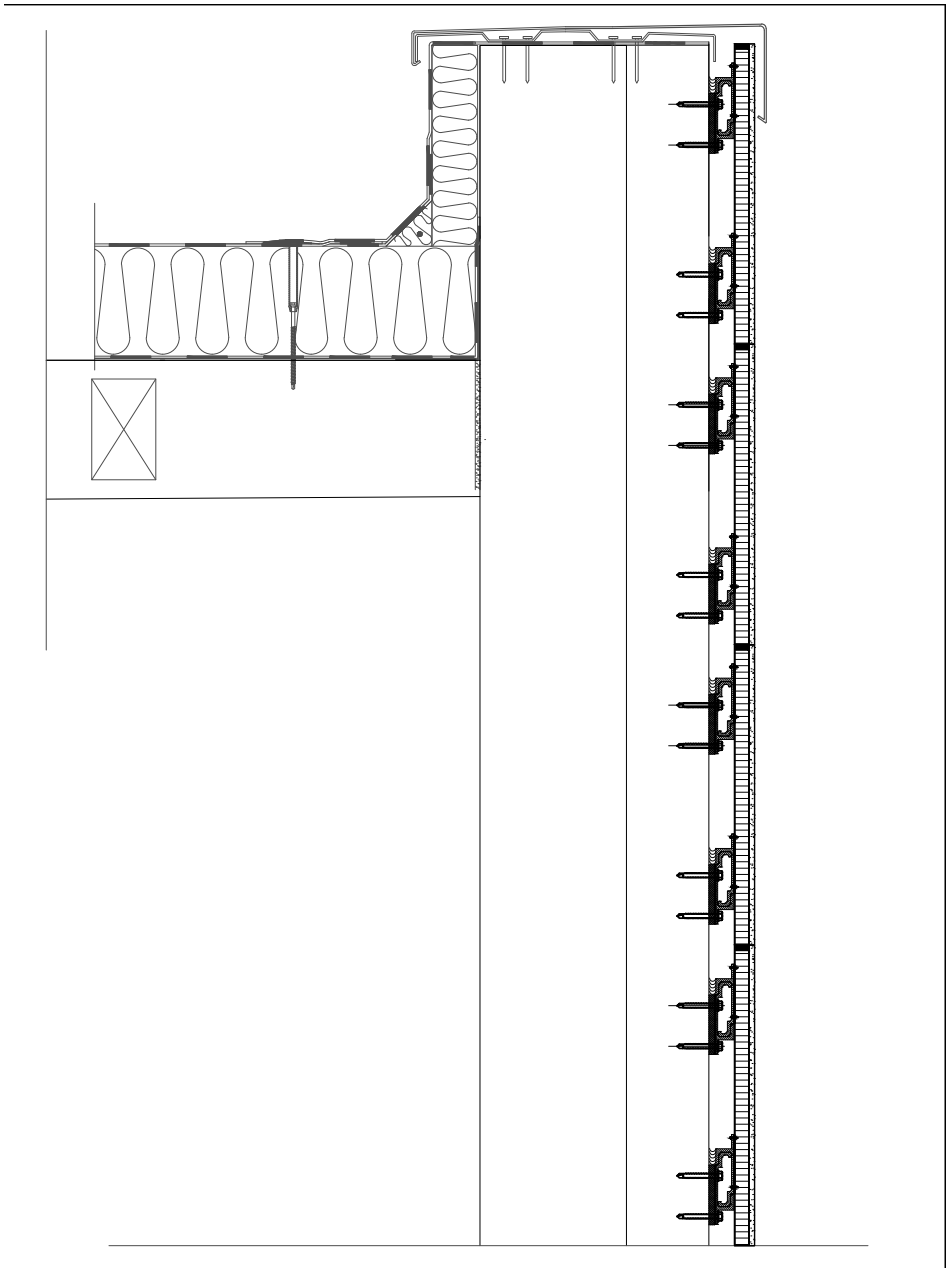


Figure 61. Technical drawing – Technical drawing – section with the details

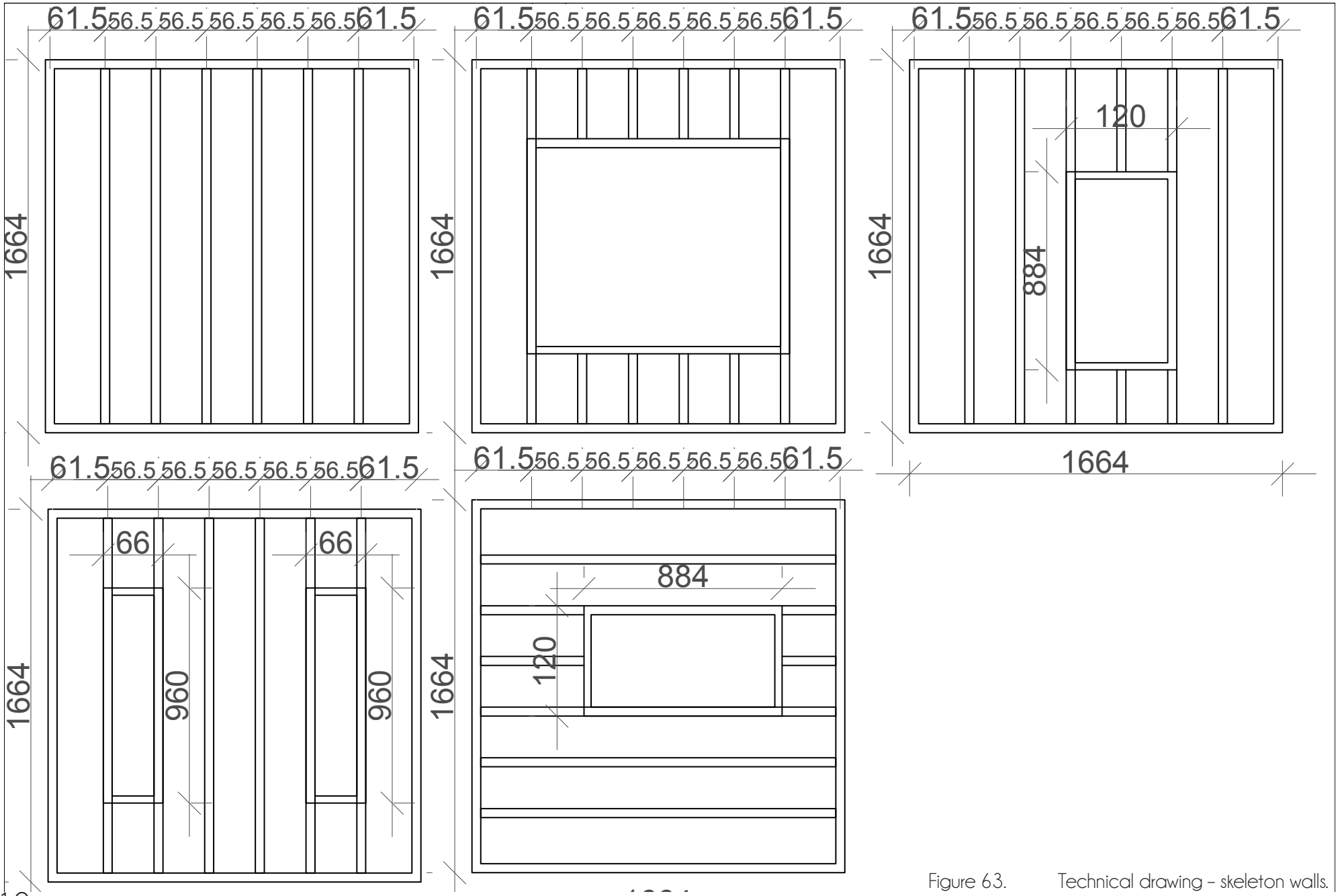


Figure 63. Technical drawing – skeleton walls.

Materiality

Several different cladding options were taken into consideration as a finishing. Traditionally, in the vernacular buildings in Sicily mostly lava stone were used, or the white stone from Syracuse.

Firstly, the idea was tro use the lava stone imitation, as a connection to the surroudings and the tradition. Furthermore the idea was abandoned – the building became to similar to the site. Additionally using "imitations" – lava stones in ready-made cladding plates, can be assumed as atectonic.

Figure 64. Stone cladding

Figure 65. Stone cladding

Figure 66. Cladding on the building

Figure 67. Cladding on the building

Figure 68. Cladding on the building

As a result, white plain cladding was choosen. As a result, the building is visible on the site, but in the same time it is not intrusive. Contrast can be seen in surface – rocky landscape and plain cladding.

White cladding fulfill the minimalist idea about the colors. Additionally in modern buildings on Sicily, mostly this kind of finishing is noticed, therefore the design will not be outstanding.

Evacuation scheme

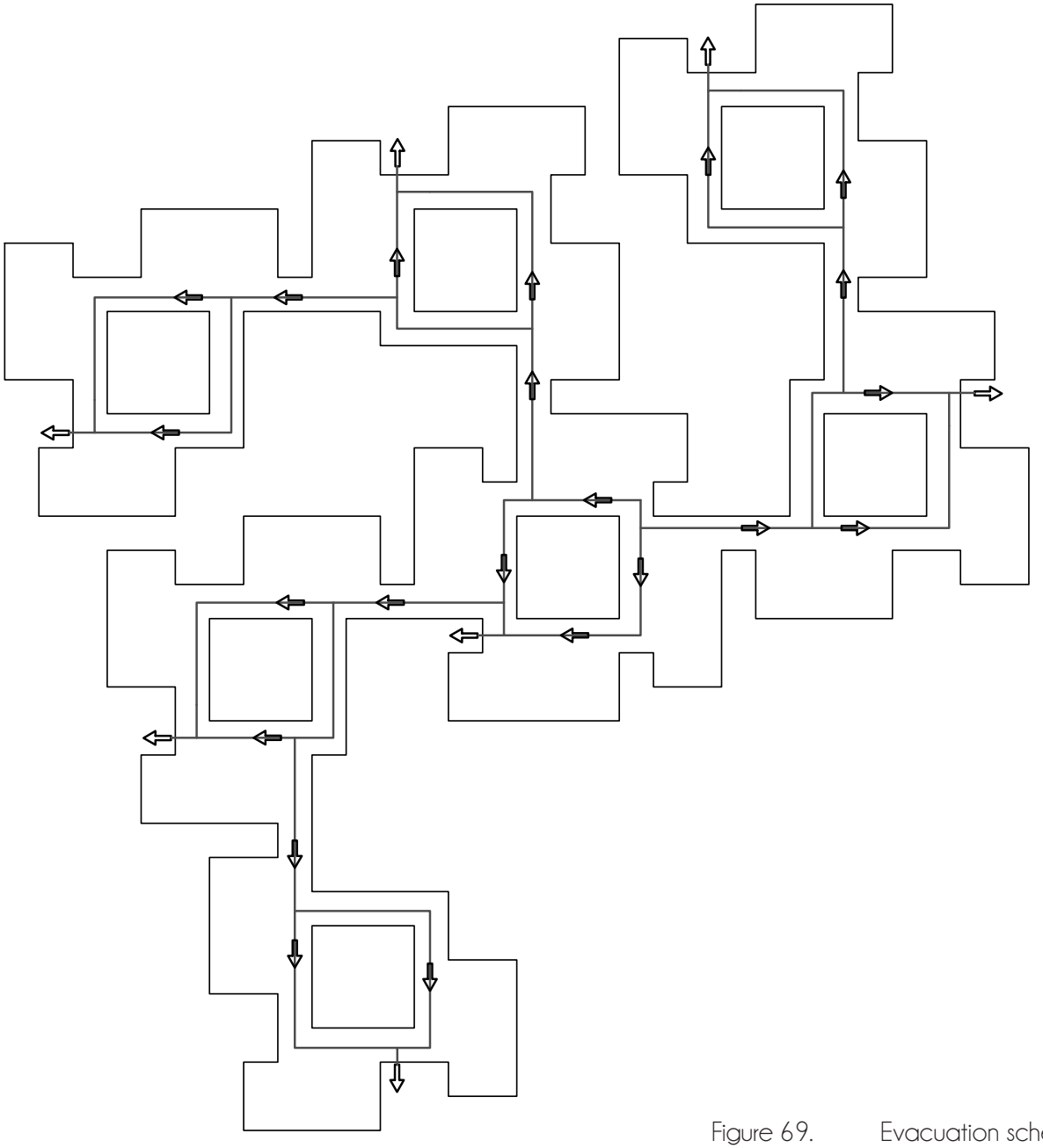


Figure 69. Evacuation scheme

Roof - rain drainage system

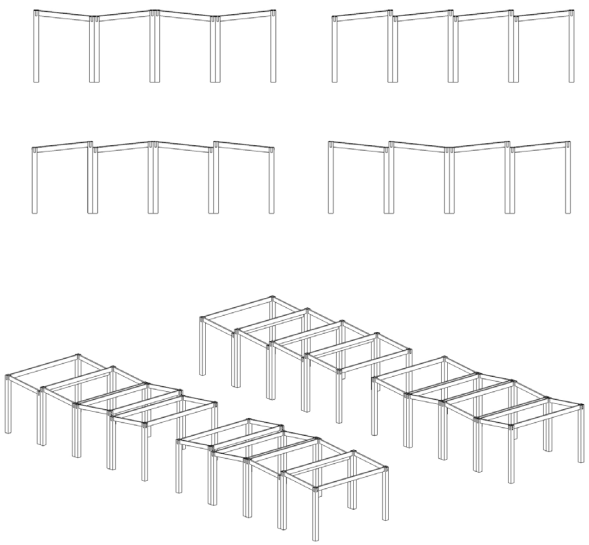


Figure 71. Roof slope possibilities.

Some corners of the buildings which are not fulfilled with the modular walls was used for placing gutters. Detailed drawing can be found as - corner with the drainage system. Corners designed in that way were shown in the circles on the rain drainage scheme.

2% slope for the flat roofs were designed.

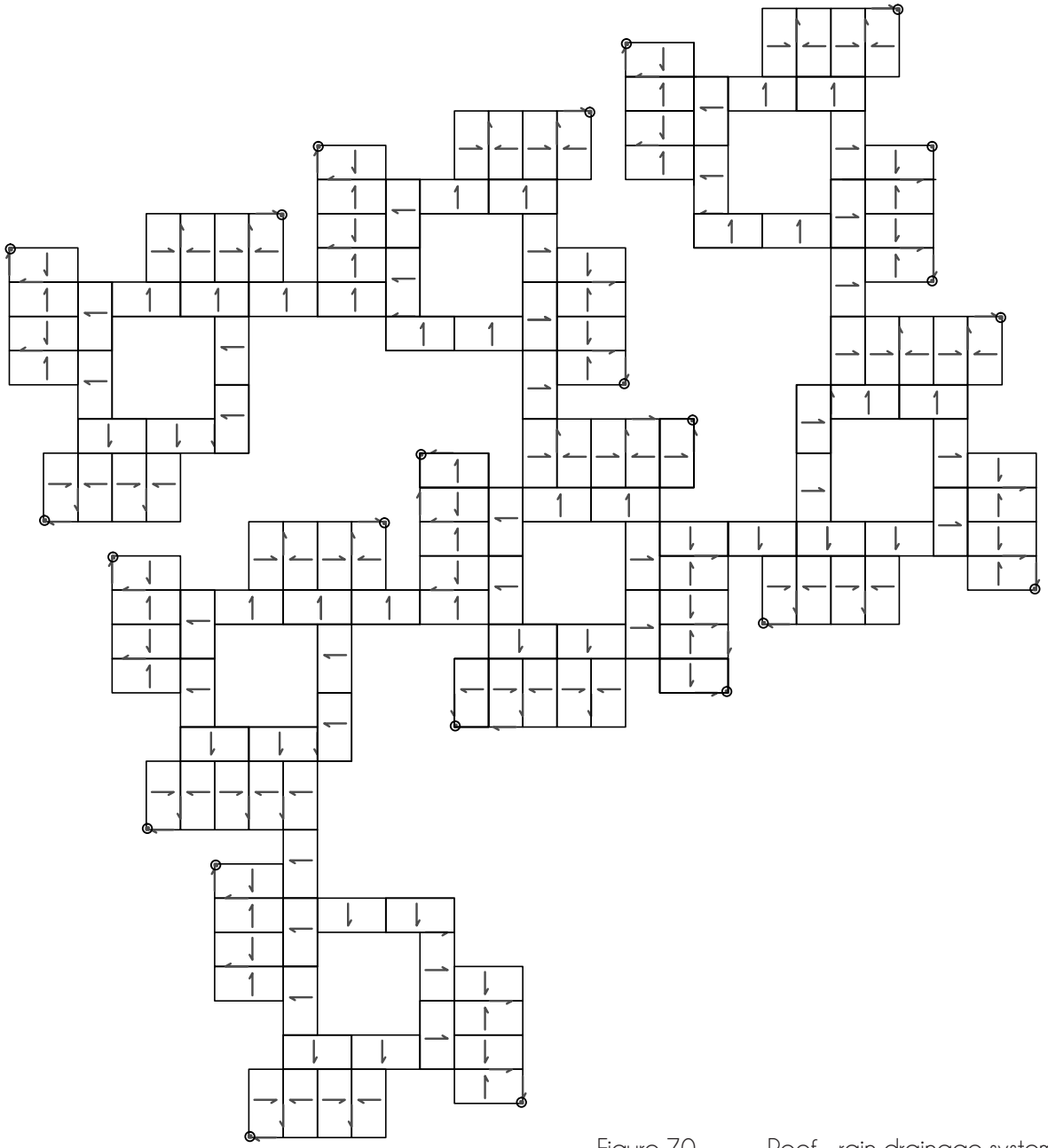


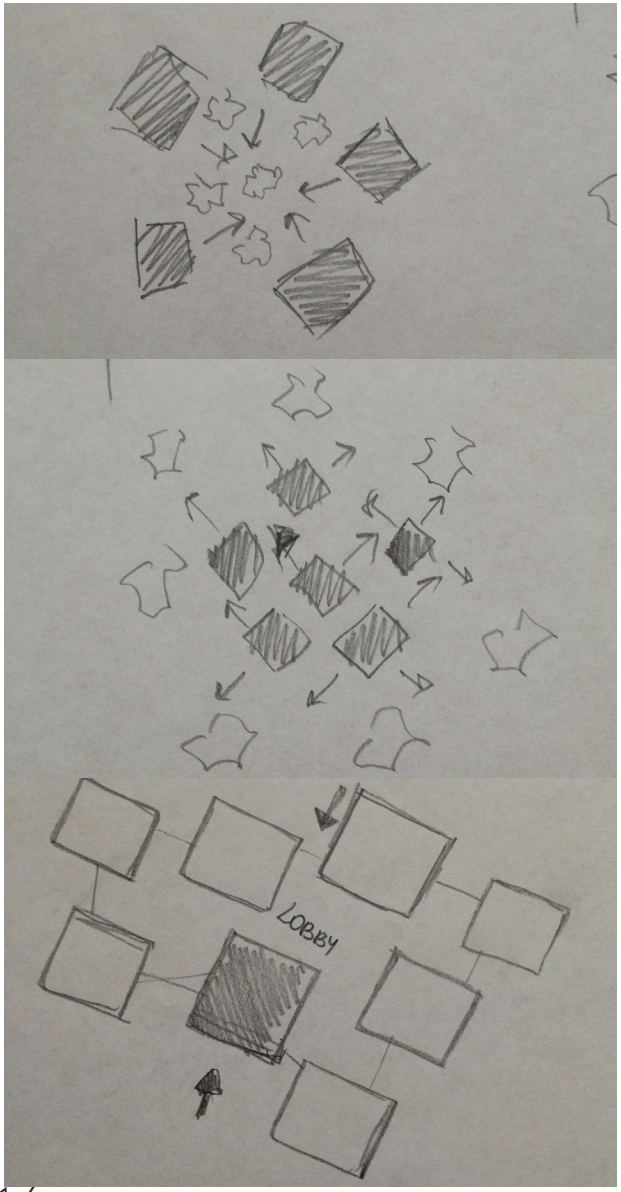
Figure 70. Roof - rain drainage system

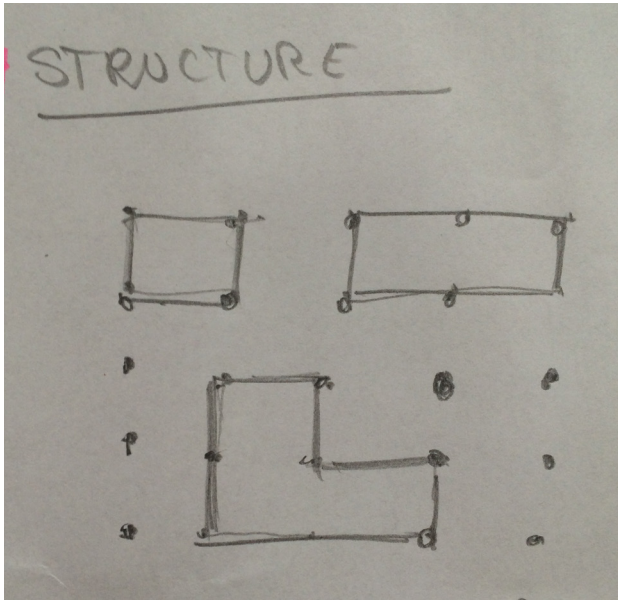
Chapter III

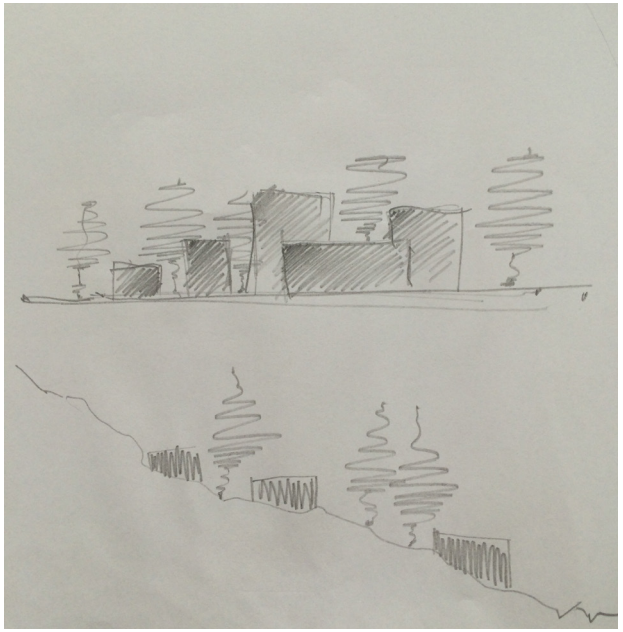
Design Process

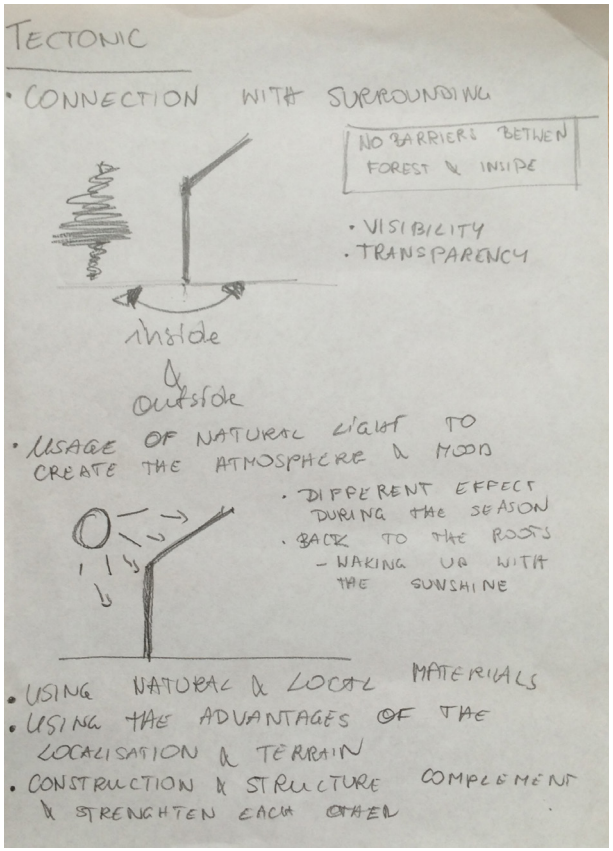
Idea sketches

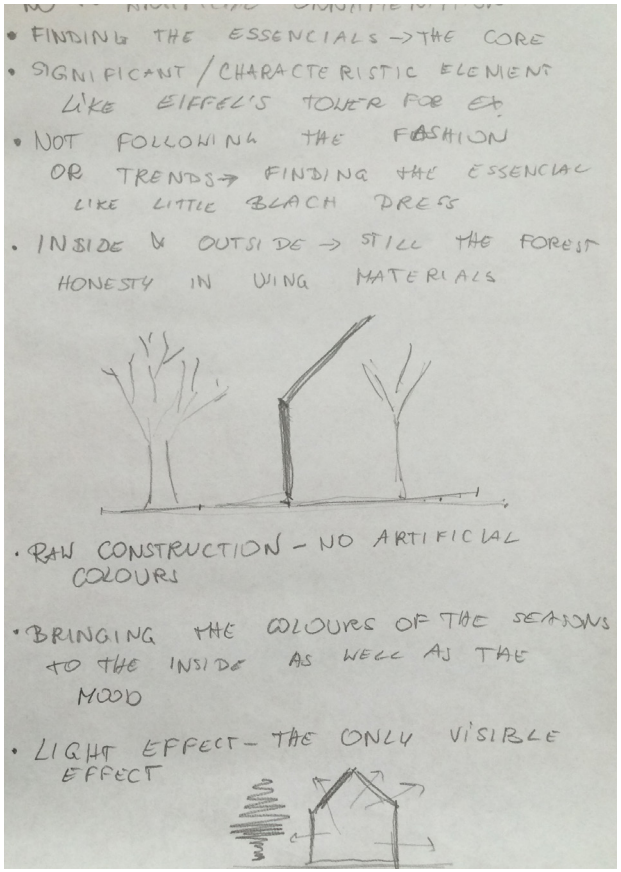
Initial ideas were hand drown, they captured the main ideas of the new design.

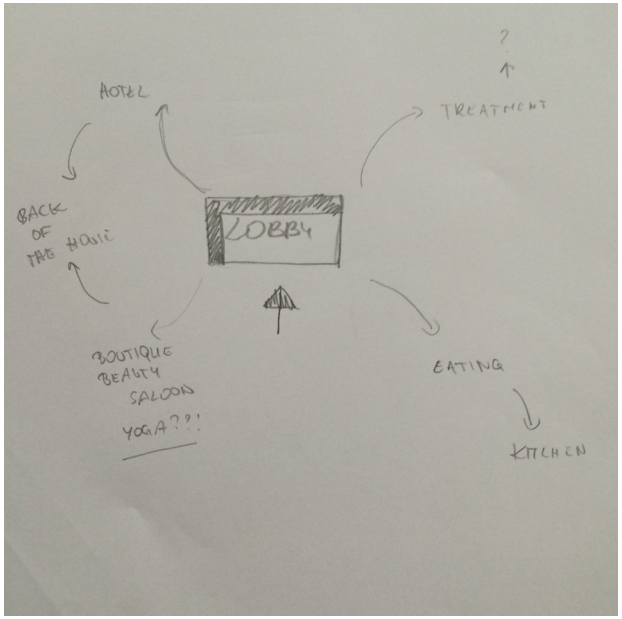


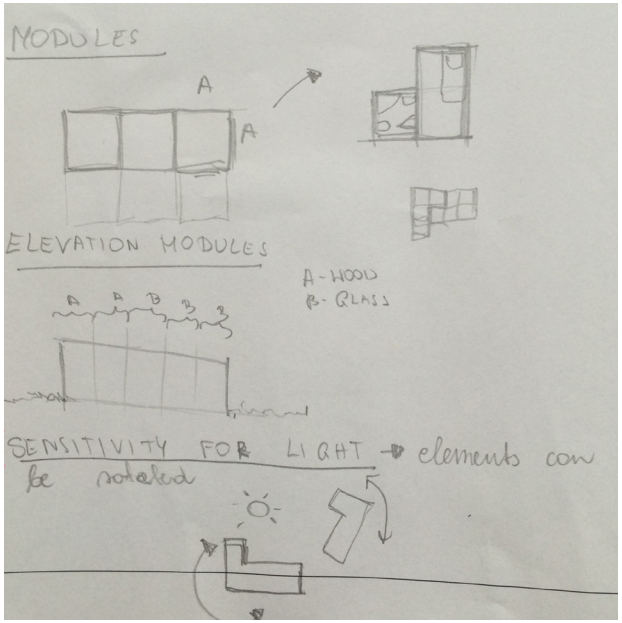












From the very beginning it was desired to have a strong connection with the site, with nature and the views. Furthermore, regular construction based on some created rule was desired. As an answer for this question it was decided to create a modular design, based on repetitive construction. The main point here was to decrease the amount of different elements as much as possible. Therefore the "looking for a perfect module" process has begun.

Modules idea

Firstly, in order to follow the idea of modules, it was decided to create "boxes" 3x3x3 meters.

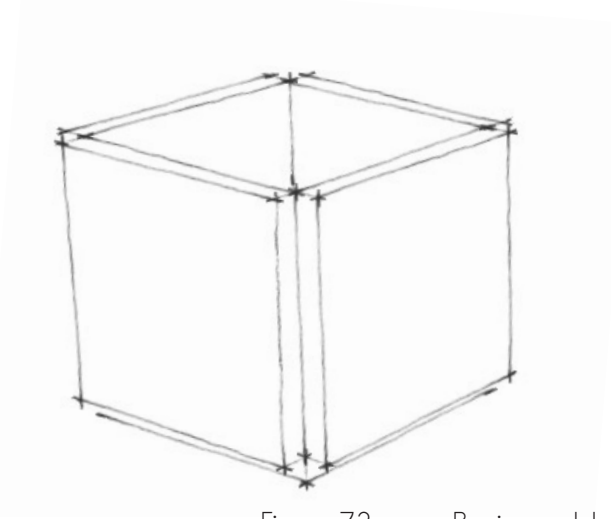


Figure 72. Basic module

Furthermore, several experiments were made to find the way to create more spatial rooms. Therefore, the boxes started to be put together as a building blocks.

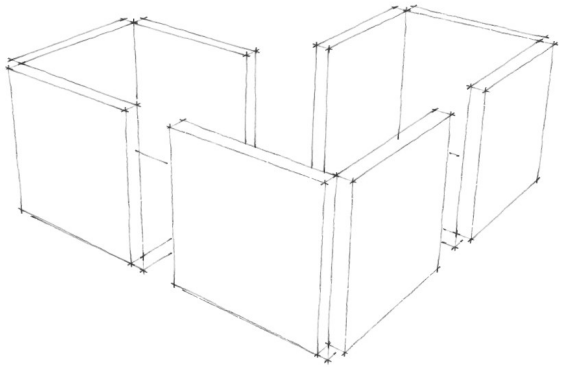


Figure 73. Modules' connection

It was desired to create the possibility to work not only with one plane, but also to create additional floors.

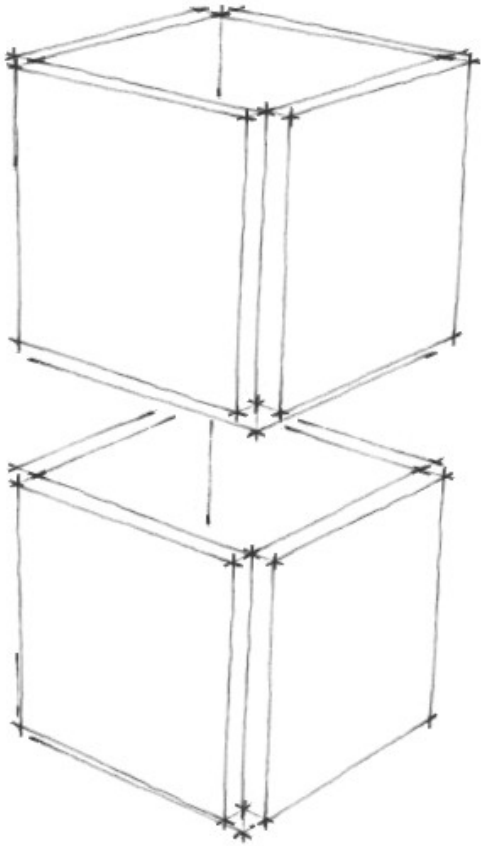


Figure 74. Modules' connection

One of the biggest minuses of this solution was that it was necessary to create numerous different modules, according to the needs: with 4 walls, with just 2 or 3 walls. There is also a necessity to have different types of walls: interior, exterior, plain, with doors, with different windows etc.

As a next step, it was desired to create more flexible modules, therefore frames with removable floors and walls were designed.

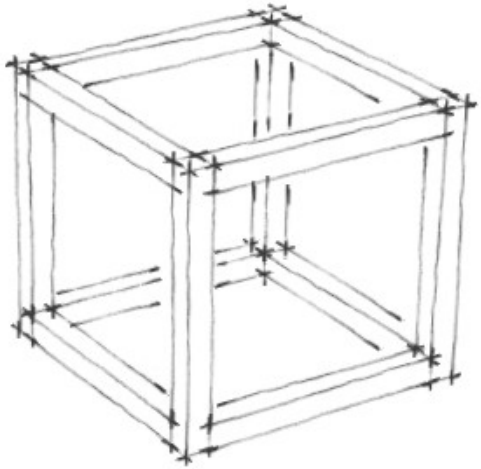


Figure 75. Basic structure

The idea of joining the modules was further developed. It was assumed that in order not to double the construction elements not all the modules need all the beams and pillars.

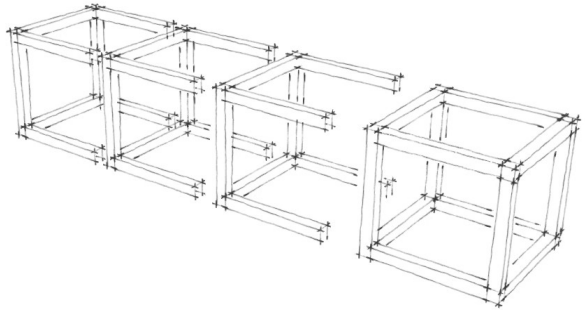


Figure 76. Structure connection

It was assumed that different types of elements are needed:

1. Interior walls:
   - With doors
   - Without doors

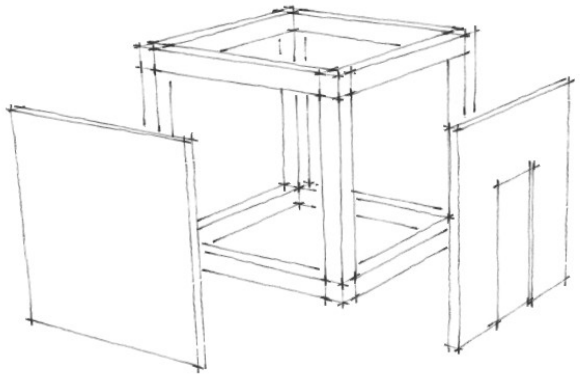


Figure 77. Module elements

2. Exterior walls:
   - With doors
   - Plain
   - With big glazing
   - With small window

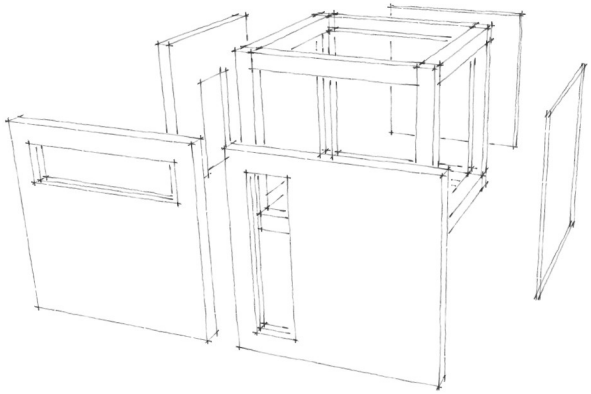


Figure 78. Module elements

3. Floors:
   - Ground floor
   - Floors between the floors
   - Roof

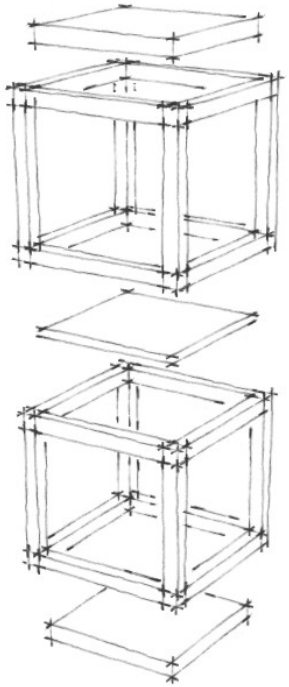


Figure 79. Module elements

Since it is possible to achieve the span of 6 meters, as a next step it was decided to create bigger spaces with abandoning not necessary elements.

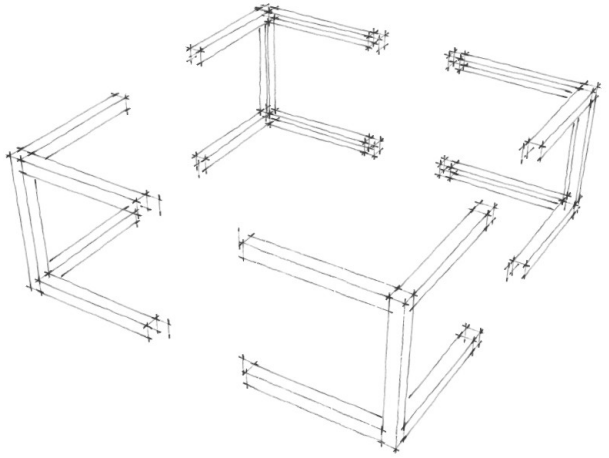


Figure 80. Construction development

Created frames can be fulfilled with the floor and walls elements.

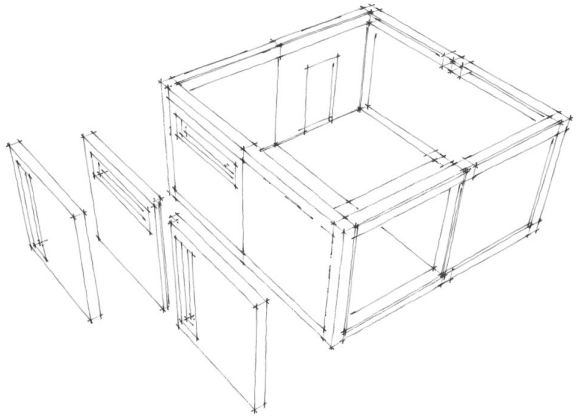


Figure 81. Construction development

It is possible to join the frames to create more than one floor. Once again – non crucial elements can be reduced.

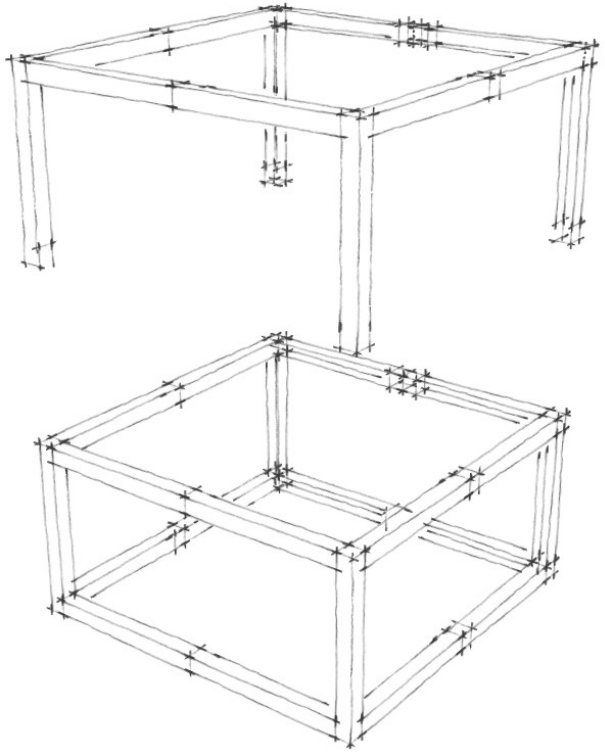


Figure 82. Structure connection

As a next step the stair case was created and fitted into the design.

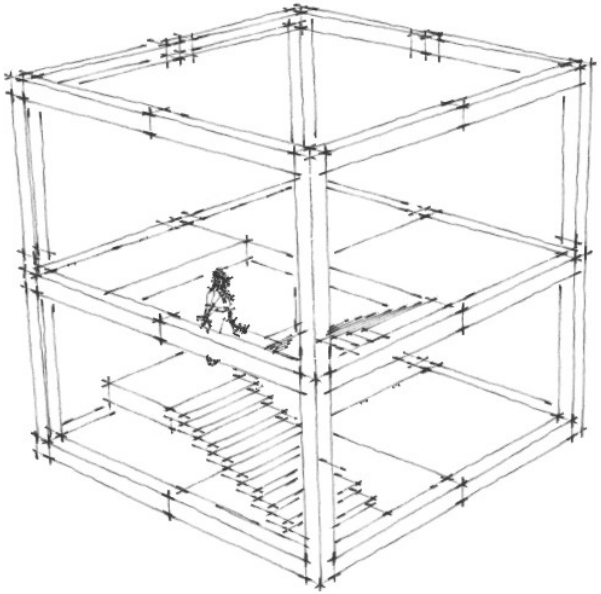


Figure 83. Stairs

As a next step the stair case was created and fitted into the design.

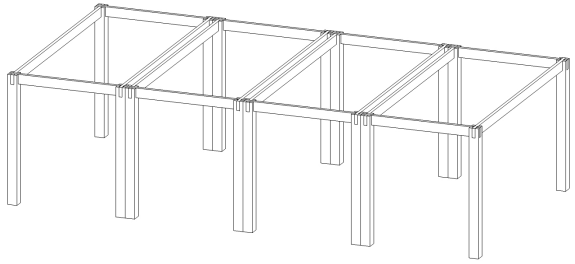


Figure 84. Double columns

When connecting the modules horizontally, double column will appear. Therefore as a next step, inspired by Sol LeWitt and his Incomplete Open Cubes, several configurations were created in order to explore possibilities of avoiding double columns.

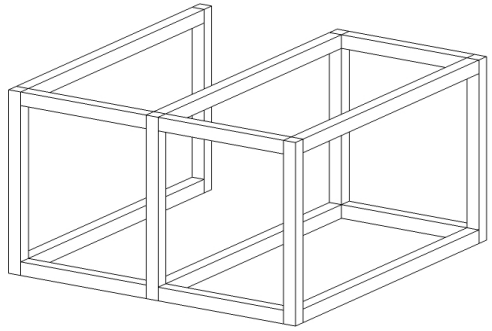
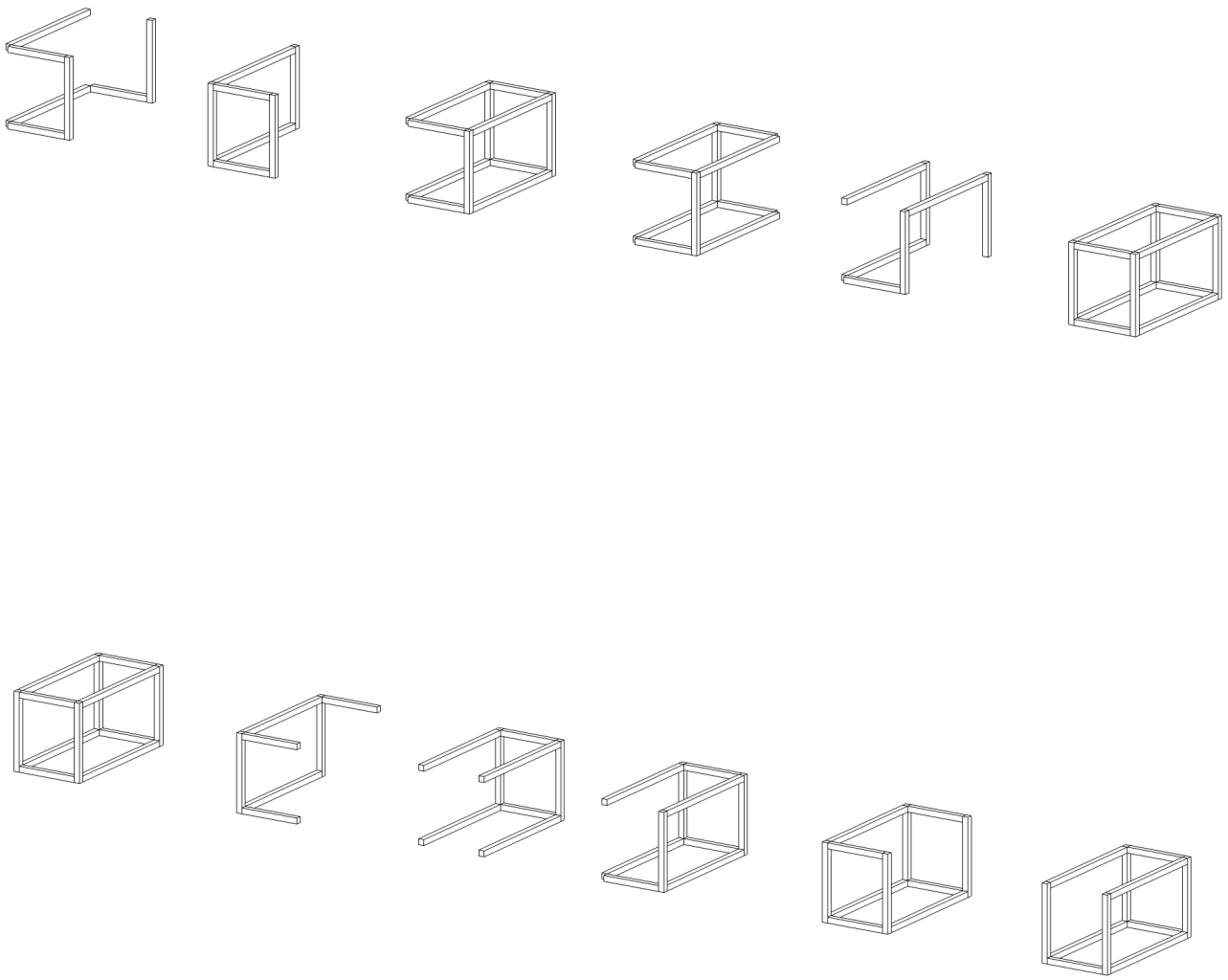


Figure 85. Sol LeWitt experiment

The experiment was not further developed, since the modules were assumed as not being self-sufficient. Additionally, in that case the number of modules grew significantly, which is not desired for the design.



As a next step, the module was further developed as cuboid construction, made of timber. Inspired by the Japanese traditional architecture – all load are caring by the construction, there are no barring walls – the walls have only a function of creating shelter and dividing space.

Figure 86. Sol LeWitt experiment

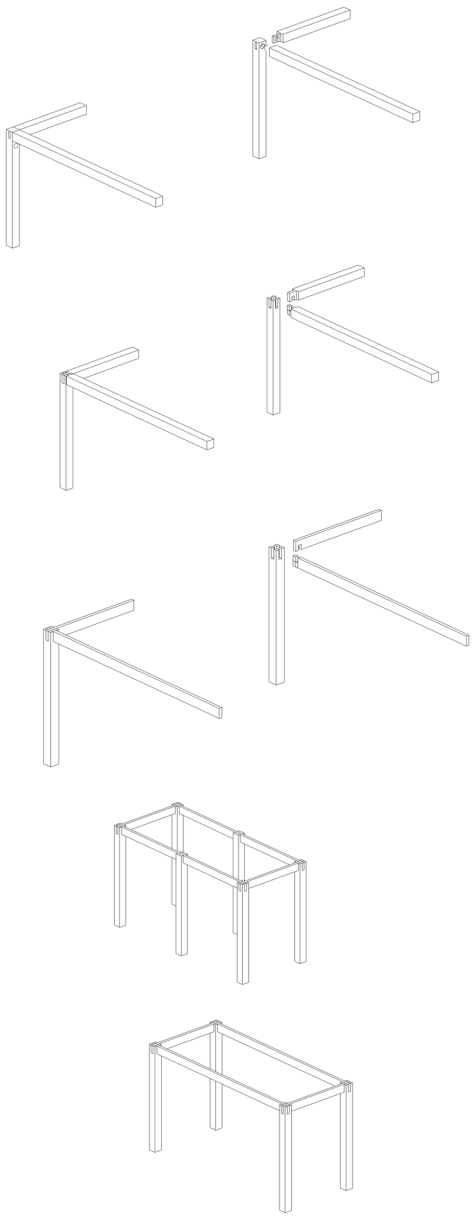


Figure 87. Joint detailing

According to the created guidelines, joint is one of the main focus of the project. Several different methods were examined as a drawings, as well as a physical models.

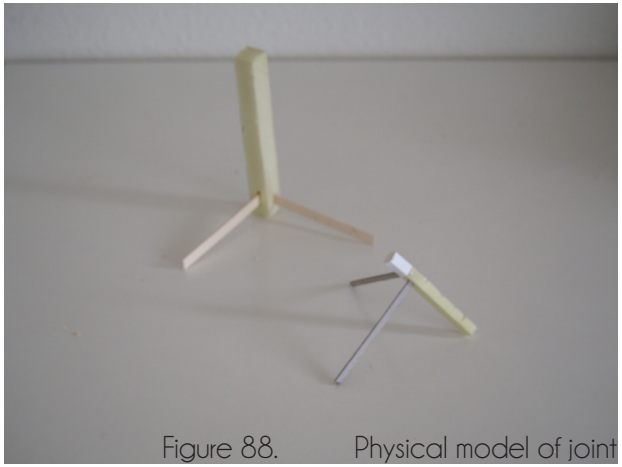


Figure 88. Physical model of joint

JOINT DEVELOPMENT

Detailing modules was a long process. Since in the report it was stated that "Industrially produced building components can only be used in a proper way when all those components can be easily added to a building without necessity to be cut or adapted.", it was desired to achieve this kind of result.

Therefore sizes of the whole modules, as well as of the walls have been repeatedly changed.

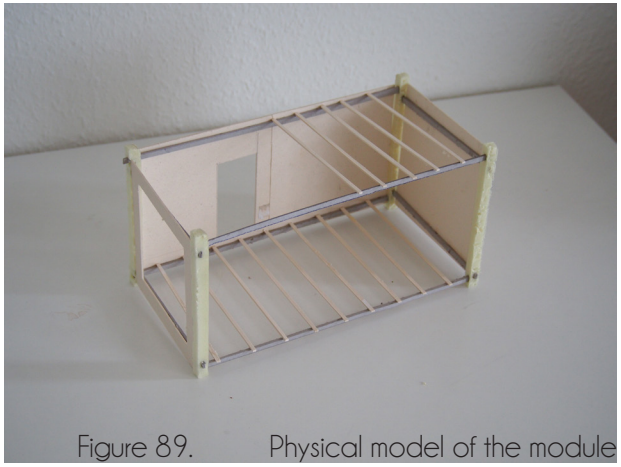


Figure 89. Physical model of the module

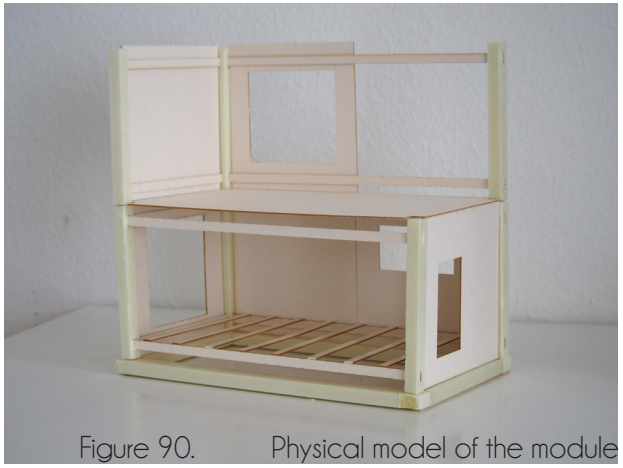


Figure 90. Physical model of the module

One of the main problems was that when the one single module was solved, there was a problem when connectin the modules in order to create clusters.

Theredore the process had to be made simultaniously – in the same time single module as well as the whole construction had to be controled and modified.

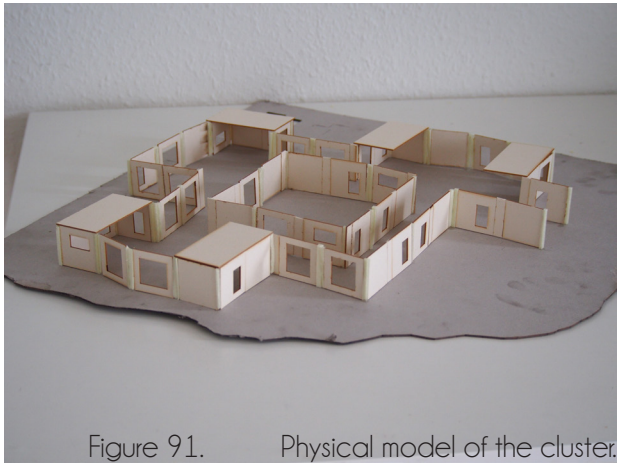


Figure 91. Physical model of the cluster.

In order to provide the shelter from the sun and in the same time gain similarity to traditional Sicilian villages with the inner places of gathering, modules were collected around the courtyard. Several investigations were made in order to find an optimal size of the courtyard.

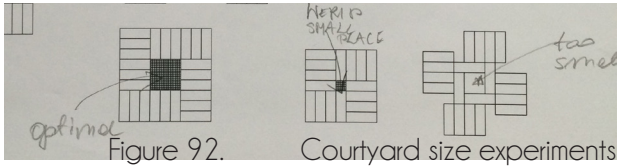


Figure 92. Courtyard size experiments

In order to provide the shelter from the sun and in the same time gain similarity to traditional Sicilian villages with the inner places of gathering, modules were collected around the courtyard. Several investigations were made in order to find an optimal size of the courtyard.

Additionally, the courtyards reminds the roofless gardens from the Japanese traditional building. They provide picturesque view from the windows, and can be used to hide from the direct sun.

In order to provide the shelter from the sun and in the same time gain similarity to traditional Sicilian villages with the inner places of gathering, modules were collected around the courtyard. Several investigations were made in order to find an optimal size of the courtyard.

Additionally, the courtyards reminds the roofless gardens from the Japanese traditional building. They provide picturesque view from the windows, and can be used to hide from the direct sun.

Plans were developed based on the room program.

People flow were taken into consideration. Therefore it was assumed to create a 3 different wings connected to the main cluster: hotel part, restaurant and kitchen, Spa and beauty. Yoga studio were placed close to the entrance, since some guest may come only for the class. The same with the Spa boutique – close to the entrance, with the spacious glazing.

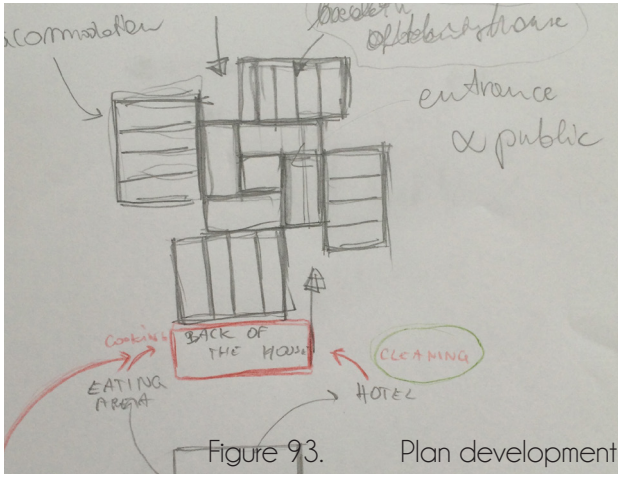


Figure 93. Plan development

Plans were developed based on the room program.

People flow were taken into consideration. Therefore it was assumed to create a 3 different wings connected to the main cluster: hotel part, restaurant and kitchen, Spa and beauty. Yoga studio were placed close to the entrance, since some guest may come only for the class. The same with the Spa boutique – close to the entrance, with the spacious glazing.

Hotel rooms were organized in order to achieve an equilibrium between the comfort and reasonable decisions. They were created in boxes made of four modules, therefore they can be freely added or changed.

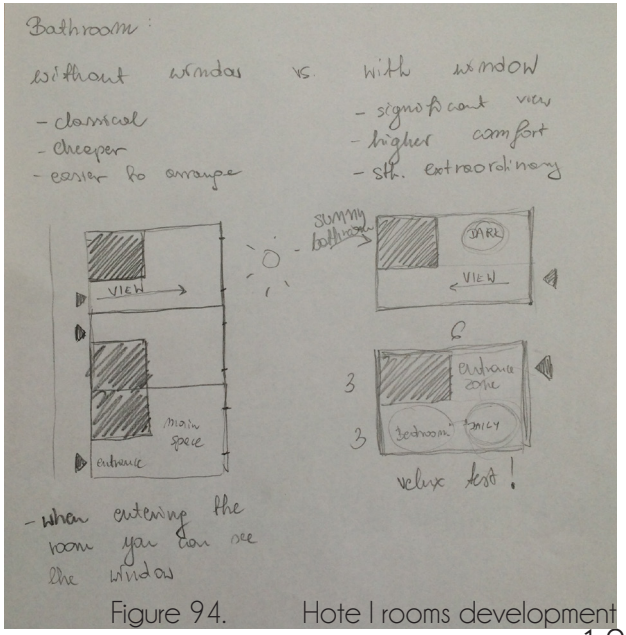


Figure 94. Hote l rooms development

DEFINING THE COURTYARD SIZE

Construction development

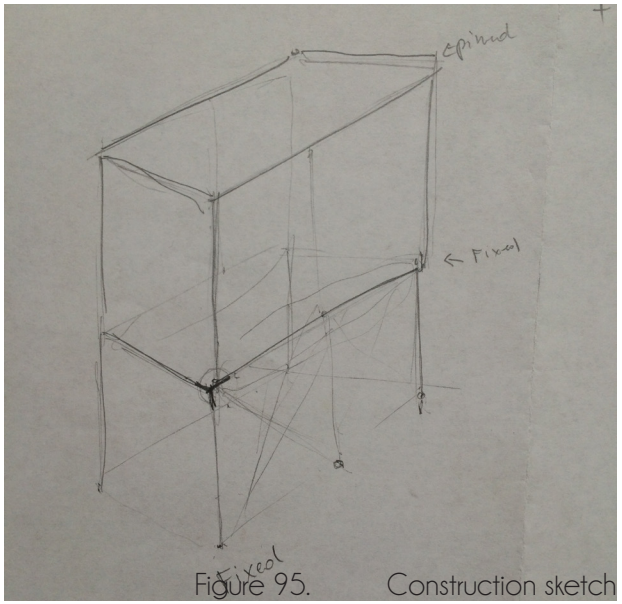


Figure 95. Construction sketch

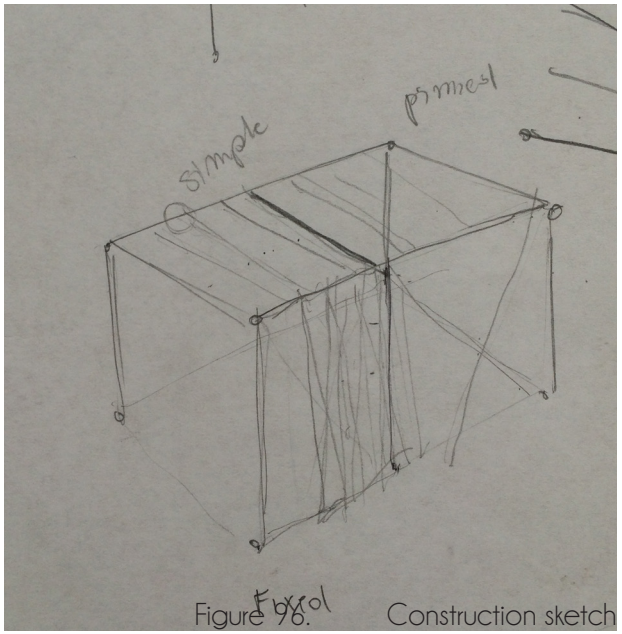


Figure 96. Construction sketch

The process of developing the construction started with the understanding of the loads and forces. As a next step, statistic scheme was created, to use it then in Robot Analytics.

Knowledge gained at the previous semester was used to create a model in the Robot Analytics. In order to achieve the results, hand calculations were made (in appendix).

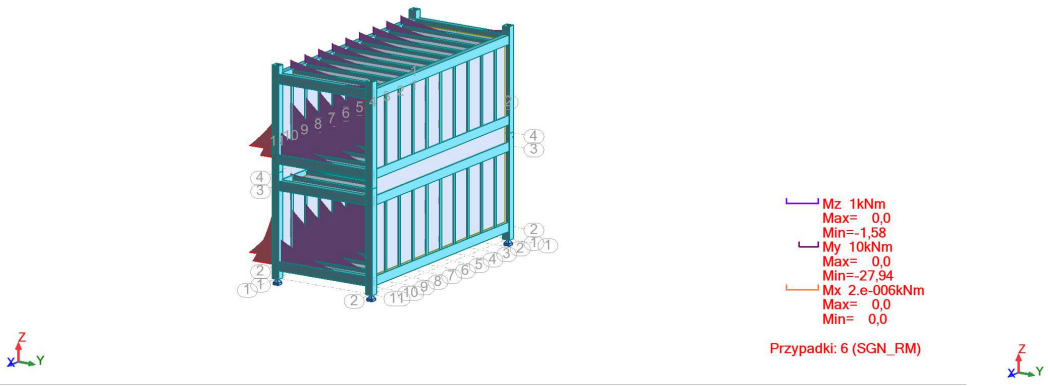


Figure 97. Diagram showing moments for ULS.

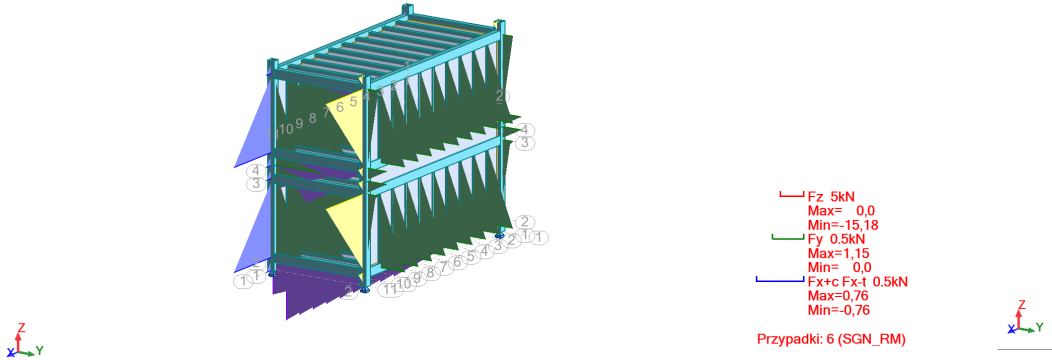


Figure 98. Diagram showing axial forces for ULS.

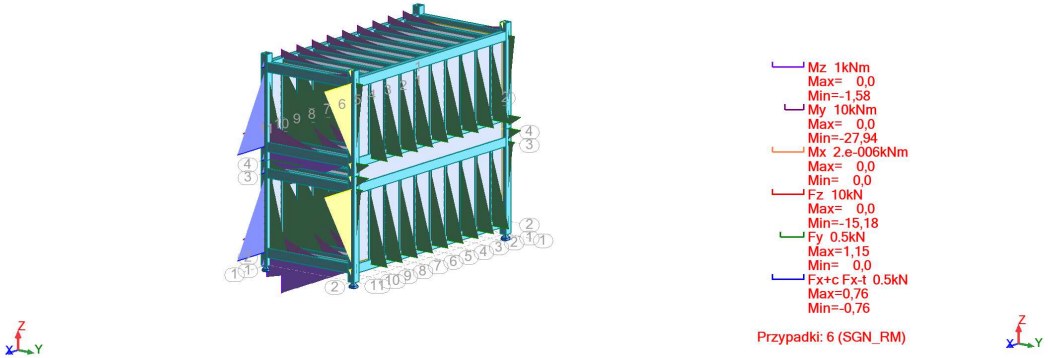


Figure 99. Diagram ULS.

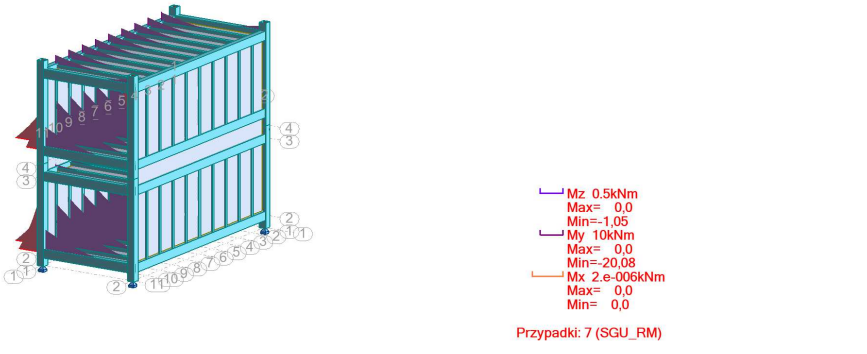


Figure 100. Diagram showing moments for SLS.

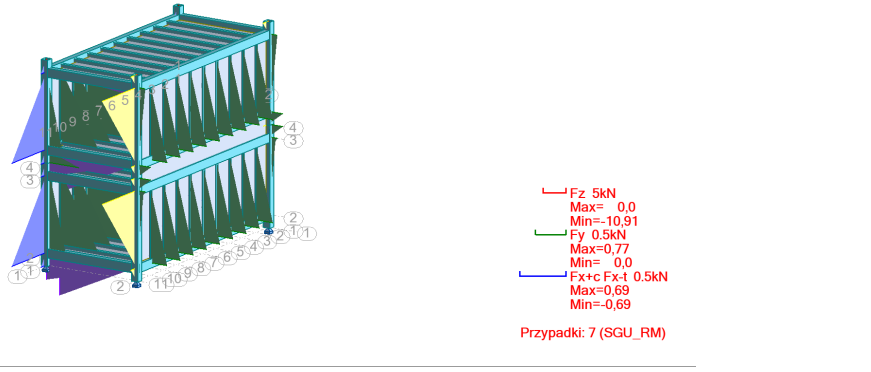


Figure 101. Diagram showing axial forces for SLS.

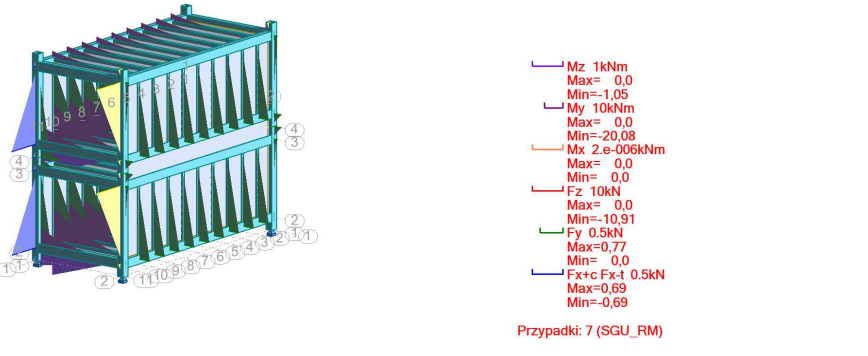


Figure 102. Diagram SLS.

Reflections

Reflecting upon the theme and intended project, one can find that several challenges and problems were meet during the design process. Mostly they were connected with the modularity and prefabrication. Finding the satisfying solution which is minimalistic, tectonic, functional and technically possible was a long time process. Finally, not all the problems within the building were solved.

In the theoretical part of the report it was written that:

"Industrially produced building components can only be used in a proper way when all those components can be easily added to a building without necessity to be cut or adapted."

whereas some walls' modules had to be slightly adjusted on site.

As a conclusion, I have to admit that in theory the idea of prefabrication and modularity works perfect, whereas in practice building components that cannot be cut or adapted challenge the technical design, and the whole process of construction. In some cases it was also a reason for consuming more materials then in case that the building would be freely design and build on site.

However, it is crucial to notice not only the weakness but also the strengths of the modularity. The idea provides endless possibilities to develop and expand the design, according to the needs and budget. Furthermore, the structure, construction and joints once correctly designed, can be then repeated in different place. Wall panels that are not part of the construction provides independence with choosing materials and colors, therefore it can be adjusted to the place site and vision. Additionally, construction based only on columns allows to organize an inner space freely.

Chapter IV

Appendix

Load Calculation

Basic data

Total length	8,56	m
Bay width	4,28	m
Height (max)	7,37	m
Roof slope	5	

$v_{b,0}$ = 28 m/s (for Sicily)

Basic velocity pressure

$q_b = 1/2 * q_{air} * v_b^2$

$q_b = 1/2 * 1,25 * 28^2$

q_b 490 N/m^2

Peak preassure:

$q_{p(z)} = [1+7\, l_v(z)] * 1/2 * q * v_{m(z)}^2$

Calculation of vm(z)

vm(z) mean wind velocity

$v_m(z) = c_r(z) * c_o(z) * v_b$

Where: co(z) is the orography factor

cr(z) is the roughness factor

$c_r(z) = k_T$

Type of load	service load		
dynamic load	2	1,4	2,8
permanent load - roof			
	0,2	1,1	0,22
	0,05	1,2	0,06
	0,01	1,3	0,013
	0		0
	0,22	1,3	0,286
	0,01	1,3	0,013
	0,35	1,3	0,455
SUMMARY	0,84		1,047
permanent load - floor			
	0,03	1,2	0,04
	0,11	1,2	0,13

Robot Structural Analysis

Positive results and final cross sections from the Robot Structural Analysis

Pręt	Profil	Materiał	Lay	Laz	Wytęż.
1 Pręt_RM_1	słup_nar_26x26	GL24h	48.50	48.50	0.76
3 Słup drewniany_3	słup_nar_26x26	GL24h	48.50	48.50	0.81
4 Pręt_RM_4	słup_nar_26x26	GL24h	48.50	48.50	0.78
6 Pręt_RM_6	słup_nar_26x26	GL24h	48.50	48.50	0.80
7 Belka żelbetowa_7	belka_obw_20x32	GL24h	39.84	63.74	0.09
8 Belka żelbetowa_8	belka_obw_20x32	GL24h	39.84	63.74	0.19
9 Pręt_RM_9	belka_obw_20x32	GL24h	39.84	63.74	0.10
10 Belka żelbetowa_	belka_obw_20x32	GL24h	89.20	142.72	0.58
11 Pręt_RM_11	belka_obw_20x32	GL24h	89.20	142.72	0.56
12 Pręt_RM_12	belka_obw_20x32	GL24h	89.20	142.72	0.56
13 Pręt_RM_13	belka_obw_20x32	GL24h	89.20	142.72	0.59
14 Pręt_RM_14	Belka_str_14x22	GL24h	57.94	91.06	0.03
15 Pręt_RM_15	Belka_str_14x22	GL24h	57.94	91.06	0.03
16 Pręt_RM_16	Belka_str_14x22	GL24h	57.94	91.06	0.03
17 Pręt_RM_17	Belka_str_14x22	GL24h	57.94	91.06	0.03
18 Pręt_RM_18	Belka_str_14x22	GL24h	57.94	91.06	0.03
19 Pręt_RM_19	Belka_str_14x22	GL24h	57.94	91.06	0.03
20 Pręt_RM_20	Belka_str_14x22	GL24h	57.94	91.06	0.03
21 Pręt_RM_21	Belka_str_14x22	GL24h	57.94	91.06	0.03
22 Pręt_RM_22	Belka_str_14x22	GL24h	57.94	91.06	0.03

23	Pręt_RM_23	OK	Belka_str_14x22	GL24h	57.94	91.06	0.33
24	Pręt_RM_24	OK	Belka_str_14x22	GL24h	57.94	91.06	0.33
25	Pręt_RM_25	OK	Belka_str_14x22	GL24h	57.94	91.06	0.33
26	Pręt_RM_26	OK	Belka_str_14x22	GL24h	57.94	91.06	0.33
27	Pręt_RM_27	OK	Belka_str_14x22	GL24h	57.94	91.06	0.33
28	Pręt_RM_28	OK	Belka_str_14x22	GL24h	57.94	91.06	0.33
29	Pręt_RM_29	OK	Belka_str_14x22	GL24h	57.94	91.06	0.33
30	Pręt_RM_30	OK	Belka_str_14x22	GL24h	57.94	91.06	0.33
31	Pręt_RM_31	OK	Belka_str_14x22	GL24h	57.94	91.06	0.33
32	Pręt_RM_32	OK	belka_obw_20x32	GL24h	39.84	63.74	0.29
54	Pręt_RM_54	OK	słupek_10x10	GL24h	94.92	94.92	0.06
55	Pręt_RM_55	OK	słupek_10x10	GL24h	94.92	94.92	0.08
56	Pręt_RM_56	OK	słupek_10x10	GL24h	94.92	94.92	0.08
57	Pręt_RM_57	OK	słupek_10x10	GL24h	94.92	94.92	0.08
58	Pręt_RM_58	OK	słupek_10x10	GL24h	94.92	94.92	0.08
59	Pręt_RM_59	OK	słupek_10x10	GL24h	94.92	94.92	0.08
60	Pręt_RM_60	OK	słupek_10x10	GL24h	94.92	94.92	0.08
61	Pręt_RM_61	OK	słupek_10x10	GL24h	94.92	94.92	0.08
62	Pręt_RM_62	OK	słupek_10x10	GL24h	94.92	94.92	0.07
63	Pręt_RM_63	OK	słupek_10x10	GL24h	94.92	94.92	0.14
64	Pręt_RM_64	OK	słupek_10x10	GL24h	94.92	94.92	0.15
65	Pręt_RM_65	OK	słupek_10x10	GL24h	94.92	94.92	0.15
66	Pręt_RM_66	OK	słupek_10x10	GL24h	94.92	94.92	0.15
67	Pręt_RM_67	OK	słupek_10x10	GL24h	94.92	94.92	0.15
68	Pręt_RM_68	OK	słupek_10x10	GL24h	94.92	94.92	0.15
69	Pręt_RM_69	OK	słupek_10x10	GL24h	94.92	94.92	0.15
70	Pręt_RM_70	OK	słupek_10x10	GL24h	94.92	94.92	0.15

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