ELDERLY CARE AND SOCIALIZATION CENTER IN BEIRA (Mozambique)

Project/Dissertation to obtain the Master's Degree in Architecture

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DECLARATION OF AUTHENTICITY

I, ELENA GRUODYTE,

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I confirm that this final work is based on my own research and has used only such additional information as is indicated in the reference, explanations, list of sources, literature and figures. I certify that the dissertation does not contain the work of other employees, that without mentioning and in any part of the dissertation does not infringe any copyright of a person or institutions. Also, no part of the thesis was submitted to any other higher education institution as an academic report or in order to obtain a degree.

04/09/2021

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ABSTRACT

Beira, Mozambique. The second biggest city by population in one of the poorest countries in the world. A city that has been devastated by regular floods followed by illness outbreaks. With a fast growing but very young population, where half of the inhabitants are less than 15 years old, Mozambique is a country with many challenges to overcome.

After addressing the most adequate urban planning strategies to mitigate the impact that the city's regular floods have and the current lack of residential units available, this work focuses on one of the less talked social issues in Mozambique. The elderly abandonment and the lack of social support this minority group has. An issue that has been long due to be addressed in a holistic way to which the role of the Architects in society can give a great contribution.

The aim is to analyse the needs, from a designer point of view, of an elderly care center. Analysis focuses on the situation in Mozambique, and in the city of Beira, regarding the local architecture, construction industry, existing elderly care being provided and existing elderly care focused facilities.

The conclusion will be a set of "Design Guidelines for Elderly Care Centers in the city of Beira", which can then be applied to other parts of Mozambique and other countries with similar context.

ABSTRACT

Beira, Moçambique. A segunda maior cidade por população, num dos países mais pobres do mundo.Uma cidade que tem sido devastada por oodas regulares seguidas por surtos de doenças. Com um crescimento rápido mas muitopopulação jovem, onde metade dos habitantes tem menos de 15 anos de idade, Moçambique é um país com muitosdesafios a vencer.

Depois de abordar as estratégias de planeamento urbano mais adequadas para mitigar o impacto que a cidadeas cheias regulares e a actual falta de unidades residenciais disponíveis, este trabalho centra-se numa das menos faladasquestões sociais em Moçambique. O abandono dos idosos e a falta de apoio social que este grupo minoritário tem.Uma questão que há muito tempo devia ser abordada de uma forma holística, à qual o papel dos Arquitectos na sociedadepode dar uma grande contribuição.

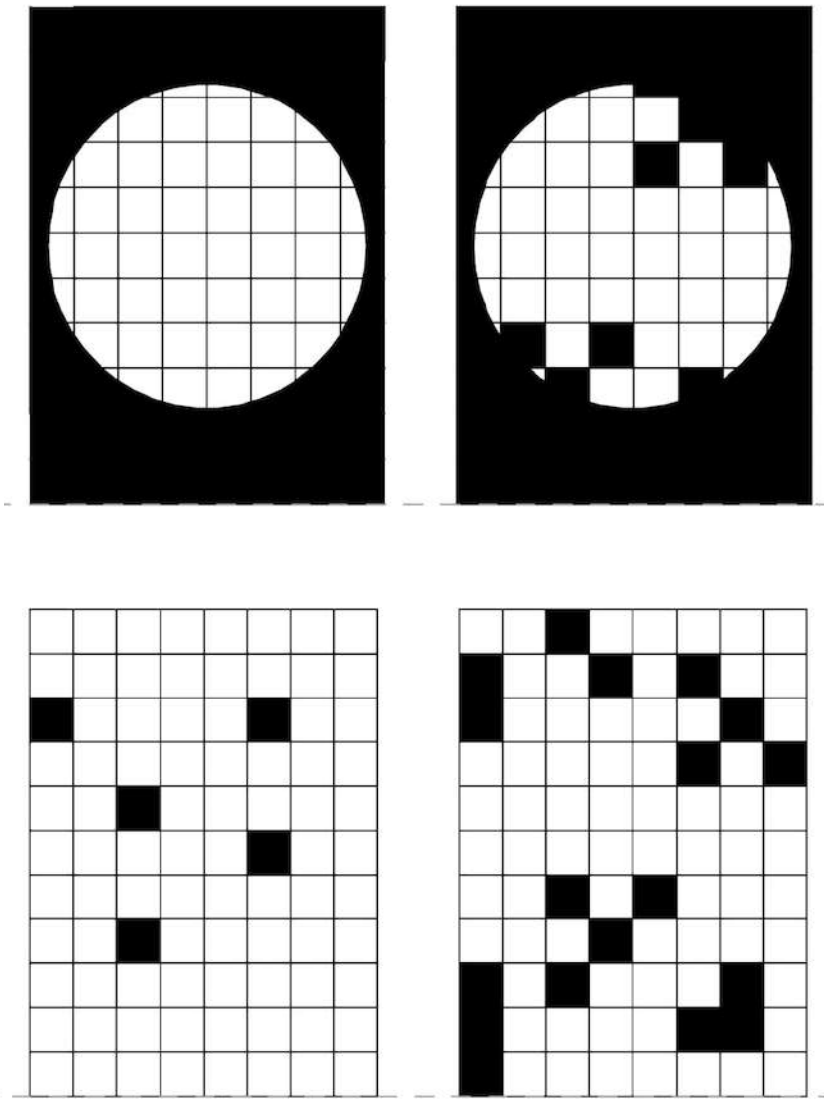
O objectivo é analisar as necessidades, do ponto de vista de um designer, de um centro de cuidados para idosos. A análise centra-sesobre a situação em Moçambique, e na cidade da Beira, relativamente à arquitectura local, à indústria da construção,os cuidados a idosos existentes que estão a ser prestados e as instalações existentes centradas nos cuidados a idosos.

A conclusão será um conjunto de "Directrizes de concepção para Centros de Cuidados a Idosos na cidade da Beira", que pode então ser aplicado a outras partes de Moçambique e a outros países com contexto semelhante.

Acknowledgment

Thank you to family, friends and lecturers who have supported, encouraged, challenged and advised me through this thesis

This thesis is dedicated to my son Jonas Gruodis Castro - as being the biggest force in my life.



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TERMINOLOGY

Gerontopsychology - a branch of psychology that studies the mental go of the elderly go elderly behavioral dynamics go regular. **Gerontopsychology** is closely related to gerontology and age psychology. Research methods are already used. Gerontopsychology seeks to find ways to prolong an active and fulfilling human life.

Epistemology, gnoseology, cognitive theory-branch of philosophy, studying cognition (knowledge, knowledge)
nature and principles. In the nineteenth century, endings were more common in German and Russian literature gnoseology. Silver ends

Cognitive sciences, cognitive sciences - a field of science aimed at studying cognitive phenomena, abilities. It is an interdisciplinary field of research that includes both psychology and neuroscience sub-branches, cognitive theory, philosophy, etc.

INTRODUCTION

In a country where greater effort needs to be made to address the rapid growth of the population, their care, and their social, educational and health needs, it is mandatory not to marginalize the elderly. In Mozambique infectious diseases are still a big concern and we see, at the same time, a rapid rise of non-communicable diseases, with the typical chronic diseases of developed countries starting to appear, due to a middle-level income population that is growing, along with increasingly unhealthy habits of living in urban settings. Currently, there is a huge deficit in the offer of both healthcare facilities (number and conditions of the old existing ones) and availability of trained healthcare staff. Population's access to education is still a struggle. Mozambique's high poverty rate is sustained by natural disasters, disease, high population growth, low agricultural productivity, and the unequal distribution of wealth all come together.

Because of all these needs over the shoulders of such a young and fast growing population -45% of the population is younger than 15- it's easy to forget and neglect the elderly needs. Not only from a health point of view, but from a social point as well. Elderly abandonment by their own families is a huge social issue in Mozambique, resulting in large numbers of elderly homeless unsupported people. The State of Mozambique has tried to address this important issue with educational projects for the younger generations and created social support programmes together with laws that protect the rights of the elderly but all these noble initiatives have failed to correct the social issue. Still the problem persists and the Government recognized that there is a big need for more facilities that can support these elderly homeless in a dignifying way.

Creating laws to protect the elderly isn't enough. Laws, and their implementation, are needed but this issue needs a more holistic approach. As architects, we have the power and the responsibility to also address this problem. Not only calling the public attention to it, but addressing it in our urban planning instruments and in Design Guidelines to be applied in the architectural solutions for the coming Elderly Care Centers.

Most and foremost, we will need to address the major source of Beira's destruction and disease, the regular floods. We need to try to find an effective urban planning strategy that can mitigate the damages these natural events have in the city and it's population. Without this there is little we can do for Beira and it's citizens. This urban strategy will also consider what could be the most appropriate way to provide new residential units to this population.

After that, the focus will be one of the least exposed social issues in the region, the elderly abandonment and the lack of properly designed facilities to support this part of the population. This work will discuss existing generic elderly care center design principles applied in developed countries, the state of the art of the existing elderly care in Mozambique, the Mozambican typical and most used architecture principles, the local construction sector, and will try to conclude what would be the design guidelines and best practices that could be applied to future elderly care centers in Beira. The aim is to create a framework to guide architects to plan and

design better facilities that could help address the social problem related to the lack of care and support to the Mozambican elders.

WORK OBJECTIVES AND QUESTIONS

This work focuses on two different research fronts:

1. The most adequate urban planning strategy to structure the destroyed city of Beira; Part of this research will also focus on how we could provide new residential units that could respond better to the challenges of living in this city.

2. The design strategy to provide an appropriate solution for one of the major and less talked social problems in the country, the lack of properly designed elderly care centers to support the neglected elderly.

Regarding the first research front, the urban planning strategy to structure the destroyed city of Beira, the research explores what went wrong with the previous planning, or lack thereof, and why the floods that periodically happen have such a big impact in the city. It will also focus on trying to understand what could be the most appropriate mitigation solutions that could be implemented, given the economic and social contexts of Beira. Another subject to this part of the research is the best way to provide new residential units given the natural and social context of the city.

Regarding the second research front, the design principles for elderly care center facilities, the research also explores the elderly behaviour factors which may influence architectural design principles. At the same time, the research focuses on the state of the art of the existing elderly care in the city of Beira, Mozambique, to address one of this cities biggest social problems - the elderly abandonment and lack of properly designed social and health care support facilities. The built environment, and the way in which it is designed and adapted to meet the needs of Mozambican people with different levels of mobility and capability throughout their life is clearly a key factor for people to be supported to live a fully functional life. This work will look for the key design principles to help design the most efficient living arrangement to provide care for the abandoned elderly of Beira.

WORK STRUCTURE

This work consists of: introduction, research object, work structure, research methods, followed by three research chapters.

The first research chapter focuses on the background of elerly care facilities and how they evolved, on the cognitive psychological disorders that are common in the older ages and need a special attention from a Design point of view, a summary set of universal guidelines and design best practices that are commonly found in this type of facilities around the world and finishes with a quick analysis of case studies about some elederly care facilities that could be used as reference.

The second research chapter focuses on an analysis of the city of Beira, its challenges, urban planning strategies and residential solutions, a description of the current state of elderly care facilities in the country, and ends with a conclusion that is meant to be a set of design guidelines for elderly care centers in Beira.

The third research chapter is dedicated to a summary of the urban planning and design solutions proposed in the presentation boards.

RESEARCH METHODS

The chosen methodology is mostly based on a qualitative analysis of the existing literature about the city of Beira, in Mozambique, it's urban planning, it's architecture, it's challenges and also about it's eldery care support system and facilities. There is also a qualitative analysis on the main subjects of this work, urban planning strategies, innovative architectural solutions adapted to flood-prone areas in the context of poor countries, cognitive psychological disorders that should influence design for elderly care centers and best practices used in elderly care centers around the world.

Besides this literature analysis, there will also be some subjective effort based on personal interpretation of the existing data and personal perception to try to reach some level of innovation through a creative process.

This study isn’t meant to be a purely data-based objective one, instead it is meant to be a subjective study, based on an objective body of knowledge, but relying on interpretation and imagination to create possible scenarios of how we can create strategies that structure Beira city sustainable growth and expansion, create better adapted residential units, and create a set of design guidelines to guide the future development of elderly care and socialization facilities for this city.

CHAPTER ONE

1.DEVELOPMENT OF ARCHITECTURE FOR ELDERLY CARE AND SOCIALIZATION INSTITUTIONS

1.1.TIMELINE OF ELDERLY CARE

This chapter overviews the historical development and the genesis of elderly care in order to understand it as an important part of society growth.

- 500,000 B.C.: First evidence of caring for elders (bones of older, disabled people found in 2013);
- 3100-332 B.C.: Egyptian pharaohs are buried with canes for walking;
- 1900-1600 B.C.: The older Bronze Age men are buried with copper axes, which shows tremendous respect;
- 700m B.C.: Ancient Etruscans made dentures from human and animal teeth;
- 44 B.C.: Roman philosopher Cicero writes a treatise on old age;
- 104 A.D.: Roman and Egyptian census figures describe many generations of different ages living together;
- 600 A.D.: Latin poet Maximian writes "About old age and love";
- 1025 : "Medical Canons," written in Arabic by Ibn Sina, one of the first texts describing care for seniors;
- 1200 : Icelandic law stipulates that persons over 70 must be dismissed;
- 1632 : Historical data from the Austrian Census show that 8.7% of women and 4% of men are widowed;
- 1790 : After the French Revolution, towns and villages set up celebrations to honor the elders;
- 1823 : One of the first retirement homes opened in the United States (Philadelphia's Indigent Widows' and Single Women's Society);
- 1853 : One of the first books on caring for seniors is published (Barnard Van Oven, author of "On the Decline of Life," The Best Ways to Reach Healthy Aging);
- 1880 : x first state in the world to set up a Retirement Pension;
- 1893 : The Visiting Nursing Society establishes a system to help care for poor seniors at home;
- 1899 : Susannah Mushatt Jones, oldest known alive, was born;
- 1901: 10% of older British men and 6% of women live in the "WorkHouse" (or "The House of the Poor");
- 1906: Alzheimer's disease first described by German psychiatrist Alois Alzheimer;

- 1909: The term "geriatrics" was introduced by Austrian doctor Ignatz Nascher;
- 1933: The first lightweight, folding stroller is developed;
- 1935: Social Security Passports originated in FDR;
- 1946: Britain establishes free health care for senior citizens;
- 1965: Medicare and Medicaid are established in the United States, prompting the - establishment of seniors homes;
- 1974: First hospice opened in the US;
- 1981: The first official home with elderly assistance opens in the US;
- 1993: De Hogeweyk opens a revolutionary hamlet for dementia sufferers, also known as Dementiaville, in the Netherlands;
- 2010: Baby boom in the US turns into the Silver Tsunami as the number of Americans over 65 reaches 40 million;
- 2012: 5.4 million Americans diagnosed with Alzheimer's;
- 2013: China passes new law requiring children to visit their aging parents;
- 2015: 50th Anniversary since the inception of Medicare and Medicaid.

1-"A History of Old Age" Pat Thane, Oxford Press, 2005
2-"History of Long Term Care" Karen Stephenson, self-published online book

"The History of Nursing Homes" Foundation for the Elderly

1.2 ARCHITECTURE GENESIS OF ELDERLY CARE

Not long ago, nursing was provided in homes, churches / temples, hospitals and other public institutions. One common factor that used to unite all nursing facilities was that it was a temporary solution, and then the younger generations had to take care of their parents and grandparents. This factor led to the absence of the need to set up specialized nursing centers geared to the needs of the elderly.

Nowadays, in Western countries, the idea that children will have to take care of their old parents is foreign and rarely practiced.

The idea that offspring will provide comprehensive care to their parents in the same way they got it while growing up - from housekeeping, cooking, hygiene, etc. - seems to be now more left to other people or elderly care centers.

The beginnings of nursing homes for the elderly began at the beginning of the modern era. The first attempts to establish hospitals for the sick began in the sixth century BC, when Buddha assigned one physiotherapist to ten villages and built hospitals for the disabled and needy. It is much more difficult to determine when hospitals began to specialize as long-term care facilities for the elderly. However, evidence was found that such institutions functioned as hospitals and, indirectly, as long-term nursing homes in the temples of the Kos, Trika and Knid settlements.

In the Greek and Roman communities, partial care was provided to the elderly, widows, orphans, and the sick or disabled. The emergence of elderly care centers was influenced by the Christian Church and the

Byzantine Empire. Greek men who had no children could adopt a child who would later take care of him in his old age and take over all the man's property.
The development of nursing centers intensified during the Renaissance, around the middle of the 14th century, when medical discoveries and new treatments began to be put into practice.
The first nursing centers began to emerge in America in the early 19th century as homes for the poor, when single elderly people began to gather in the same buildings. Only at the end of the 19th century did the specialty of nursing emerge with the concept of nursing home. Newly built hospitals needed nurses for patients. When skilled nurses emerged, wealthy families began hiring these individuals for personal nursing at home. Unused home rooms became "personal nursing homes".*4. "The History of Nursing Homes" Foundation for the Elderly*

1.3 20th CENTURY ELDERLY CARE INSTITUTIONS

Until 1970 seniors who needed care basically had two options. They could grow old at home, being cared for by a family member or a health worker, or choosing a nursing home. Unfortunately, at the time, a number of nursing home abuse cases were reported involving elder abuse. In addition, many older people felt that although they were unable to live independently, they were still independent and able to work and did not need the higher level of health care offered in nursing homes. These two factors are what ultimately led to the emergence of options for older people.

1970 In the mid-60s, Jessie F. Richardson, a 60-year-old woman who lives in a nursing home, spoke with her daughter, Dr. Karen Brown Wilson, about how to help the elderly deal with their problems. Richardson urged his daughter to take initiatives to create more choices for seniors in need of care. Mother's encouragement led Wilson to devote her life to creating what is today called "assisted living."

Wilson, 1981 - What is widely considered the first senior care home for seniors opened in Portland, Oregon. They have been successful from the start. Several years passed before homes began to resemble the "assisted living" homes we know today. In 1986 they already had round-the-clock medical staff as well as organized social activities for home residents. Over time, especially over the past two decades, the idea has spread and "assisted living" homes have become the main choice for many older people.

1.4 ELDERLY CARE INSTITUTIONS TODAY

Today, assisted living is known as the ideal lifestyle for older persons who want to age independently, actively and safely. The increase in the number of seniors that is expected to happen over the next few years as the Baby Boomer generation reaches retirement age is only expected to expand options and styles of assisted living.
Facilities are now beginning to tailor their appearance and offerings to suit certain populations, what's known as "niche housing," according to Fox Business.

"We've reached the stage of evolution where, rather than all these assisted living facilities looking alike, recognizing that there's a large population of seniors out there so we can divide into specialty housing," Andrew Carle, founding director of the Senior Housing Administration program at George Mason University, told the news source.

There are now various housing styles for seniors of different ethnicities, sexual orientations, and interests. Assisted living communities have also changed in what they offer seniors. Many now provide opportunities for continuing education, so seniors can continue to grow and expand their minds as they age. There has also been work done at the political level to help make such housing affordable, so that more seniors can enjoy the benefits of assisted living.

1.5 SOCIOLOGICAL DEVELOPMENT FACTORS

A report by HelpAge International emphasizes that the country's greater economic development does not mean that older people can live better there. For example, Sri Lanka, Uruguay, Chile and New Zealand rank much better than one would expect on the basis of gross domestic product (GDP) alone. It is also stated that, for example, in Russia, economic growth has not brought greater benefits to the elderly.

For the first time, HelpAge International has published the Global AgeWatch Index, which compares the socio-economic well-being (income, health, education, work, enabling environment) of 91 states and their older people. According to the study, the best places to live for the elderly are in Norway, Germany, the Netherlands and Canada. The worst are in Afghanistan, Tanzania, Pakistan, Jordan and Rwanda.

The main and most important factor influencing the demand for nursing homes is the steadily growing share of senior members of society. The United States is projected to have a population aged 85 and over since 1990. (3.1 million) by 2040. (14.3 million) will grow about 3 times. 300% growth over 50 years is significant, but other researchers suggest that ongoing biomedical breakthroughs and disease prevention advancements can reduce mortality by 2%, resulting in growth of 440% instead of 300%. This would mean that the total population aged 85 and over would exceed 23 million. The growth of this part of the population would be particularly pronounced after 2030. As a result, almost one in four older people would have reached the age of 85 by 2050.

2. COGNITIVE PSYCHOLOGICAL DISORDERS AND NEEDS OF ELDERLY PATIENTS

Cognitive functions are the ability of a person to retrieve, process, store and reproduce certain information. These functions are essential for normal human functioning. Cognitive functions include attention, memory, consistent social behavior, planning, as well as language, computing, practice, spatial attention orientation, and more. Cognitive impairment is manifested by impaired memory, speech impairment, perceptual (visual and spatial) and skills impairment.

Disorders of cognitive function may occur under different pathological conditions. The most common reasons are:

- Age-related memory impairment;
- Mild cognitive impairment;
- Amnesia, amnesic syndrome;

- Delirium and other states of unconsciousness;
- Alzheimer's disease, dementia with Lewy bodies, vascular dementia, etc.;
- Depression;
- Undesirable effects of some medicines.

Aging of an organism covers all systems. Normal aging also reduces cognitive function (making it harder to remember and reproduce old information), but does not interfere with daily activities. This is considered to be a physiological age-related memory disorder, or benign oblivion in old age. These age-related changes have been demonstrated in many clinical trials in the elderly (22% to 56% of people complain of memory problems).

Next, we will see what are the major age-related impairments that should be taken into consideration when designing a facility to provide care to elderlies.

2.1 MEMORY AND FOCUS

Concentration and working memory disorders can influence the outcome of all other cognitive functions, including memory assessment. If attention or working memory is impaired, all other cognitive tests may yield unreliable results.

Attention concentration difficulties are an important indicator of other Alzheimer's cognitive disorders: memory, visual-spatial functions, language.Investigating selective attention in Alzheimer's patients by computerized tests,using a touch-sensitive screen,found that Alzheimer's disease patients had lower levels of attention concentration than healthy patience, both quantitatively (slower pace of execution) and qualitatively (poorer planning, higher number of stimulus skips and perseverations).The cognitive function of the subjects was assessed in more detail using the CANTAB (Cambridge Neuropsychological Test Automated Battery) program.The test used a laptop with a touch sensitive color screen.Patients were planted in front of a computer screen to comfortably touch the monitor during tasks.Each test consists of several steps: one had to be completed before moving on to the next. The set consisted of the following tests:

- It is a two-choice reaction time test that measures the patient's concentration.
- Paired Association Learning Test
- Figure recognition test
- Spatial working memory test

Data from 66 subjects were analyzed: 30 had mild to moderate Alzheimer's disease,36 had no memory impairment (control group).The two groups were statistically significantly similar in terms of sex, length of education, age, and level of depression.Short-term memory and learning new things were found to be statistically significantly better in the healty patience group compared to the Alzheimer's group.It was observed tha reaction time was related not only to complex cognitive processes or general depth of dementia but also to the expression of depression.

Depression has influenced short-term cognitive processes of the nature of psychomotor reactions.

2.2 VISUAL IMPAIRMENT

One of the first challenges of elderly is visual-spatial impairment. Interest in these disorders has been fueled by the fact that early in the disease(Alzhimer,dementia), lesions are found in various parts of the brain,associated with memory processes and visual-spatial perception.

It has been found that many aspects of visual perception suffer from Alzheimer's disease.Disorders of color and contrast, angles, motion, face recognition, positioning of objects in the cavity, perspective and three-dimensional images are observed.

The work analyzes the perception of optical illusions using a set of 32 pictures.

1-Geometric illusions, i.e. optical illusions in which the evaluation of an object is distorted by adjacent elements of different size or shape;

2-Color illusions, i.e. optical illusions in which the evaluation of an object is distorted by adjacent elements of scaling size or shape;

3-Multiple images, i.e. visual perception tasks where the subject has to identify all objects (faces, animals, shapes) hidden in the picture;

4-Ambiguous images, i.e. visual perception tasks in which the same object can be perceived in several different ways;

5-Optical paradoxes, i.e. visual perception tasks, in which the subject has to evaluate the visibility of the structure shown in the figure in 3D;

6-Illusions of motion, i.e. optical illusions in which the stationary drawing gives the illusion of motion.

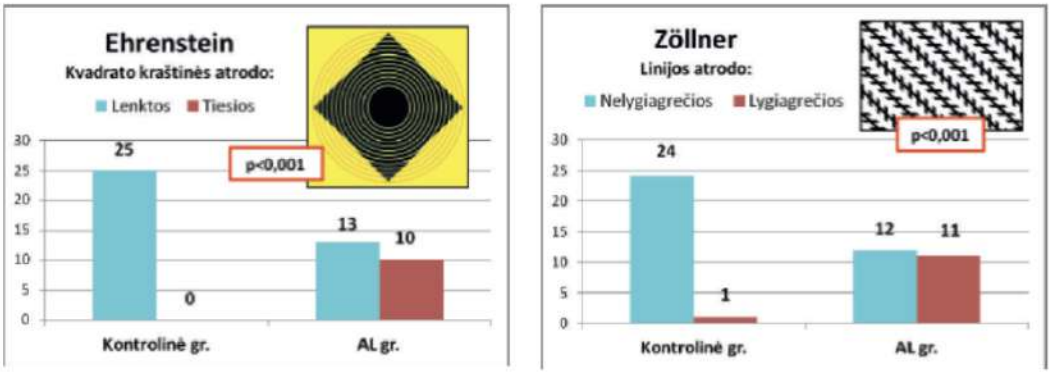

Figure 1. Evaluation of Ehrenstein optical illusion in Alzheimer's and control group(red color bendet,blue straight lines)

Figure 2. Evaluation of Zollner i optical illusion in Alzheimer's and control group
red collar parallel ,blue not parallel)

The study found most Alzheimer patients to have impaired visual perception. Most of the disorders observed were observed in the early stages of the disease.

2.3 ASSOCIATIONS, IDENTIFYING COLOR, MEMORISING

Color has been found to influence object recognition and perception.Individual studies have shown that the color of objects displayed in Alzheimer's patients in some cases affects the accuracy of their identification.In addition, colors are important for visual memory. Thus, color perception disorders could contribute to the naming and visual memory disorders observed in Alzheimer's disease.
When evaluating colors, their connection with emotions is also important. Many studies have found that associations of color and emotion are quite universal throughout the world, with colors associated with identical emotive adjectives in different countries and cultures. The present study aimed to investigate color naming and memory and the associations between color and emotion in Alzheimer's disease.

Color naming and memorizing abilities and associations between color and emotion were evaluated using a set of five original tasks:

1-Naming colors. The name requires 13 colors (Figure 3);
2-memorising color by order. Note and list the sequence of three colors displayed in sequence;
3-remembering color combinations. When demonstrating combinations of salves consisting of 2, 3 or 4 colors (Figure 4), they were asked to note them, i.e. it was necessary to note 2, 3 or 4 colors displayed side by side at a time.
Subsequently, after changing one of the colors of the combination, subjects were asked to indicate which of the colors in the previous combination did not exist;

4-Choosing favorite colors. Sort the colors listed from most to least comfortable. Nine colors were used in the exercise: black, gray, red, ghetto, pink, green, cyan, blue, and purple (Fig. 5);

5-Associations of color and emotive adjectives. The nine colors used in the exercise (Figure 5) were asked to select appropriate adjectives from the descriptors that indicate positive (gentle, happy, calm) and negative (boring, sad, annoying, nasty, aggressive).

The colors for the tasks are selected based on the RGB color model (Red-green-blue), which is used to encode images on electronic devices (such as computers and televisions). The study used primary colors and intermediate variants of this system. Additionally, colors with common names - black, gray, brown - are included.

Figure 3. The colors given in the naming task

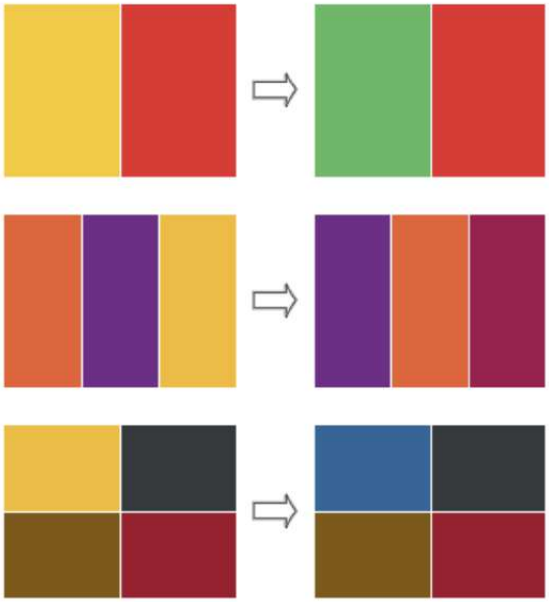

Figure 4.Examples of color matching

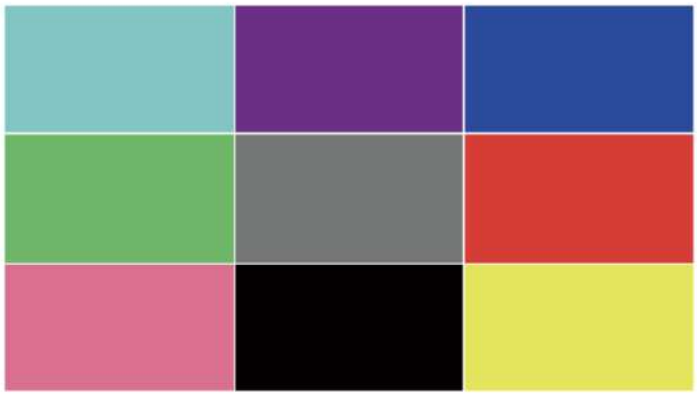

Figure 5. Favorite colors in the color selection and color and emotion association tasks

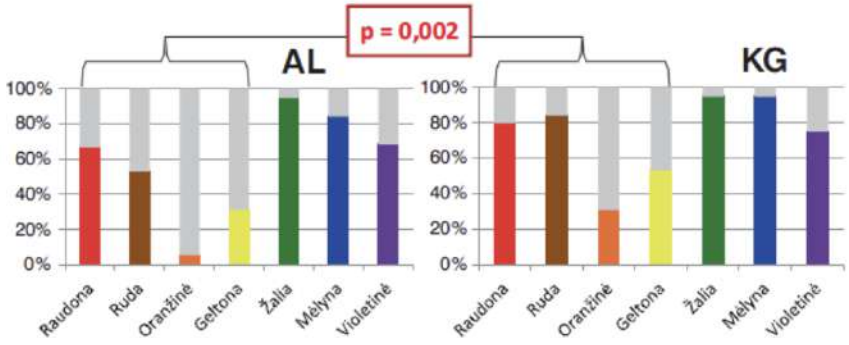

Figure 6.Naming colors correctly in Alzheimer's and control groups.

The study found that patients with Alzheimer's disease were more likely to be mistaken for color, with predominantly wavy color-coding (red, brown, orange, and yellow).

The patients remembered the sequence of three colors displayed in succession, combinations of colors displayed simultaneously.Subjects in the Alzheimer's group are less likely to like gray. The attribution of gray to less pleasing colors is associated with lower scores on cognitive function assessment tests.Multiple adjectives that reflect conflicting emotions are more commonly attributed to Alzheimer patients in the same color.

2.4 THE ENVIRONMENTAL PERCEPTION HYPOTHESIS

The environmental wisdom hypothesis, described in "Ecology and the Aging Process" (Lawton and Simon, 1969), states that as a person ages or experiences the effects of dementia, the individual is exposed to the growing influence of the surrounding environment.In other words, as the disease progresses, the individual's behavior is increasingly influenced by the environment.The environment cannot have any barriers to prevent a patient from becoming completely disabled due to their illness.

The model developed by Lawton and Nahemow (1973) shows that human behavior adapts to "environmental pressure" or environmental forces that are favorable until "environmental pressure" becomes a negative factor.However, a strong drop in "environmental pressure" can also have negative effects such as boredom and sensory impairment.

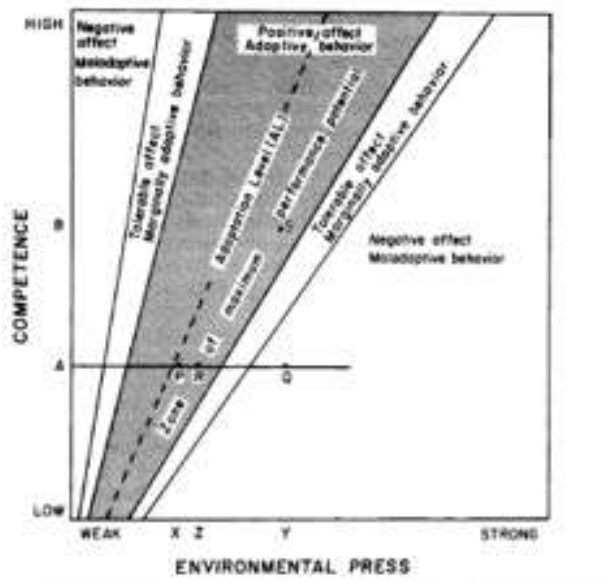

Figure 7.Scheme explaining environmental pressure as a negative factor for elderly patience.

Naturally, dementia dictates life only at that moment, with immediate stimulation without any analysis.The balance between under-stimulation and over-stimulation can be very delicate.Excessive stimulation can cause defensive reactions and distraction, but insufficient stimulation can be monotonous or unforgettable.

2.5 PERCEPTION OF “HOME”

Frequent institutional philosophy dictates creating a sense of 'home'.The concept of "home" and whether it can be applied authentically to an elderly care home is discussed in R. Fray and C. Owen's work, "Home" in an elderly care home: authenticity or replacement”.The misunderstanding of the concept of home and its tendency towards domination led to the association of "home" with space and physical form.This led to the imitation of the "home" and their fake representation.Fray and Owen write that privacy and autonomy are the key design intent when designing an elderly care home.

2.6 TERRITORIAL BEHAVIOR

Irwin Altman writes that territorial behavior is an inherited biological, instinctive response, not a cultural or environmental reaction.Territorial events can be associated with different motives or needs such as: sleep, eating, or geographical factors such as: space size, location, or social factors: groups or large social systems.The author describes three types of territories: primary, secondary and public.Primary territories are property and are used exclusively by those individuals or groups. They are clearly identifiable as their other residents and governed on a permanent basis.They are also central to patients' daily lives.Violation of the primary territory can be a strong expression of a person's self-perception, especially if the intrusion is repeated.
Clearly delineating the boundaries between public and private spaces in group accommodation can facilitate a sense of privacy. Ch. Alexander sends bedrooms in the farthest locations on an intimacy scale far from the common areas. Entrance positions can help define the territorial boundary.

2.7 FAMILIARITY

Familiarity, or freedom of behavior, is also a very important aspect in creating a comfortable environment for elderly patients. Kaplan's definition of familiarity: "It's the relationship between an individual and with what that individual has had enough experience with.

"There are two types of memory: defined (declared) and predicted (habit). Habits memory is a demonstration of past experiences without conscious awareness of those experiences. Declared memory is a conscious, directed effort to gather past experiences and facts. Many scholars claim that the elderly suffering from dementia have an intact memory of habits but a compromised declarative. Another important aspect of building a care home for dementia patients is to make sure that they create habitual memories of the institution itself before the disease progresses. As such, if design solutions offer a different environment than their home, their experience with declarative memory will help them in the installation process.

2.8 ORIENTATION

A resident's ability to navigate independently in a care home is a prerequisite for maintaining a high quality of life.The article, “Dementia-Friendly Architecture: Environments that Encourage Guidance in a Ward,” summarizes research that encourages the development of a home for patients with easy guidance. Three basic layouts of floor plans for orientation are analyzed:
1-Direct circulation
2-L-shaped circulation
3-Continuous walkways around the inside garden

Patients with more severe forms of dementia were included in the study, as mildly oriented patients had no problems. Multiple reorientation only made patient orientation more difficult.G. Marquardt and P. Scmieg disagrees that small unit structures with many different design decision spaces and direct visual axes improve

orientation. Moving patients to another facility divided the opinions of the researchers.Moving patients from one care home to another can also have a negative emotional impact on the patient's relatives as they attach to the care workers.

3.CHALLENGES OF THE CITY OF BEIRA (Mozambique)

3.1 OVERVIEW

Mozambique's high poverty rate is sustained by natural disasters, disease, high population growth, low agricultural productivity, and the unequal distribution of wealth. Flooding and cyclones have been a huge problem, recently destroying around 90% of the city of Beira in 2019. These events are a tragedy not only for the destruction they cause, but the disease outbreaks in the aftermath. Diseases such as malaria and cholera are still the main cause of death in the country, leveraged by the very weak sewage system and regular floods.

3.2 RECURRENT FLOODS

Figure 8. Picture of Flood in Mozambique.Photographer unknown

Floods regularly affect the livelihoods of millions of people in Mozambique, Beira being one of the most affected regions in the country.

The negative impact of these natural events is not solely a result of their magnitude but also a result of the high level of vulnerability of the people. In a large, sparsely populated country such as

Mozambique, a structural approach to flood risk management cannot be justified on environmental and economic grounds (Christie & Hanlon, 2001; Hussein & Husain, 2004)

Although the cost of the 2000 floods was approximately 20% of Mozambique's annual gross domestic product, and the floods of 2019 had an even bigger impact, any form of future disaster protection measures must compete against other development expenditure (e.g. education, agriculture) in one of the world's poorest countries (Christie & Hanlon, 2001). As a consequence, flood mitigation measures need to focus on nonstructural solutions, such as reducing communities' vulnerability, raising awareness and improving preparedness. One of the lessons learnt from the 2000 floods was the need to promote education programmes on flooding, at all levels, so that in the future the loss of life and damage caused by large floods can be minimised (Christie & Hanlon, 2001).This hasn't clearly been well implemented since the floods of 2019 were the biggest disaster ever in the region, much better efforts must be made.

The simple solution to flood mitigation in a country like Mozambique is that people should live on higher ground. After the 2000 and 2001 floods, this was the main policy pursued by the Mozambican Government, who constructed new homes for flood victims outside floodplains (Mozambique News Agency, 2001). However, floodplains provide fertile farmland and most rural communities want to work on and live near them (Eduardo Mondlane University Department of Geography and Famine Early Warning Network, 2003). People do not want to move to less productive land just to avoid another flood that may not happen in their lifetime (Christie & Hanlon, 2001). This means communities need the ability to live with floods and implement sustainable flood risk management strategies. After the floods in 2019 we can understand that none of the measures used by the Government before have worked and Mozambique needs more than ever better strategies to deal with future cyclones and floods that can better prepare the population for the events and their aftermath.

A strategy for an individual community may consist of a number of measures. Examples of measures include strengthening of houses in areas prone to flooding to reduce the probability that houses will be destroyed and providing safe water supplies during flood emergencies (Lumbroso, Darren & Ramsbottom, David & Spaliveiro, M.. 2008).

3.3 RESIDENCE UNITS

Figure 9. Picture of Life in Mozambique.Photographer unknown

The lack of available residence units, especially after the latest natural disaster in 2019, is a big problem for the population. But it also represents an opportunity for new types of residences to be explored and to try to avoid repeating the mistakes from the past.

Living on higher grounds has been proven in the past not to be a solution, as the population seeks to live closer to the fertile ground on the floodplains (Eduardo Mondlane University Department of Geography and Famine Early Warning Network, 2003). There should be a bigger concern regarding the future inevitable floods and the way the new housing units can eventually cope with them in a

On another hand, given the different typologies of housing in the city and the many different ways the population needs to adapt and appropriate the place they live in, there should also be a strong focus on providing the necessary flexibility in the future residential solutions.

3.4 INFRASTRUCTURE

Another big challenge for Beira, and many other areas in Mozambique, are the very weak sewage system, that, together with recurrent floods, are the main sources of mosquito that causes malaria. The cyclones and floods are the cause of great destruction, but the aftermath brings outbreaks of illnesses that keep killing long before the natural disasters are over. The government should invest in a better sewage infrastructure for the city or implement better local sewage treatment with better regulations.

3.5 ELDERLY IN MOZAMBIQUE

Mozambique has yet to ratify the International Covenant on Economic, Social and Cultural Rights but it has ratified other core international and regional human rights treaties. There are a number of policies, instruments and programmes in place to protect the rights of older people in Mozambique, such as the National Policy of Older People, the Basic Social Subsidy Programme and the draft Law on the Promotion and Protection of Older People's Rights. Despite this, the survey findings analyzed , point to possible failures by the State to take all appropriate measures to protect and promote the rights of older people. Older women and men reported that discrimination on the basis of their age was a regular and common experience in their lives. They reported high levels of violence and abuse that appears to be committed with impunity and little access to redress. They also reported considerable levels of neglect in social care and support and being treated in a degrading or humiliating way because of their age. However, in spite of the discrimination they face, older women and men reported that they participate actively in political and community life.

Another big problem regarding the elderly population in Mozambique is the high rates of elederly abandonment by their families. In 2014, in a temptative to fight this big social issue, the Government approved the first law that regulates the protection of the rights of the elderly.

This political instrument reinforces family's responsibility over their elderly and criminalizes the families, communities and the State in case this responsibility is neglected. Despite that, there have been barriers on the implementation of this new law and, the law alone, wasn't enough to solve the problem. ((www.dw.com). "Ser Idoso Em Moçambique É Um Pesadelo | DE 04.05.2017." *DW.COM*. N. p., 2020. Web. 25 Apr. 2020.)

In a country where greater effort needs to be made to address the rapid growth of the population, their care, and their social, educational and health needs, it is mandatory not to marginalize the elderly. In a country where infectious diseases are still a big concern, we see at the same time, a rapid rise of non-communicable diseases, with the typical chronic diseases of developed countries starting to appear, due to a middle-level income population that is growing, along with increasingly unhealthy habits of living in urban settings. Currently, there is a huge deficit in the offer of both healthcare facilities (number and conditions of the old existing ones) and trained healthcare staff. Because of all these healthcare needs for such a young and fast growing population -45%

of the population is younger than 15- it's easy to forget and neglect the elderly needs. Not only from a health point of view, but from a social point as well.

4. ELDERY CARE AND SOCIALIZATION ARCHITECTURE IN BEIRA (Mozambique)

4.1 MOZAMBIQUE ARCHITECTURE

Mozambique's architecture is characterized by a quite eclectic mix of design styles that reflect the history of the country. From the colonial architecture and modernist iconic buildings to the new brutalist buildings built after independence. One will find old low rise houses, 2 story commercial buildings, newer high rise office buildings, small apartment blocks, victorian houses, beach-front condominiums and plenty of traditional huts in the rural areas. This richness of styles and layers of history, together with the warmth of the local culture and climate result in a friendly and cozy contrasting environment that has a unique identity.

4.2 MATERIALS CONSTRUCTION METHODS

The construction sector in Mozambique is driven by recent huge investments in infrastructure improvements that are designed to support the country's rapidly developing oil and gas, and mining sectors. Nonetheless, this is an industry still facing huge barriers, such as the lack of coordination and information failures among institutional and private players, as well as a workforce that isn't sufficiently qualified and poor management practices.

Construction methods are still very traditional, with this sector still being quite behind on modern technological advances. In terms of materials used, most buildings are made of concrete blocks, bricks, concrete, cement, stone and steel. Processed materials are mostly imported, but the country has a large production of cement and steel, having also plenty of local wood available. This means that all interior finishes, plumbing fixtures, roof tiles, piping, wiring, etc are imported and expensive. On the other hand, the local, more traditional materials, easily available locally, like sand, clay and stone and all their by-products, have good quality and durability.

The typical structural solution - column and beam - is done in reinforced concrete.The walls in the older traditional buildings are made of clay blocks. This can still be found today in some newer constructions, for its low cost, its great thermal properties and for the widely-spread know-how. Walls in more modern buildings are typically made of hollow cement blocks, usually 200mm for external walls and 150 or 100mm for internal walls. Hollow bricks also show adequate thermal behaviour and require much less maintenance and are faster to assemble, allowing easier installation of electrical routing and piping. Railings and roof structures, as well as some structural elements for bigger spans, are usually made of steel. Doors, window frames, cabinets, joinery, framework and smaller roof structures are usually made of local wood.

4.3 ARCHITECTURE OF HEALTHCARE AND ELDERLY CARE IN MOZAMBIQUE

The Government of Mozambique has been doing a strong investment, through the Ministry of Health, to refurbish the existing hospitals and to build new facilities, both in the main cities, and the rural areas. But the investment hasn't been enough to follow the quick population growth, there is still a huge need for refurbishment of the existing buildings and to extend the existing healthcare network, both in rural and urban settings. The existing hospitals are very old facilities, most of them with more than 50 years, operating in very difficult conditions. Poor maintenance and the unplanned expansion in some of the old hospitals resulted in very hard conditions for appropriate medical attention. There is a huge lack of qualified health professionals adding to the problem.

Most modern hospitals in urban settings were already developed according to modern race-track plans and double-loaded corridors, while double or single-loaded corridor pavilion-type facilities are the majority of the hospitals and can be found in the rural and provincial areas. Medical care provided isn't very specialized, with only basic medical and surgical services being offered across the country.

In a country where access to adequate healthcare isn't easy, the elderly, that is the age group that typically needs more healthcare attention, are the least protected age group in the country and the most neglected one.

The Government, together with private and religious institutions, to address the problem of elederly abandonment by their families, has been working to open several new elderly care homes. This measure had positive and negative impact, positive because many abandoned elderly now have social and health support through the new elederly homes, but negative because the elederly abandonment rate has increased even further. Also, there are still many abandoned elderly living in the street that have no place in the elederly homes built, which means the country still needs more infrastructures to support the elderly.

The existing elderly care homes are very simple and old fashioned ones, usually linked to religious institutions, that are doing an amazing job helping the needy elderly. But their facilities could be greatly improved with better planning and design, following the latest design guidelines adapted to the context of Beira. Very few attention has been given to architecture and design concerns in these facilities, following traditional pavilion structures. There is a lot that could be improved, from an accessibility point of view, to evidence-based design principles, that would greatly improve the user and staff experience without even increasing construction or maintenance cost.

5.CASES STUDIES

5.1 NANAI HOME FOR SENIOR CITIZENS, MASHIKO JAPAN BY MASAMITSU NOZOWA

Nanai home for senior citizens is located in Mashiko, one of the most attractive natural settings of its kind in Japan. Residents in the nursing home live in a spacious individual room with a private toilet and lavatory where they can live as richly as possible. In order to minimize the floor area, a cushion space was created to separate between private rooms and corridor; a lavatory station separated from the corridor by means of a translucent screen. Nnai homes also provide a large meeting area for the local citizens to have different activities for the elders and local residents.

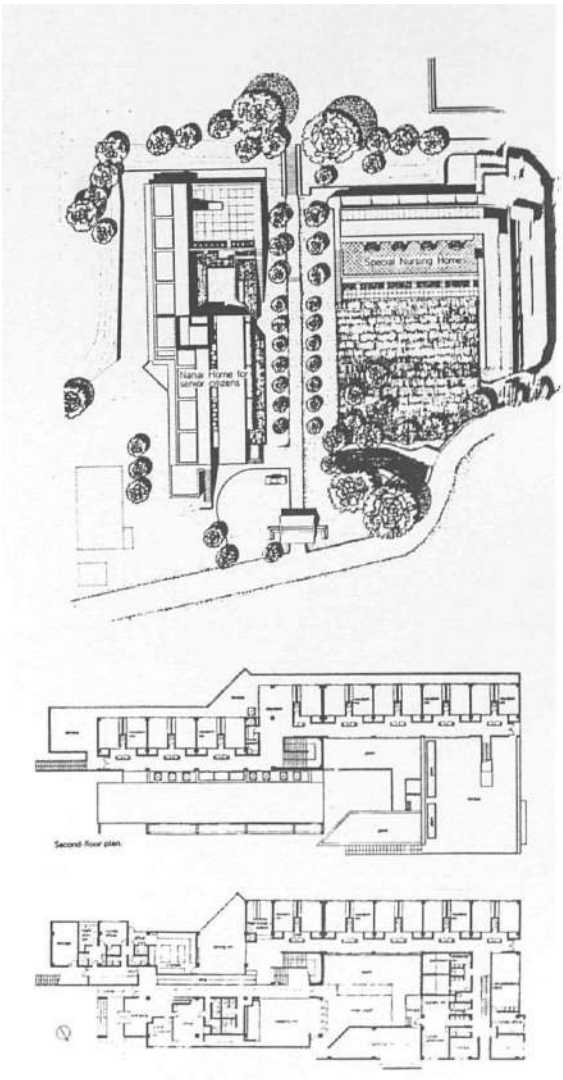

Figure 10-Architectural plan

5.2 ASIL GOTTES HAND OLD AGE HOME,BERNE SWITZERLAND,BY ATELIER 5

This nursing facility is located in Wittigkofen on the outskirts of Berne. The entire facility is organized around the basic units of the 24-30 two-bedroom units. The distinctive Y-shaped configuration of the floor plan ensures that each bed has some privacy and is equally privileged for light and view.

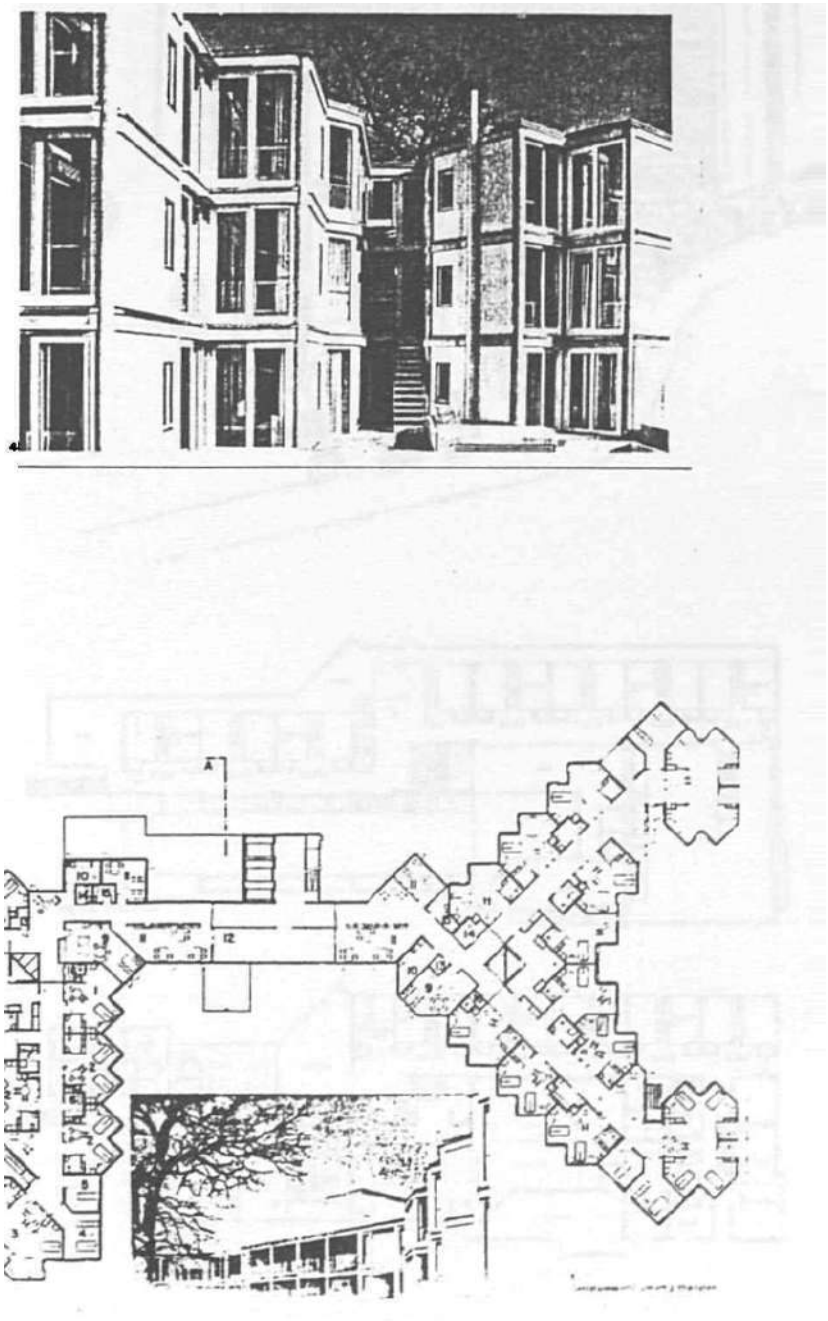

Figure 11. Architectural plan

CHAPTER TWO

6.UNIVERSAL DESIGN GUIDELINES AND RECOMMENDATION FOR ELDERLY CARE CENTER IN BERIA

Correct design solutions improve the quality of life for elderly. The guidance collected in this section may be useful for all elderly people who require special care, but it is particularly important to adapt it in the context of Beira, Mozambique.

The environment increases the autonomy of the population, improves social life and participation in routine, everyday activities. A natural, calming environment also helps employees interact with residents. The more the design decisions resemble the home environment, the more residents feel more autonomous in the environment they are given. The more patients have autonomy, the more likely they are to improve their well-being, maintain their existing skills or regain forgotten skills.

The main recommendation for the characteristics of the spaces is to keep the nursing home facilities as close as possible to the residential environment. Living in a home-like space will increase the opportunity for residents to get to know, analyze their surroundings, socialize with others, engage in activities while maintaining independence and ability.

After analysing the context of Mozambique, and the city of Beira in particular, from different points of view, and identifying the urgent need for better facilities where the elderly in need can receive the care they deserve, this work create a set of "Design Guidelines for the Elderly Care" that is bespoke to the city of Beira and its elderly population needs. The main goal of these guidelines is to improve the quality of the new facilities, empowering local architects, project managers, politicians, investors and other key stakeholders to reach better outputs. This will mean better planned and better designed facilities, developed according to modern guidelines and evidence-based design rules, adapted to the local context, that will greatly improve the life of elderly, caregivers and families.

6.1 SITE SELECTION

The site selection for an Elderly Care facility is quite important as the site will need to have the minimum area required, shape, good solar exposure, good accessibility and preferably located at a higher ground and far from river beds to avoid floods.

The site should have a regular shape, with enough area for the planned facility footprint, future horizontal expansion, ancillary buildings like worksop, central utility building, water tanks, local sewage treatment plant, enough area for the required parking places, an inner ring road, and enough area for outdoor living areas for the users.

Accessibility is another important issue, the facility needs to be easily accessed by different means of transportation, from public transports, to private cars, bicycles or by foot.

Good solar exposure with correct building orientation is also important for health and sustainable reasons and pleasant surrounding views of nature are also very desirable.

Safety and security are also factors to consider. The facility should be located in safe areas, far away from any potential dangers, like facilities with high risk of explosions or fires, sources of noise like highways or mines, or industries with emissions of particles to the atmosphere or intense smells.

Topography is very important. Choosing places with higher grounds is particularly important in Beira. Previously flooded areas are to be avoided. The site should be more or less flat, avoiding very accidented sites where construction may be more expensive, requiring more land work.

Access to sewage, power, water and waste treatment should be also considered. Usually in Beira, utilities can be easily found along the main roads and this needs to be considered when choosing a site. If the infrastructures for utility supply are not available, then the site should be big enough to accommodate alternative sources of drinkable water, power generation and local sewage treatment systems.

6.2 ARCHITECTURAL OBJECT

6.2.3 VOLUME

The building should resemble a home, both inside and out. Proper weight (volume and shape), interior layout, room hierarchies and circulation (corridors, staircases, elevators, lounges), materials and furniture, color palettes and even room names can significantly improve patient well-being.

The simplicity of the design of the building reduces the irritability of residents and the feeling of stress. Considering the time of day, it is advisable to optimize the use of natural light.

The external masses of the building should respond to the human mind. A monotonous, one-plane facade should be avoided.

6.2.4 SHAPE

The shape of the building should adapt well to the function it will hold, the care for elderly people, but also respect the space appropriation that those people are used to, making them feel as much at home as possible. The building should be perceived as a whole in both its interior spaces and its exterior spaces. People in Mozambique do most of their life in the exterior spaces around the buildings, so we should give special attention to the outdoor areas of the facilities. Shaded patios, gardens, planting areas, covered outdoor spaces and the like are going to be very used by the Beira elderly and their caregivers. This means the shape of the building should create all these spaces and be very permeable in terms of interior-exterior connections.

6.2.4 ORIENTATION

The orientation of the building should, on one hand, protect the longer facades from the heat of direct sun exposure, and explore the surrounding views while creating shaded outdoor areas. When possible, an orientation East-West for the longer axis of the buildings is commonly recommended because it exposes the longer facades to North and South, making it easier to protect the most problematic North (South Hemisphere) facade from the peak of sun radiation, using horizontal louvers and, if needed, to protect the East and West facades with vertical louvers. This type of passive protection of the buildings is extremely important in places like Beira, where the climate can be quite hot and there is little resources and technology to rely on mechanical means of cooling. It is also a much more sustainable solution for the planet.

When placing and orienting the footprint of the proposed building, we should also consider strategies for easy future expansion and possible future adaptations. We shouldn't land-lock the building in areas where it is easier to expand it in the future, either by extending parts of the existing building, or by building future additional buildings linked to the original one.

6.3 MASTER PLANNING

6.3.1 ENTRANCES

Regarding the master planning proposed for the site, we should consider at least 2 entrances, one main entrance and an emergency one, that can be used for service as well. The entrances should be separate enough to be considered alternatives to each other and the main entrance should be well signed.

We should also consider a protected dropoff area next to the public entrance to the elderly care building, to protect users coming in and out of vehicles. If there are more than one building or more than one public entrance, than it is recommended we use clear wayfinding, for example, by using characters to identify the entrances, which helps people identify it more readily and can create a sense of uniqueness, friendliness and individuality for building that often seem institutional or faceless. The approach to the main entrance is where the facility causes the first impact and we should focus on having a friendly, welcoming and trustworthy image.

Innovation at the main entrance also causes a positive impact, and it could be in many forms: art, sculpture, landscaping, planting (using species that , architectural features etc – all of which add to a sense of modernity and progress, as well as providing interest. High and generous entrance ways feel welcoming and uplifting.Low or narrow entrances are claustrophobic and oppressive, not easily identified and can cause uncertainty and should be avoided. Generous space leading up to the building entrance confirms its presence, projects confidence and creates an easily identifiable meeting point. Entrance areas should provide meeting points and places for people to rest or wait outside, so these areas should be well shaded, using canopies and trees, and will be used a lot by the elderly users in Deira. Landscaping, using trees and bushes, will protect these outdoor areas from sun, rain, wind and, increasingly in city centres, noise and pollution. Lighting is another element that will have a great impact in the entrance and outdoor areas of the building, as well-lit entrances and outdoor areas lead to a sense of safety. At last, we should consider using surfaces adequate to all types of users, with special attention to the fact that most users in an elderly care center will have conditioned movements, so non-slip pavements with color contrast and drop kerbs are extremely important.

6.3.2 FUNCTIONS AND CIRCULATION

Most studies have shown that the physical environment of elderly, in combination with therapeutic activities, influences their quality of life. Creating a patient-responsive environment greatly improves this. Slow progression of the disease and the need for medication have also been observed.

Environmental orientation consists of three key elements: knowing where you are, how to get to your destination (with a "mind map"), and recognizing your goal. The orientation system in any building can be an important aspect of the comfort of residents and visitors, especially those who may feel unsafe in their environment. The cognitive impairment experienced by patients is an extremely important aspect of building orientation. If residents feel safe and know how to find a way home, they can more often walk freely around the care home, socialize and be more physically active. Premises should avoid repetitive or mirrored layout of rooms, as they may appear faulty to some patients. Spaces should have a clear defined function, since sharper distinctions are easier to remember than subtle changes.

- The interior should not resemble a hotel or a hospital, so it combines a variety of home cozy details.The functional layout of buildings is based on the principle of single-dwelling houses.In modern Western culture, the most common example is the transition from public to private, i.e. the transition from the hall to the living room, the dining room and the kitchen to the bedrooms as the most private space.Premises should create a natural "flow" using as few corridors as possible, and easy to navigate. Typical layout of premises:
- Patient bedrooms are grouped to distance them from common areas, creating more private accommodation;
- Bedrooms surround the core of the building - social spaces to minimize walking distances and maximize visual communications that encourage patient and professional nurse socialization.
- The workers should be able to monitor patients without interruption of the activities.This is achieved by inserting internal windows and wall openings between different spaces, creating visual links, shortening corridors and creating spaces to encourage staff presence.

- Provide clear access and site lines (visibility) to waiting and circulation areas from staff workstations, desk stations, nurses' stations and other staff working points. These physical features can be achieved through design spaces and forms shaped to avoid areas blocking from view and use window walls to allow visual control.

- Provide clear circulation hierarchy and ample corridors to limit, control and direct movements through the facility. *(Lion, Dubin, & Futrell .1996)*

Each user of elderly care centers in Beira should have access to public areas inside and outside the building, but they should also have access to areas where they can feel private and secure their belongings. This should happen near their beds. It is very important that each user has some space that they can feel ownership of and they can have things like family portraits and personal objects. This helps feeling at home in an institution. Even in open wards, when users don't have their own rooms, to keep costs as low as possible, at the very least each user needs their own personal cupboard and ways to be able to have some privacy, whether it's using curtains, folding screens, modular furniture, or other methods.

6.3.3 SEMI PRIVATE SPACE

In general, the space should not be too large. On the contrary, each space should be functional and free, proportionate, reminiscent of a large family home. The mix of larger, leisure-type and smaller-room-type rooms brings together smaller groups of people for communication based on interest. It creates a feeling of coziness and privacy, so the main challenge is to create a family environment that will influence small group gatherings.

Patients can be easily distracted and upset when exposed to large groups of people and spaces.This applies to various group activities, dining and even accommodation arrangements. Patients tend to function more easily in quieter, smaller groups.In this way, stronger social connections and a sense of security are formed not only among patients themselves, but also among their carers and nurses.Socio-emotional support is a well-known factor for improving the emotional and mental state of patients.It is advisable to form accommodation complexes for groups of 10-14 people, consisting of bedrooms, common kitchen, dining room and living area.

Multifunctional facilities should be avoided.Although the overall concept of flexibility for a building is important for its evolution over time, multifunctional spaces are not recommended as patients may have difficulty adapting to changes in room function and expected social patterns.

For patients, social support received from family members, friends and staff reduces patient stress and psychological negative outcomes which in turn has a positive impact on both patients and families. Family members also need social support to face, for example, a long-term illness or the death of their relative. A family members' long-term illness affects the entire family's well-being and health (Roger S. Ulrich 138). Social support is perceived as "emotional, informational support or caring obtained through interpersonal relationships, and tangible care delivered by others"; healthcare design should enable the occurrence of this support. However much attention should be paid to avoid designs that boost social support through providing space for family in wards and patient rooms, because this situation can make these spaces high populated and noisy, taking away the sense of privacy and confidentiality needed for patients' recovery process (Hamilton & Shepley 161). The design process should carefully balance the advantages and disadvantages of each need versus each design solution to ensure patients, families and staff well-being and ultimately satisfaction.

6.3.4 PRIVATE SPACE

Residential bedroom design should reflect the individuality of each resident. Residents and families themselves should be encouraged to personalize the room as much as possible. By creating a familiar environment, we help them navigate their surroundings. For example, personal belongings, favorite ornamentation or personal photos could be placed in a special window to each resident's bedroom from the outside, thus orienting them to their own space.
Enlarged photos of residents at important times in their lives (weddings, parties, work, birth) can also be a source of comfort, coziness and security.
Built-in shelves, cabinets or boards displaying interesting collections of items would be a stimulus for residents to have a conversation and have fun with each other. Browsing through fragrant, visually appealing objects will evoke memories and give you the opportunity to have a discussion or conversation.

Home care for people should be done in a safe environment: furniture should be at low angles, rooms should be well lit if the patient eats themselves - tools should not be sharp either. The sick must be treated with respect and dignity.

A strict, unchanged daily regimen is important in nursing. One has to know exactly when to wash, eat, walk, exercise, sleep.Patients not only forget where they put things, but they can put them in the wrong places, leave the lights on, the gas switch off, the water tap and so on.
It is important to ensure a peaceful and safe environment.They can get lost in the hospital, especially at night.Noise and other stimuli should be kept as low as possible in the patient's environment.The environment must be cozy and familiar.Potentially dangerous items must be hidden or locked. Furniture should be stable, at low angles. Appliances with simple controls are used.

Provide natural and passive surveillance through strategic physical design features to ensure informal observation. This can be achieved through:

- Placing balconies or verandahs along building's façades, overlooking outdoor spaces

- Concentrating public movement—hospital mall—overlooking outdoor grounds through large windows or glazed walls
- Placing windows (one way viewing glass) along building façades to ensure privacy for insiders while enabling them to overlook outdoors

6.4 CIRCULATION AND ACCESSIBILITY

The facilities should have seamless handrails along the corridors to provide support and stability to the users. Recessed seating areas along corridors provide places for patients and staff to meet and rest. The circulation areas should be well lit, both during the day and during the night, not only to prevent falls, but also to make users feel safe and comfortable. The use of plants and art pieces help the interior spaces to feel more friendly and warm and peaceful. The circulation areas should also include very clear wayfinding signs and cues that make it easier for the users to build their own mental map of the facility and help them keep their independence.

Users should have easy access to toilet facilities. Whether from their sleeping areas or from the indoor and outdoor living areas. Data shows a very large number of falls occur between the bed and the toilet, especially at night. This is true in domestic, resident and hospital environments. So special attention needs to be given to the path from the bed to the toilet. This way, designers should ensure that there is something to hold on to throughout the journey into and round the room. When designing toilets for the elderly care centers in Beria, space must be left for patients to be assisted: in many cases the elderly will need help from the caregivers. Automatic movement-detected lighting should be considered, as nowadays there are quite inexpensive solutions. Designers should opt for materials that can easily be cleaned and should consider using flush rather than recessed joints.

6.4.1 LIGHTENING SOLUTIONS

When designing spaces, care should be taken to ensure that the light is not too bright (does not shine) or too dark (creating shadows). Aging eyes need more light and find it harder to distinguish between different light intensities. Non-flashing natural daylight should be used wherever possible. Table or wall candlelights create a lot of reflections of light and are therefore undesirable where people with intellectual disabilities live.
Changes in floor height due to poor lighting or the pattern of the floor can cause the patient to fall. Bright, shiny, reflective floors should be avoided. People with disabilities will avoid rooms with visually disturbing floors, which will limit their freedom of movement and other opportunities.

The reduced ability to perceive slight differences in light, shade and reflection requires a more pronounced color contrast between the walls and floor, between the door and handle, and between the toilet and bathroom floor and walls. The contrasting colors used on the toilet lid, door handle, handrail, help residents recognize these architectural features and provide functionality for the premises.
In buildings where there is a risk of escape for residents, non-contrasting architectural elements reduce the chance of escape. Thanks to the appropriate design, exits can be masked out so that the occupants of the building cannot see them.

6.4.2 VENTILATION

The building should be developed along a narrow footprint, with strategically placed windows and doors allowing proper natural ventilation between the interior compartments and should allow for good daylight levels in all interior spaces. For passive cooling, the architectural solutions should rely on natural air flow within the building that ensures hot air rises and is drawn out of the building and replaced by natural fresh air intakes located at lower levels (through windows, breathers or other intake solutions). Another recommended solution for passive cooling in the proposed architectural solutions will be to have high to medium pitched roofs, allowing the air chamber (airspace between the roof and the ceiling) to naturally ventilate, minimizing the transmission of solar radiation between the external environment and the interior spaces.

These roofs should also be thermally insulated using aluminium foil radiation barriers, mineral wool or similar solutions, which will help create thermally comfortable indoor environments without the use of more expensive and less reliable active (mechanical) measures.

6.4.3 MATERIALS

The furniture in the premises should be selected to minimize excessive noise. Materials, window blinds, floors should be selected from materials that absorb rather than amplify the sounds emitted. Older people tend to have hearing loss and even the slightest sounds can be disturbed, especially when many sounds are mixed at once. In order for residents to receive and understand the information they hear, extraneous sounds should be suppressed.Music-making devices and TVs should only be used in certain areas.
Frequently sliding equipment and wheelchairs should be covered with rubber.

The interiors of elederly care centers in case of Beira, should also respect a low budget and have easy maintenance, with preference given always to the use of locally available materials and local construction techniques. Trip hazards should be avoided when designing these facilities, as well as following basic accessibility principles that can cater for the needs of a population with low levels of mobility. It is recommended to use non-slip pavements with color contrast in the spaces most used by the elderly.

6.4.4 COLORS

All furniture, flooring, wall colors and window coverings should be warm to medium colors. Yellowish, mild peach, pale pink or blue are perceived as white non-distinctive colors, while harsh dark colors such as dark brown, blue or black are seen as black. Warm mid-intensity colors are noticeable and cozy. Red and yellow are believed to be the best perceived colors.

Mirrors, shining surfaces and glass elements should be avoided in the premises. Their quantity must be limited. Glossy surfaces cause glare, which distracts attention and limits visibility. Some people with intellectual disabilities may be disturbed by mirrors and should be removed or covered.This can be enhanced by the introduction of higher-contrast items or architectural elements that help residents discover their surroundings through texture.

Auxiliary facilities in the building should be designed so that they cannot be seen by residents and there is no risk of injury. For example, doors to utility rooms should be the same color as the walls next to them.

The design should also optimize the visibility of employees to the location of the residents, ensuring optimum security without compromising privacy.

It is necessary to consider ways to find the path using artwork or objects of interest (not just verbal instructions). For example, a large, cozy colored blanket on the couch would encourage you to gather in the same place where you can talk to each other. To ensure that residents have unobtrusive access to real rooms, such as a picture of a toilet in a shared bathroom and a picture of a large plant outside the garden door.

People with intellectual disabilities should be accommodated on the ground floor to ensure their safe evacuation and access to evacuation exits.

Clear, large room notes and numbers are used for this purpose, as studies show that dementia patients remember words and numbers longer than other types of memory. The words are paired with pictures that clearly indicate the function of the room.In this way, facilitating the well-being of patients in the later stages of the disease, and ensuring that the population is not misguided and safe.

The design will use yellow, green, bluish and purple colors.Yellow is the color of the sun, which is the main source of life on Earth. Indeed, yellow enhances intelligence, psychic abilities and assimilates information, and the ability to communicate with others, express their thoughts and emotions.It symbolizes optimism and determination, caution.In the kitchen is recommended yellow color, yellow details.Not only does yellow stimulate metabolism, it also provides energy and lightens architectural space.If the dining room is separate from the kitchen, it can be boldly complemented with red details to awaken energy and appetite.

Green is the dominant color on our planet, making it the most relaxing and harmonizing, helping to regain hope and inner balance. Green color is great for soothing inflammation and nervous system, helping to restore hormonal and enzyme balance in the body.The green color corresponds to the heart chakra, making it suitable for treating bronchi and eyes, normalizing pressure, treating heart ailments and "broken" heart pain.It also strengthens the muscles and bones and promotes growth.Green is considered the most relaxing color.It is suitable for almost every space as the main color of the interior.In the kitchen, the green is as cool as it is on the living room, warm enough to create a sense of comfort and communion.

Blue is considered to be the strongest healing color, affects both the physical and spiritual body, relieves pain, and is suitable for healing emotional and spiritual traumas.
Blue color cleanses and detoxifies the entire body. Blue color helps focus, clears thoughts, relieves anxiety, and allows you to listen to your inner voice.It helps those suffering from insomnia.

However, a large amount of blue tones can exert pressure and cause melancholy.Depressed people in the blue space may feel like they are in a closed circle of self-struggle.Blue is equally good for work and relaxation,

but it should be complemented with warm accents so the interior doesn't look too cold.Violet is great for accents or as a side color for an interior that gives depth, playfulness.

Purple is the darkest shade of eggplant and it is dramatic, luxurious and deep. It is not only about luxury but also about creativity.A lighter option, the lavender shade creates a relaxing effect, making it perfect for bedrooms. It has the same effect as blue, but purple is much warmer than the latter.

6.5 OUTDOOR AREAS AND LANDSCAPE

In outdoor living spaces, it is recommended to have well shaded areas where the elderly can find the same type of both sociopetal and sociofugal seating arrangements. Landscape should be used to provide shelter from wind and direct sunlight, as well as noise, especially where the facilities are located in city centers. Views of nature are valuable additions as are access to planting, as most of these elderly will have experience in agriculture activities. Open areas for outdoor activities like gymnastics, yoga and games are crucial to keep the elderly active and healthy.

The beneficial effects of nature views extend to lower patients' blood pressure and heart rate, increase psychological, physiological and emotional positive changes, including feelings of pleasantness, calm and mood, while eliminating negative feelings such as anxiety, anger, worrisome and stressful thoughts. These benefits increase patients and family satisfaction, and staff effectiveness and efficiency. (*Ulrich, Zimring, Zhu, DuBose, Seo, Choi, Quan & Joseph. 2008) (Marberry.2006)*

The proximity of nature and outdoor recreation spaces are important aspects for the quality of people's living environment. In greener environments people experience less symptoms and have better perceived quality health. People's mental health is also better when they are surrounded by greener environments *(Sjerp, Verheij & Spreeuwenberg. 2003).*

Provide outdoor spaces specifically close to cafeteria or dining areas, main entrances, lobbies and main corridors, waiting areas and pharmacies, staff offices, inpatient and therapeutic areas.

Well-designed gardens, courtyards and patios are not only sources of restorative nature views, but also improve many patient outcomes and foster social support, restorative escape and self-control with respect to clinical environments.

Depending on which indoor space they are directly related to, they may be used as a place for gathering, interacting, eating, waiting, respite, smoking, viewing, and enhancing spatial orientation. Quiet spots within green gardens and courtyards can be used for private conversations and meditation.

Designing a safe outdoor space is also appropriate.It is important to provide visually and acoustically private spaces to avoid unnecessary patient distraction and further behavioral disturbances (e.g. large, noisy dining areas are associated with muted food intake).

Residents need to be adapted if they go outside on their own, and the various weather conditions change over the years. Closed parks can stimulate, but also distract, depending on the occupant's condition and behavior. The environment should be exemplary and captivating but not too big, like public parks.

Pots with different species of plants placed on the ground, or hung in the garden, need to be considered. Natural plants stimulate senses, emotions as well as distraction. The designer should use local species of plants in the outdoor spaces, that will remind the users of their former environment and make them feel at home.

Designers should also consider the use of equipments and the creation of spaces that will allow for different outdoor activities, such as:

- There could be a rope in the open for rejoicing;
- A comfortable place to sit (without absorbing heat);
- Birds for bird watching
- Fireplace, firewood
- Arbor
- Winding tracks

Fences should be attractive and natural. Trees, shrubs, creepers will camouflage fences and will not tempt residents to explore elsewhere. Chain or organic glass fences can be tempting to flee because the action behind the fence can attract the attention of the general public.

There should be several places to sit, conveniently positioned along the tracks, encouraging wandering with purpose. Walking paths should be level to avoid tripping or falling.

Indirect sunlight should be readily available. Arbor, canopies, shelters or umbrellas will allow residents to enjoy the outdoors without being exposed to direct sunlight.

Gates should be avoided, disguised along with the fence and not be visible. In the center of the outdoor space, interesting objects should be designed (focused) to distract the residents from the fringes.

Outdoor space offers residents the opportunity to engage in knowledge of daily activities or entertainment. Also reminding themselves of their past circumstances.

There are several important aspects to consider when designing open spaces: accessibility, movement, and orientation.The garden is easily accessible to patients from common areas (eg living room).On the next floors, it is important to secure the balcony railings.The design of open balconies is advised to increase the number of open spaces so that patients can enjoy the fresh air, sunlight and views of the natural environment.On cool days, or during the cold season, residents can admire nature in their lounges, with large windows overlooking the gamut.

Patio tracks should be clearly laid out, flush with the lawn and without curbs. Doing so will boost your self-confidence and independence.The tracks should be clearly visible from the common areas, so that patients can easily navigate to find and mislead them. Walking trajectories are projected in a circle so that the resident can easily return to the starting position.The tracks should not end in deadlock, and the gateway to the yard (if it is not a closed yard) should be hidden from the eyes of the residents.

Walkways should be marked with clear navigation signs such as strong-scented flowers or other dwarf plants.The tracks themselves should be wide enough for patients to walk side by side.In this way, people with disabilities should be kept in mind. Many places to stop and sit down to rest should be designed.

Most dementia patients have gardening experience, so accessing a garden space can evoke positive emotions and provide a sense of security.By raising plant pots, residents are encouraged to touch the vegetation, and they become accessible to people with disabilities and those who have difficulty bending.

Paths, trees and other garden elements should be illuminated in the evenings to ensure safety and to allow the garden to be enjoyed during the dark hours of the day. This is especially important for patients who are sensitive to sunlight.

The vegetation palette should reflect seasonal variation so that patients can associate with current time and chronology. Augaali should have different scents, textures and colors.

Elderly care centers should be planned and designed to accommodate the need of outdoor living, meeting the most common habits of the local population. The integration of building elements as a means of transition between interiors and external spaces should be considered.

The country has a climate that encourages spending most of the time outdoors and people are used to accomplishing most domestic activities under the natural environment. Landscape should be used to provide shelter from wind and direct sunlight, as well as noise, especially where the facilities are located in city centers.

Outdoor views of nature are valuable additions as are access to planting areas, as most of these elerly will have experience in agriculture activities. Elderly care centers should include wide verandas, decks, porches, and external covered patios can allow the users of the facility many opportunities for interaction, activities and social support.

Also, consideration should be given to species of plants proven to use some mosquito repellant plants as a way to mitigate mosquito-spread diseases, which could be an useful landscape feature for Mozambique.

6.6 SUSTAINABILITY

There is no other way than following sustainable design principles for the new elderly care centers in Beira. They just can't afford it, and, in a way, architects should be happy about it. Let's see the cup half full instead of half empty. This needs to be a designer's approach to this kind of project in the context of Beira.

This means following passive sustainable design principles of narrow footprints to maximize the effect of natural ventilation and appropriate levels of daylight inside all rooms. Building orientation in a way that the longer facades get facing North-South and North (South Hemisphere) facade glazing is well protected from direct sunlight through the use of vertical louvres or tall trees and East/West facade glazing is protected by horizontal louvres or lower trees/bushes.

Design solutions that will provide high to medium pitched roofs, allowing the air chamber (airspace between the roof and the ceiling) to naturally ventilate, minimizing the transmission of solar radiation between the external environment and the interior spaces. Passive cooling designs that rely on natural air flow within the building that ensures hot air rises and is drawn out of the building and replaced by natural fresh air intakes located at lower levels (through windows, breathers or other intake solutions). The use of landscape features to shade the building and the outdoor spaces around it.

In areas in risk of becoming flooded, buildings should be raised from the ground. They should also have ways to collect rain water and have water tanks integrated in the architectural solutions that can provide means of surviving during emergency events.

To go around the problem of a weak sewage system that becomes a source of illness, each facility should have their own ecological wastewater treatment that uses a tidal process that operates outdoors in tropical and temperate climates. Aquatic and wetland plants, bacteria, algae, and other organisms are used in the system to provide specific cleansing functions.

6.7 CONSTRUCTION MATERIALS AND BUILDING METHODS

Locally available construction materials should be selected for the elederly care centers in Beira. Not only to keep costs low, but as a matter of ecological sustainability, generating less waste and less carbon dioxide emissions. Traditional construction materials, as well as local construction techniques, currently found in many buildings in Beira show appropriate thermal behaviour, providing good comfort levels to the local climate. There are huge budget limitations so these facilities will need to make the most out of very few, with proper design techniques, local cheap materials and using the know-how of the local builders. If designers use these locally available materials and traditional construction methods, together with a set of Design Guidelines for Elderly Care Centers in Beira, the facilities will be greatly improved without increasing their cost when comparing the currently existing facilities for elderly care.

Elerdly Center in Beira will benefit from modular solutions, that are repeatable and easy to convert according to future needs. We should consider using traditional constructive methods that are easy to build using the local know-how, and using local construction materials to keep the price as low as possible. Passive cooling solutions should always be adopted, with crossed ventilation, appropriate building orientation exposing the main facades to North and South, shading of the most exposed windows with louvers or trees, and correct material selection being at the top of the design concerns. In areas known to be flood-prone, we should consider raised building solutions to mitigate the destructive impact as well as integrated water tanks to use in emergency situations.

CHAPTER TREE

7. PROPOSAL - ELDERY CARE AND SOCIALIZATION CENTER IN BEIRA (Mozambique)

This chapter discusses the design brief development, site selection and location, site conditions, site inventory, site analysis and the design process together with concept and its impact on the users.Proposal of design and all solutions based on collective data and research in Chapters 1 and 2.

7.1 GENERAL OVERVIEW

Proposals of the master project contain not only for elderly care center, but together they propose architectural form living houses.

This facility is not just an elderly health facility but it also aims to encourage elderly to participate in city life, and according to context invite society inside it .

The environment needs to be created to help not only them but also the staff, families, and anyone who enters the facility. The space is designed to be a transforming space; one that is spiritual, psychological and physical.

The proposal for the elderly care and socialization center facility took into consideration the cultural and climatic elements of the country. From the research and case studies done, the facility which will stimulate the comfort and improve quality of life for elderly is needed, together bringing a new approach of socialisation factor.

The design brief was developed taking into consideration ;

-Elderly medical care

-Elderly integration in to socium

-Administrative and caregivers comfort

-Space psychological comfort

-Architectural form integration into urban contextual narrative

7.2 URBAN PLANNING PROPOSAL

The project proposes new urban planning for the destroyed city part. First part of the proposal presents a new city urban structure plan.

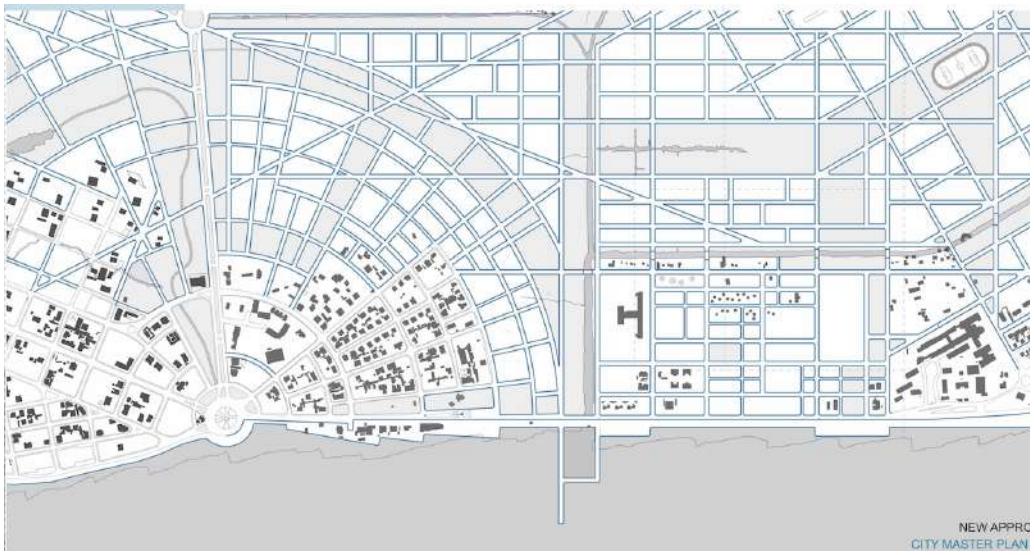

Figure 12.New Urban plan proposal of city Beira(marked blue color)

Figure 13.Urban plan city of Beira before Cyclone 2019

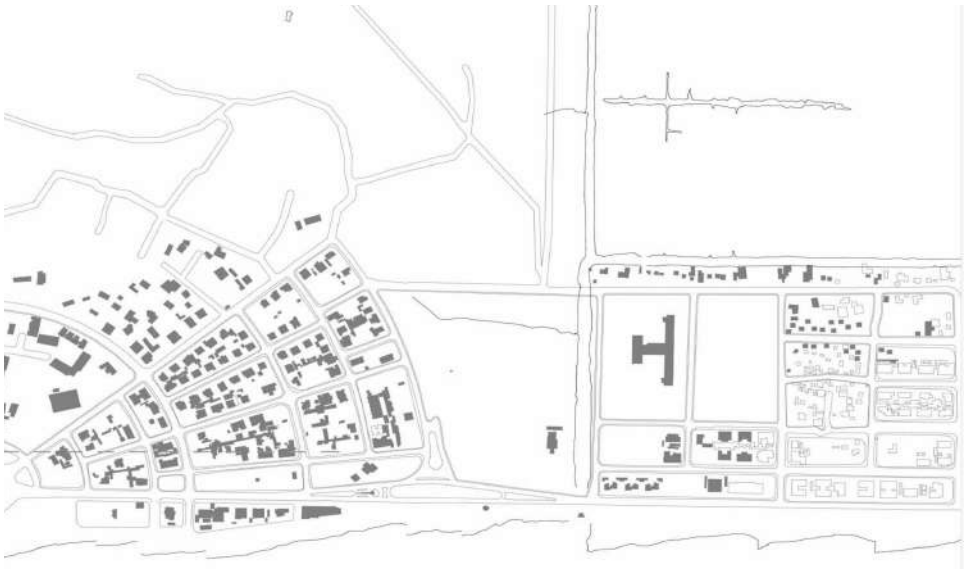

Figure 14.Urban plan city of Beira after Cyclone 2019

7.3 LOCATION OF ARCHITECTURAL OBJECT

Information gathered during the research, and practically creating a new city master plan approach for Beira (Mozambique) city , we are able to create perfect conditions for a new eldelry care and socialisations center, fulfilling all research recommendations and guidelines of this work.

The choice of site and the manner the building is integrated into the community is integral when seeking to encourage community and family interactions and participation with the elderly.The choice of site and composition of the scheme also affects public attitudes and stigma towards the elderly and architecture that seeks to respond to their needs. If the architectural composition is designed in a shape that responds to the needs of the elderly, it has the potential to empower them and promote active ageing. *(Global Age friendly cities Guide ,2007)*

The role architecture form which would be taken, by designing a facility, can have a positive impact in community development by offering intergenerational relationships between generations, and elderly itself.

Therefore locations are easily accessible from the city center, in active residential neighborhoods.

The site's location partially joins the city public areas narrative involving elderly center participation in city life. Quiet and calm site surrounded by residential neighbourhoods gives potential security. Site was designed close to the hospital to reach first aid quickly. The nearby church fulfills the need of spirituality and encourages social integrity in society. The site is large enough to accommodate outdoor areas and fulfill all design programs. Location for any kind of transportation easily reachable.

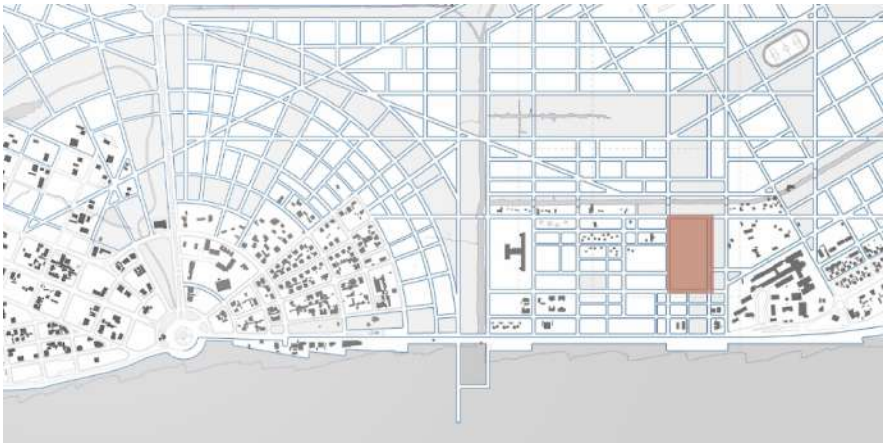

Figure 15.Architectural object place in New Urban plan proposal of city Beira(marked red color)

Figure16.New architectural skin narrative proposal of city Beira including

7.4 FUNCTION PROGRAM FOR ELDERLY CARE CENTER

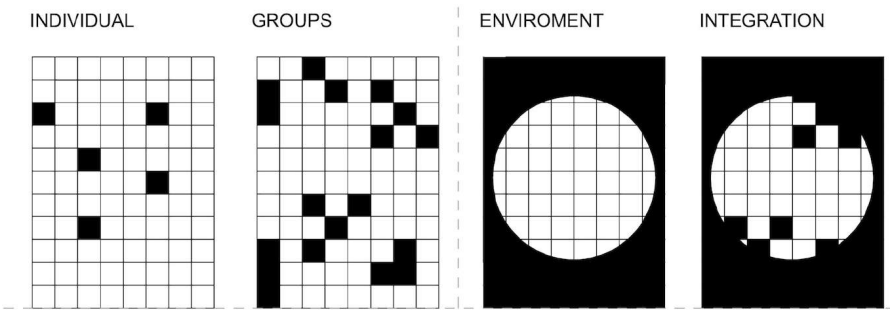

Figure 17.Functional scheme to explain conceptual proposal of functional plan together fulfilling previous chapters challenges.

The primary function of this facility is to provide nursing-care to the elderly individuals. These elders may need 24-hour care or just a few hours each day. We will call the elders living for 24-hours in the facilities, "residents". The elders that will come just for some hours during the day and then will leave to sleep at their homes or with their families, "day-care users".

The reason these elders stay in the nursing home instead of staying at home is because they need medical care during the day, or 24/7, and their families cannot provide that kind of service for them. Many of these elders will be victims of elederly abandonment by their own families, which is a big social problem in Mozambique and if they didn't have this type of facilities to care for them, they would be homeless. Most of these elders have 3 or more pathologies, many of those pathologies are chronic diseases that need close monitoring and management. Some of them will be in critical conditions and will require palliative care.

A proper Health Service Needs Assessment will need to be done in the future to have a better understanding of the epidemiologic profile of the population inside the area of intervention (catchment), to determine exactly what are the expected clinical needs of the future users of this facility. For the sake of this exercise we will estimate that we will have the following 4 types of patient profiles, described in crescent order of acuity: the day-care users, residents level 1, residents level 2, residents level 3.

Day-care users - are users that are still able to come to the facility for socializing, rehabilitation, consultation or geriatric treatments.Lowest medical care.

Residents level 1 - are users that live in the facility for reasons of abandonment by their families and they mostly need social care. They might need regular clinical care for their pathologies.Low medical care needs.

Residents level 2 - are users that live in the facility, despite being abandoned or not by their families, and they need intermediate level clinical care for their pathologies. They are still able to leave their beds and do activities ,rehabilitation outside their rooms.Medium medical care needs.

Residents level 3 - are users that live in the facility, despite being abandoned or not by their families, and they need acute level clinical care for their pathologies. They are not able to leave their beds. They might have one or more organ failures and might need mechanical ventilators.High medical care needs.

The proposed facility will cater for 100 resident users + 40 day-care users. The 100 resident users will be divided as follows: 50 residents level 1, 30 residents level 2 and 20 residents level 3.

Secondary functions day care center and cafeteria with informal spiritual need block

7.5 FUNCTIONAL PROGRAMME

Support Departments

- Laundry
    - Soiled Linen Storage
    - Washing Area
    - Drying Area
    - Sewing Area
    - CLean Linen Storage
- Food Services
    - Preparation Area

    - Cooking Area
    - Carts and Trays Assembly
    - Kitchenware/Pottery/Dish/Tray Wash
    - Food Storage
    - General Storage
    - Public Cafeteria
- Morgue
    - Mortuary
    - Pick-up Dock
- Material Management
    - Receiving Dock
    - Warehouse and Stores
    - Flammable Products Store
- Waste Management
    - Soiled Pick-up Dock
    - General Soiled Staging/Holding
    - Recyclables Holding
    - Biohazard Holding
    - Cart Wash
- Maintenance and Workshops
    - Maintenance Workshop
    - Storage
- Staff Support and Amenities
    - Staff Bedrooms
    - Staff Showers and Toilets

- Environmental Services
    - Cleaning Products Storage
    - Landscape and Planting Storage

Medical Support Departments

- Medical Care
    - Consultation Rooms
    - Treatment Rooms
    - Equipment Store
- Pharmacy
    - Receiving Area

    - Preparation Room
    - Storage
- Physical Rehabilitation
    - Gymnasium
    - Equipment Store

Residences Departments

- Residents level 1
    - Double Bedrooms with Ensuite (x25)
    - Pantry
    - Living Area
    - Clean Utility
    - Soiled Utility
    - Caregiver Station
    - Staff Toilets
    - Equipment Storage
- Residents level 2
    - Double Bedrooms with Ensuite (x15)
    - Pantry
    - Living Area
    - Clean Utility
    - Soiled Utility
    - Caregiver Station
    - Staff Toilets
    - Equipment Storage
    - Terraces
- Residents level 3
    - Double Intermediate Care rooms (x10)
    - Pantry
    - Clean Utility
    - Soiled Utility
    - Caregiver Station
    - Staff Toilets
    - Equipment Storage
    - Resuscitation Equipment Storage
    - Terraces

Day-care Departments

- Living/Eating Area
    - Living/Visitors Lounge
    - Dining Room
- Multifunctional Area - Activities and Learning
    - Multifunctional Room for classes and activities
- Support
    - Equipment Storage
    - Day-care User Toilets
    - Pantry
    - Clean Utility
    - Soiled Utility
    - Staff Toilets

Administrative Departments

- Administration
    - Reception
    - Offices
    - Conference Room
    - Copy/Print
    - Archives
    - Storage
- Security
    - Guard Bedroom
    - Storage
    - Toilet
- Social Services
    - Office

Staff Support Departments

- Staff Double Bedrooms with shared toilets (x3)
- Staff Toilets and Showers
- Staff Lounge
- Staff Dining Room

Day care center

- Lounge
- Gallery
- Classrooms
- Toilets
- Storage

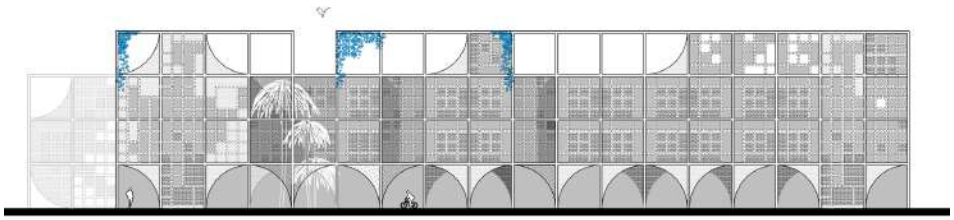

Figure 18. Architectural facade conceptual approach

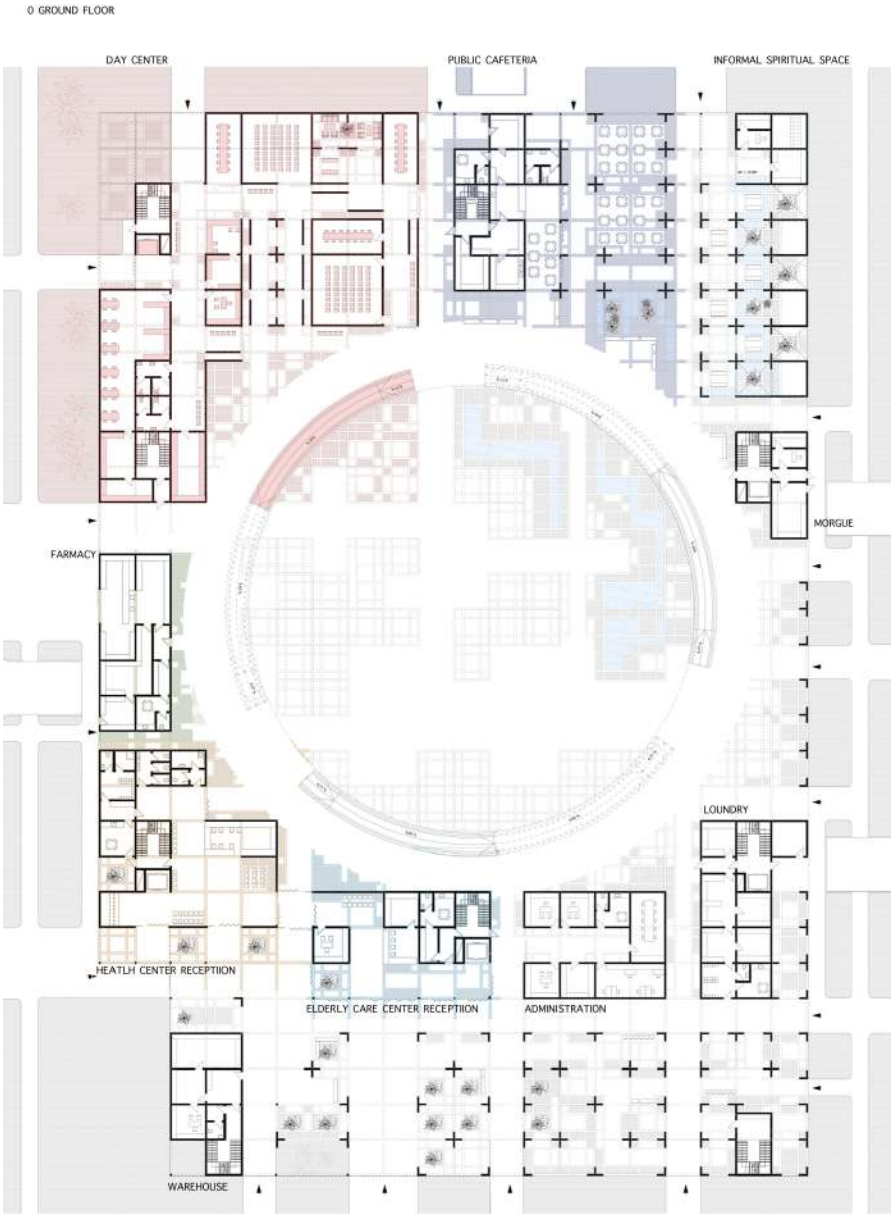

Figure 19. Architectural plan 0 Ground floor

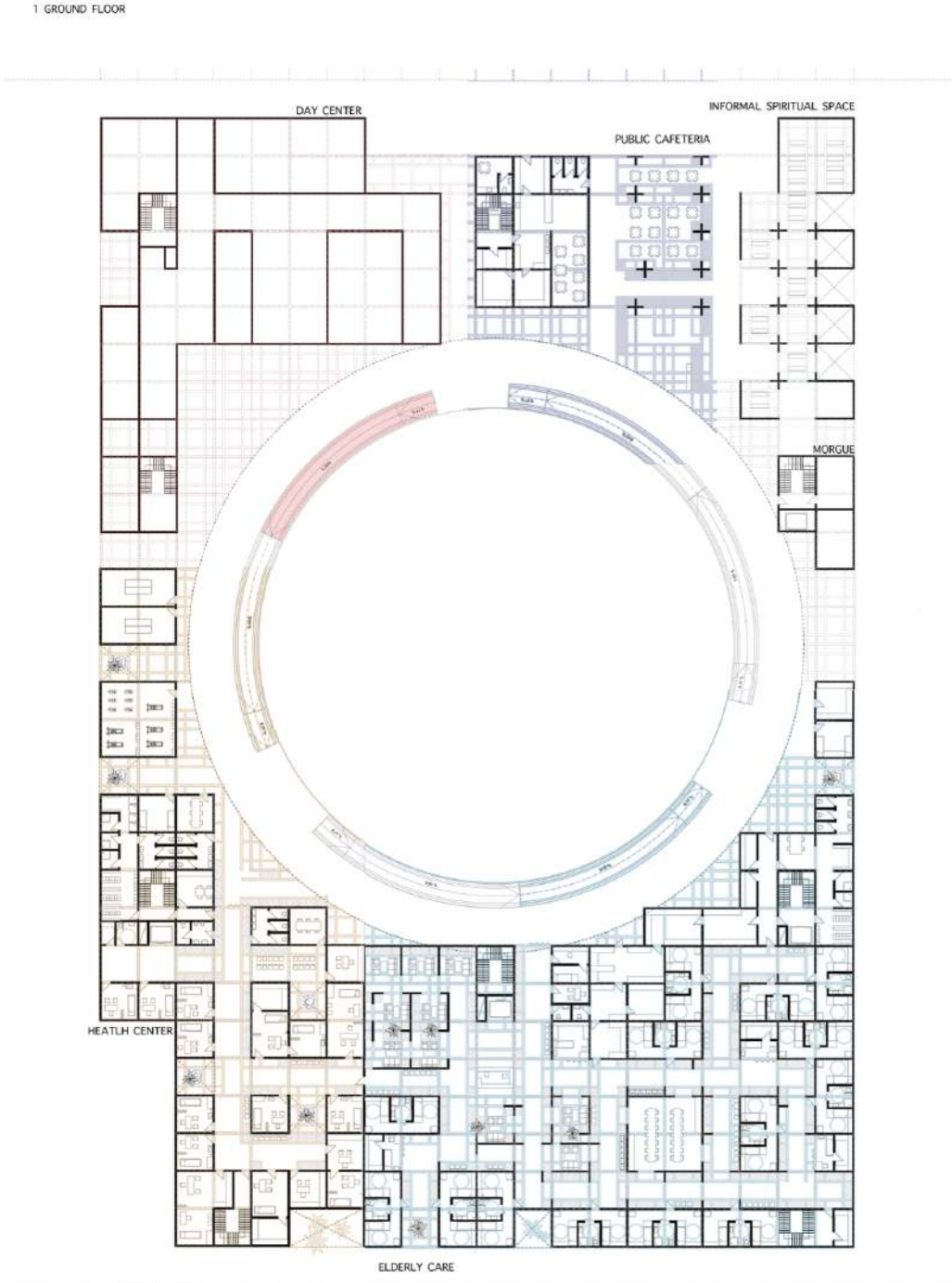

Figure 20. Architectural plan 1 Ground floor

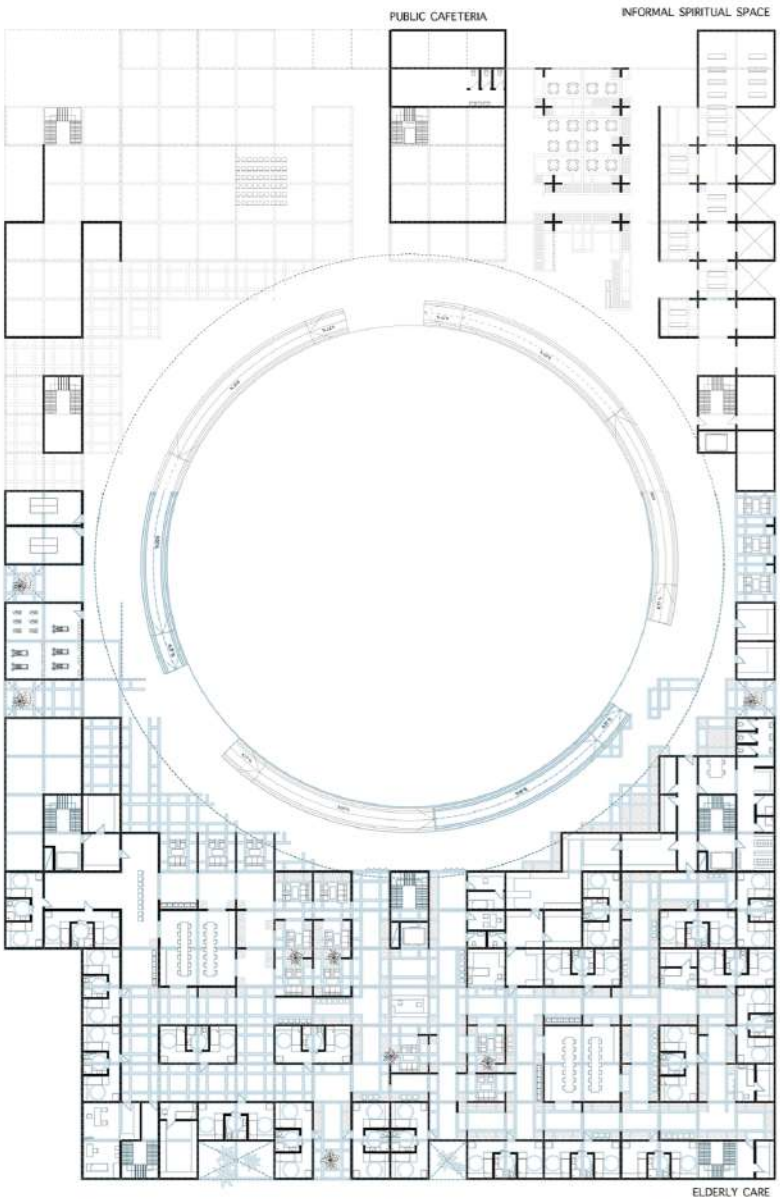

Figure 21. Architectural plan 2 Ground floor

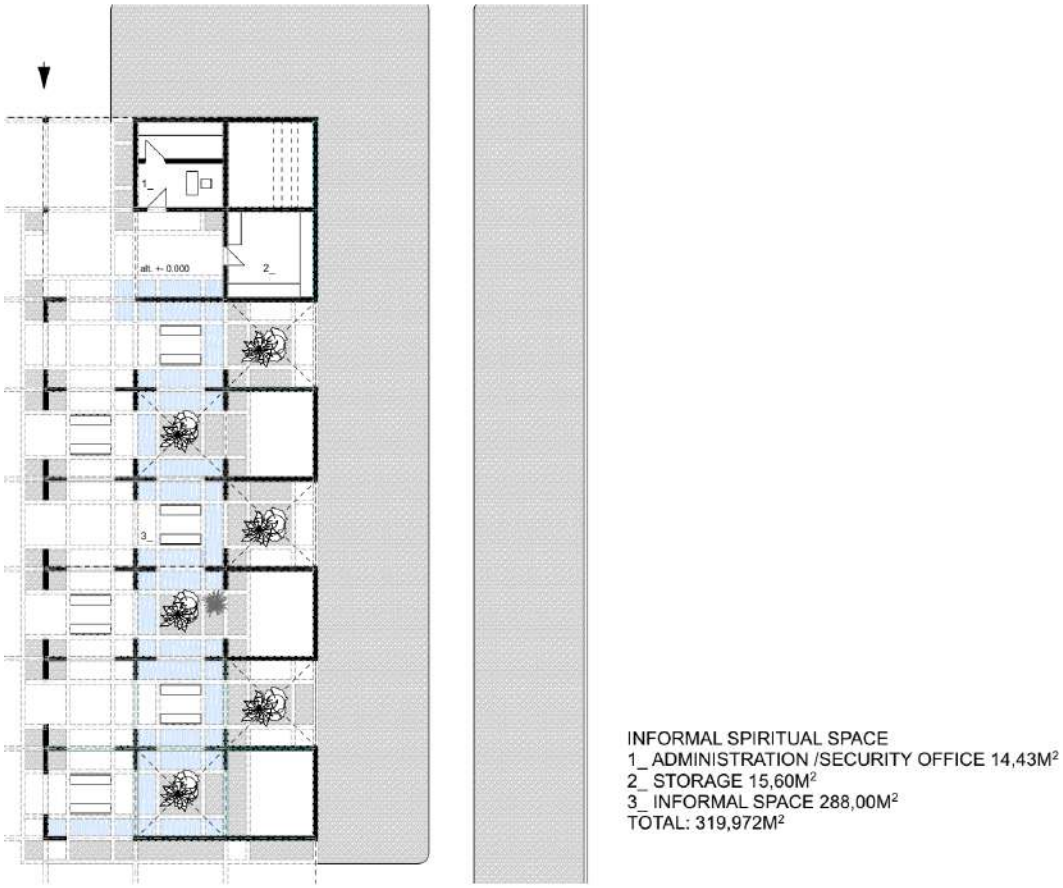

Figure 22. Architectural plan of informal spiritual place in elderly care center proposal

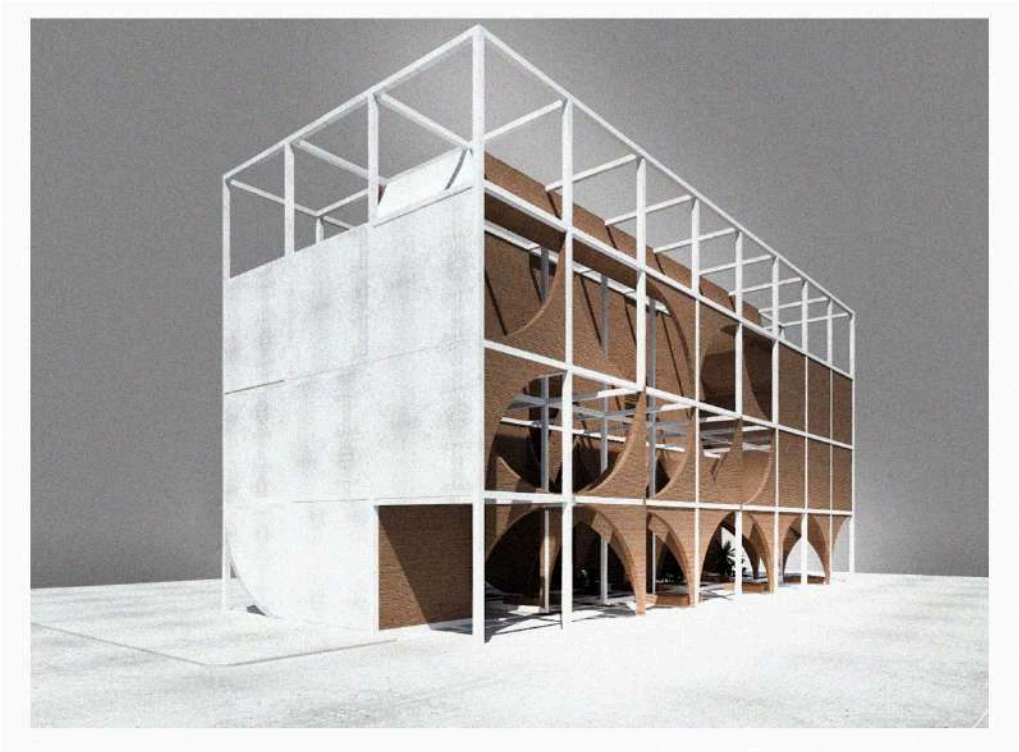

Figure 23-24. 3D of informal spiritual place in elderly care center proposal exterior

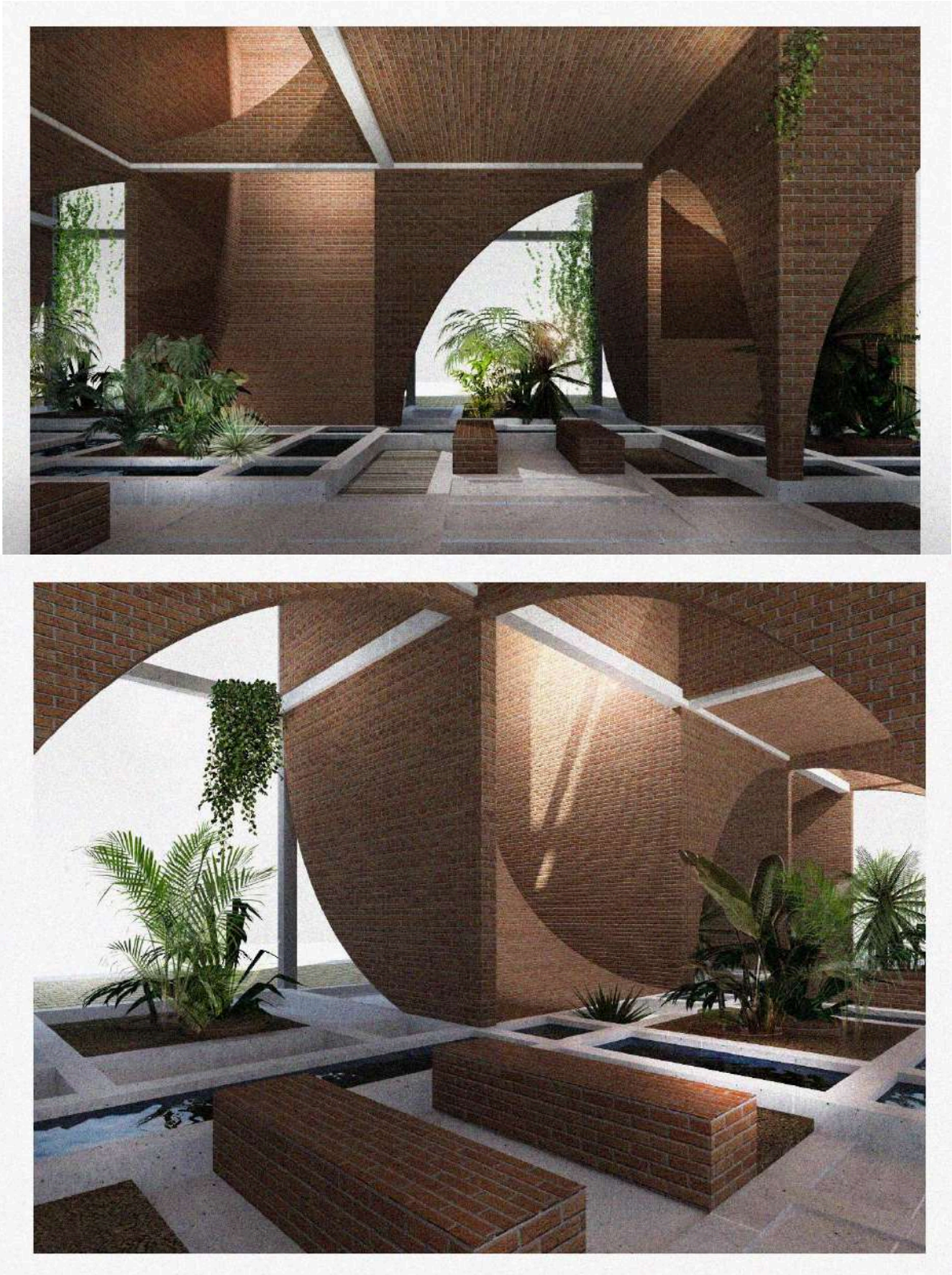

Figure 25-26. 3D of informal spiritual place in elderly care center proposal exterior

7. 6 COURTYARDS AND LANDSCAPING

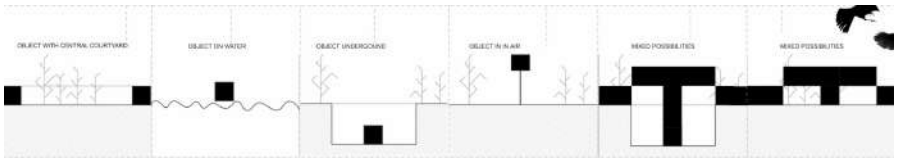

Figure 27. Scheme of structural concept

The building entrance and all the entire ground floor is mixed between the stone pavement and green zones. In green courtyards where all trees make a natural sun shade and make a meeting point . Building green yards filled with healing herbs and vegetables will grow in direct connection to the outdoor kitchen. The plants can be used by the patients and the staff.In ground floor waterways are designed in more spiritual functional areas.

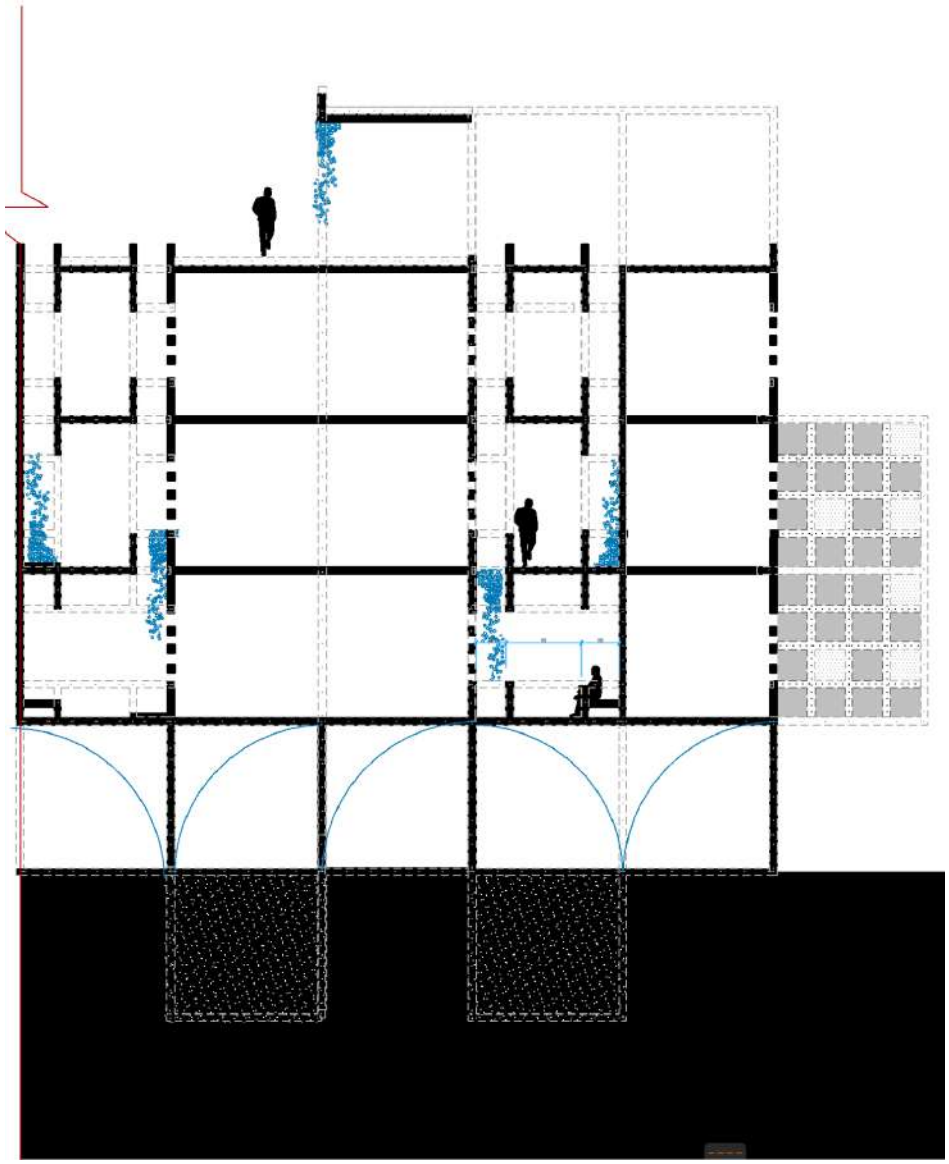

Figure 28.Functional scheme- building section to explain conceptual proposal of vegetation inside of building.

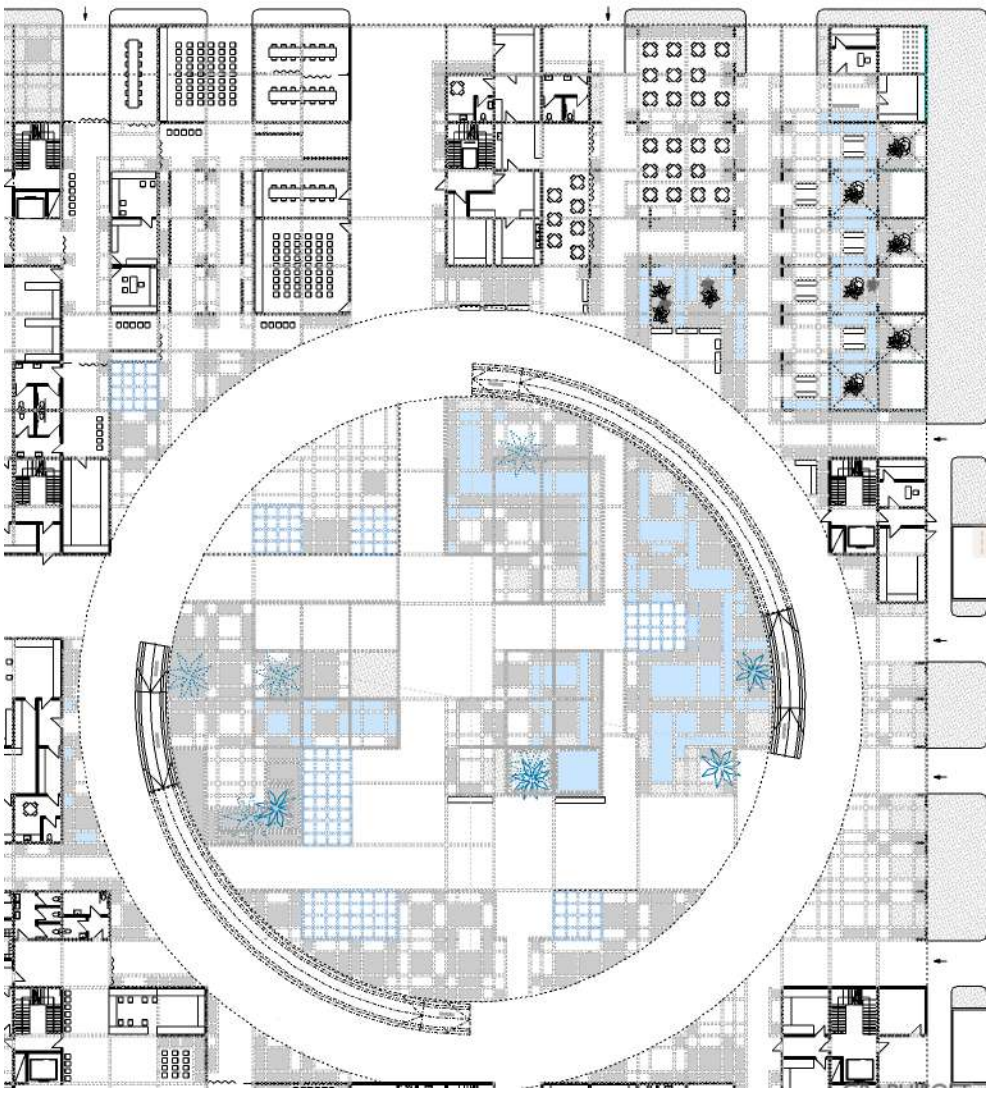

Figure 29.Functional scheme of vegetation and water inside of building ground floor and courtyards.

7.7 NATURAL VENTILATION SOLUTIONS

Natural ventilation is created with open holes in the facades. The roofs pro- mote natural ventilation by allowing hot air to pass up through the holes in the corrugated steel roof. The windows are small and inside areas moved away from most exposed sunlight. Second decorational facades are formed in purpose to dissolve direct sunlight.

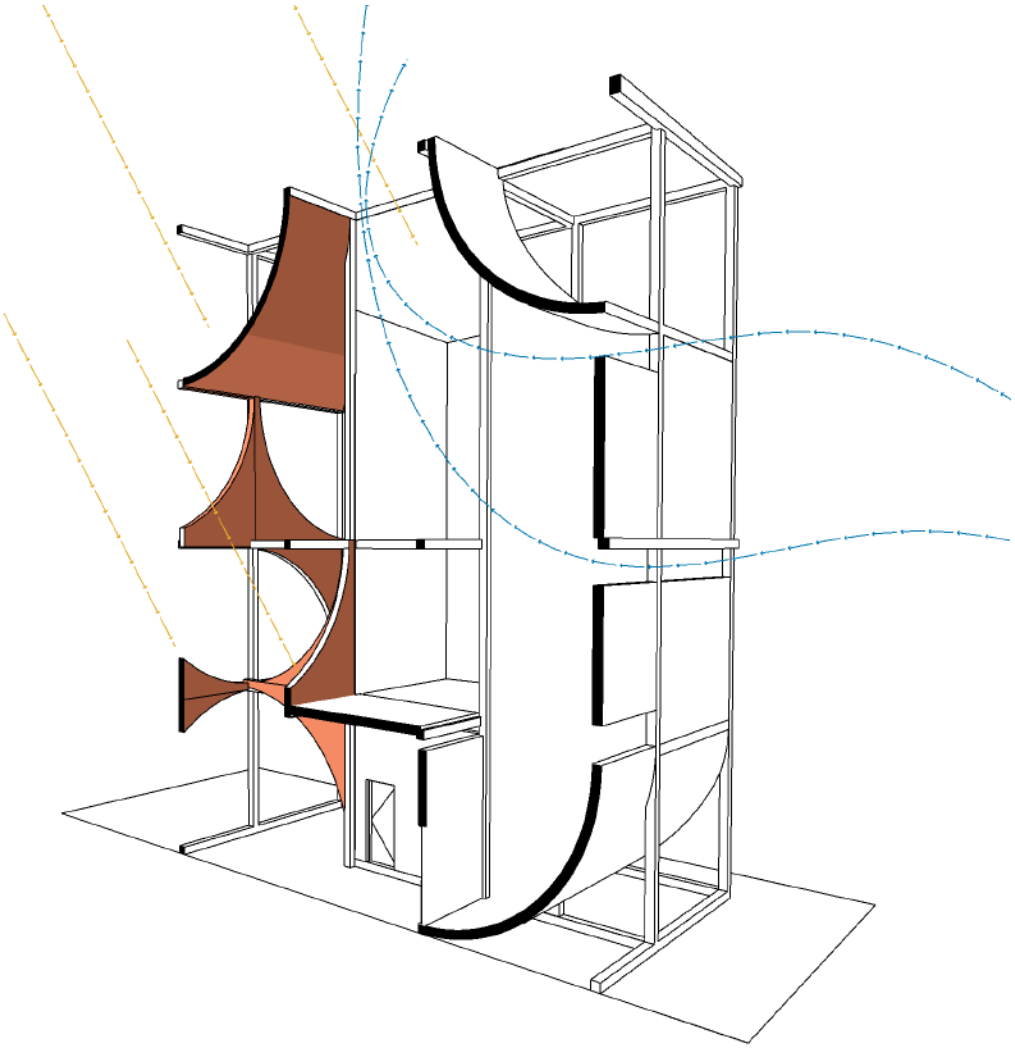

Figure 30..Scheme to explain the concept of natural ventilation through building of Elderly care and socialization centers.

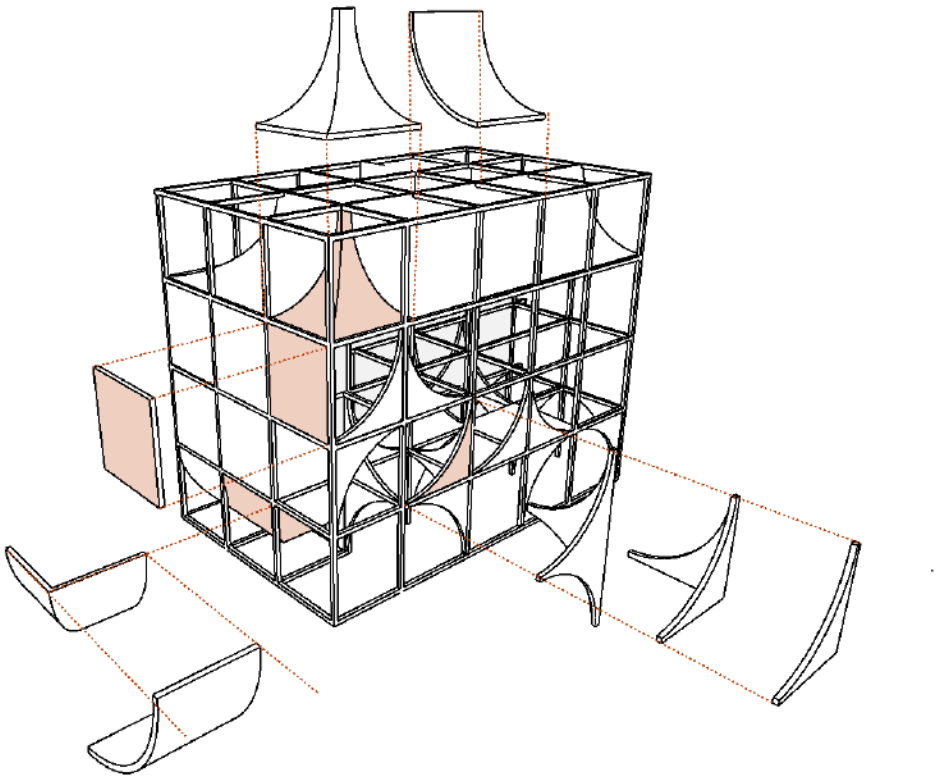

Figure 31..Scheme to explaining the concept of modular system

7.8 LIVING UNITS PROPOSAL

The proposal for living units focuses on sustainability, durability,coast ,cultural and climatic elements of the country. From the research and case studies done, the housing should be affordable, flexible, not well defined. Main idea is to let the city grow in the most natural way possible, so that architecture structure and morphologic variation would have freedom to appear as it wants to be.

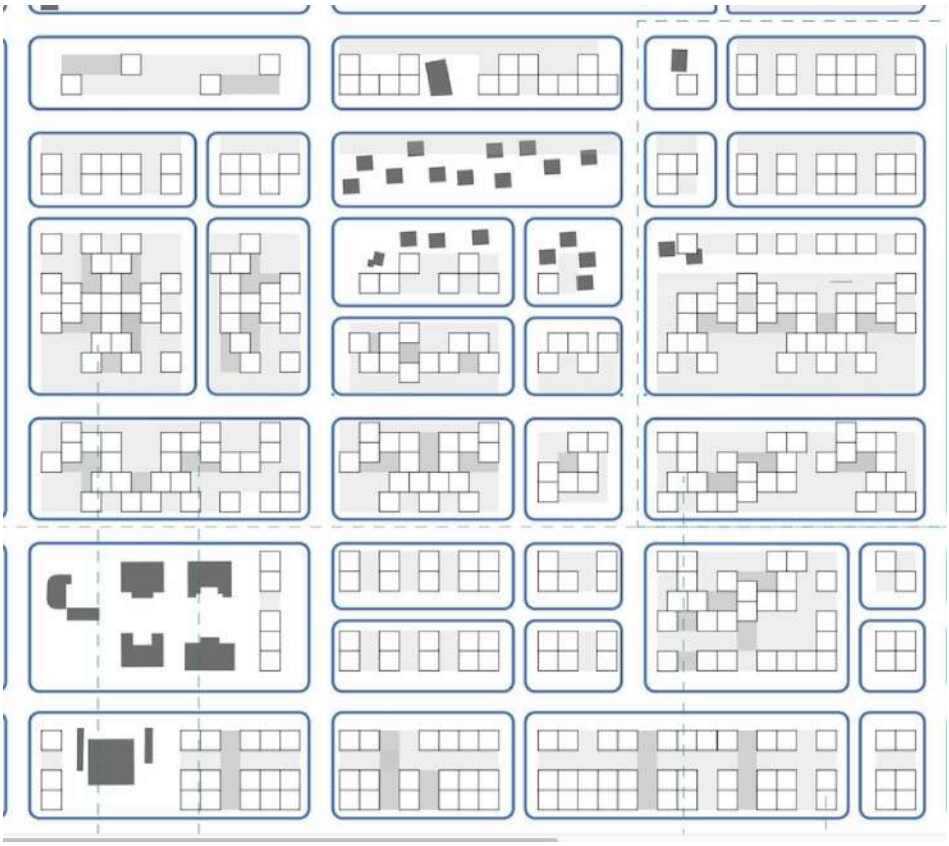

Figure 32. New urban narrative proposal for living units

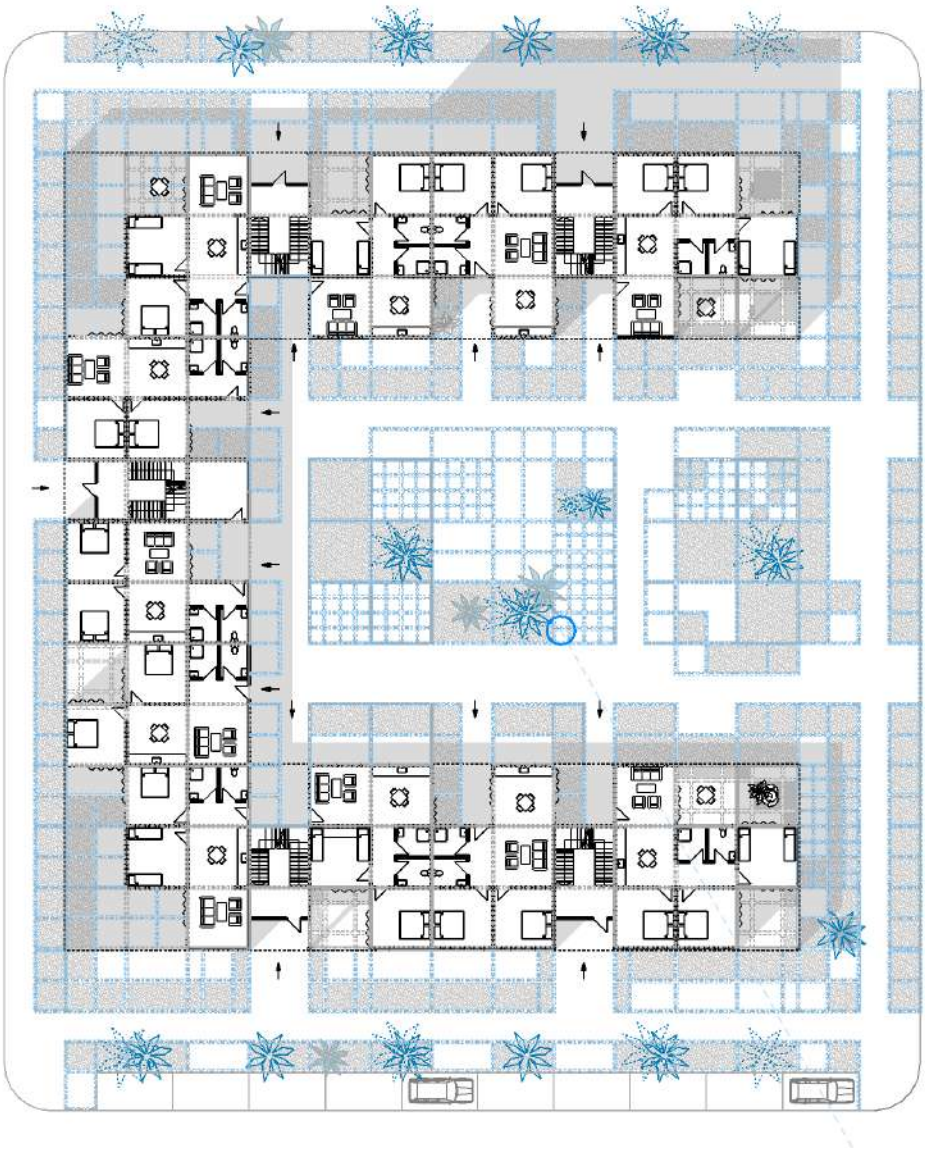

Figure 33. New architectural plan proposal for living units

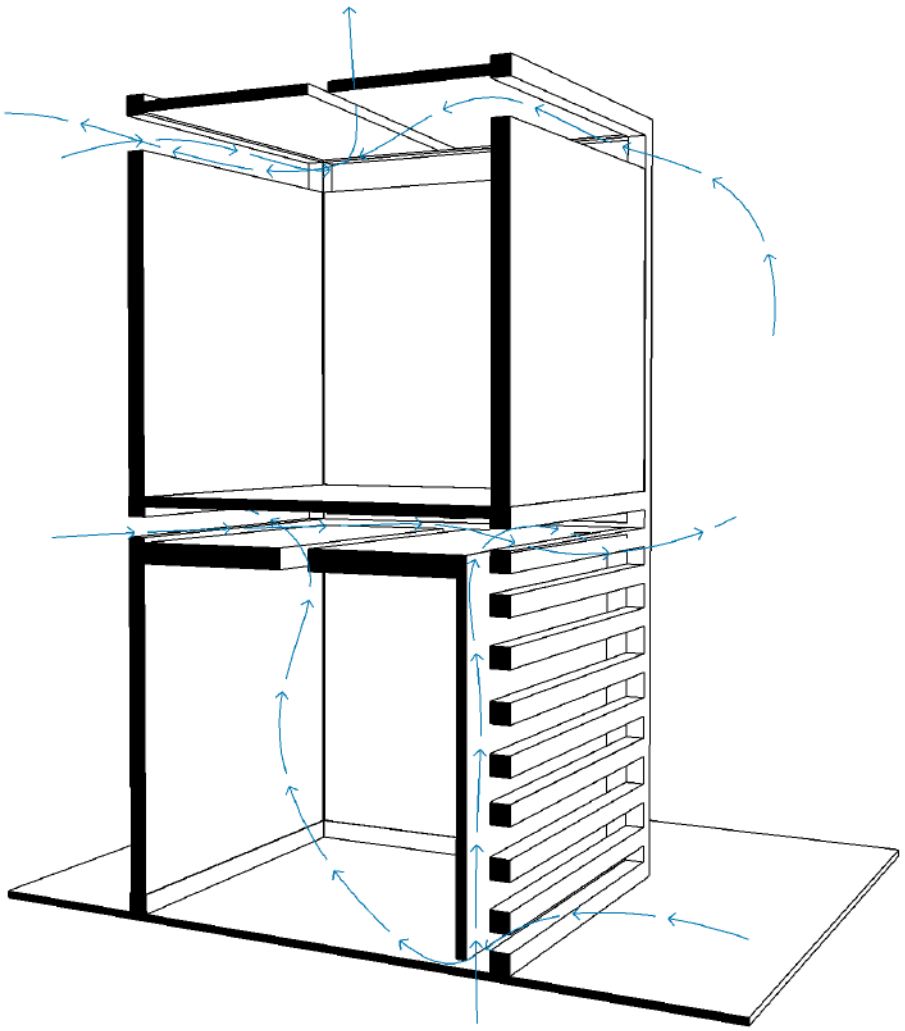

Figure 34.Scheme to explain the concept of natural ventilation through housing buildings.

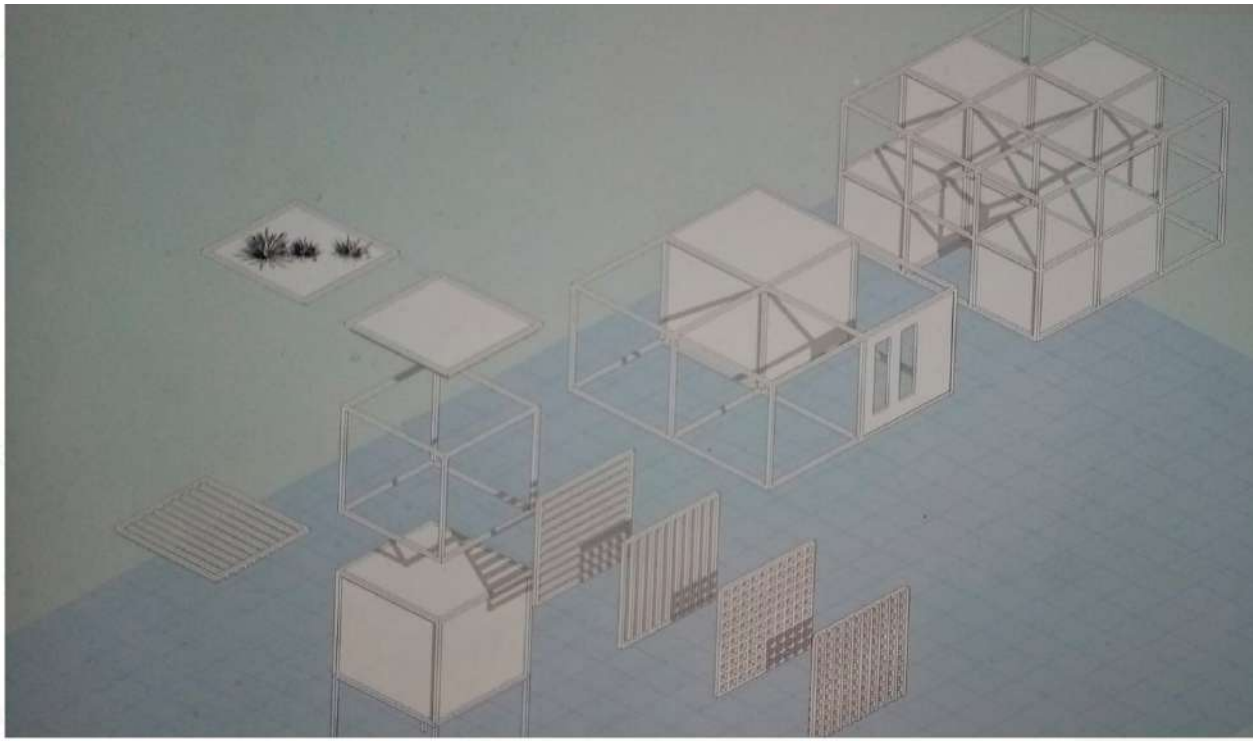

Figure 35.Scheme to explaining the concept of modular system

8.BIBLIOGRAPHY

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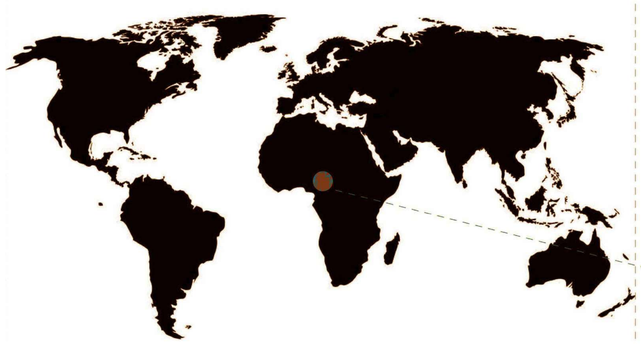
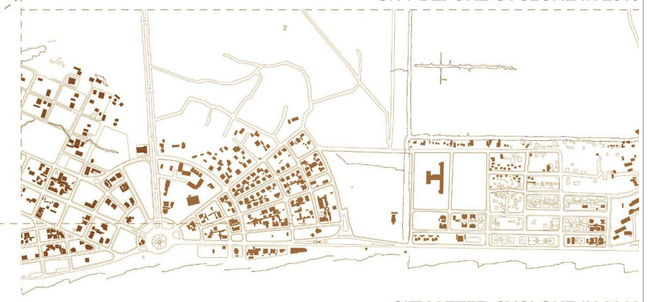


CITY BEFORE CYCLONE IN 2019



CITY AFTER CYCLONE IN 2019

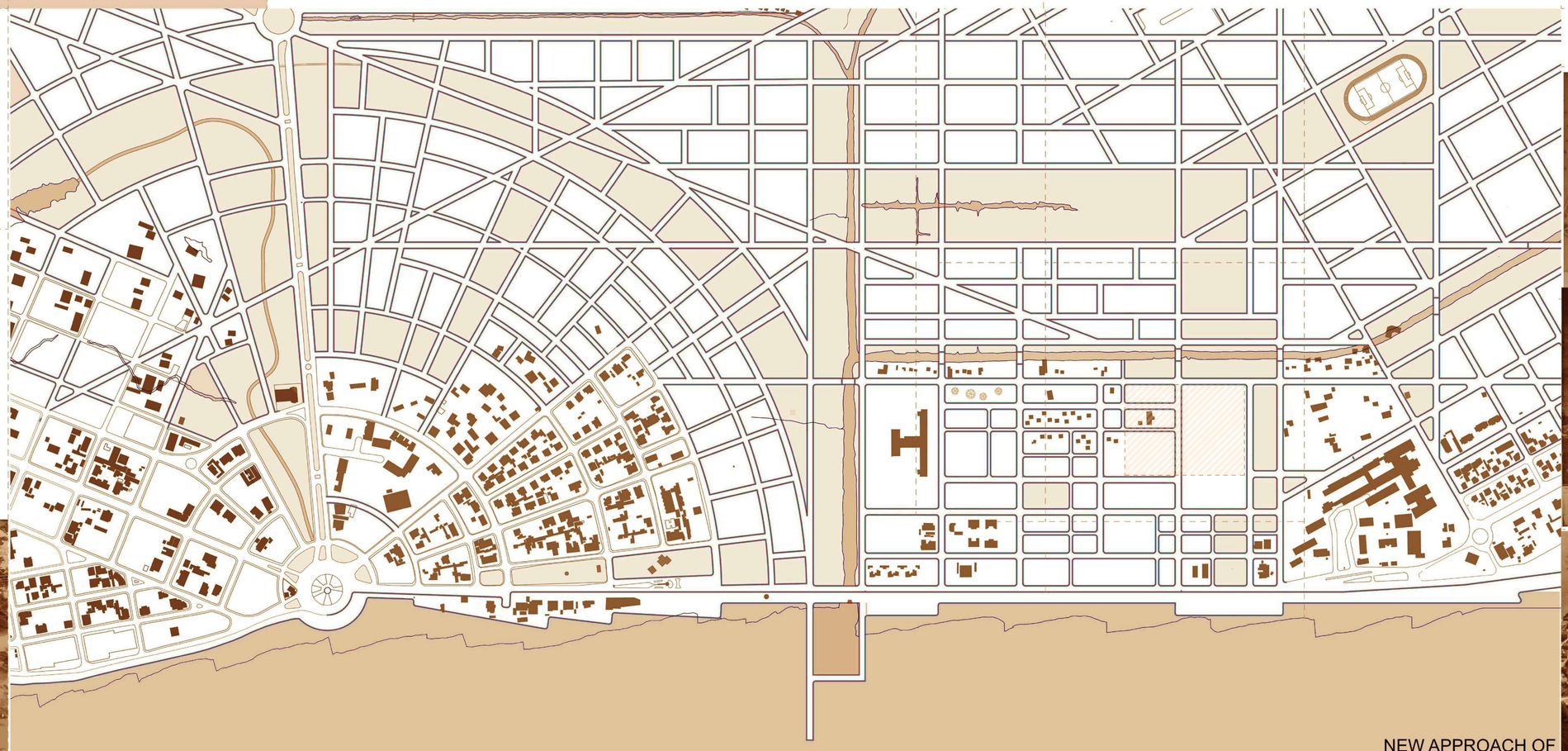
Mozambique

BEIRA

URBAN PLANNING/RESIDENTIAL/ ELDERLY CARE AND SOCIALIZATION CENTER

- AREA 633 km2
- POPULATION
450,000 inhabitants (estimate)
- CLIMATE
Tropical
- ECONOMIC RESOURCES
Hydroelectric power, gas, coal, minerals, wood and agricultural land

Mozambique cyclone: 80/90
PERCENTAGE of Beira city and surrounds damaged or destroyed



NEW APPROACH OF
CITY MASTER PLAN M1:5000

HISTORICAL URBAN PLAN TIMELIN

PROBLEMATIC
Need of new Urban plan

PROBLEMATIC
LACK OF RESIDENTIAL UNITS

PROBLEMATIC
IGNORED ELDERLY NEEDS

N

GREEN AREAS
EXISTING PLANING
NEW URBAN PLANING
EXISTING BUILDINGS

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PROJECT/DISSERTATION TO OBTAIN THE MASTER'S DEGREE IN ARCHITECTURE
SCIENTIFIC ORIENTATION:
PHD PROFESSOR / SPECIALIST JOANA BASTOS MALHEIRO
STUDENT: ELENA GRUODYTE 20171526

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ELDERLY CARE AND SOCIALIZATION CENTER IN BEIRA (MOZAMBIQUE)

TOTAL PLOT AREA

3,6000 M2

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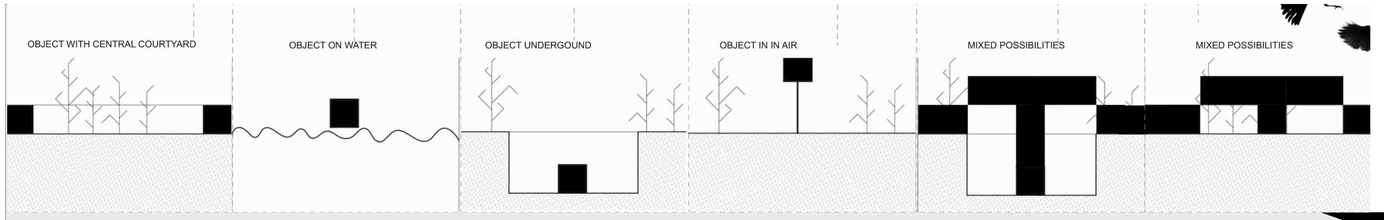

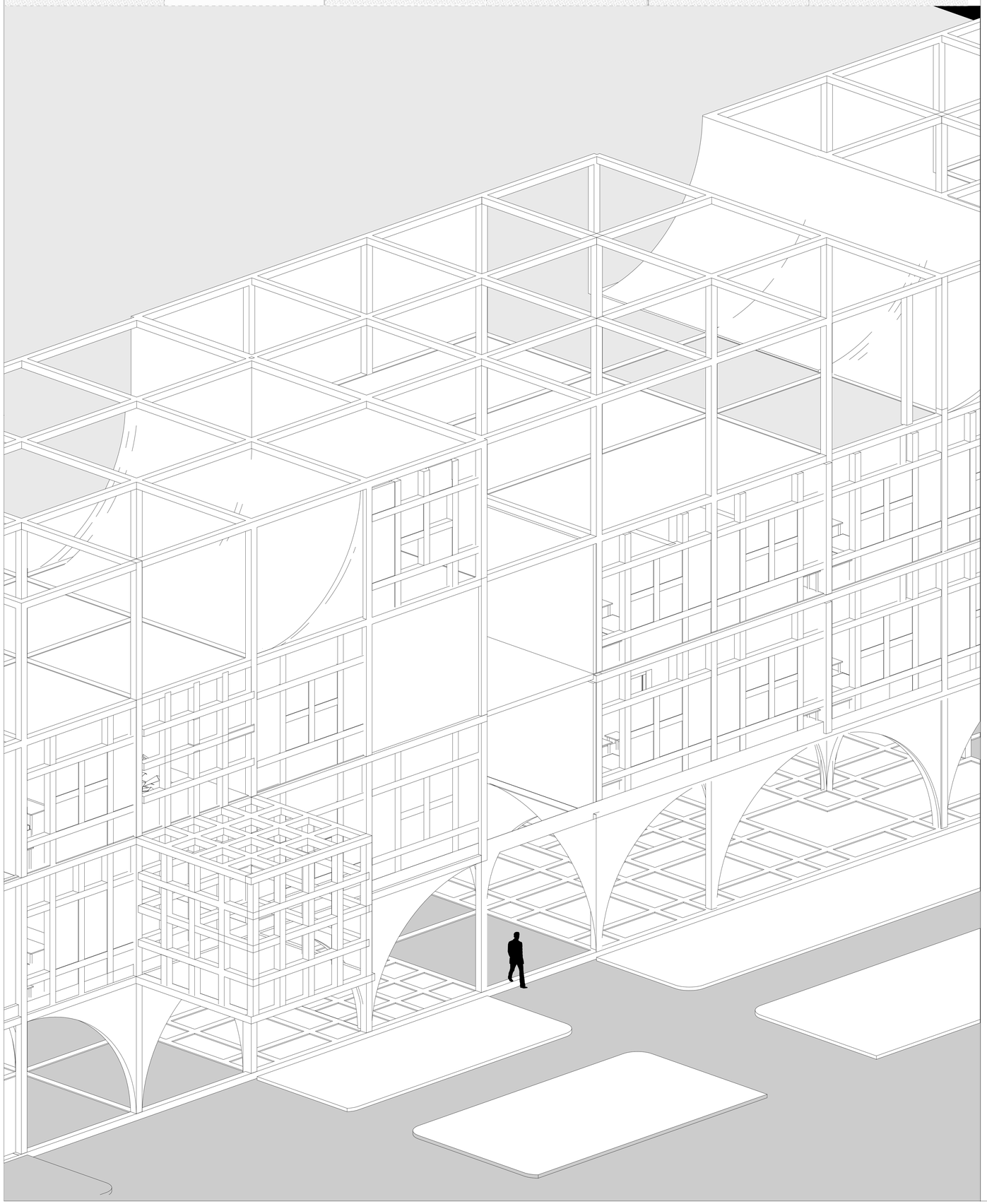

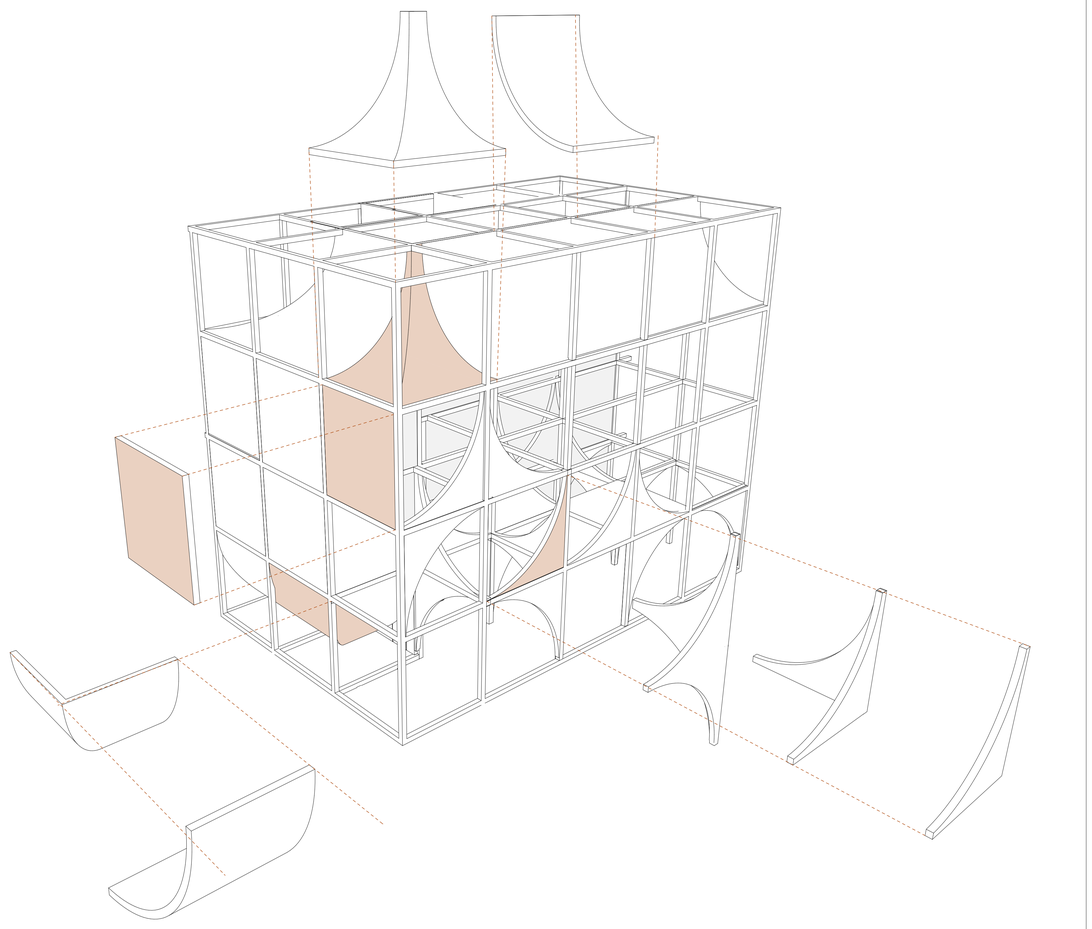

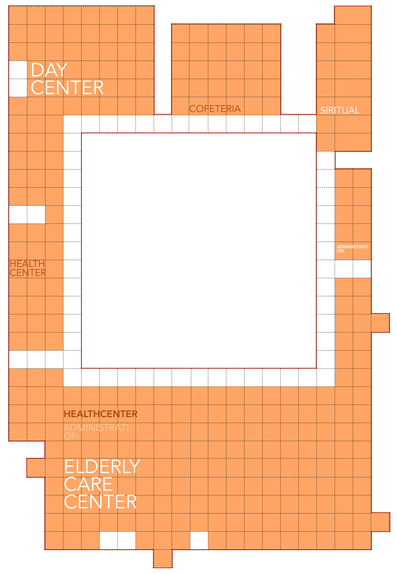

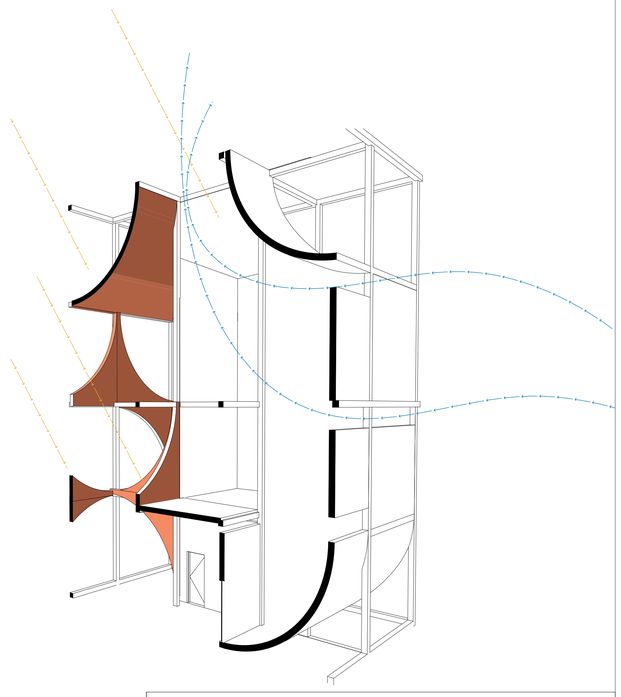

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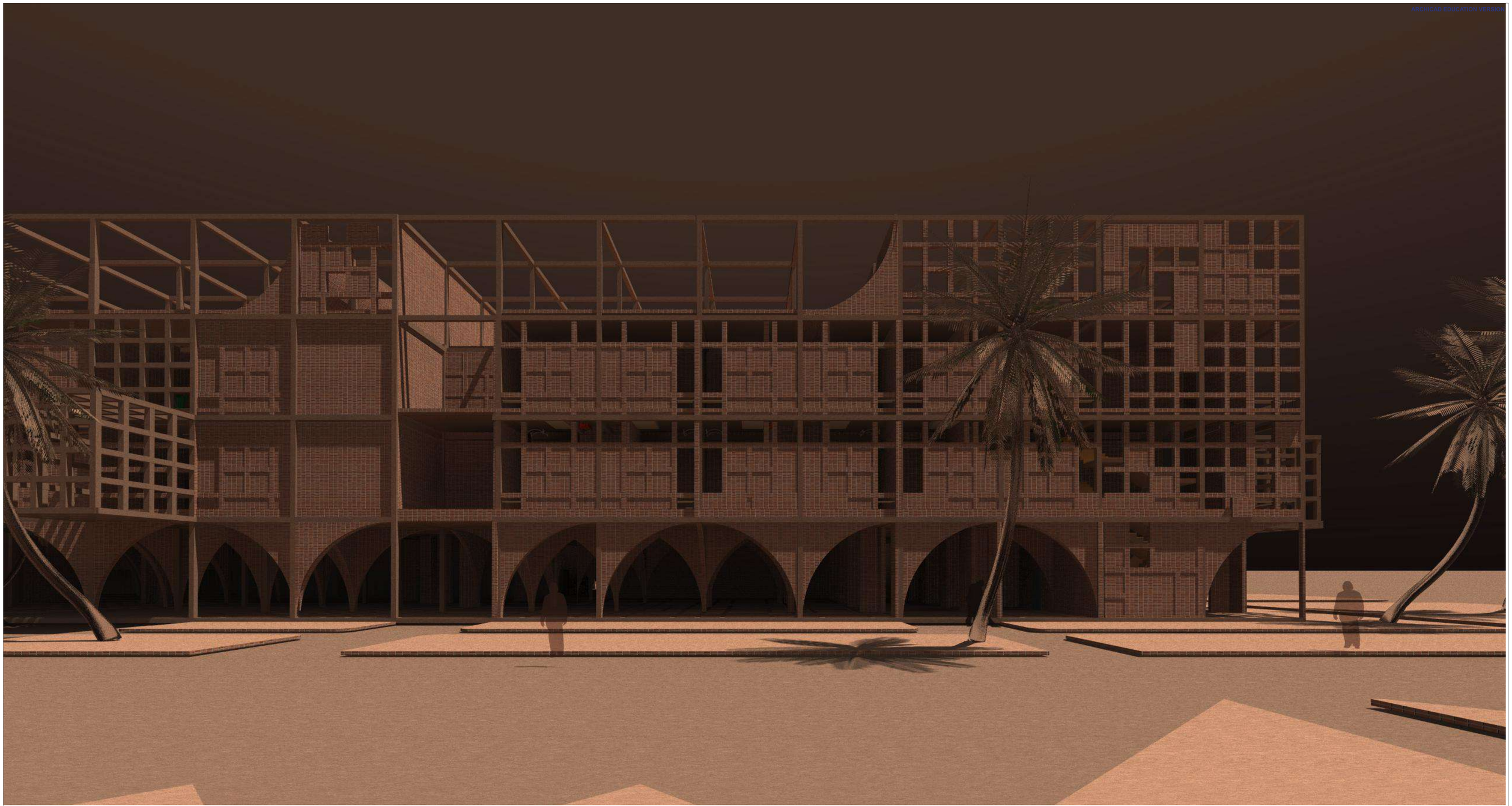

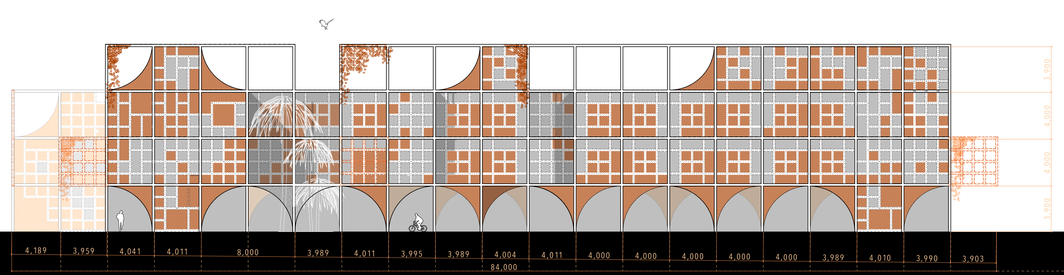

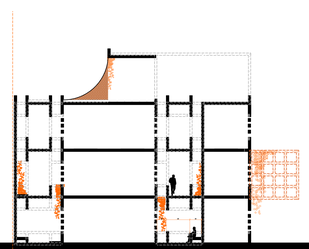

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INFORMAL SPIRITUAL SPACE
1_ ADMINISTRATION /SECURITY OFFICE 14,43M²
2_ STORAGE 15,60M²
3_ INFORMAL SPACE 288,00M²
TOTAL: 319,972M²

MORGUE
4_ADMINISTRATION /SECURITY OFFICE 14,43M²
5_CORRIDOR 5,29 M²
6_ STORAGE ROOM 23,24M²
7_STAIRWAY 30,711M²
TOTAL: 76,82M²

LAUNDRY
8_ STAIRWAY 30,71M²
9_ SOILED PICK-UP DOCK 15,60M²
10_ DRYING AREA AND FOLDING AREA 22,36M²
11_ SOILED LINEN STORAGEM15,60M²
12_ WASHING AREA 15,60M²
13_ SEWING AREA 15,60M²
14_ DRESSING ROOM 15,60M²
15_ LUNCH ROOM 15,60M²
16_STAIRWAY 25,75M²
TOTTAL

ADMINISTRATION
17_OFFICE 29,64 M²
18_CONFERENCE ROOM 29,64 M²
19_ OFFICE 15,60M²
20_ OFFICE 15,60M²
21_OFFICE 15,60M²M²
22_ OFFICE 15,60M²²
23_ ARCHIVES 15,60M²²

TOTTAL

ELDERLY CARE BLOCK RECEPTION
24_ RECEPTION 29,64 M²
25_ ARCHIEVES 15,60M
26_ OFFICE 15,60M²
27_ LUNCH ROOM 15,60M²
28_ COORIDOR 8,20M²
29_ STAIRWAY 25,48M²
30_ HOLWAY/WAITING ROOM 136,67M²

TOTTAL

WAREHOUSE
31_ MAINTENANCE STORAGE 15,60M²
32_ MAINTENANCE STORAGE 29,64 M²
33_ MAINTENANCE STORAGE 15,60M²
34_ MAINTENANCE WORKSHOP AREA 15,60M²
35_ STAIRWAY 21,34M²
36_ STAFF WC 7,22M²

TOTTAL

HEALTH CENTER BLOCK RECEPTION

37_ HOLWAY/WAITING ROOM 181,16M²
38_ RECEPTION 31,18 M²
39_ STAIRWAY 19,94M²
40_ STAFF LUNCH ROOM 15,60M²
41_ STAFF STORAGE 8,44M²
42_ STAFF CHANGING ROOM 21,75M²
43_ CUSTOMERS WC 14,82M²
44_ CUSTOMERS WC 14,82M²

TOTTAL

FARMACY
45_SERVICE HALL 45,16M²
46_STORAGE 30,73M²
47_STORAGE 28,82M²
48_ LOADING DECK 15,60M²
49_STAFF ENTRANCE 7,41M²
50_STAFF STORAGE 7,61M²
51_STAFF LUNCH ROOM 14,43M²

TOTTAL

DAY-CENTER

52_EQUIPMENT STORAGE 29,87M²
53_STAIRWAY 24,79M²
54_LIBRARY EQUIPMENT STORAGE 14,86M²
55_LIBRARY EQUIPMENT STORAGE 20,55M²
56_LIBRARY 92,46 M²
57_CUSTOEMERS WC 14,82M²
58_CUSTOEMERS WC 14,82M²
59_WAITING HALL 30,02 M²
60_OPEN GALLERY 94,80 M²
61_WAITING HALL/CORRIDOR 263,03 M²
62_ OFFICE 15,60 M²
63_STORAGE15,60 M²
64_RECEPTION 15,60 M²
65_MEETING ROOM 31,15M²
66_ CONFERENCE ROOM 61,19 M²
67_ REST ROOM 62,41 M²
68_MEETING ROOM 31,15M²
69_MEETING ROOM 31,15M²
70_CONFERENCE ROOM 61,19 M²
71_STAIRWAY 28,88 M²

TOTTAL_M²

PUBLIC CAFETERIA

72_LOADING DECK
73_STORAGE
74_STAFF LUNCH ROOM
75_BAR
76_DISHWASHING
77_TRASH AND RECYCLABLES
78_COOKING AREA
79_SERVING AREA
80_SERVING AREA
81_CUSTOMER WC
82_STAIRAWAY

TOTTAL

GROUND FLOOR PLAN M1:200

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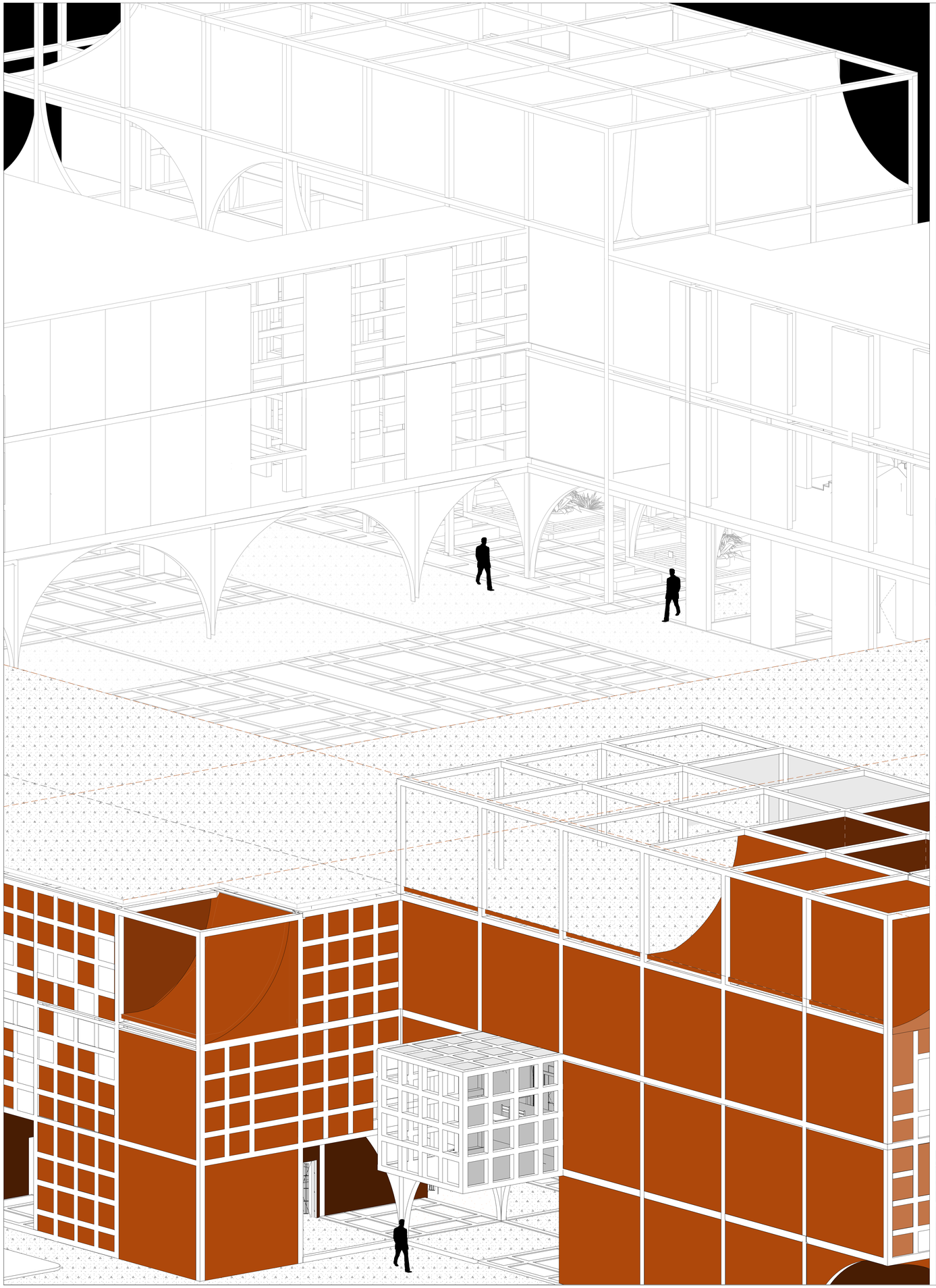

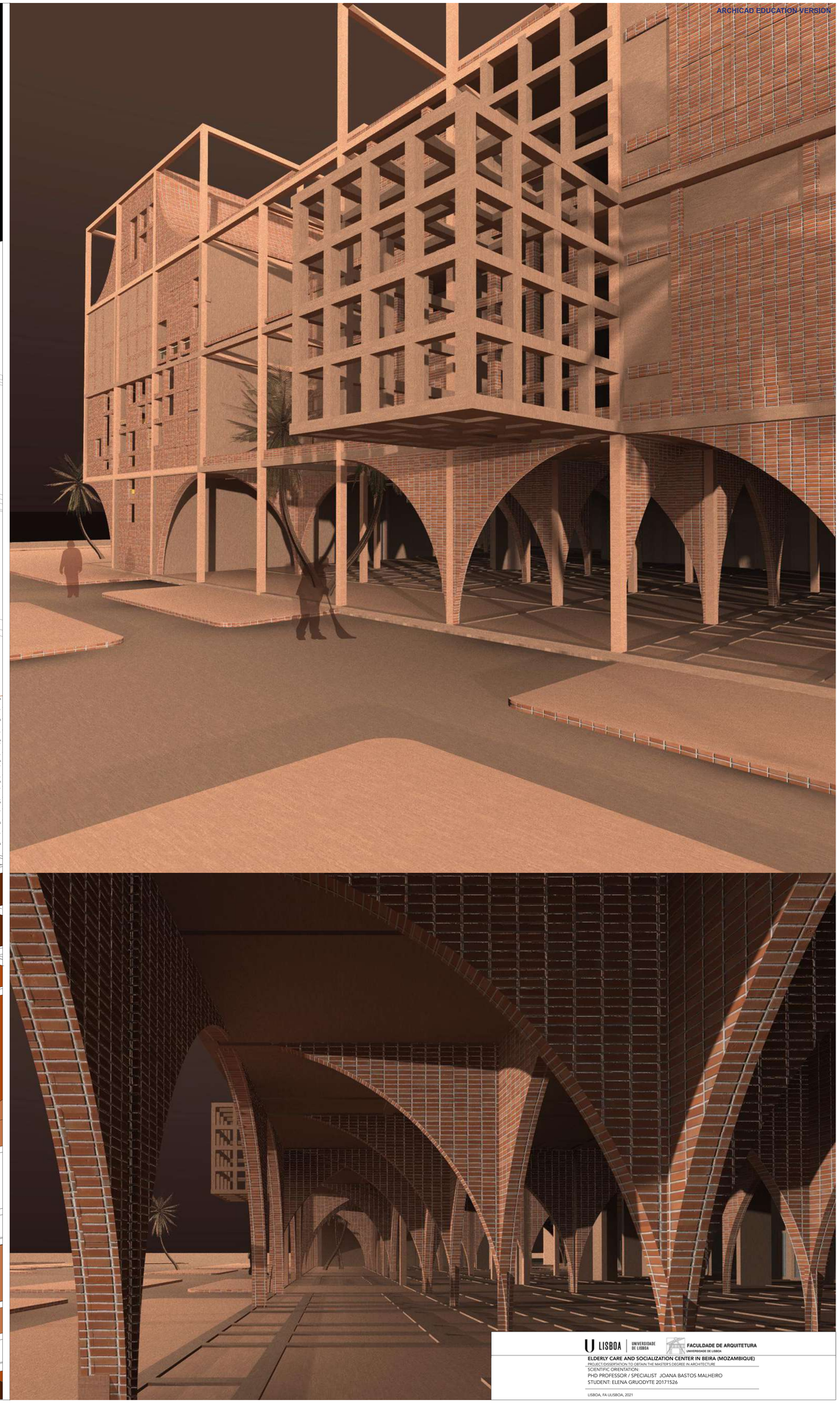

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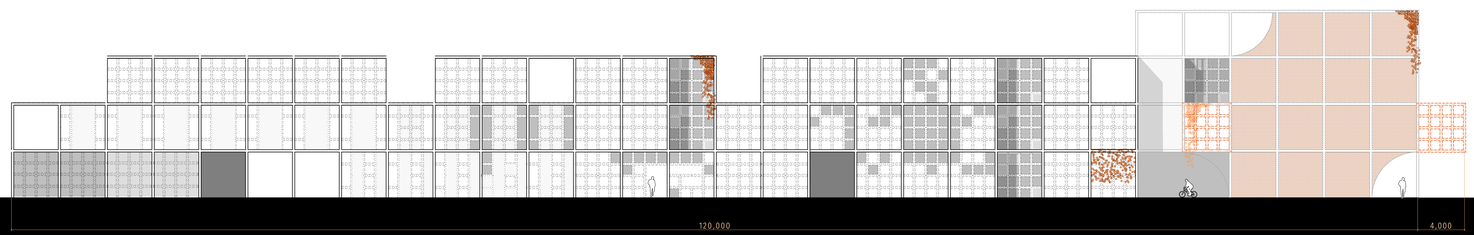

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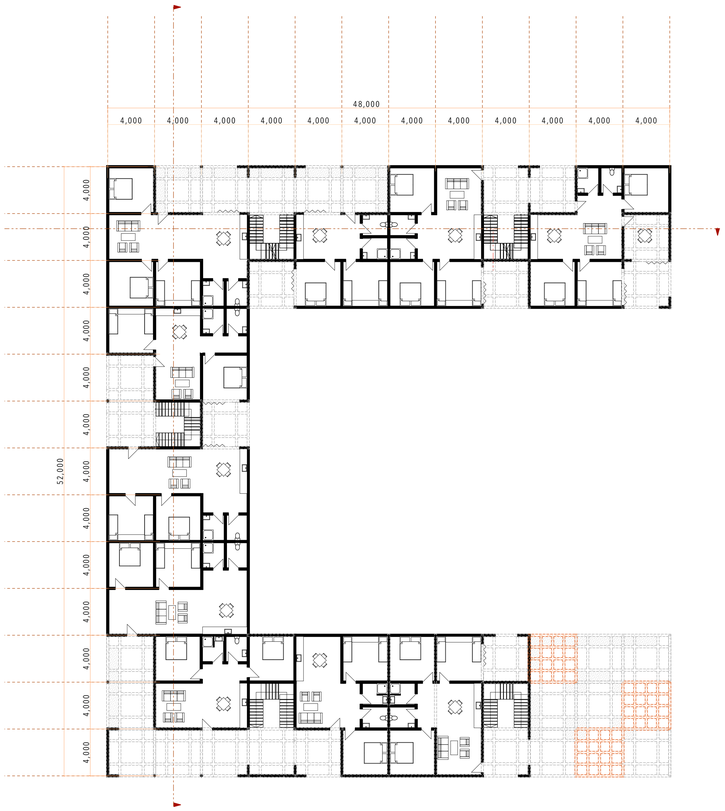
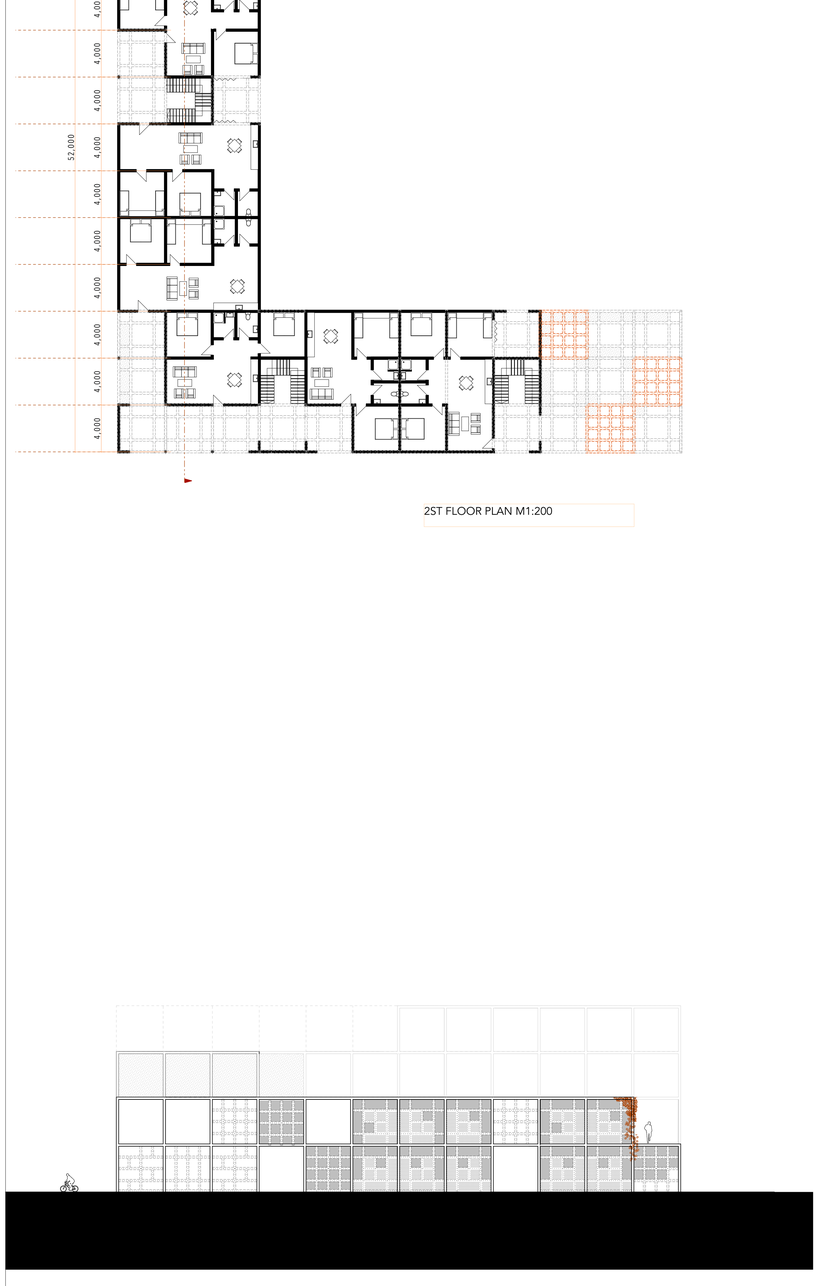


2ST FLOOR PLAN M1:200



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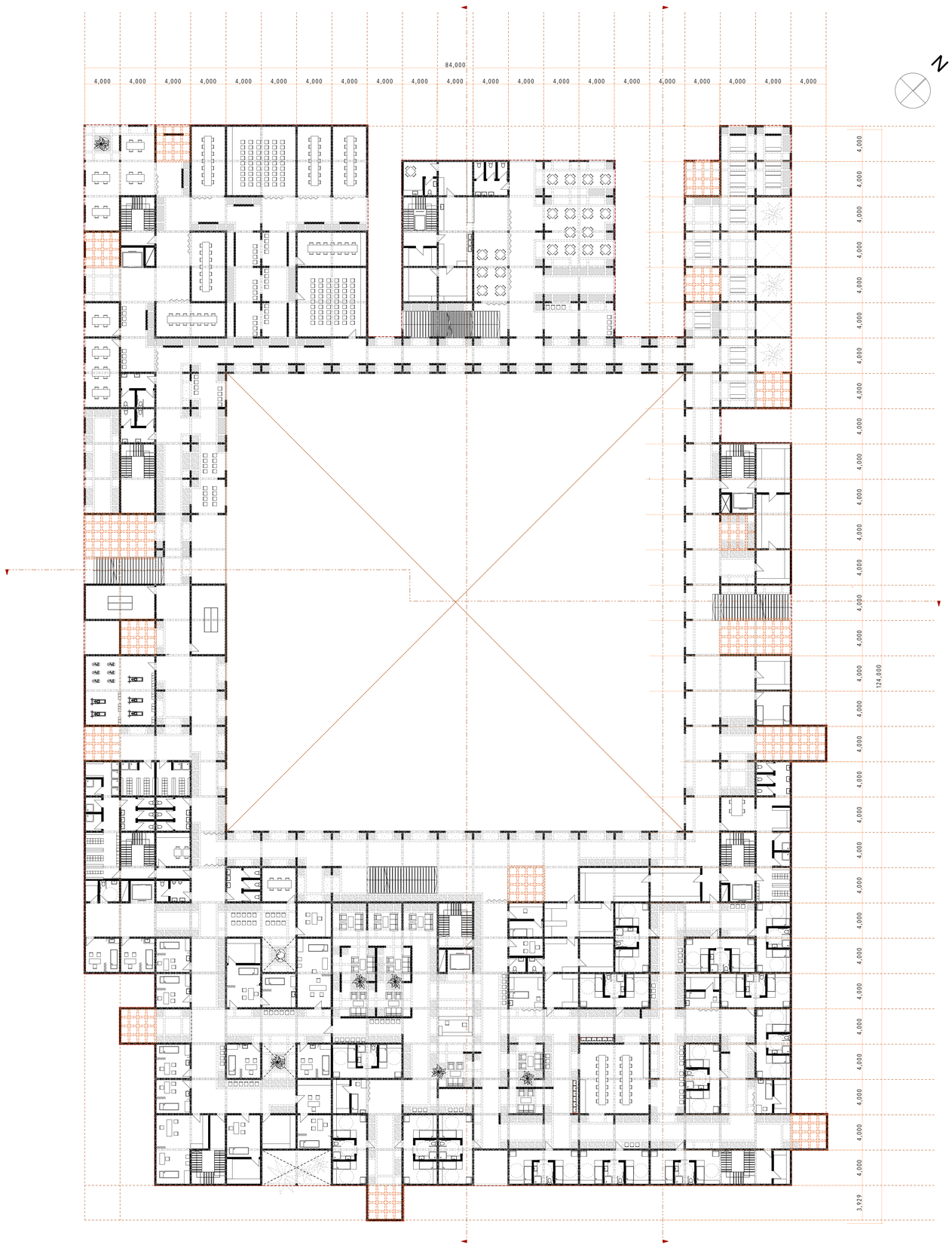

2ST FLOOR PLAN M1:200

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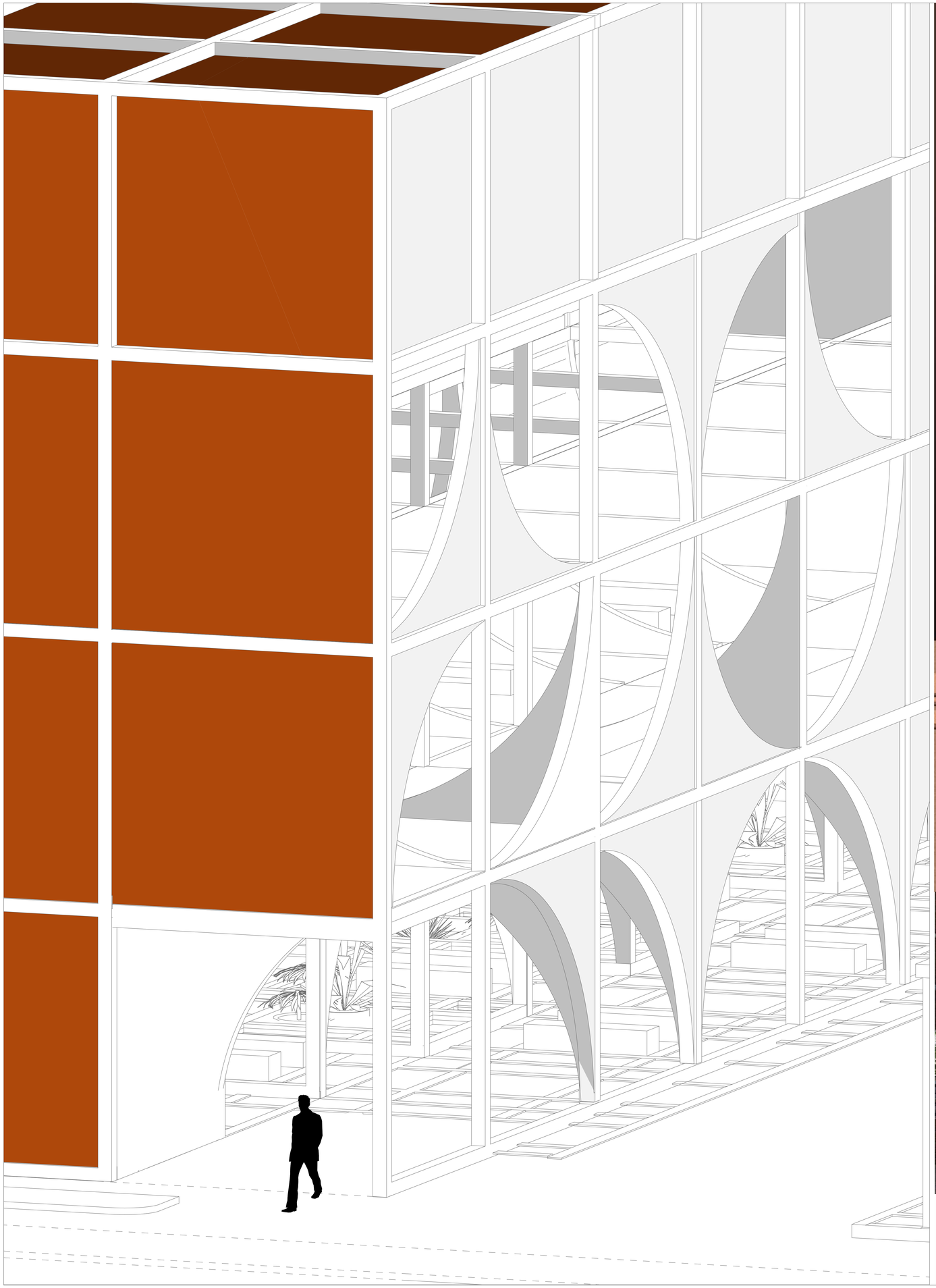

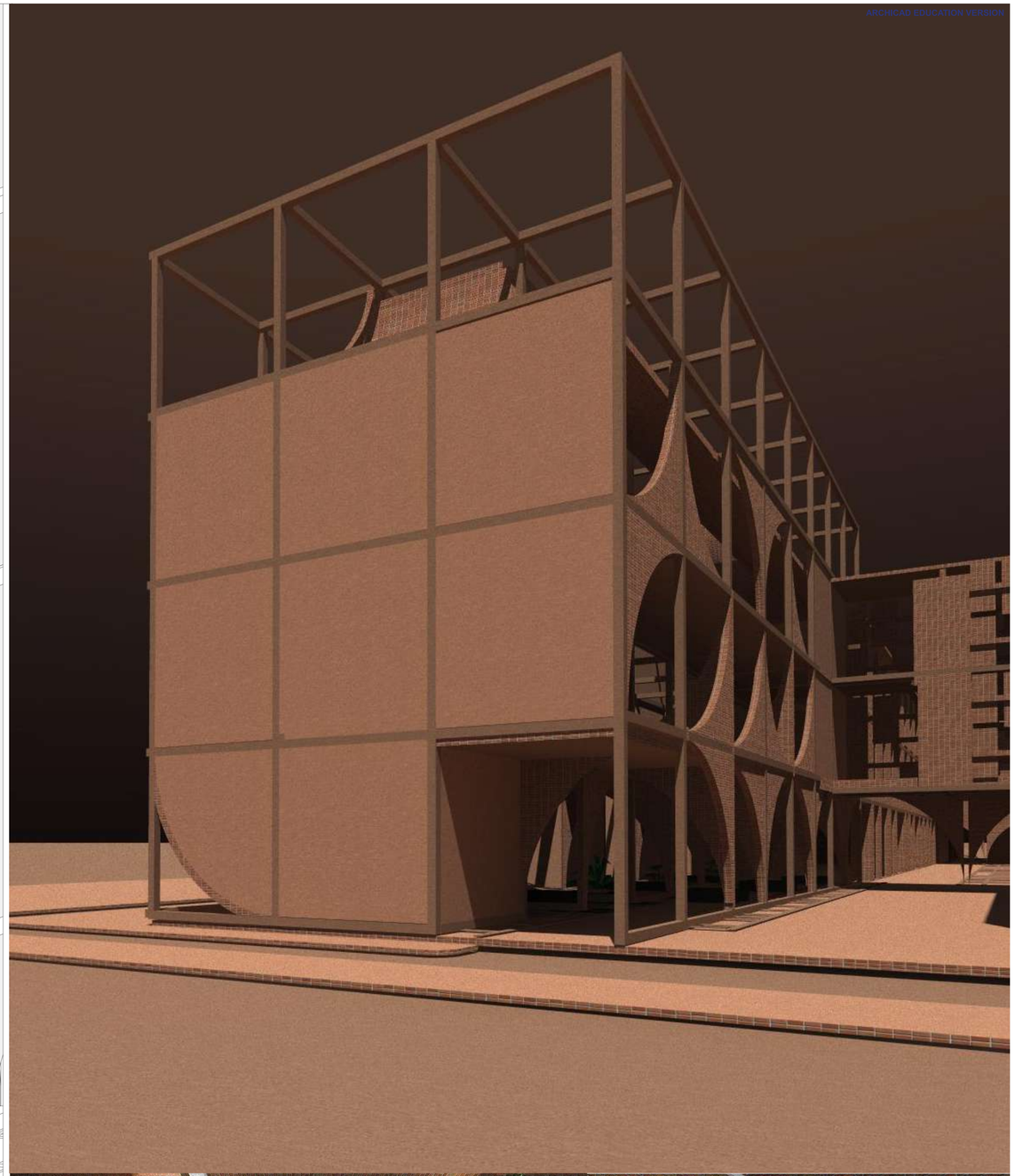

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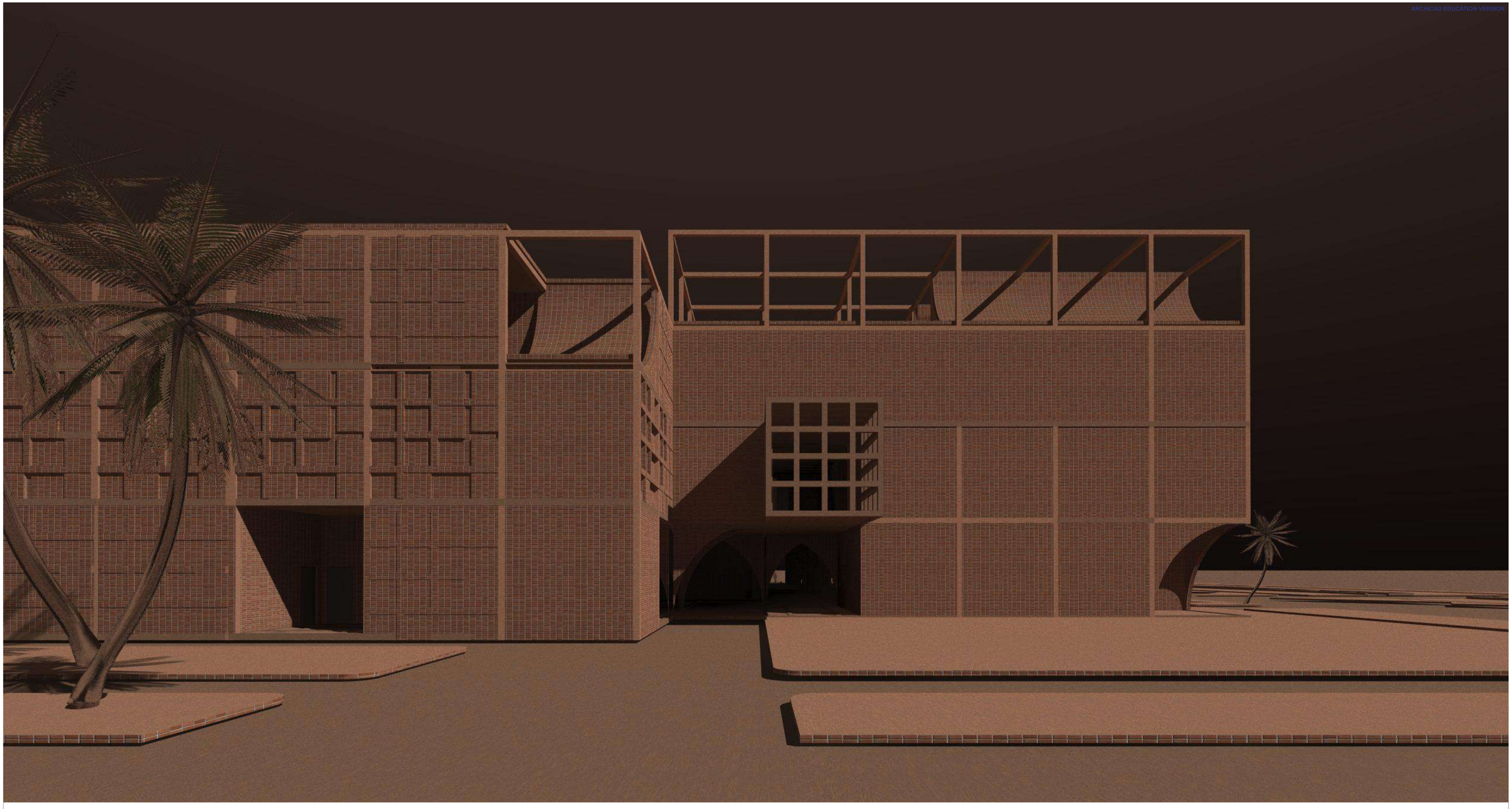

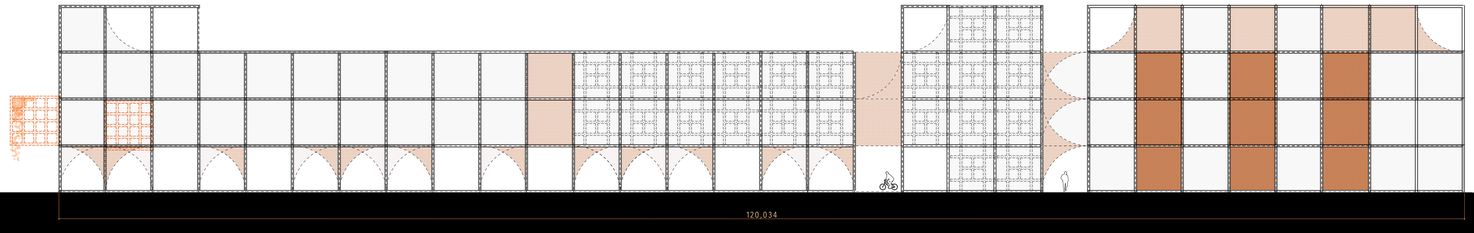

FACADE M1:200

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Universidade de Lisboa

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STUDENT: ELENA GRUODYTE 20171526

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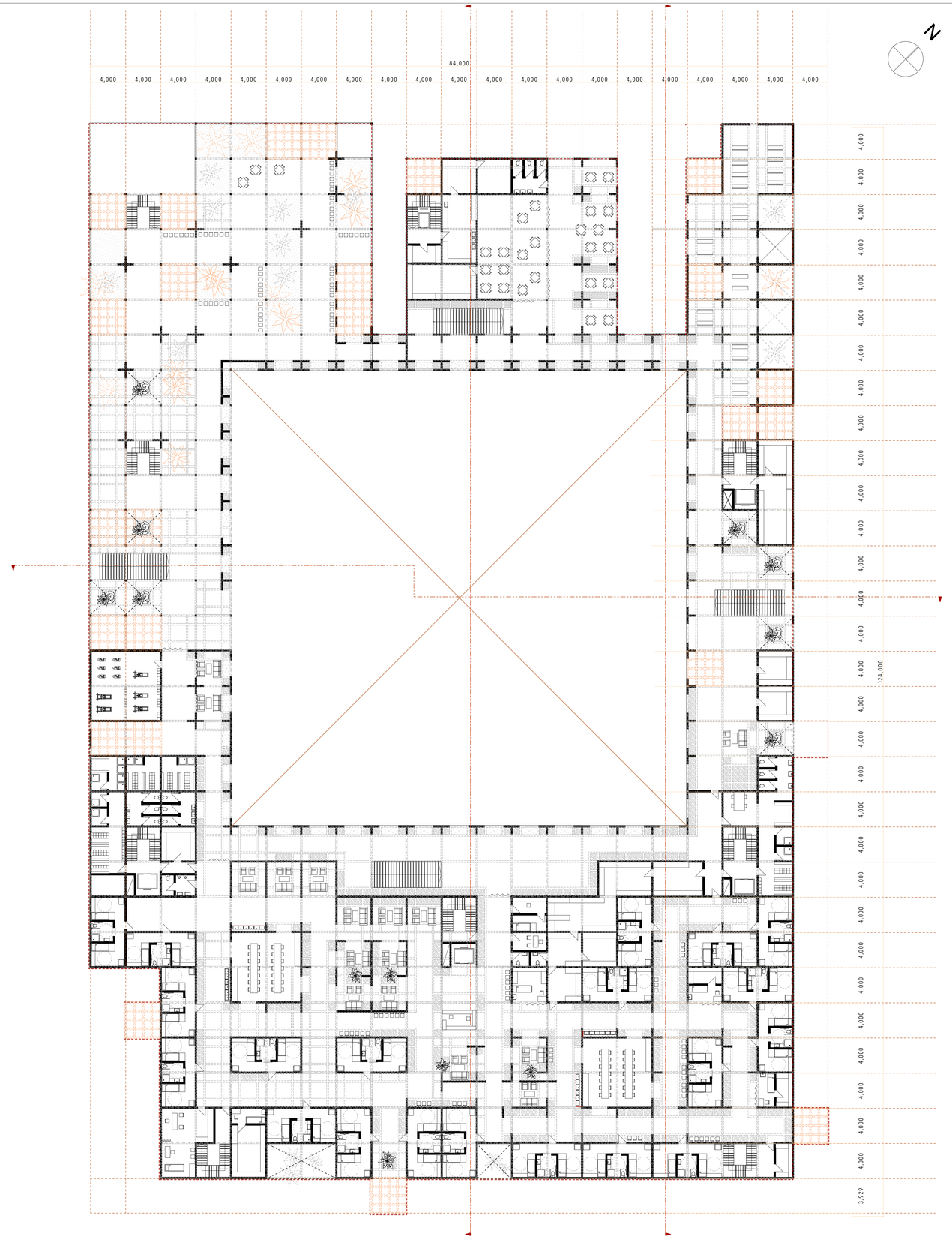
2ST FLOOR PLAN M1:200

3ST FLOOR PLAN M1:200



2ST FLOOR PLAN M1:200

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ELDERLY CARE AND SOCIALIZATION CENTER IN BEIRA (MOZAMBIQUE)

PROJECT DISSERTATION TO OBTAIN THE MASTER'S DEGREE IN ARCHITECTURE

SCIENTIFIC ORIENTATION:

PHD PROFESSOR / SPECIALIST JOANA BASTOS MALHEIRO

STUDENT: ELENA GRUODYTE 20171526

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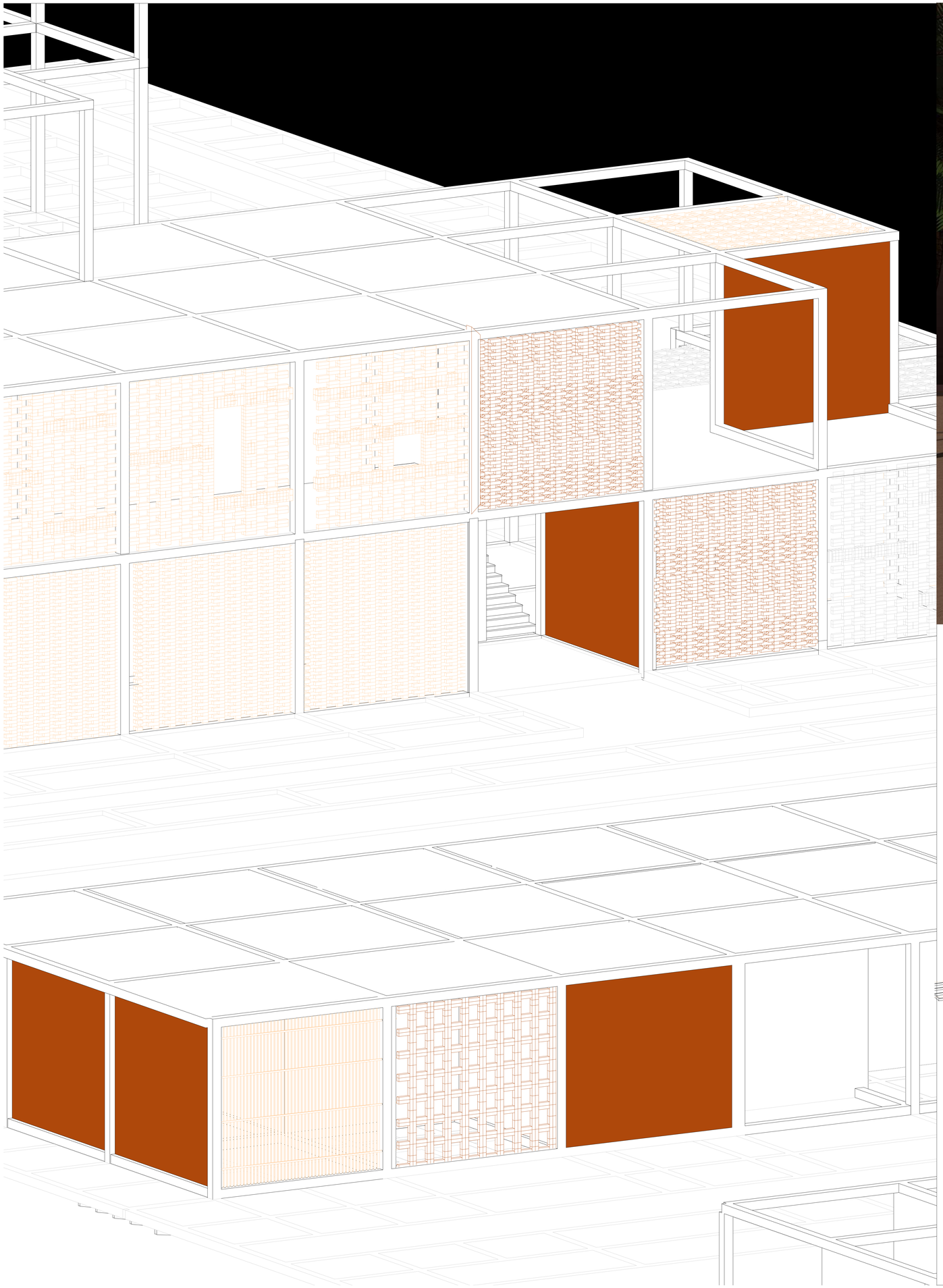

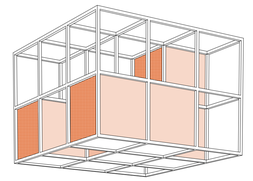

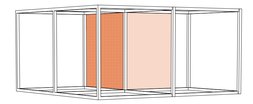

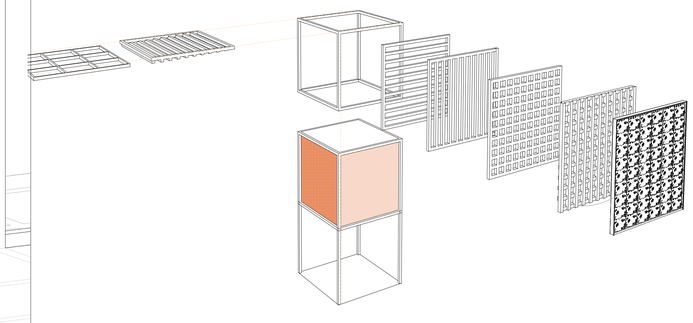

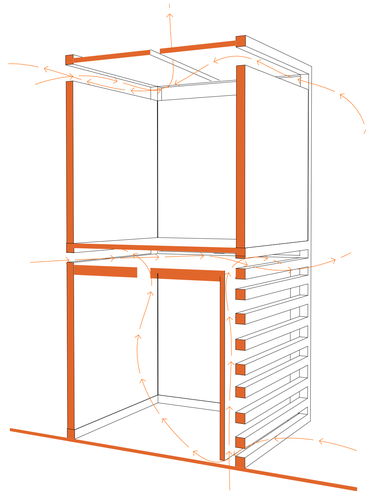

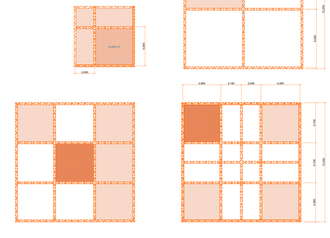

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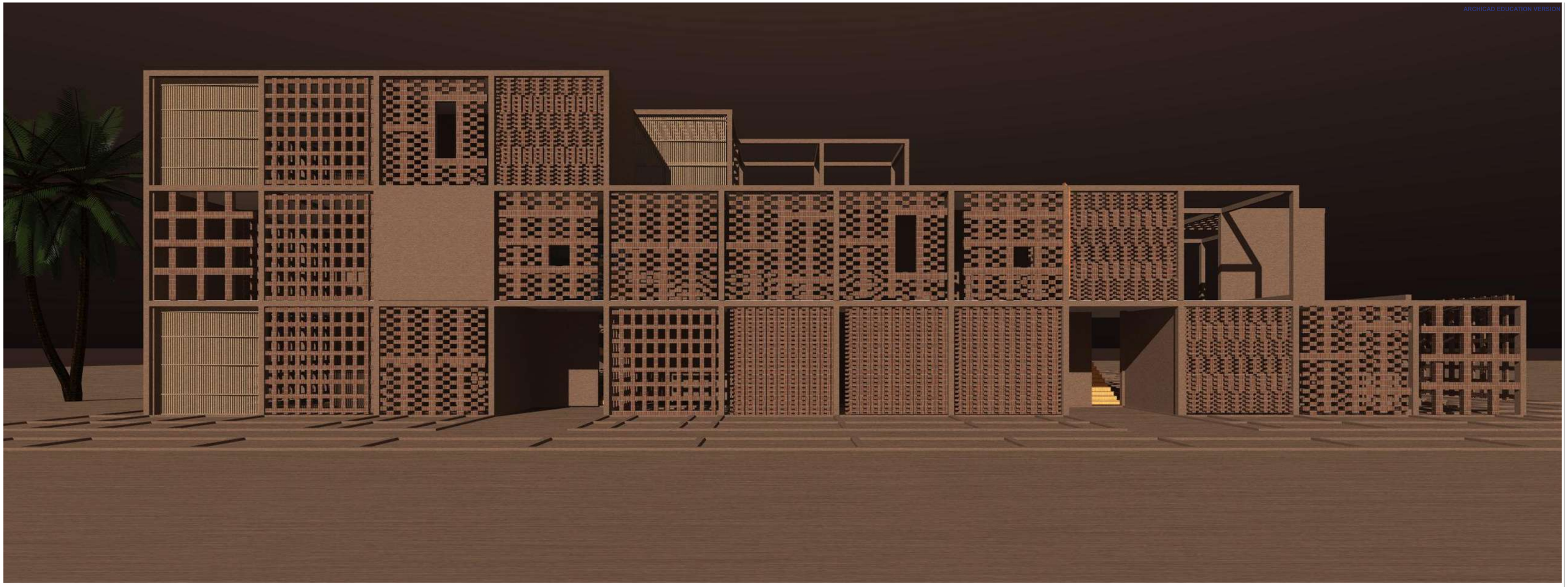

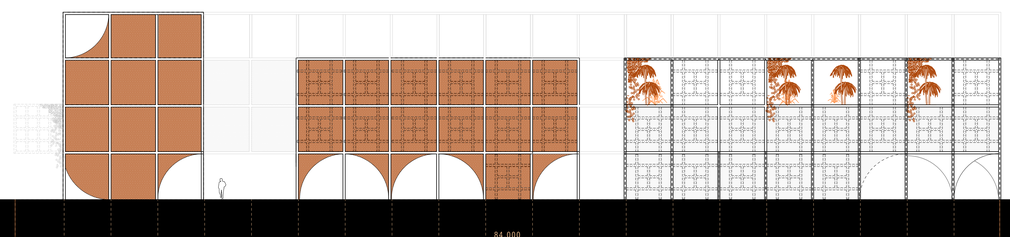

FACADE M1:200

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