

Designing a Psychiatric Center in Ngaoundéré : When Architecture Becomes Therapeutic

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Abstract:- Architecture plays a crucial role in shaping spaces that influence human behavior and well-being. In the context of mental health, therapeutic architecture has emerged as a powerful tool to enhance patient care and recovery. This article focuses on the design of a psychiatric center in Ngaoundere, where the principles of therapeutic architecture are applied to create a healing environment. By incorporating thoughtful spatial layouts, natural light, and soothing materials, the center aims to support the mental well-being of its patients. The project highlights how architectural design can specifically address the needs of psychiatric care in Ngaoundere, offering a new approach to healthcare in the region.

Keywords:- Therapeutic Architecture, Psychiatric Center, Mental Health, Mental well-being, Healing Spaces.

I. INTRODUCTION

In the field of mental health, the physical environment of psychiatric centers profoundly influences patients' well-being and recovery. Therapeutic architecture, a concept aimed at creating care spaces that foster healing, is increasingly integrated into the design of these facilities. Studies show that elements such as natural light, views of green spaces, and noise reduction can reduce stress and improve the care experience for patients with mental disorders [1], [2]. The design of a psychiatric center, therefore, goes beyond simple infrastructure: it becomes a vehicle for mental well-being and rehabilitation. For instance, projects like the Vejle Psychiatric Hospital in Denmark illustrate how innovative design can enhance safety while creating a calming atmosphere, encouraging a sense of belonging and autonomy among patients [3].

II. OVERVIEW OF THE CITY OF NGAOUNDERE

➤ Justification for Site Selection

Ngaoundéré stands out as an ideal site for establishing the psychiatric center due to its accessibility as a strategic crossroads connecting several regions of Cameroon, including the North, East, and Center, which facilitates access for patients and medical staff. The Adamawa region lacks psychiatric infrastructure, and mental health issues are still often underestimated and neglected. The city's ethnic and cultural diversity also supports the adaptation of care to local realities, making treatments more acceptable.

Ngaoundere, as the capital of the Adamawa region and the Vina department, one of the five administrative divisions in the region, is strategically positioned geographically and serves as a crossroads between the North and South of the country.

➤ Location and Context

As the capital of the Adamawa region and the Vina department, Ngaoundere is illustrated in Figure 1. The city is accessible by various transportation routes, including:

- **Road:** The city is accessible via national roads, particularly RN1, which connects it to Garoua in the north and Yaoundé in the south.
- **Railway:** Ngaoundéré marks the end of the northern railway line of the Transcameroon, connecting it to Douala and Yaoundé through Camrail.
- **Air:** Ngaoundéré Airport offers regular flights to Yaoundé and Douala, facilitating air access.

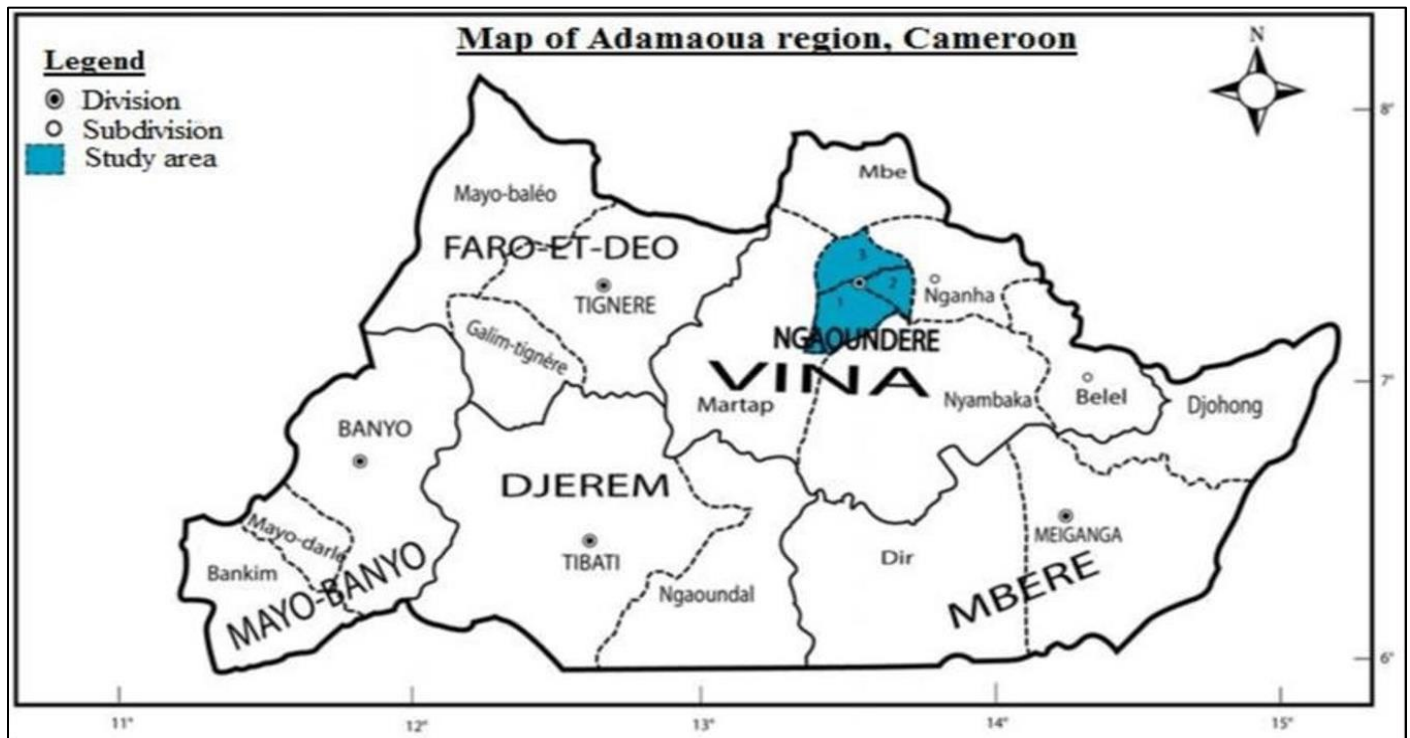


Fig 1 Map of Adamaoua Region (<https://www.researchgate.net>, 2020)

Ngaoundéré is located at 7°19' north latitude and 13°34' east longitude, with an altitude of about 1200 meters. Waste collection and disposal.

➤ History

The name Ngaoundéré comes from the Fulfulde (or Fulani) word “Ngaou Nderé,” which means “the navel of the mountain” or “the belly of the mountain.” This name refers to the city’s geography, particularly an iconic hill shaped like a navel located near the city, which serves as an important natural landmark in the region.

➤ Demographics

In 2023, Ngaoundéré had a population of 298,016 and continues to experience sustained demographic growth, partly due to urbanization and the economic appeal that attracts migration from rural areas and other regions of Cameroon.

The city is characterized by its ethnic diversity, with a majority of Fulani (or Fulbé), who played a key role in its foundation, followed by the Mboum, the region’s first inhabitants. Other groups, such as the Tikar, Bamileke, Hausa, as well as populations from the North and South of Cameroon, also contribute to this diversity.

Islam, influenced by the Fulani heritage and the Adamawa Sultanate, is the dominant religion, though Christians, mainly Catholics and Protestants, as well as followers of traditional African religions, are also present.

➤ Climate and Temperature

Ngaoundéré has a tropical savanna climate, classified as Sudanese-Guinean, marked by an alternation between a dry season and a rainy season.

The annual temperature in Ngaoundéré is around 22.9°C. Annual rainfall is approximately 2248 mm.

During the dry season, Ngaoundéré is often affected by the Harmattan, a dry and dusty wind from the Sahara Desert. This makes the air very dry, and nighttime temperatures can be quite cool.

The rainy season is characterized by high humidity, while the dry season is much more arid.

➤ Relief, Hydrography and Pedology

- **Relief:** Ngaoundéré is situated on the high plateaus of Adamawa, at an average altitude of 1,100 to 1,300 meters. The landscape features hills, rocky outcrops, and valleys, with the Ngaoundéré hill as the highest point. This volcanic terrain has varied rock formations and fertile soils.
- **Hydrography:** The city has a dense hydrographic network. Major rivers include the Vina, which originates in the Adamawa mountains and is essential for irrigation, as well as the Dang River, which also supports agriculture and domestic activities. These rivers, along with seasonal water points, are vital for fishing and irrigation, especially during the dry season.
- **Pedology:** The soils in Ngaoundéré vary by topography:
- Ferrallitic soils, which are red and well-drained, are often nutrient-poor and require organic amendments.
- Volcanic soils, from past volcanic activity, are nutrient-rich and favorable for vegetable farming.
- Alluvial soils, found near rivers, are rich and suitable for irrigation of crops such as rice and vegetables.

➤ Socio-Economic Activities

- **Agriculture and Livestock:** Agriculture and livestock are essential to Ngaoundéré's economy, with staple crops like maize and cassava and cash crops such as coffee and cotton. The region is a major center for livestock, especially cattle.
- **Commerce:** As a strategic commercial center, Ngaoundéré facilitates trade between northern and southern Cameroon and Chad. Markets are vibrant, especially for agricultural and artisanal products.
- **Transport:** The Douala-Ngaoundéré railway, managed by Camrail, is essential for transport. The city is also well-connected by road to Garoua, Maroua, and Yaoundé.
- **Industries:** The industry is modest, with a few agro-processing units and artisan workshops.

- **Tertiary Sector:** Health and education services are expanding, as is tourism thanks to the proximity of Benoue National Park.
- **Craftsmanship:** Local craftsmanship, particularly leather and wood products, is developing with local know-how and targets both local and tourist markets.

III. SITE PRESENTATION

Located in the Béka neighborhood, the site is near the Adamaoua Reference Hospital, Béka Hosséré, the SIC Ngaoundéré Baladji camp, and some administrative offices such as Feicom Adamawa. It also lies at the boundary between the new city (expansion area) and the old city (original settlement). (Figure 2).



Fig 2 Site (Google Earth)

➤ Accessibility and Current Site Occupation

The site is accessible by a main road, specifically National Highway No. 2, which also serves the Adamawa Reference Hospital, as shown in Figure 3.



Fig 3 Accessibility and Current Site Occupation

➤ Site Topography and Soil

Observations indicate a relatively gentle slope on the land, with a north-south elevation difference of 7 meters and an east-west difference of 4 meters, as shown in Figures 4

and 5. The soil is primarily lateritic and moderately stable. However, geotechnical studies would be advisable to confirm soil composition and strength.



Fig 4 North-South Elevation Difference (Google Earth)



Fig 5 East-West Elevation Difference (Google Earth)

➤ *SWOT Analysis of the Site*

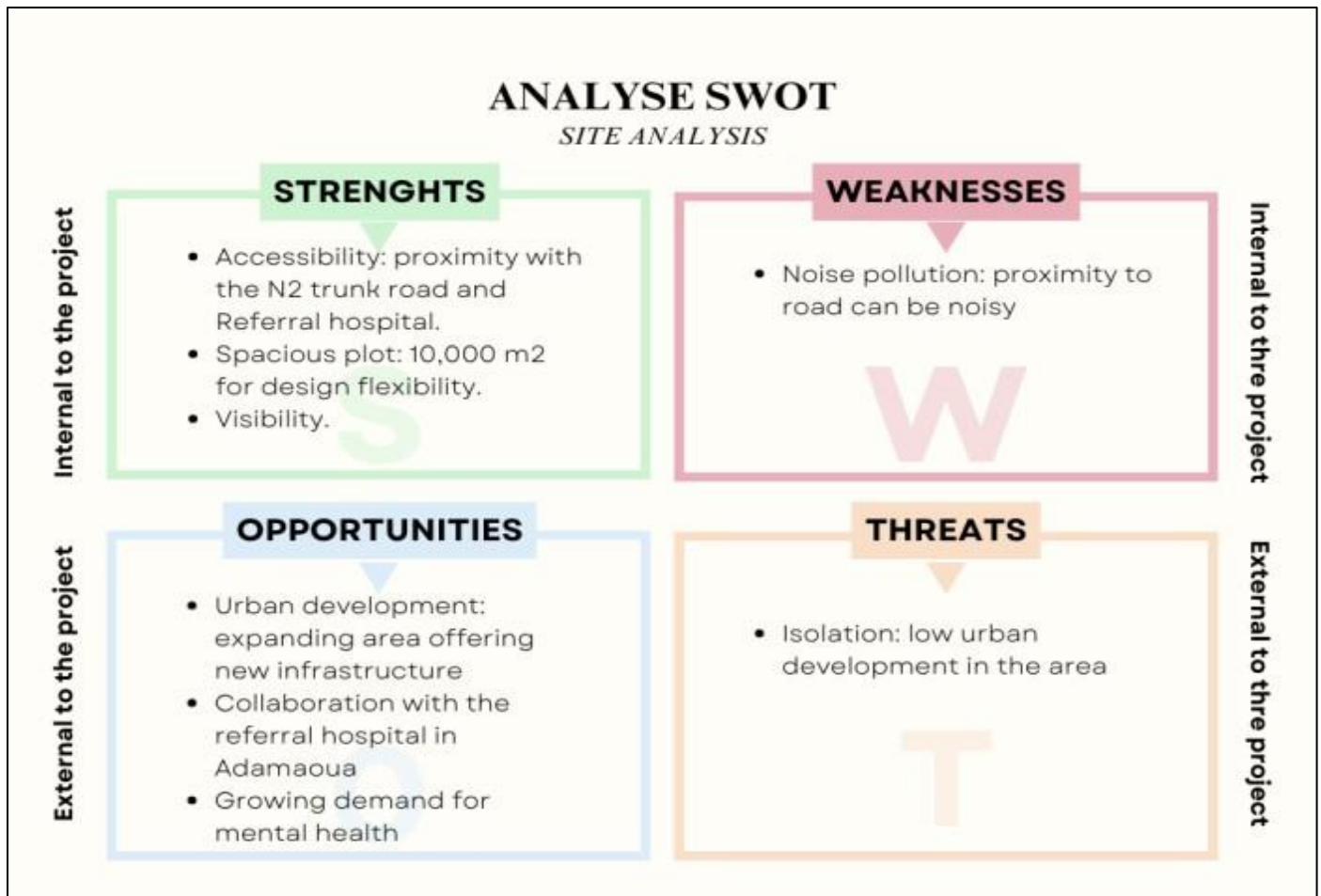


Fig 6 SWOT Analysis

IV. PROJECT DESIGN

➤ *Architectural Programming*

The layout and design of a psychiatric center require careful definition of its components to meet the needs of its users. The examples presented in the state of the art, along with our research and other data collection efforts, have allowed us to identify key elements and provide an estimate of their surface area.

The primary function of a psychiatric center is to provide specialized care and services to individuals with mental disorders. The center offers a safe and structured environment where patients can receive medical treatment, psychological and emotional support, as well as guidance to help them overcome their challenges. The objective is to treat mental disorders, improve the psychological state of patients, and facilitate their social reintegration. Thus, the following elements are essential: reception, an administrative unit, a therapeutic unit, an accommodation unit, and a socio-cultural unit.

• *Functional Diagram*

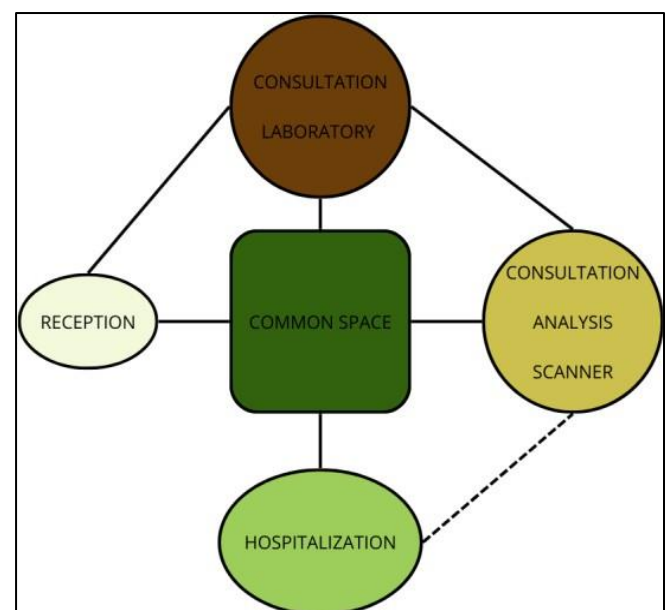


Fig 7 Ground Floor

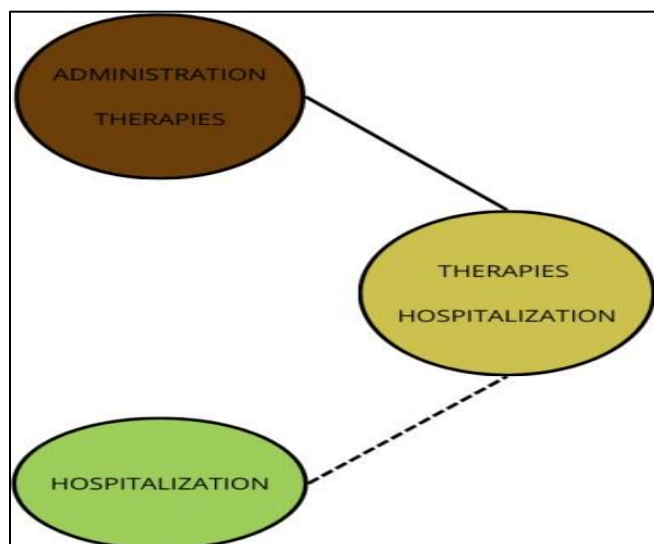


Fig 8 First Floor



Fig 10 Third Floor

- *Programming and Surface Areas*

The psychiatric center is designed to accommodate up to 65 patients and it is also equipped to provide outpatient care. The areas have been planned as outlined in the following table.

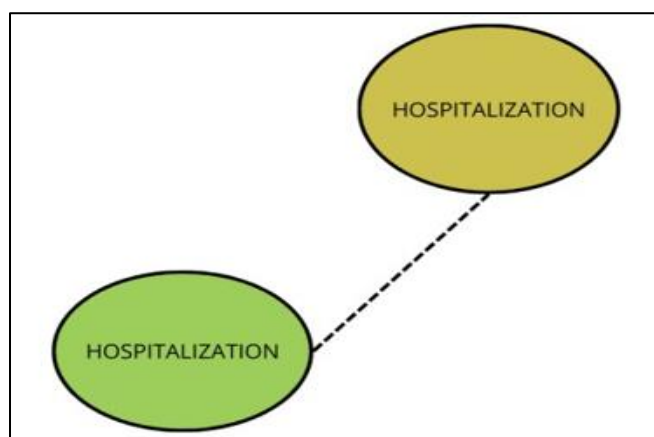


Fig 9 Second Floor

Table 1 Program Surfaces

Rooms	Number	Unit area	Total area
Waiting hall	3	25	75
Reception	3	20	60
Cashier	3	3	9
Cashier office	2	12	24
Dining hall	1	50	50
Store	1	18	18
Kitchen	1	18	18
Dishwashing area	1	12	12
Lounge	2	30	60
Sampling area	2	3	6
Offices	2	12	24
Medical analyses	1	20	20
Storage	1	12	12
Scanner room	1	20	20
Interpretation room	1	12	12
Preparation room	1	12	12
Consultation room	5	15	75
Meeting room	1	40	40
Monitoring room	10	12	120
Broom closet	1	8	8
Director office	1	15	15
Secretary	1	15	15

Single room	18	12	216
Double room	4	16	64
Triple room	12	20	240
Therapy room	3	30	90
TOTAL			1315

➤ Architectural Concept

The architectural concept of your psychiatric center is based on a pavilion organization arranged around interior gardens and therapeutic green spaces to create a calming environment for patients. Each pavilion is dedicated to a specific function (care, accommodation, administration) while maintaining a visual connection to nature to promote mental well-being. Local materials, such as stabilized earth bricks, are used to enhance thermal regulation, suited to Ngaoundéré's warm climate. The layout of the buildings allows for effective natural ventilation and optimization of daylight.

➤ Conceptual Approach

The conceptual starting point is rooted in the architectural tradition of circular huts in Adamawa, as illustrated in Figure 11. These earth structures, often covered with thatched conical roofs, reflect a deep connection to nature and community. The circle, a symbol of inclusivity and equality, is echoed in the general shape of your project, maintaining a strong link with the region's cultural roots.



Fig 11 Traditional Houses in Adamawa Region

Starting from this circular base, the organization of the pavilions follows a logical progression, with each building designed as a “subunit” integrated into a larger whole. Each pavilion has a defined function (reception, administration, hospitalization, therapy), creating a smooth transition between different spaces and services while drawing inspiration from the spatial fluidity of traditional huts. Figure 12 explains the development of this concept in detail.

The traditional homes of the Adamawa are circular with a conical roof. Here, the roof has been removed, but the circular base is preserved.

The circular base is divided into four sections, and each quarter is reduced, allowing us to create our four units.

An interior green space is created, serving as a shared area for the four units. Subspaces are also created within each unit, designated exclusively for these units.

Two of the four units are offset, and the number of floors alternates to accommodate the necessary rooms and enhance aesthetics.

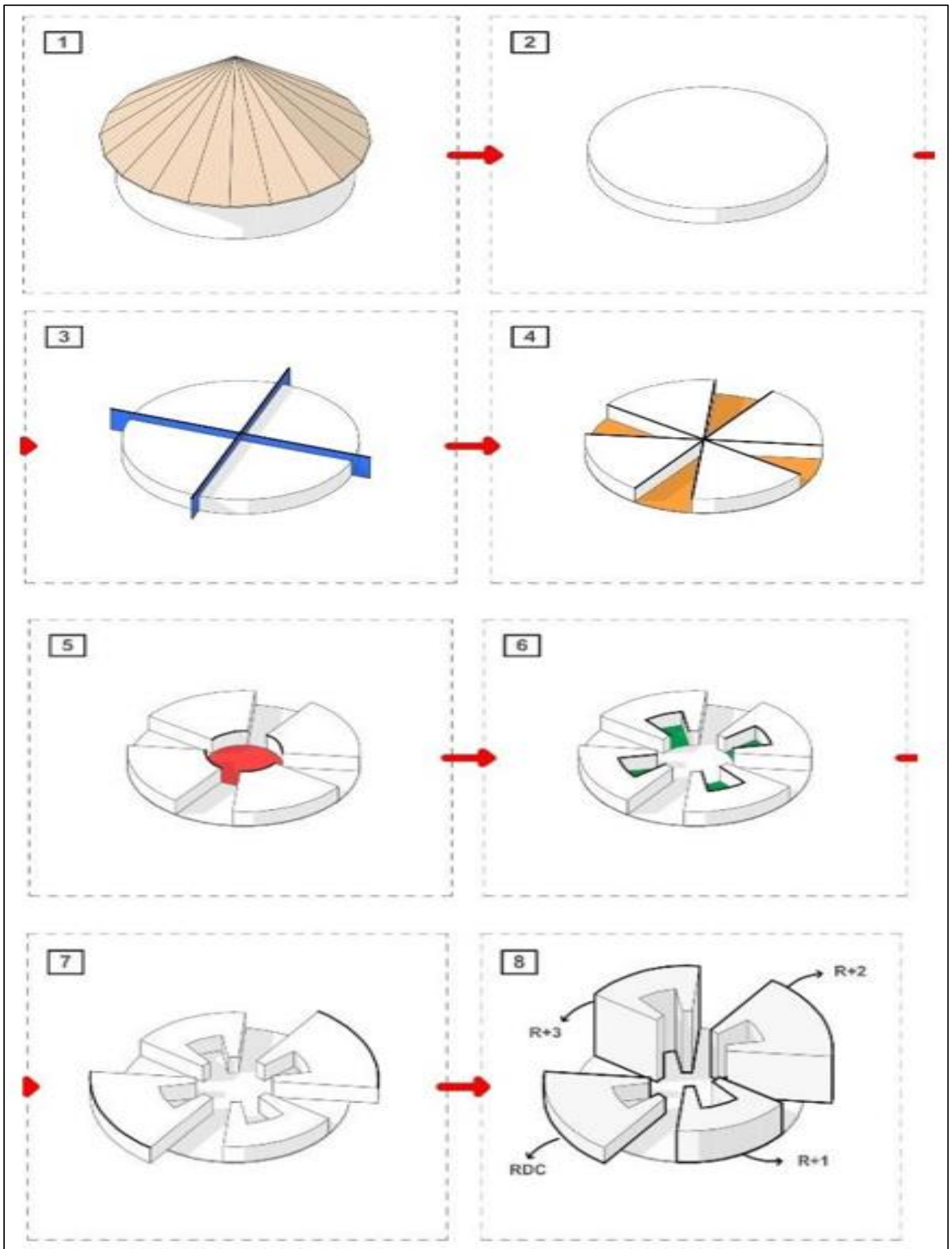


Fig 12 Conceptual Approach

➤ *Sustainable Design Strategies*

• *Orientation*

The circular shape of the psychiatric center naturally optimizes sun exposure. The facades are evenly distributed, reducing direct sun impact on any single part of the buildings. The layout also supports smooth circulation for users while allowing for efficient natural ventilation by incorporating prevailing winds in the design. Figure 13 shows that point.

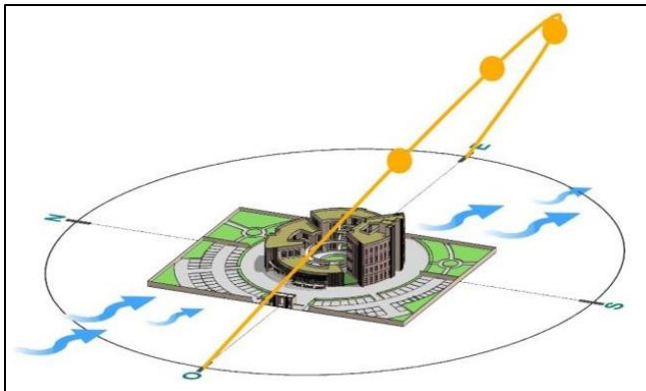


Fig 13 Sunlight and Natural Ventilation in Relation to the Project

• *Natural Ventilation and Lighting*

Thanks to its circular shape, natural ventilation is maximized by the convection effect created at the center of the building. The heart of the circular space can serve as an open courtyard or garden, allowing air to flow naturally through the pavilions. High-placed windows and skylights are integrated to encourage natural lighting, minimizing artificial lighting during the day. A double-skin facade serves as thermal insulation. The hot air is cooled and redistributed, providing users with a comfortable indoor temperature, as illustrated in figure 14.

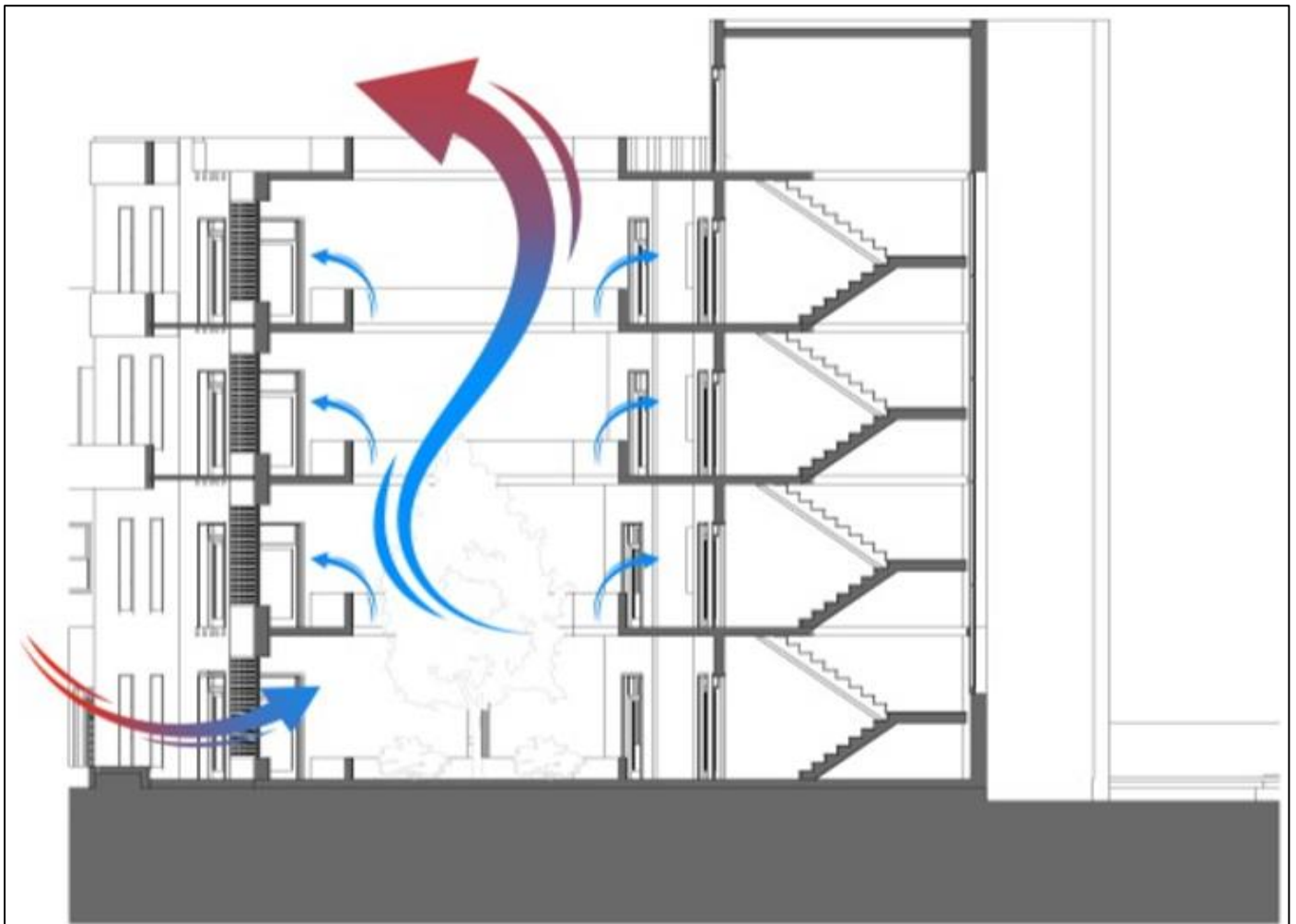


Fig 14 Natural Ventilation Diagram: Hot Air Inflow and Cold Air Outflow

- *Building Materials*

Wood, brick, and concrete are harmoniously used. Wood is preferred for interior areas and finishes, adding warmth and a natural feel to the environment. Brick, especially stabilized earth brick, is used for its thermal properties and local integration, helping regulate temperatures. Concrete, used sparingly for primary structures, ensures robustness and durability while being insulated to prevent overheating.

The green roof enhances thermal insulation by creating a natural barrier that reduces heat transfer between the interior and exterior, helping to maintain a more stable indoor temperature. It also absorbs some rainwater, reducing runoff and easing the load on drainage systems, while promoting biodiversity in urban areas.

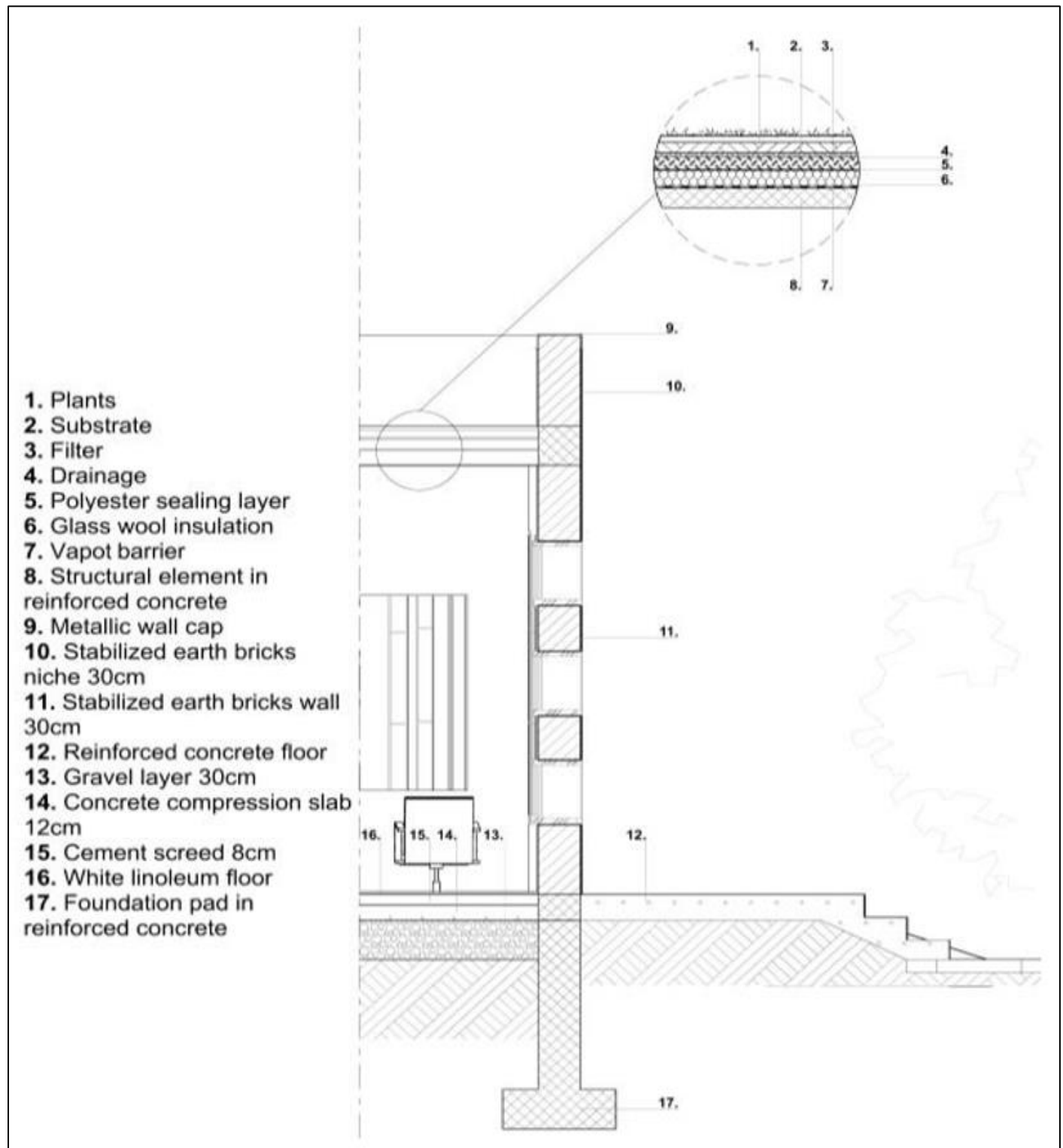


Fig 15 Technical Section: Composition of the Green Roof and Materials

- *Biophilia*

The circular shape enhances the integration of nature into the architecture. The center of the circle is designed as a therapeutic garden, accessible from all units. This green space, filled with local plants and shaded areas, allows patients to benefit from nature, supporting their recovery. Plantings around the building and green roofs complement this biophilic approach, ensuring a respectful integration with the environment.

V. IMPACT ASSESSMENT AND MAINTENANCE

➤ *Socio-Cultural Impacts*

The psychiatric center strengthens the integration of mental health care into the local culture, contributing to the destigmatization of psychiatric disorders. It is designed to align with the community's traditions and values by incorporating vernacular architectural elements and fostering closeness to nature, a core aspect of the local culture. The project thus becomes a model for awareness and social support concerning mental health issues.

➤ *Socio-Economic Impacts*

The psychiatric center stimulates the local economy by generating jobs during construction and later for site maintenance and management. Additionally, the use of local materials such as brick and wood supports the local industry. By providing specialized health care, it reduces the need for long-distance travel, offering a local service that lowers costs for patients and their families.

➤ *Environmental Impacts*

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➤ *Architectural and Urban Impacts*

The project blends seamlessly into the urban fabric of Ngaoundéré with its circular shape, respecting the surrounding landscape while providing modern and functional architecture. It becomes a landmark in the area, contributing to urban development and structuring this part of the city. Architectural choices, such as the use of pavilions, allow for gradual adaptation to future urbanization while respecting climatic constraints.

➤ *Maintenance*

The psychiatric center is designed to minimize maintenance costs through durable materials and passive systems (natural ventilation, natural lighting). A periodic maintenance plan is implemented, covering checks on electrical installations, ventilation systems, and green space upkeep. The use of materials like brick and wood, suited to local conditions, limits wear and facilitates routine repairs.

➤ *Photorealistic Images*

High-quality visualizations of the plans, showcasing day views were produced with the help of Lumion, Twinmotion and AI.

VI. CONCLUSION

This analysis highlights the key elements of the psychiatric center project in Ngaoundéré, particularly its integration into the city's urban fabric and the unique characteristics of the Béka site. The circular and sustainable design of the center not only promotes the well-being of patients through well-adapted spaces and a harmonious connection with nature but also addresses the environmental and sociocultural challenges of the region. Finally, the evaluation of both socio-cultural and environmental impacts demonstrates how this project can become a model for mental health care, contributing to a significant improvement in residents' quality of life. The implementation of effective maintenance strategies ensures the durability and sustainability of the facilities, making this center an essential pillar for mental health in the Adamawa region.

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