Politecnico di Torino

Polytechnic of Turin

Master's Degree in Sustainable Architecture

A.y. 2024/2025

Graduation Session December 2024

The Birth Center: A Catalyst for Health and Urban-Development in Borujerd

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Abstract:
This thesis is dedicated to the design a maternity hospital and birth center in Borujerd, a city in western part of Iran, which due to the lack of maternal healthcare facilities has been decided to be projected and designed on an abandoned site which is about 34,000 square meters. There is an existing emergency hospital located next to the site. The present hospital is almost in the central area of the city which manages cases of traffic accidents and violent disputes quite often and of course other cases, and therefore it usually gathers people in a state of stress and anger, which altogether forms a problematic and unstable atmosphere around the site area, on the other hand this abandoned area has been unused for many years which has created repellent atmosphere in that part of the city which is the area which I lived for many years and accordingly I propose a project in response to these challenges, a maternity hospital that would hopefully address these issues and turn them around to show an actual positive, community-centered neighborhood area.
This would then have been a specialized-care maternity hospital for mothers and newborns, one of the major healthcare gaps in the region which had forced my mother and many others to go to another city to give the birth to their children.
Besides the health services, it is also foreseen that this area should be turned into a very lively public space with a daily marketplace, parks, and sports center which serve local schools and high schools. A multifunctional approach will make best use of the big area that was left to decay and will contribute positively to the environment, creating a sense of community and good feeling.

It will further incorporate into it the facilities necessary for education within the maternity hospital, thus providing opportunities for workshops and practical training for medical students coming from nearby universities. The inclusion of communal spaces like a cafeteria will make interaction and collaboration among students, healthcare professionals, and the community at large quite easy.

Hence, this project, which aims at transforming a largely underutilized urban area into an active health hub, improves holistic health infrastructure in terms of facilities and community integration.

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Introduction :

As a rule, the activities of maternity hospitals are aimed at protecting the health of mothers and children by providing access to specialized care throughout pregnancy, childbirth and postpartum.

I first examine existing theoretical studies on maternity hospitals, where design for the purpose of their specialization and sustainability were deconstructed. Throughout the next part, I will share case studies from some international maternity hospitals. Then, I am also set to provide an analysis of Iranian healthcare context and Borujerd city itself from the country-wide perspective on their evolution in healthcare including description about history of this province, its demographic figures, political influencing forces which have been affecting current health care infrastructure.

Then site analysis recognized the project area and reason to choose that location beside shahid Chamran hospital, also with SWOT (Strengths, Weaknesses, Opportunities and Threats) factors to understand its advantage and disadvantages points.

The project part will show and explain the development of a new maternity hospital in Borujerd, designed to adopt modern healthcare facilities with communal public spaces. The project emphasizes sustainability and accessibility, aiming to enhance community well-being while providing specialized maternal and neonatal care. Each subsection will explore the hospital’s master plan, design philosophy, and structural considerations.

MATERNITY HOSPITALS: THEORETICAL STUDIES

1.1 Overview of Maternity Hospital Design and Function

A maternity hospital is crucial in the protection of maternal and neonatal health, which can decrease maternal mortality and increase health condition rates. Functioning hospitals have to be designed well so that specialized care can happen without delay and so people will receive treatment in an environment where their emotional as well as physical needs are addressed (Hodnett et al.,2013). In addition the maternity hospital practice approaches are reported that they have been improving health care delivery and birth outcomes, such as midwife-led care arrangements or for example a move towards increased use of private birthing rooms and family friendly spaces (Goberna-Tricas et al., 2011).

The arrangement of services is the important part of the design of a maternity hospital (Symon et al., 2008). The flexible spaces make for a clear path of flow between staff and patient, to allow better emergency response times (Gallant, D., & Lanning, K., 2001). Decentralized nursing stations provide communication and workflow grouped in care sets, reducing stress throughout labor (Fay, L., Real, K., & Haynes, S., 2022). Maternal hospitals are not only to provide medical care, but they also help to promote the mother and child process in a more compassionate way (Tobe, R. G., Islam, M. T., Yoshimura, Y., & Hossain, J., 2019). Research indicates that improving the harmony between hospitals and families will lead to increased patient satisfaction with care (Ulrich et al., 2008).

This combination of professional care and empathy stands at the core of good maternity hospital design (Sandman, H., Meguid, T., & Levänen, J., 2020). Safe pregnancies, successful deliveries and healthy postnatal outcomes are some of the important requirements for adequate maternal and neonatal healthcare facilities. These facilities are built to help and care for the health needs of women during pregnancy, childbirth and within other postpartum periods, as well as the centers which can offer special treatments for the newborns. They played a role in the reduction of maternal and infant death, something that is usually virtually absent where general healthcare access might be limited (Homer et al.,2013).

According to the WHO (World Health Organization, 2022), comprehensive and high-quality maternal care is vital in reducing risk of complications that may occur at any time during pregnancy, or delivery and even after childbirth. The absence or delay in seeking specialized services increases the risk of life-threatening complications to both mothers and newborns unlike when pregnant women have the access to them (Goberna-Tricas et al., 2011). Hospitals providing dedicated services for maternal care are staffed with obstetricians, midwives, and neonatal care specialists experienced in dealing with high-risk pregnancies such as pre-eclampsia or premature birth (Haire, D., & Elsberry, C., 1991). Complications during labor and delivery require emergency measures in order to ensure the safety of mothers-childbirth especially when they face multiple emergency cases (O'Reilly, Buchanan & Bayes., 2024).

Maternity hospitals are the key in providing neonatal healthcare services, especially high- tech ones such as Neonatal Intensive Care Units (NICUs) (Haire, D., & Elsberry, C.,1991). Nowadays, The success of survival and medical assessment in early delivery or sick infant lifespan is closely related to high-level care which NICUs provide. The units are capable of managing acute conditions such as respiratory distress, infections and congenital anomalies that if unattended can prove fatal for infants (Fink et al.,2023).

In much the same way, for example in survival rates of premature babies and long-term health are significantly improved if they can be admitted to a NICU (Zhao et al.,2023).

These centers are also important in maintaining the health of both mother and fetus, by providing prenatal care a time when blood levels help monitor fetal growth—atop their original function as agitator sites (Ngo, T.T.M et al,. 2018). It is important to catch complications such as gestational diabetes, hypertension and infections early enough that health risks can be managed before they spiral out of control (Costa et al., 2023). These appointments help to provide necessary advice on nutrition, lifestyle and mental well-being that can assist mothers in taking control of their pregnancies better and making them less vulnerable to complications (Yan, 2017).

Maternal healthcare facilities also offer essential postnatal services which involves keeping a check on how the mother recovers from childbirth, providing support for breastfeeding and ensuring that the new baby is growing well (Wudineh, K et al., 2018). The leading cause of maternal death, postpartum hemorrhage and infections can be effectively managed in a maternity hospital (WHO 2022). Postnatal care is key as well to see off potential mental health problems such as postpartum depression which may go away without diagnosis but can have long-lasting impacts on the mother, and in turn harm a child (Brummelte & Galea, 2016).

Maternity hospitals in rural and medically underserved communities provide a safety net. Sonenberg et al. (2023) call these areas maternity care deserts to comprehend a large number of women with limited access to pregnancy and delivery healthcare. Setting up maternal health care centers in such places thus globe them with the health facilities and enables to off tending which may possibly facilitate preventing complicating during pregnancy (Sonenberg et al., 2023). Health facilities can also be learning centers on maternal and child health, conducting classes for reproductive health issues like family planning methods and how to take care of a newborn ensuring women better manage their own well-being as well as that of her children (Sonenberg et al., 2023).

Moreover, maternal healthcare centers can reduce the incident of maternal morbidity as cesarean sections, blood transfusions and emergency surgeries (Fink et al., 2023). These hospitals have expert professionals and great medical appliances that even the difficult births are handle in these places with proper care (Iwo-Amah et al., 2022). Women delivering in well-resourced maternal health facilities have much lower mortality rates from systematic reviews than women who deliver at home or health facility without equipment (Fink et al 2023).

Maternity hospitals have important health implications beyond immediate biological outcomes. They also support healthiness throughout life and thus contribute to long-term societal well-being. In addition, healthier mothers and babies mean better communities since the wellbeing of a population is related to maternal health status due partly from socio-economic characteristics (Vedam et al., 2019). Investing in maternal health facilities can produce long-term benefits such as increased access to education, reduced impoverishment and better future healthcare (World Health Organization 2022).

Finally, these hospitals play a crucial role in research and development of new approaches for the care during pregnancy or neonatal period. With their conduct of trials and medical research, maternity hospitals help in the advancement and progress of new standards which can therefore benefit many other low-to-middle-income countries by sharing these treatments / technologies or practices.

1.2. Maternity hospital design

Birth Centers represent innovative models of both architectural and care practices, designed to approach childbirth as a physiological process rather than a highly medicalized event (Setola et al., 2019). These centers prioritize the well-being of mothers, newborns, and care providers by fostering environments that promote relaxation, privacy, and functionality. Birth Centers often adopt midwife-led care models and emphasize continuity of care, supporting women before, during, and after childbirth (Sandall et al., 2016).

Architecturally, these spaces integrate flexibility to accommodate various stages of labor and postpartum care, with designs that include adaptable furnishings, privacy-enhancing elements, and connections to outdoor areas for movement and relaxation (Setola et al., 2019). Common spaces, such as kitchens and lounges, facilitate social interaction and support. International examples, particularly from the UK and the Netherlands, demonstrate how Birth Centers can improve maternal outcomes, reduce unnecessary medical interventions, and enhance user experiences (Birthplace in England Collaborative Group, 2011).

The architectural design of Birth Centers also serves as a means to communicate the philosophy of birth through symbolic elements like artwork and natural imagery (Walsh et al., 2018).

Outdoor spaces, private rooms, and sensory controls further contribute to creating a nurturing and calming atmosphere. These centers are often modest in size, with 2–8 birth rooms, emphasizing functionality and personal care (Hermus et al., 2017).

Modern maternity hospitals should create the correct conditions for a rapid, efficient and quality clinical process on the one hand or dispense the meaning with selective technologies to maintain all of this in an atmosphere that supports a psychological vacuum. Evidence-based design (EBD): designing healthcare facilities to enhance patient outcomes through architectural and design innovations. (Ulrich et al.2008). Findings the effect of EBD principles like maximizing daylight exposure, minimizing noise and providing natural views has been found to reduce patient stress levels which also enhance recovery times. (Gelder, 2016).

Architecture and interior design considerations are about much more than appearance; they can also impact patient healing as well as staff efficiency. Incorporating gardens and daylighting among other natural elements results in stress reduction for patients as well care providers. It is also an important approach to maintaining psychological well-being, especially in maternal health care settings where anxiety and emotional fueling are critical factors. Moreover, technology and telemedicine have been integrated since then to design modern hospitals in this era which helps the staff respond to any emergencies more quickly. (Ulrich et al 2008)

They are guided that maternity hospitals should be reformed to focus on models of community-based care and expectant women must receive ongoing support. The quality ratings of Studies on continuity of care models (where the same healthcare professionals supports mothers during pregnancy and birth) suggested higher levels of satisfaction by women as well as better health outcomes. This article will detail how these models of care are set up in birth hospitals and the advantages to such model for maternal health outcomes, as well as patient satisfaction. (Sandall et al.2016)

The use of technology in maternal care is transforming the functionality of hospitals (Campbell, 2004). This makes the availability of maternal and neonatal care better than ever with advancements in real-time monitoring systems, telemedicine services and advanced diagnostic tools helping healthcare professionals to provide efficient quality (Kuppuswami et al., 2021). The research shows that how technology can be used properly to increase the chances of saving patients and making things easier for hospitals, as well as new technologies using in maternity hospital such a region like Borujerd (Khorrami et al., 2019).

CASE STUDIES

The following section will analyze a sample of international maternity hospital projects to provide an understanding on innovative architectural solutions and sustainable design models. Case studies were selected for their applicability in addressing major development constraints − community participation, use of resources and specialized healthcare delivery. These case studies helps to understand better the concept, design elements and the architecture that going to be done in our context, primarily with respect to functionality and adaptability aspect but also giving an overview towards environmental sustainability.

1. Woldyia Maternity Center - Vilalta Studio

- Location: Weldiya, Ethiopia
- Year of Construction: 2017
- Area: 800 m²

Woldyia Maternity Center - Vilalta Studio: This proposed project in Woldya, Ethiopia includes a maternity unit and a waiting space for rural mothers, culturally infused and naturally lit. Maternity unit has three functional spaces while the waiting area is designed according to traditional Ethiopian huts, this is the area that people can use for a communal living (archdaily.com)

Figure 01 : Woldyia Maternity Center - Vilalta Studio, external view

- Important Characteristics:

Dual Functional Areas: maternity center units and waiting area for rural moms from other areas (archdaily.com)

Cultural Design Elements: The facade integrates traditional Ethiopian patterns, respecting local culture. (archdaily.com)

Natural Ventilation and Lighting: Interior spaces elevate comfort and they reduce the needs for energy by using natural lights and air circulation. (archdaily.com)

Community Integration: An open-air reception fosters a welcoming environment that connects the community to the facility. (archdaily.com)

Traditional Architectural Inspiration: The mother's waiting area is inspired by Ethiopian huts which provides a familiar and comfort environment. (archdaily.com)

Figure 02 : Woldyia Maternity Center - Vilalta Studio, external view

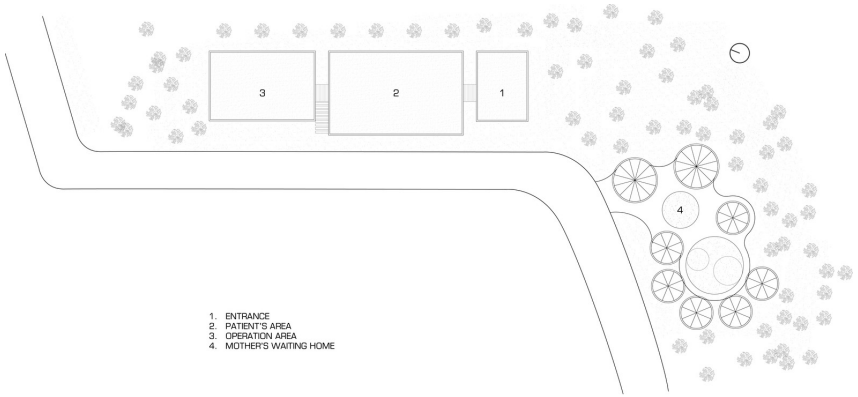


Figure 03 : Woldyia Maternity Center - Vilalta Studio, master plan

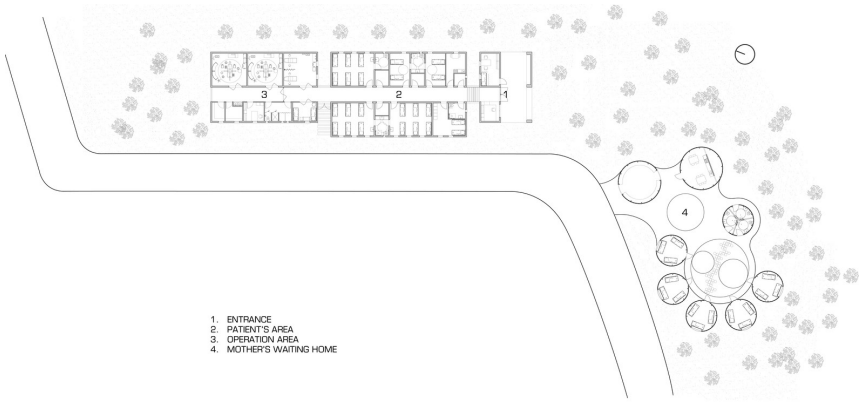


Figure 04 : Woldyia Maternity Center - Vilalta Studio, plan

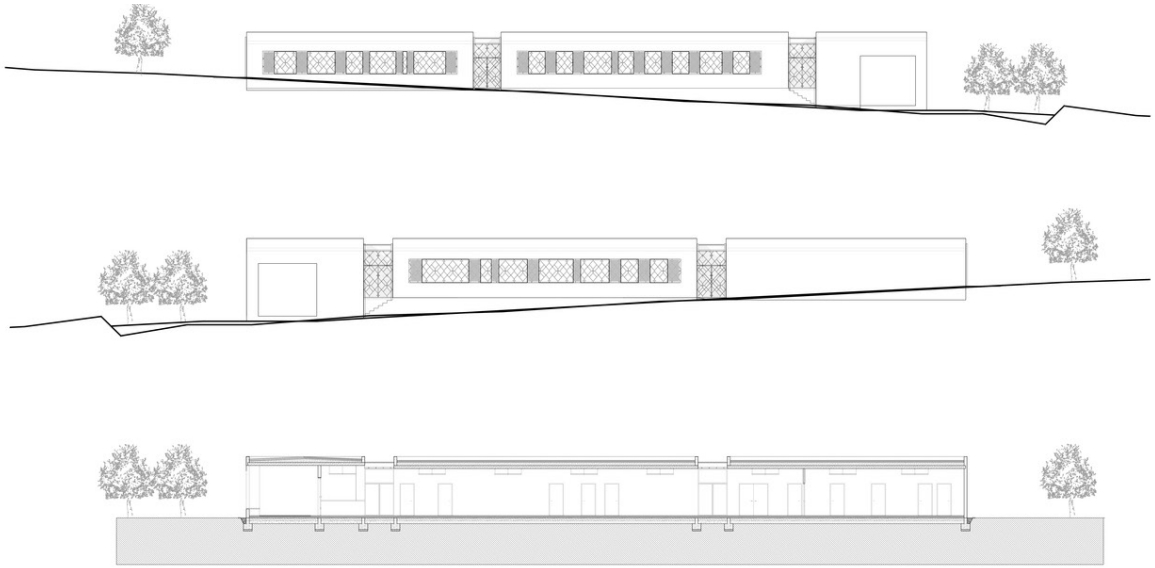


Figure 05 : Woldyia Maternity Center - Vilalta Studio, Prospects and

Figure 06: Woldyia Maternity Center - Vilalta Studio, waiting area

2. Xiamen Humanity Maternity Hospital - Lemanarc SA

- Location: Xiamen, China
- Year of Construction: 2021
- Area: 96,000m2

Xiamen Humanity Maternity Hospital - Lemanarc SA: made in 2021, with 600 beds in the area of 96,000 m², focused on effective and caring maternity hospital, having energy-saving and progressive ventilation aspects. by its flexible interiors creates enough range of facilities from pre-delivery to post-natal care in a safe environment (archello.com).

Figure 07: Xiamen Humanity Maternity Hospital - Lemanarc SA, external views

- Important Characteristics:

Inclusive Maternity and Gynecology Services: Offering complete range of services from pre-delivery to post-natal care, making sure a continuous support and help for mothers and new borns (archello.com).

Patient-Focused Design: Highlighting a warm and private atmosphere with spaces which are separated for maternal health in order to improve patient comfort experience (archello.com).

Flexible and resilient Interiors: Modular interior architecture permits effortless rearrangement in order to answer to the future needs (archello.com).

Distinct Circulation Paths: clear and separate ways for different medical functions (archello.com).

Figure 08: Xiamen Humanity Maternity Hospital - Lemanarc SA, master plan

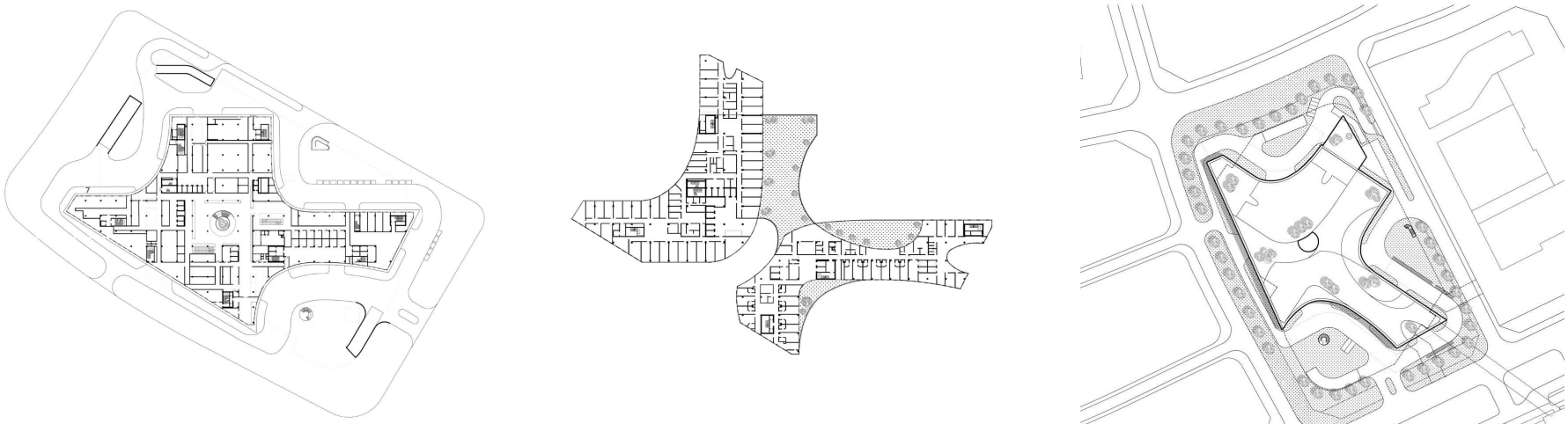


Figure 09: Xiamen Humanity Maternity Hospital - Lemanarc SA, master plan and plans

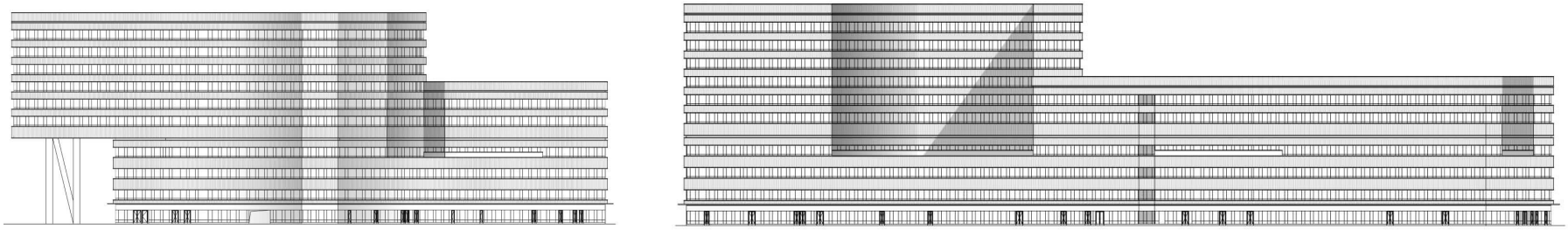


Figure 10: Xiamen Humanity Maternity Hospital - Lemanarc SA, prospects

all the photos from: https://amazingarchitecture.com/

Figure 11: Xiamen Humanity Maternity Hospital - Lemanarc SA, internal views

3. Aarhus University Hospital - C.F. Møller Architects

- Location: Aarhus, Denmark
- Year of Construction: First phase completed in 2017; full project expected by 2020
- Area: 22,800 m²,

Aarhus University Hospital: The New University Hospital in Aarhus, Denmark, is an innovative “health-promoting architecture” done like a small city with specialized areas and green spaces, for public services. Its sustainable elements such as solar panels, rainwater lakes, and advanced wastewater filtration. Focused on patient well-being, the design uses “Knowledge and Evidence-Based Design” to optimize comfort, navigation, and a healing environment (archello.com).

Figure 12: Aarhus University Hospital - C.F. Møller Architects, external view

- Key Characteristics:

Curative Architecture: Designed to have patient well-being improvements by with green spaces, natural light, and views towards landscapes (archello.com).

Brick Material: Using Brick material in the facades of the building creates a warm, human-scaled atmosphere, keeping a connection to local architecture and boosting the comfort (archello.com).

Sustainable Design: Solar panels, rainwater lakes, sustainable drainage systems, and advanced wastewater filtering to reduce environmental impact (archello.com).

Knowledge and Evidence-Based Design with Multi-Use Forum: Guided by research, the design brings together patient and visitor needs to a central Forum area — with shops, a cinema and recreational spaces — into a knowledge and evidence-based design (formation of a complete experience) (archello.com).

Figure 13: Aarhus University Hospital - C.F. Møller Architects, internal courtyard

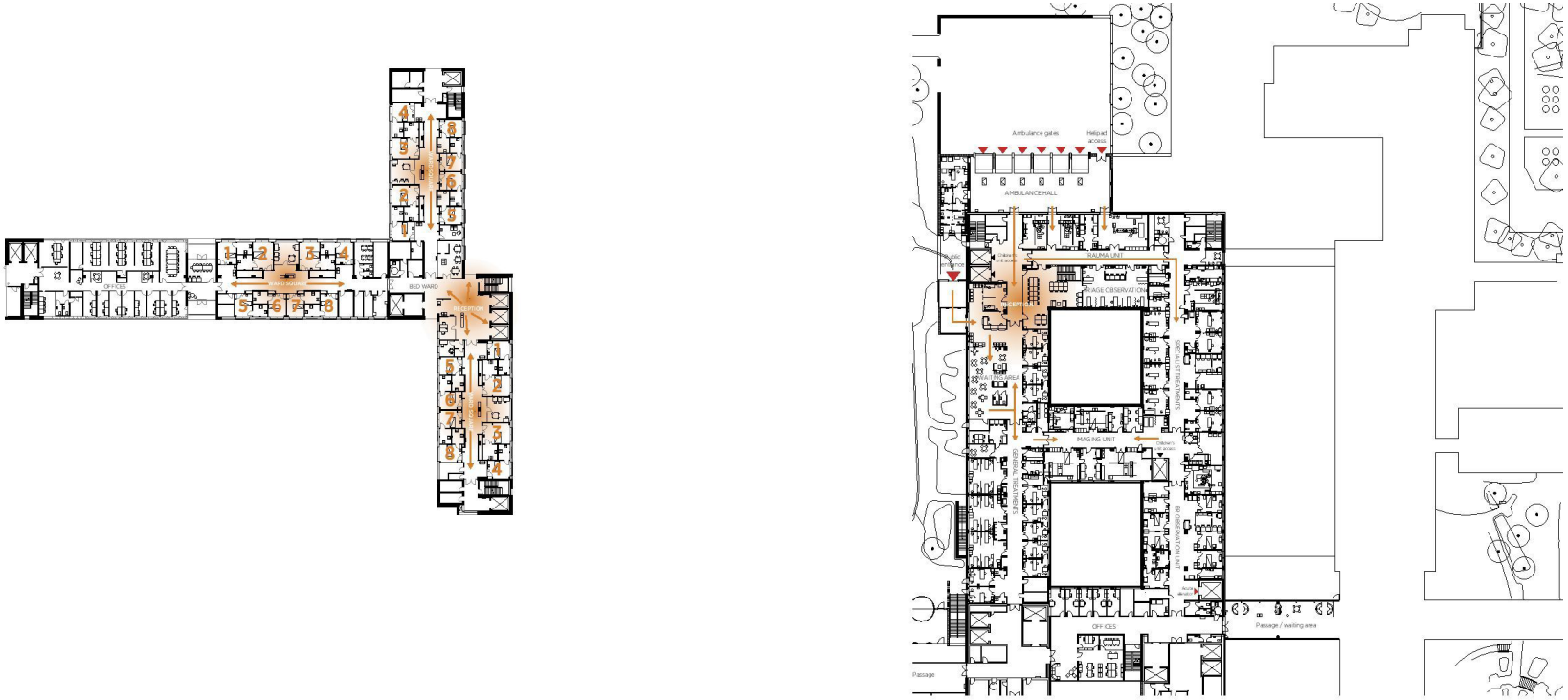


Figure 14: Aarhus University Hospital - C.F. Møller Architects, plans

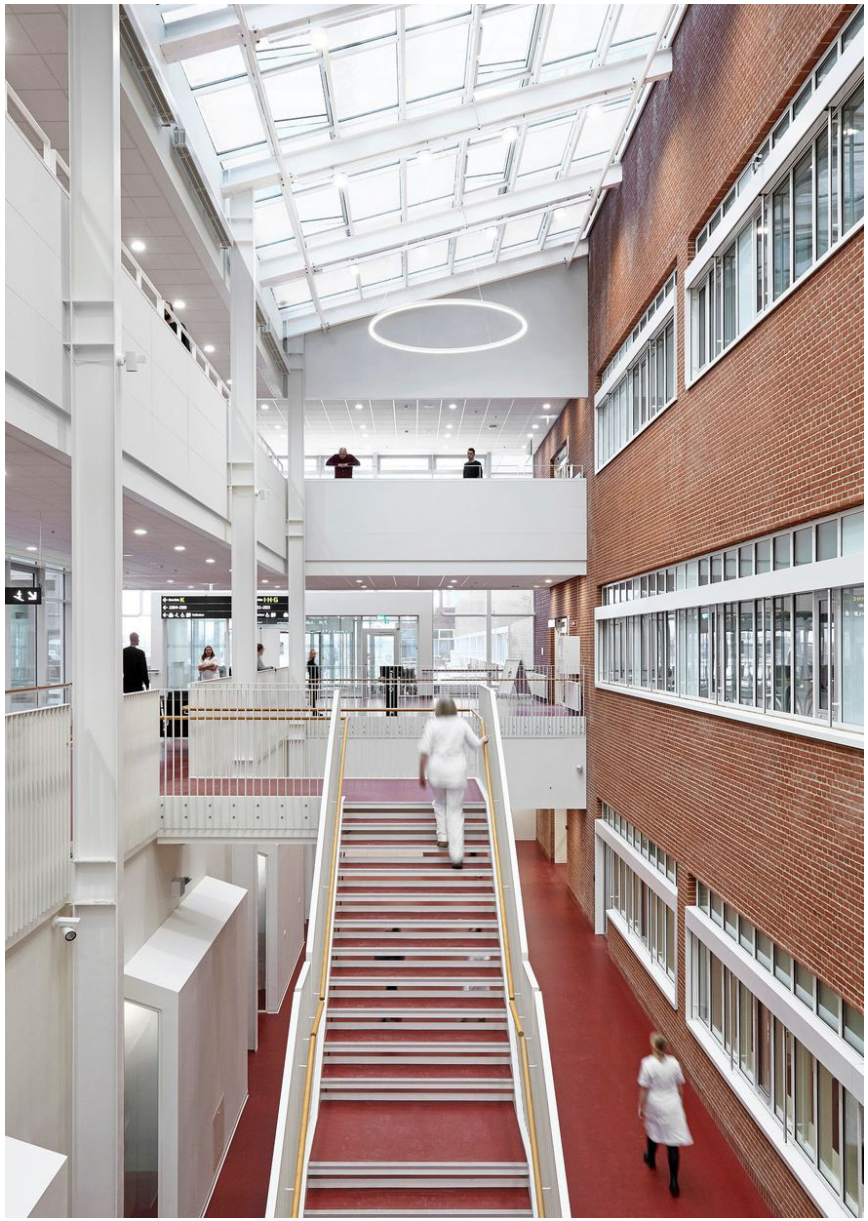


Figure 15: Aarhus University Hospital - C.F. Møller Architects, internal

Figure 16: Aarhus University Hospital - C.F. Møller Architects, internal

4. General hospital of Ontinyent - Ramon Esteve

- Location: Valencia, Spain
- Year of Construction: 2009
- Area: 18,221 m²

General hospital of ontinyent: Located in Ontinyent, the new county hospital is located near main roads and had separate entries for emergencies, patients, and staff. It consists of interlinked parts for different purposes: an inviting public zone, a medical facility for emergent diagnostics and operations, and an area designed for patients inside. The design focuses on natural light, efficient circulation, and a modern exterior, accommodates patient comfortably and in private mood by its reflective glass (ramonesteve.com).

Figure 17:General hospital of Ontinyent - Ramon Esteve, external view

- Key Characteristics:

- Interconnected Functional Volumes: The hospital is divided into specific areas, including a central medical building for diagnostics and surgery, a public reception and administration area, and a dedicated inpatient section (ramonesteve.com).

- Efficient Circulation and Access: Organized circulation paths and a vertical core simplify movement throughout the hospital (ramonesteve.com).

- Modern, Scientific Aesthetic with Reflective Glass: The exterior uses reflective glass to project a technological and scientific image, aligning with the hospital's focus on innovation (ramonesteve.com).

Figure 18:General hospital of Ontinyent - Ramon Esteve, Top view

5. Margherita Birth Center - Careggi Hospital - Ipostudio

- Location: Florence, Italy
- Year of Construction: 2011

Key Architectural Features:

The Margherita Birth Center features a round form that provides an organizational emphasis like the classical circular spatial typology of ancient Iranian “caravanserai.” This backyard clubhouse becomes a central gathering place for the facility providing that common shared space and social glue.

Figure 19: Margherita Birth Center - Careggi Hospital - Ipostudio

ANALYSIS OF THE HEALTHCARE CONTEXT IN IRAN AND IN THE CITY OF BORUJERD

3.1 Historical Development of Healthcare in Iran and Borujerd

3.1.1 Evolution of Healthcare Systems in Iran

Iranian healthcare has a long history, beginning when the Achaemenids established early hospitals referred to as bimaristans later. During the Islamic Golden Age, some of Avicenna's medical works, like The Canon of Medicine, were found to fulfill functions and influence both the Islamic and European communities (Ullmann, 1978).

The development of modern healthcare in Iran had begun during the reign (1925–1979) of the Pahlavi Kings for founding city hospitals based on Western medicine. On the contrary, rural areas have not received as much attention as the cities(Mehryar 2004). After the Islamic Revolution in 1979, they have tried to improve the situation based on what the islamist and lefties were claiming which was equity in all of its aspects health care delivery became a governmental priority with "Health Houses" designed for rural areas, and as outcomes improved somehow, including maternal mortality ratios (WHO, 2008).

Now, Iran's healthcare system includes private and public services that are provided by the Ministry of Health and Medical Education (MOHME). The emphasis is on primary healthcare, ensuring that coverage even extends to remote areas (World Health Organisation, 2018).

3.1.2 Healthcare in Borujerd

The course of healthcare development in Borujerd has generally followed national trends combined with solutions tailored to local requirements. While the majority of healthcare facilities were promised and established during the Pahlavi dynasty, they virtually lacked any sort of functionality other than general clinics till after the revolution by accessing large hospitals with limited specialities (Mehryar 2004). Despite this, there have been gaps in specialised services, especially maternal and neonatal healthcare (World Health Organisation, 2018).

The reforms in the 1980s established more centers throughout rural areas to provide basic health services. Nonetheless, maternal speciality care remains lacking and forces residents to travel outside their hometown for treatment (World Bank, 2020).

Faced with an increasing demand, today Borujerd has a general hospitals and public clinics. The absence of a maternal health care centers places big pressure on the established hospital, which results in prolonged waiting time for those seeking special care. (World Health Organization, 2018)

3.2 Influence of Politics on Healthcare in Iran

3.2.1 Government Policies Affecting Healthcare Infrastructure

The healthcare landscape in Iran has retreated before political changes, with significant differences between Pahlavi era (1925-1979) and the post-1979 Islamic Republic.

Difficult times followed the 1919 Treaty of Versailles, under which Iran had been handed over to British interests (Behravesh, 2012). It's oil resources were largely converted into profit for other countries, and, is this period shows an acceleration of Decline from the prewar standard of living low point which has been unparalleled in Iran's history. (Katouzian, 1998).

On the April 1925, Reza Khan, who was earlier appointed minister by Ahmad Shah, two months later has declared as shah or the king by the Iranian parliament In order to clean the state of its feudal trappings and to try for modernization of Iran, Reza Shah, which means the king Reza finally decided to follow the example of Western states and also the new Turkey which was stablished after Ottoman empire (Motamedi & Amini, 2016).

Realizing the need for a national health system, Reza Shah Pahlavi undertook important reforms and laid the groundwork for modern medicine in Iran. New hospitals, medical schools and urban clinics were created and this began structured health care here That was how the country drafting its basic medical designs came about. The government gave a more urban bias to its services, and with notable authority these ideas were enforced (Abrahamian, 2008).

Under Mohammad Reza Shah Pahlavi his son, attention to healthcare infrastructure seemed to continue; several new hospitals were established, and medical education increased. Adding Western-trained doctors and nurses to the health system introduced modern practices, cut down on mortality rates, and improved overall health of the urban population. The rapid expansion of hospitals, along with modernizing healthcare infrastructure in general, meant that Iran saw remarkable improvements in its healthcare indicators as opposed to what they had been before (Katouzian, 2004).

The post-1979 regime in Iran concentrated mainly on the principle of fairness and equitable distribution, which led to aiming for health improvement by providing previous deprived areas, especially rural ones. The establishment of health houses as a rural public health clinic was intended to aid essential services provided for the rural population and reduce health disparities between urban and rural areas in Iran (World Health Organization, 2008).

But we must understand that most of the infrastructure developed after 1979 for increasing healthcare coverage was offered from the Pahlavi era. The medical infrastructure that already existed formed the basis of new policy developments. Such as it did in Borujerd, where local clinics opened after 1979, but more because the Pahlavi regime left behind a supply-side network that just needed some new tilling to grow(Malekzadeh, 2023).

The cities like Borujerd and other neighbouring deprived areas were not fortunate enough in early 2014 to use these advanced services, especially for maternal-neonatal care. Due to the use of economic sanctions and other budgetary constraints, political decisions many times have been at cost for specialised centers, as it was less tempting compared with already existing facilities that are supported through recurrent cost subsidies. Some highly advanced healthcare services were left ignored (World Bank 2020).

3.2.2 Role of Public and Private Sectors

Nowadays Iran's health care infrastructure has become a situation which has the public and private providers meeting the needs of people in a constant procession of change. While the king and his line ruled Iran, public medical care was primarily state-supported (Ebrahimipour et al., 2013).

The Shah made great efforts to establish hospitals dotted irregularly throughout the entire nation and intended that these hospitals should be available to any citizen. Besides, specialized clinics in major urban centers started serving those who could afford to privately buy specialized or expedited health care, in terms of what can be called accessibility, there was a dual structure divided among different groups in society. (Katouzian, 2004).

After the revolution in 1979, the Islamists said they are going to take public health to the country by arranging large subsidies and programs such as this extensive rural Health House network (Doshmangir et al., 2019). At the same time, the constraints on public expenditure led extremely to grow of private medical sector. International sanctions for political reasons imposed by the state caused a dearth of state-of-the-art technologies and treatments to be banned, so that standards dipped in underfunded government facilities (Kokabisaghi, 2018). In consequence, the better-off increasingly opt for private services — which are of higher quality — and alleviate long standing inequities in Iranian health care (Kokabisaghi, 2018).

3.3 Existing Hospitals in Borujerd

3.3.1 Overview of Current Healthcare Facilities in Borujerd

Borujerd has some hospitals and healthcare centres from public (government-owned) to private sectors (wikipedia). Primary healthcare providers include:

Figure 20: Imam Khomeyni Hospital (government-owned)

Figure 21: Ayatollah Borujerdi Hospital (government-owned)

Figure 22: Kowsar Hospital (government-owned)

Figure 23: Chamran Hospital (government-owned)

Figure 24: Behbood private hospital

Figure 25: Amiralmomenin private hospital

3.3.2 Types of Services Provided and Coverage Gaps

Lorestan state's hospitals and accordingly Borujerd hospitals are well equipped for basic emergency, general surgery and internal medicine requirements, yet even then huge gaps in health care, and especially for specialized services including maternal neonatal pediatric (Changee et al., 2015). For instance, none of these hospitals are providing a special maternity care system except Chamran hospital which does have a basic infrastructure for that (Changee et al., 2015). Furthermore, because of the absence of pediatric specialized facilities in Lorestan province many children are referred for surgical services outside this area especially to crowded and metropolitan centers like Khoramabad or Tehran; which is a financial burden due to additional costs arising from accommodation, travel and time raising much more such families (Nemati et al., 2014).

3.3.3 Analysis of Healthcare Accessibility for Residents

The high load of patients that these centers have to support has medical-care resources stretched thin (Nezami et al., 2018). Borujerd's utilities provide the facility for both urban residents and those from the rural areas and in a mountainous terrain, especially in winter, the chances of people in rural areas being able to get healthcare services are still complex to say at best (Nezami et al., 2018). Although it is subsidized, the public hospitals are understaffed and resources are not enough to cope with demand. As a result many patients flow into private clinic service which is more expensive and limited in terms of its accessibility for poorer people (Nemati et al., 2014).

SITE ANALYSIS

4.1 Analysis of the city and the Project Area

4.1.1 History and Description of Borujerd

Borujerd is a city in and the capital of Borujerd County, Lorestān Province, settled in high west Iran. This region possesses many antiques from different eras that can show a 4000-year history of human life processes, as below: Borujerd historically bore the name “Key to the West” for its geographical position at important crossroads of major highways and routes in western Iran. Archaeological mounds throughout Iran—known as “tappehs” in modern Farsi—demonstrate the region was a ferment of early human settlements that are thousands or more years old. (Young, 1966).

Figure 26: General geographical Map of Iran, Lorestan, Borujerd

During the Achaemenid Empire, and after the Parthian and Sassanian empires, Borujerd has been an important stop on major trade routes. Borujerd flourished in the Islamic Golden Age from its standing close to fertile lands and accessibility of water (Encyclopedia Iranica). Center of trade in the fertile valley, its abundant gardens made Borujerd one of the economies on which a man might rely for wheat and walnuts, as well as famous name-brand handicrafts: carpets and metallhandwerk. (Djamali et al., 2016).

During the Safavieh era, Borujerd turned into a common Persian livestock center with an outstanding location and rich lands for agriculture. The significant strategic importance of Shiraz also continued during the Qajar period (1789–1925) due to its military and economic position. Borujerd was provided services during the Qajar and Pahlavi eras, with roads reconstructed or repaved as well as basic public facilities being brought to the city (Encyclopedia Iranica). By linking the better the whole of Iran to cities such as Tehran, Kermanshah, and Hamadan it has been always strategic area for the country (Encyclopedia Iranica).

Figure 27: Jameh Mosque

Figure 28: Soltani Mosque

Figure 29: Emam Zadeh Jafar

4.1.2 Demographics

As of the census of the 2016 (census,2016), Borujerd had a population of about 234997 people. Slightly has decreased due to the Migrations to Tehran or also to other cities, e.g., Isfahan (Sadeghi et al., 2020).The population consists largely of ethnic Lurs who have lived in the mountainous regions of Lorestan, and a significant part is still expressed today both culturally (especially in regard to their language and traditional music styles, which were created by lures) and politically (Farzad et al., 2013).

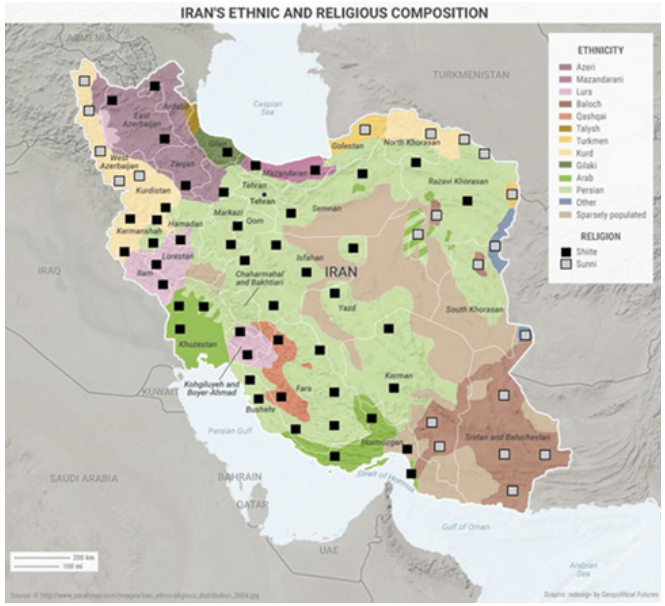


Figure 30: Iran's ethnic and religious composition map

Figure 40: Lorestan ethnic map

Borujerd has a natural good economy completely based on agricultural products, such as rice, grapes, and other fruits, which are entirely grown by people living all around Borujerd and other products include grains, fruits (such as apples and grapes) and nuts. The vast majority of the rural population is employed in agriculture, while livestock farming has become an up-and-coming sector for the local economy , and (Taghipour & Ahmadi Sarchoghaei, 2015).

Besides agriculture, Borujerd is rapidly being developed into an exporter town from a commercial point of view and because it has many local markets that attract people to visit this city around the county. The history of Borujerd Bazaar dates back to the Qajar era and is still renown till today as it rests on an ideal point for commerce, catering various goods mostly from textiles to handmade carpets. The carpets include beautiful and special motifs representing Lurish culture. (Taghipour & Ahmadi Sarchoghaei, 2015).

In this regard, in the last decades of Borujerd had activities to develop the industry. The manufacture of light industrial items; textile production has been introduced to broaden the economic base. The local government has further put money into infrastructure projects to facilitate easier interaction with other cities and cause more economic activities in this way.

Figure 41: Bazaar of Borujerd

As a result of these changes, new population flows are developing in the city centers and the migration or mobility of rural populations to find better educational and healthcare facilities is increasing. The city development has shown a current elevation of urban sprawl where housing estates have been established and they have taken over former agricultural lands. Despite this, Borujerd still maintains an esteemed position in Iranian culture due to its remaining historical architecture and traditional neighborhoods. (Sadeghi et al., 2020)

Figure 42: Top view of the city

Also, the population dynamics and urban extension of Borujerd are associated by such factors as numerous high schools (academic based type) and a few vocational training centers. These institutions also draw in students from near towns and villages, which increase the population and employment activities within the city. As the city places great importance on education, Borujerd has a relatively high literacy rate in comparison with other cities of Iran. (census,.2016

Table 1
POPULATION GROWTH OF BORUJERD, 1956-2011

Census	Population	Rate*
1956	49,186	—
1966	71,486	3.81
1976	101,345	3.55
1986	183,879	6.14
1991	201,016	1.80
1996	217,804	1.62
2006	229,541	0.53
2011	240,654	0.95

*Average annual growth rate in percent.
Source: For 1956-1996, SCI, 2003, 106, 114, 124, 138, 158,177. For 2006, SCI, 2010, p. 56. For 2011, SCI, 2014.

Figure 43 : population growth 1956/2011

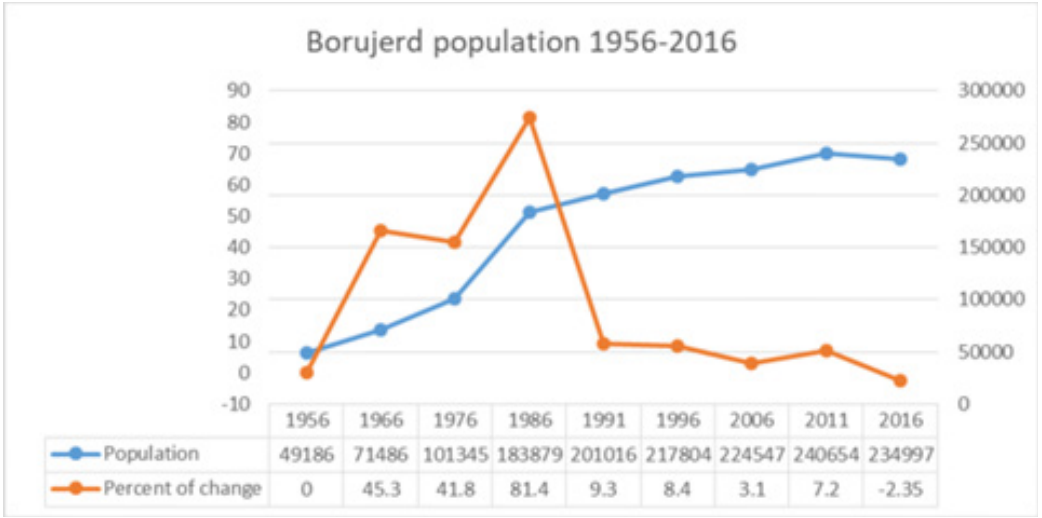


Figure 44: population change 1956/2016

4.1.3Geographic-climatic Context

4.1.3.1Geographic-climatic overview of Iran and Borujerd

Diverse geographies, including mountain ranges, deserts and fertile plains are featured in Iran. At 1,700 meters high Borujerd is a town that is nestled in the valley which is surrounded on all sides by these mountains' peaks. There are no towns between such an elevation and that lower than 500 meters deep. Officials noted that the winter and summer climates here are clearly distinct. This area has been officially protected as a natural reserve for the past 20 years (Vaghefi et al., 2019).

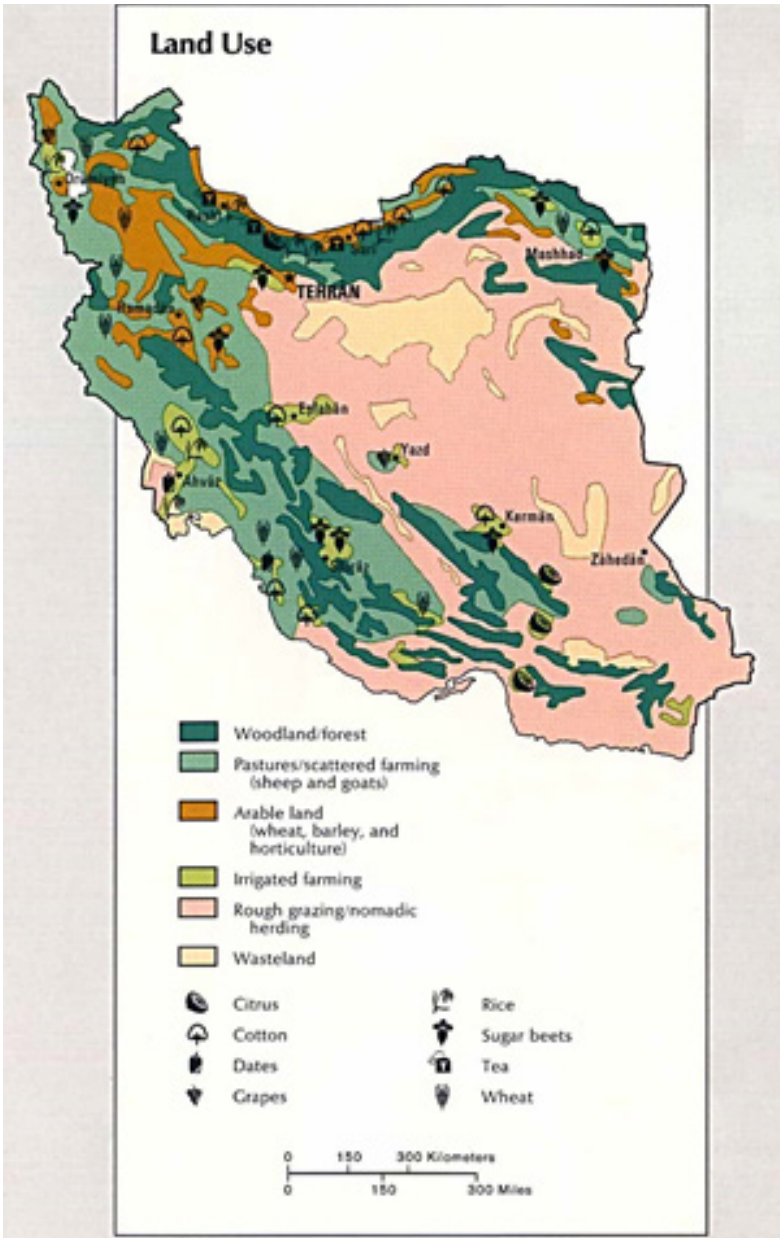


Figure 45: Iran's land use map

The Zagros mountain chain is important in determining the local climate and this has an effect on health service provision (Berberian 2014). The summer is generally warm but in winter it's very cold. This presents many challenges during periods of heavy snowfall to access healthcare for people living there (World Bank 2019). Its location within geography makes Borujerd an essential center for health services in the surrounding villages and country districts (although mountainous areas often restrict transportation during certain periods (Ehlers., 2011).

4.1.3.2 Environmental Factors Affecting Healthcare Facilities in Borujerd

Borujerd's environmental characteristics are highly affected by its position in the Zagros Mountain range, which is creating a lot of problems for infrastructure development and health-care facilities included. Among the most important of these environmental risks is seismic activity within a city.Borujerd lies in a seismically active area and experiences low to moderate level of earthquakes on regular basis but still larger events can add the challenge for responsible agencies.In healthcare facilities, where patient and staff safety is a priority, it is essential to ensure that all construction types meet high standards of stability and structural resilience (Berberian 2014).

Apart from seismic activity, The climate also adds challenges to the operational environmental managment of hospital facilities. Winter in Borujerd is cold and temperatures often drop below freezing, which could present issues with heating indoor spaces as well as ensuring access during snowstorms or icy conditions. Only during the winter months, heavy snowfall can hinder transportation and limit healthcare services for patients traveling from nearby rural areas.(Ehlers 2011).

Summers are mild, with occasional heat waves which accounting for less than 10% of the total annual days (much lower than other parts in Iran) due to elevation compared to lowlands such as Isfahan. Annual rainfall averages 450 mm, spread predominantly over the colder months. Besides promoting local agriculture, this leads to regional flooding particularly in high intensity rainfall periods with its related infrastructure damage including urban limits and also hospitals; consequence of intense tropical storms (Alamdari et al, 2013).

Given that these environmental conditions — seismic risk, cold winters and snow also potential flooding but there is no flood paper in this availability- affect not only the design and construction of healthcare infrastructure but challenge the continued operation and access to care at health facilities within Borujerd (Ulrich et al, 2008).

4.1.3.3 Climate Conditions in Borujerd

Borujerd located on the slopes of Zagros Mountain range, has a Mediterranean climate including cold snowy winters and mild summers. The region has a cool temperate climate with an annual average temperature of c. 13 °C: winter temperatures frequently fall below freezing point and snow is not uncommon. Winter, viewed here generously as January an February but cold most of the time in either case, is weather wise the toughest season (Ehlers, . 2011).

Contrast this with Borujerd; its summers are warm with the temperature in July and August varying anywhere between 25°C to 30°C. The area has a temperate climate, with an average annual rainfall of about 450 mm., mainly from November to April.This rainfall pattern sustains agriculture but may also trigger local flooding when rains fall in heavy episodes (Alamdari et al., 2013).

4.2 Description of the Site

Named Zamin Gerdo (Walnut Land) by the local people,based on observation this project site is located in from of Chamran Hospital in Burujerd. However, the area has been abandoned for many years, resulting in a general state of disrepair. Once potentially valuable for urban development, it has instead become overgrown and full with garbages, a space underused by any purpose. For the reasons behind Zamin Gardo's long term abandonment we are uncertain, but its present state is reflected in the wider issue of deserted urban spaces which abound in the city.

Based on observations Zamin Gerdo is spread over a fairly large area, giving plenty of scope for new development. However, as a result of its neglected state it has brought various problems: uncontrolled dumping of rubbish, some areas which attract stray animals, and invasive plant species springing up everywhere. The lack of proper maintenance and organization has turned it into a hole in the piece of cheese that could be otherwise a crowded and a central urban area.

The site's proximity to Chamran Hospital adds to the complexity. Although it strategically locates another patch of medical infrastructure, the tattered condition of Zamin Gerdo detracts from the hospital's environment and becomes an unsightly, unhealthy presence for patients, staff and visitors all around. Despite these challenges, it is a site with huge potential for redevelopment, especially in light of both its central location and mega-dimensional size.

Turning Zamin Gerdo into a new hospital would provide a centre of excellence for both healthcare and community needs in this forgotten area. The proposed maternity hospital, combined with public spaces such as markets or green areas, breathe life back into this site; a place of decay morphs into one of regeneration and community health. The site's proximity to Chamran Hospital adds to the complexity. Despite these challenges this site does hold promise for redevelopment. After all,its location and its size together are its important caratteristiche .

4.3 Traffic mobility

4.3.1Traffic Mobility Analysis

Borujerd is not a traffic-jammed area, except the commercial city center and historical city center during rush hours, which are between 7:00 and 8:00, 12.00 to 13.30, and 17:00 to 19:30. In these periods of time, the roads around the project site, especially those that are indicated by the red color, in the figure 46, become intensified traffic zones, which they lead to the city center and the hospital center; it's a west-east axis that leads from residential to commercial zones.

4.3.2Traffic Distribution:

High-Traffic Zones (Red): Based on the observations the roads delineated in crimson signify some of the most jammed pathways, particularly those guiding from domestic areas towards centralized Borujerd and notable landmarks. as we can see these roads, like the southern and eastern access roads, experience heavy traffic owing to their part in connecting surrounding neighborhoods to the city center, instructive institutions, and the nearby Shahid Chamran Sanatorium. This congestion could potentially affect emergency services, particularly during peak times, rendering traffic administration crucial for the maternity clinic's operations.

Moderate Traffic Areas (Orange): As observed the roads denoted in tangerine represent high-traffic regions, although less congested than the crimson zones. as we can see these roads are also pivotal connectors but experience lower vehicle volumes than the crimson-marked roads. They serve as substitutes during rush hours and can be vital routes for patients traveling from diverse parts of the city to attain the maternity hospital planned in this project. These roads can offer secondary access to the site, reducing the pressure on the most clogged arteries.

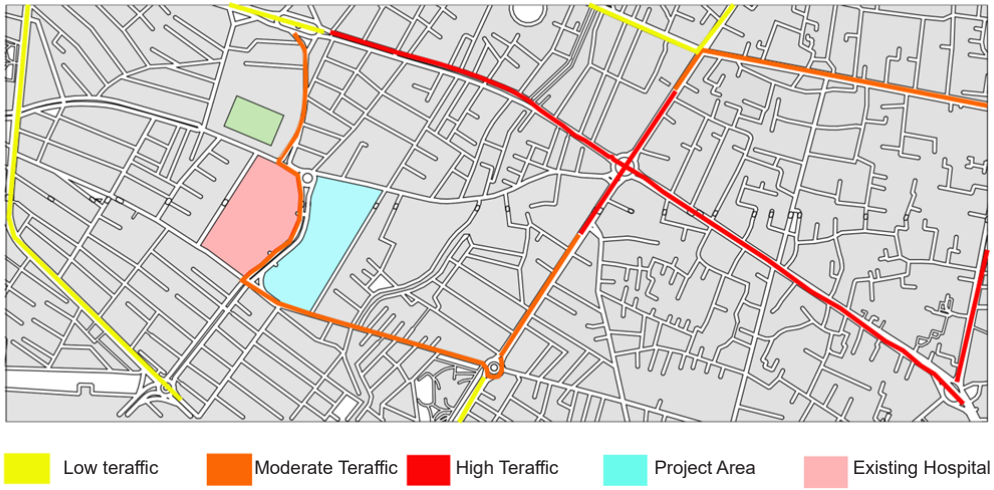
Low Traffic Zones (Yellow): The yellow-marked roads experience lighter traffic and offer more fluid motion throughout the differnet areas of the city.

Access to the Project site : Southern Road (red) serves direct access from the planned Maternity Hospital to reach out its catchment area(marked in blue).. This street follows the main lifeline to one of the most important urban roads coming from its western suburbs eastward towards downtown areas (where all major buildings are located). This road has good access to a major route, however high rush hour traffic due to the area would mean delays in patient transfer or even complications during labour for maternity patients and healthcare staff alike.

Any of these issues can potentially be solved by the implementation of traffic calming, emergency lanes dedicated to healthcare services only or optimized access-enter points prioritizing ambulance and medical-traffic.

Effects of Shahid Chamran Hospital Proximity: The current site location literacy shows that the movement in and out will certainly be through Star Square, while there is a proven link between traffic mobility and across from project area with relation to existing Shahid Chamran Hospital (marked by rose). The only hospital in the area for emergency care, it brings in quite a bit of vehicular and pedestrian traffic which compounds congestion on nearby streets. But their location side-by-side is also an opportunity for shared infrastructure: coordinated traffic signals, ambulance routes and parking solutions to facilitate access by healthcare-related transportation.

Figure 46: Borujerd traffic distribution during rush hours



4.4 Existing Hospital in the Project Area

4.4.1 Access to the Project site:

Southern Road (red) links direct access from the planned Maternity Hospital to its catchment region(depicted in blue).. This road follows the principal lifeline to one of the most significant urban paths originating from its western suburbs eastward towards downtown areas (where all key structures are placed). This path has decent access to a main route, yet peak hour traffic due to population density would imply delays in patient transport or even difficulties during labor for expectant mothers and medical staff alike. Any such problems can potentially be solved by implementing traffic appeasement, crisis lanes dedicated only to health services or optimized access-entrance points prioritizing ambulance and medical vehicles.

4.4.2 Ramifications of Shahid Chamran Hospital Proximity:

The prevailing site location analysis demonstrates that movement in and out will undoubtedly be through star Square, while there is a proven connection between traffic mobility and opposite the venture region relating to the present Shahid Chamran Hospital (depicted by rose). The only clinic in the area for crisis care, it attracts quite a bit of vehicular and pedestrian traffic which exacerbates congestion on nearby roads.

But their adjacent location is also an opportunity for shared infrastructure: synchronized traffic signals, ambulance routes and parking solutions to facilitate access by health-related transportation.

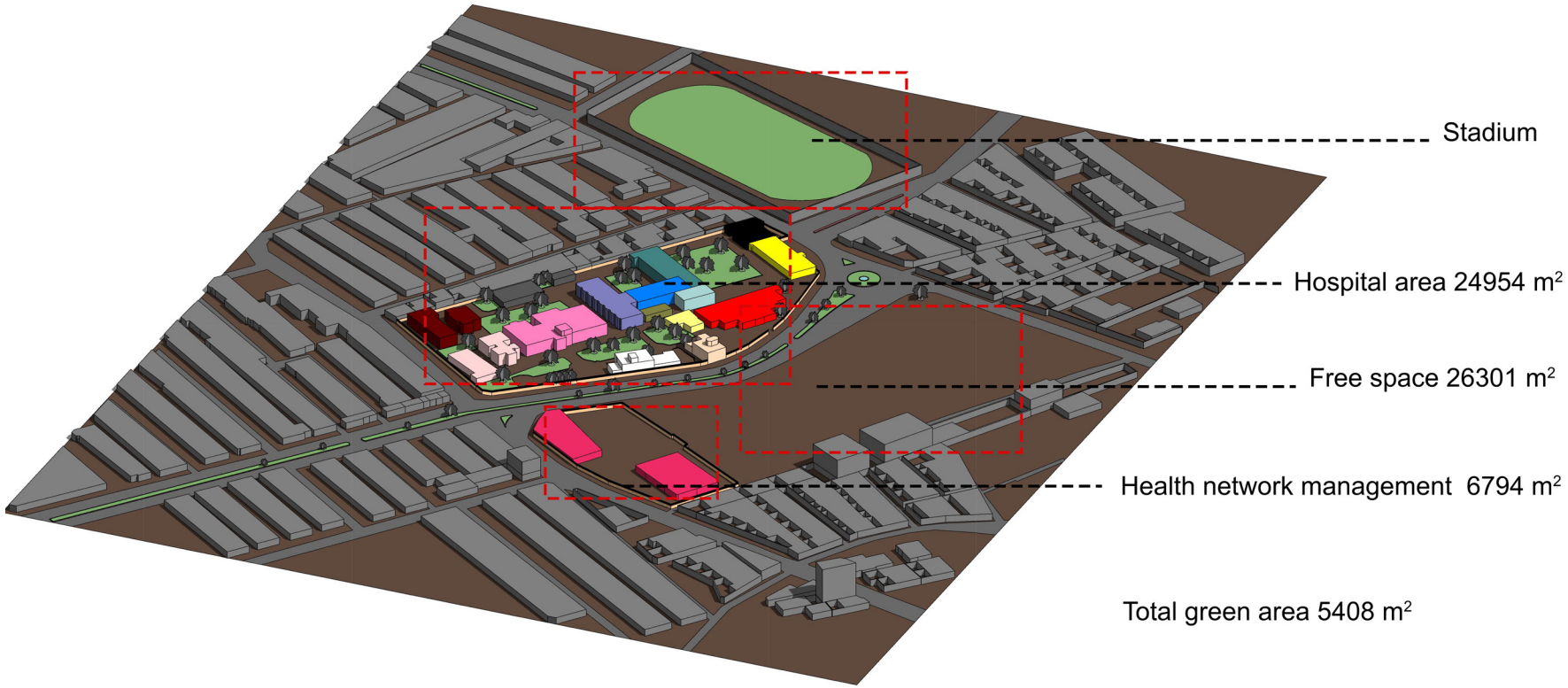


Figure 47: Project area

Figure 48: Project area and its functions

Figure 49: Photo analysis

Figure 50: Photo analysis

2.10

2.8

Figure 60: Photo analysis

4.5 SWOT Analysis of the Site

4.5.1 Strengths

Strategic location: The site, located near Shahid Chamran Hospital, provides opportunities to share critical resources and collaborate on integrated care services like emergency treatment and specialized neonatal support.

Community accessibility: members living in Borujerd and surrounding rural areas will benefit from straightforward access to maternal health services at this conveniently situated location.

Existing infrastructure: As the current presence of Shahid Chamran Hospital offers immediate entry to essential facilities and rapid crisis intervention, incorporating pregnancy care here allows a seamless fusion of provisions, easing patients' transitions between levels of treatment.

.4.5.2 Weaknesses

High patient load: Situated alongside Shahid Chamran Hospital, overflowing pationt numbers at the two places may cause congestion without well-managed patient movement in between.

Dependence on existing facilities: Should effective synchronization between the establishments falter, reliance on existing structures for support risks overburdening both sites' capacities to serve needs.

Traffic jams and noise pollution: regularly plague the area surrounding Shahid Chamran Hospital, issues which could negatively affect the care experience for expectant mothers and newborns if not addressed.

4.5.3 Opportunities

Meeting critical healthcare needs: This specialized maternal and newborn medical center will fill a critical gap by offering concentrated prenatal and birthing care customized for the community's requirements.

Training opportunities: Establishing training programs here presents a chance to cultivate clinical skills in medical students and healthcare professionals alike, helping to develop and preserve knowledgeable local practitioners.

Urban regeneration: Developing modern birth facilities can contribute to urban revival, bringing novel infrastructure and overall enhanced health environments to Borujerd.

4.5.4 Threats

Seismic risks: Seismic activity being prevalent demands stringent adherence to earthquake-resistant construction standards for patient safety in both existing and planned facilities.

Financial constraints: Financial limitations owing to economic circumstances or constrained public health budgets may impact project completion schedules and long-term operational sustainment.

Policy and economic instability: Changes in government health policy or fiscal instability introduce risks affecting funding, rules, or even project feasibility.

THE PROJECT

5.1 Vision and Goals

5.1.1Vision Statement

The vision for the hypothesis of the maternity hospital in Borujerd will be developed into a world-class maternal and neonatal health care facility that serves as a means of revitalization of a local community that could also lead to sustainable development paths. The hospital, described as shelter for mothers and newborns', would provide a positive nurturing environment that combines high-quality medical care with a holistic approach to wellness. The project aims to boost a community and present a new model for sustainable development in health care, springing from a site long considered abandoned to one that can breathe life into urban space, integrating health, recreation, and education into innovative public space.

A hospital like this would be a cornerstone of a new future of health, a new era of medical practice, architecture, and community. With this facility, I hope to establish a new model of accessible, equitable, and exemplary healthcare for Borujerd and serve as a reference for the province and beyond.

5.1.2 Goals

5.1.2.1Healthcare Excellence:

- To offer the highest standard of maternal and neonatal healthcare services in a safe and effective way
- To address regional inequities in healthcare by providing affordable, quality maternal care.

5.1.2.2Sustainable Design:

- To include eco-friendly design insofar as practicable to lessen the environmental effect of the center and enhance its operational efficiency
- Use local sustainable materials and energy-efficient system for the hospital sustainability.

5.1.2.3Community Integration

- Create inclusive community hubs with public spaces: parks, markets, and sports centres that will create a sense of belonging and community engagement.
- To help contribute to local economic development by embedding community resources and services at the hospital.

5.1.2.4Educational Advancement:

- To house educational institutes to train and develop the healthcare professionals required to provide hospital care.
- Partnering with local universities and educational institutions to research or study maternal and neonatal care

In short, all of these goals would help the maternity hospital not only meet the acute need that the people of Borujerd have for such healthcare, but also remind others of the need for public health goals in general and long-term community development in the eyes of others in this region.

5.2 Design Philosophy, Concept and Implementation

5.2.1 Philosophy:

The design philosophy of the maternity hospital in Borujerd is rooted in the synthesis of historical and modernist ideals—melding the constructivist approach of László Moholy-Nagy with the traditional Persian concept of Caravanserai [1]. This philosophy emphasizes functionality fused with aesthetic simplicity, promoting an environment that supports tranquility and community. By incorporating elements of constructivism, the design embraces geometric purity, transparency, and the integration of technological advancements to create functional, fluid spaces that facilitate ease of movement and interaction. This approach reflects a commitment to creating a healthcare environment that is not only technically proficient but also emotionally supportive, mirroring the sanctuary-like nature of

Figure 61: Composition A Xxi Artist: Laszlo Moholy Nagy

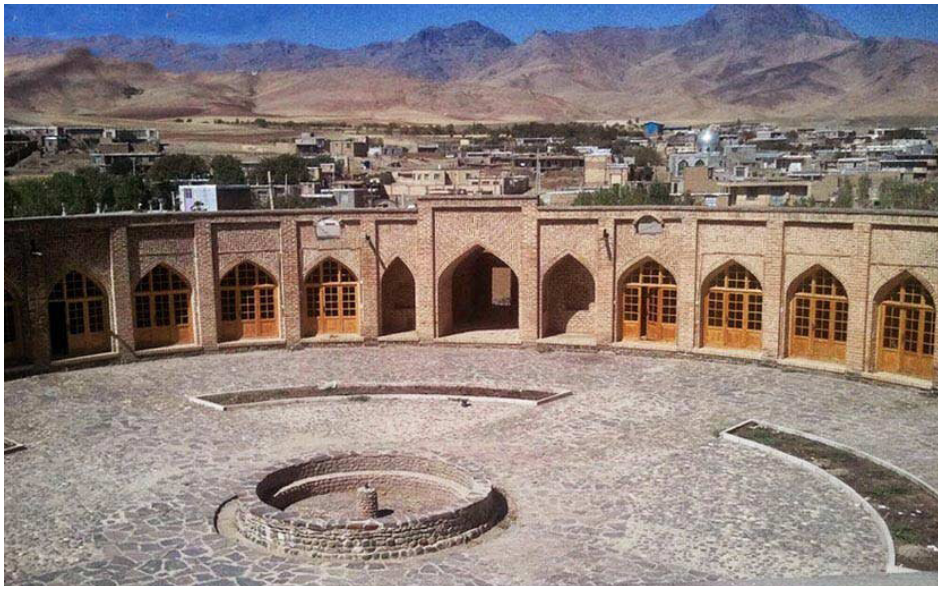


Figure 62:old Taj-Abad Caravanserai Hamedan Iran

1. Caravanserai: is a historic roadside along trade routes like the Silk Road, primarily in the Middle East and Asia. It provided travelers and merchants with safe lodging, stables for animals, and storage for goods. Typically built as a fortified structure with a central court-yard, caravanserais were essential for facilitating trade and cultural exchange across regions.

Figure 63:Zei-o-Din Caravanserai - Yazd, Iran

In Iran, for example, there are many beautiful, ancient caravanserais that are now historical landmarks or have been restored as cultural heritage sites, reflecting architectural and cultural tra-ditions from centuries past.

5.2.2 Concept:

The hospital project is based on Moholy-Nagy's "Composition A Xxi"(figure 61)—it is a composition with very strict geometry and delicate use of circle. The design incorporates a circular motif that directly reflects the circular shape of ancient Persian Caravanserai with central yards, depicting notions of unity, continuity, and life's circle—ccore ideas in maternal care. The circular forms act as anchors in the hospital, as semi-public spaces that help bring families into the hospital setting as well as encourage public participation in a similar manner to the communal gatherings in a Caravanserai.

This area is meant to provide a tranquil space for mothers to prepare for delivery, surrounded by family, friends, and those providing medical assistance. To encourage medical efficiency and a community-centered environment, the maternity hospital promotes open, central spaces that transform the institution into a new refuge for mothers and families.

5.2.3 Implementation:

To implement this concept, the hospital's architecture would utilize modular design principles, allowing for flexible use of space while maintaining the integrity of constructivist aesthetics. Materials will be chosen based on their ability to create clean, light-filled spaces that promote a sense of well-being and harmony. The use of advanced, sustainable materials and technologies will ensure that the facility meets contemporary standards for energy efficiency and environmental stewardship, further embedding the principles of humanization and sustainability in the project.

Through this design philosophy and concept, the maternity hospital aims to redefine the experience of childbirth and maternal care, making it a beacon of modern healthcare architecture that respects and revitalizes local heritage and cultural identities.

5.3 Master Plan

Overview: Based on observations and analysis of the current state of the area, the abandoned site serves multiple informal purposes during the day, including activities such as football and other sports on the open ground, as well as hosting disorganized daily markets. However, these uses come with significant challenges. For instance, young people frequently suffer injuries due to playing sports in non-standard, unsafe conditions. Similarly, the unregulated daily market generates persistent garbage, contributing to poor sanitation in the area. Additionally, a large portion of the site is occupied by a poorly utilized parking area for ambulances, which, despite occupying significant space, accommodates only a handful of vehicles. At night, the situation worsens, as the lack of adequate lighting turns the site into a haven for illicit activities such as drug dealing and substance abuse. These observations underscore the urgent need for a thoughtfully designed master plan that addresses these disorganized and unsafe conditions. The design process has therefore been guided by a careful analysis of the site's needs and challenges, resulting in a proposal that allocates and organizes spaces to meet functional and community requirements effectively.

The master plan for the maternity hospital in Borujerd strategically divides the campus into public and private zones, creating a seamless blend of accessibility for the community and privacy for medical activities. The design emphasizes the integration of green spaces and pedestrian-friendly pathways throughout both zones, ensuring a tranquil and healing environment.

Figure 64: the current sitiation of the area

Figure 65:master plan

5.3.1Public Zone:

- Parks and Green Spaces: Expansive parks and landscaped areas featuring native plant species will be located throughout the public zone, providing serene environments for relaxation and community gatherings.

- Sports Complex: A sports complex will be accessible to both hospital visitors and the local community, promoting health and wellness through physical activity.

- Daily Market: A daily market area will serve as a community hub, offering local produce and goods, which supports local economies and provides convenient shopping for hospital visitors and staff.

- Public Parking and Pedestrian Pathways: Ample public parking will be provided on the periphery of the public zone, with well-defined pedestrian pathways that facilitate easy access to all public facilities without interfering with the operations of the hospital.

daily market

public parking

green area

sport campus

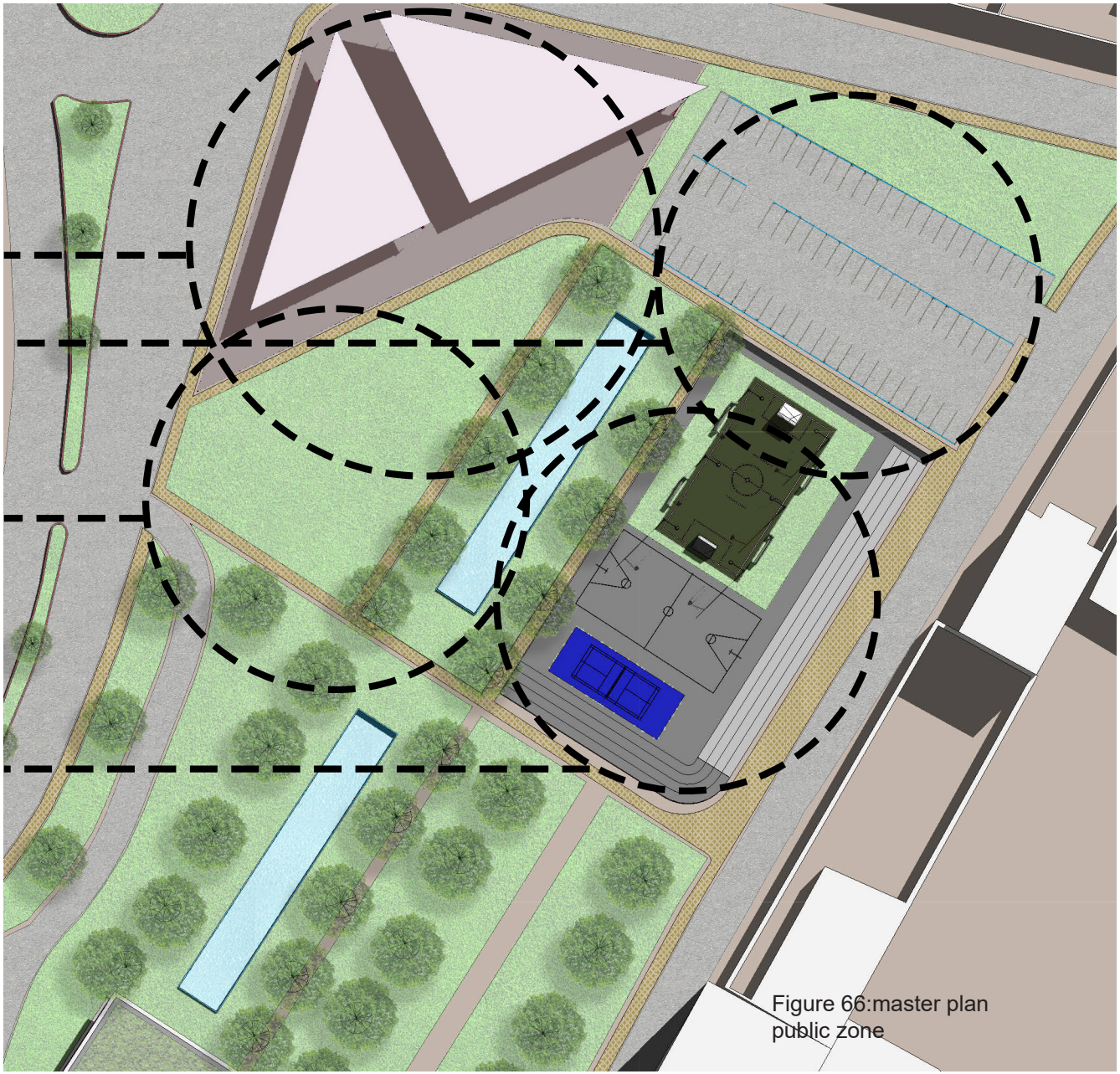


Figure 66:master plan public zone

Figure 67: exterior render of public green area

Figure 68: exterior render of sport camp

Figure 69: exterior render of daily market

Figure 70: exterior render of public parking

5.3.2 Private Zone:

- Healthcare Facilities: Centrally located within the private zone, the healthcare facilities will include advanced maternal and neonatal care units designed to provide top-tier medical services in a controlled and secure environment.

- Private Parking: Dedicated parking areas for referrals and staff will ensure a smooth flow of professional traffic, enhancing operational efficiency and maintaining privacy for patients.

- Green Spaces: Smaller parks and green spaces within the private zone will provide peaceful retreats for patients and their families, promoting a calming atmosphere conducive to recovery and well-being.

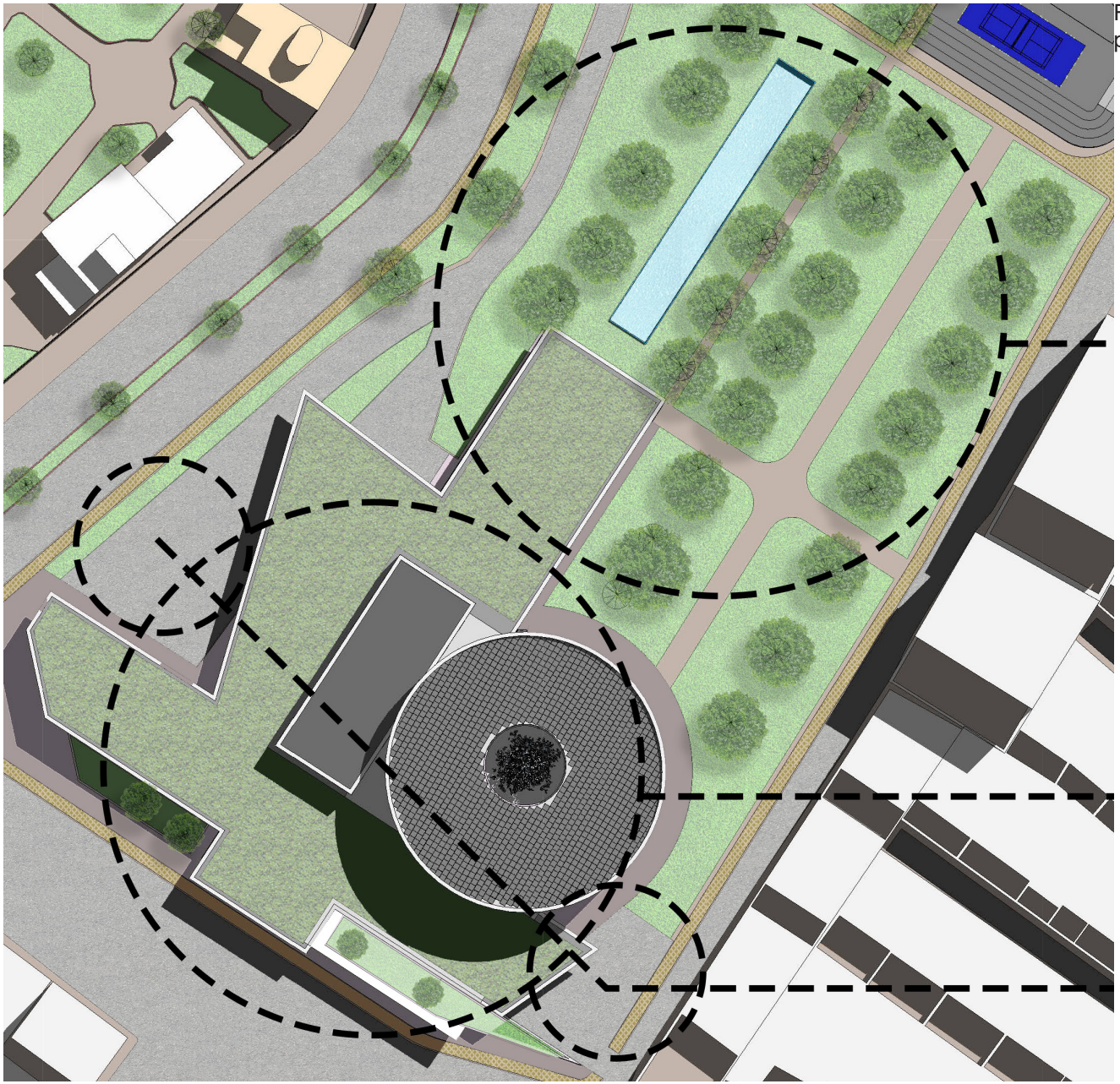


Figure 71:master plan private zone

Figure 72: isonometric view

Figure 73:exterior render birth center
private green area

Figure 74: exterior render birth center parking

5.3.3 Integration and Accessibility:

- The design ensures that both zones public and private are well connected yet distinctly defined, with clear signage and easily navigable pathways to maintain a functional flow between public and private areas.

- Pedestrian pathways will be wide and barrier-free, ensuring accessibility for all visitors, including those with mobility problems.

- The private zone will feature enhanced security measures to protect patient privacy and ensure safety, with controlled access points and surveillance systems designed to be discreet yet effective.

5.4 Interior and exterior designe:

5.4.1 designe process: As shown in the figure, the modular grid was initially applied to the painting with dimensions of 7.5 meters by 7.5 meters. However, adjustments were made to the grid to accommodate the requirements of the plan. Subsequently, the volumes were positioned based on the painting.

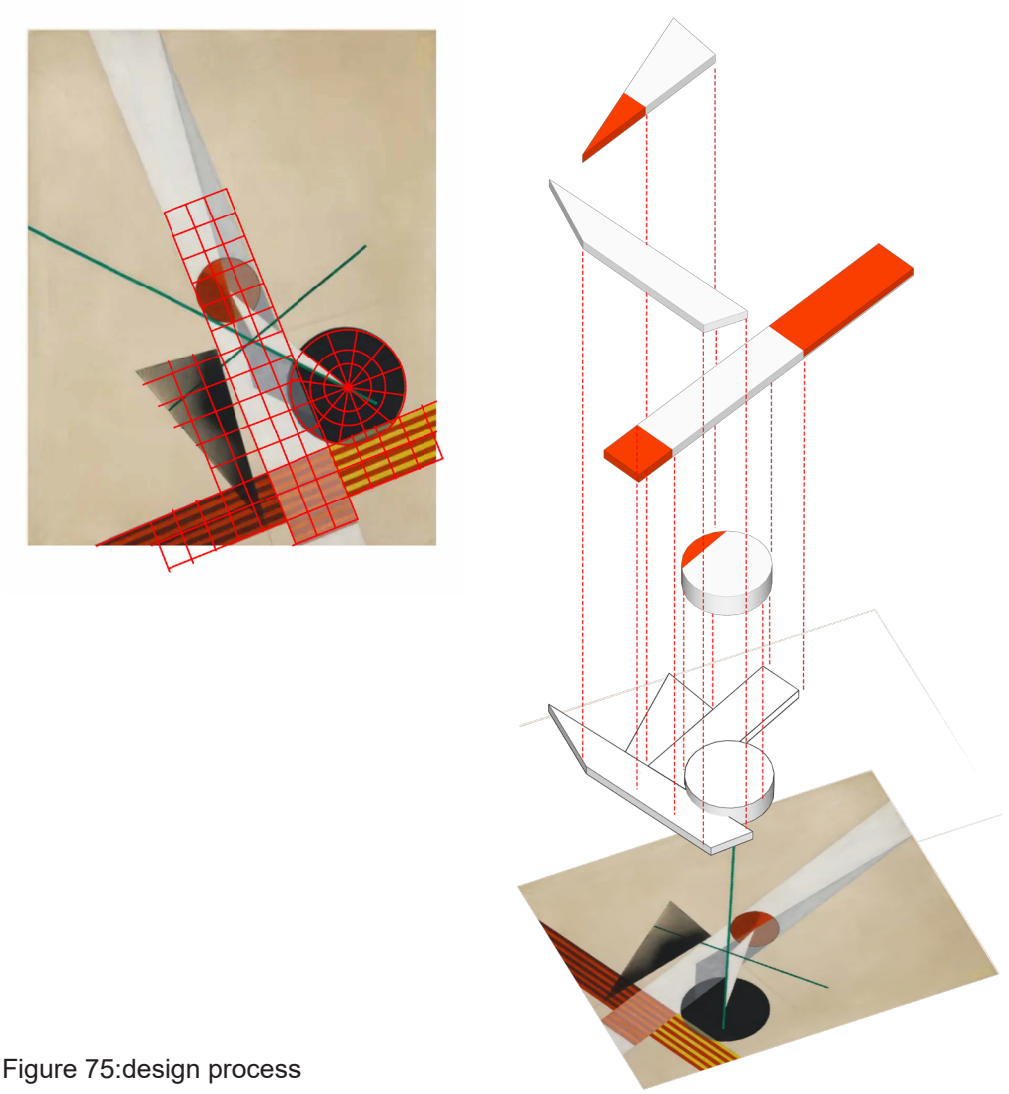


Figure 75:design process

Having a large area to work with offered significant freedom to design creatively, but it also presented challenges. The design needed to respect the form of the painting while simultaneously ensuring specific and precise spaces and areas were allocated according to the functions of the maternity center.

5.4.2 functions and zones

The placement of functions within the modular grid was one of the most challenging aspects due to the rules and specific dimensional limits required for each function. However, the challenge extended beyond just the placement of these functions to also include zoning the area based on three distinct principal uses: private, semi-private, and public. These zones needed to coexist in harmony, preserving their unique characteristics and functions.

As shown in the As shown in Figure 70, the birth center is highlighted in yellow and is positioned in a private zone across three levels to provide a sense of safety and comfort for mothers. The administrative area, shown in green, is dedicated to the management of the building. The educational section, in light green, consists of classrooms. The commercial zone, marked in pink, includes a restaurant, gift shop, and pharmacy. The entrance and lobby are depicted in light blue, while the sanitary services, in beige, are divided into private and public facilities. The emergency area, shown in brown, includes the ambulance entry point, patient rooms, and doctor consultation spaces. The operational zone is marked in red, and the relaxation zone for staff and the recovery area, located on the first floor, aim to create a harmonious relationship between the various functional areas within the building.

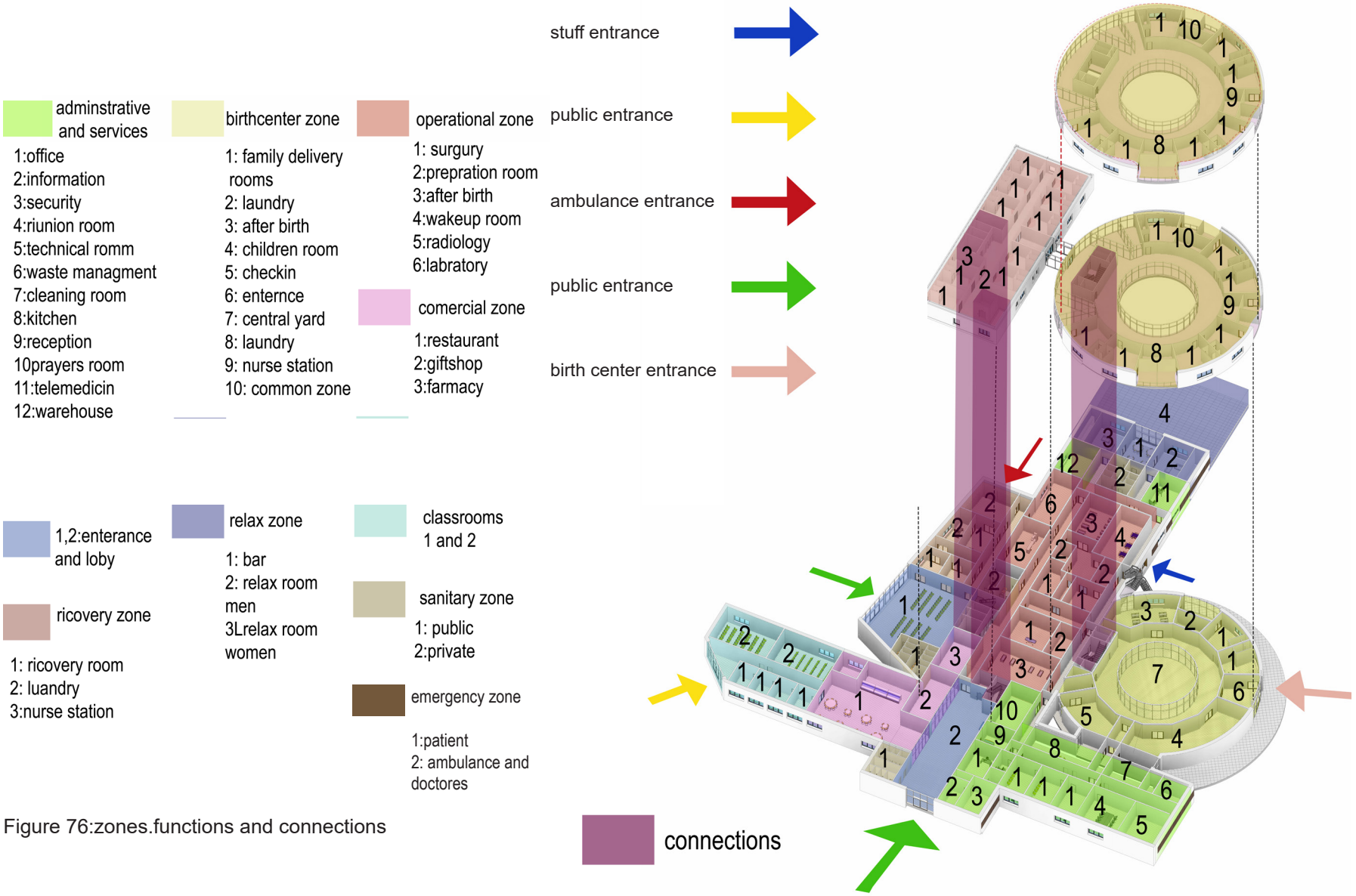


Figure 76:zones.functions and connections

5.4.3 plans

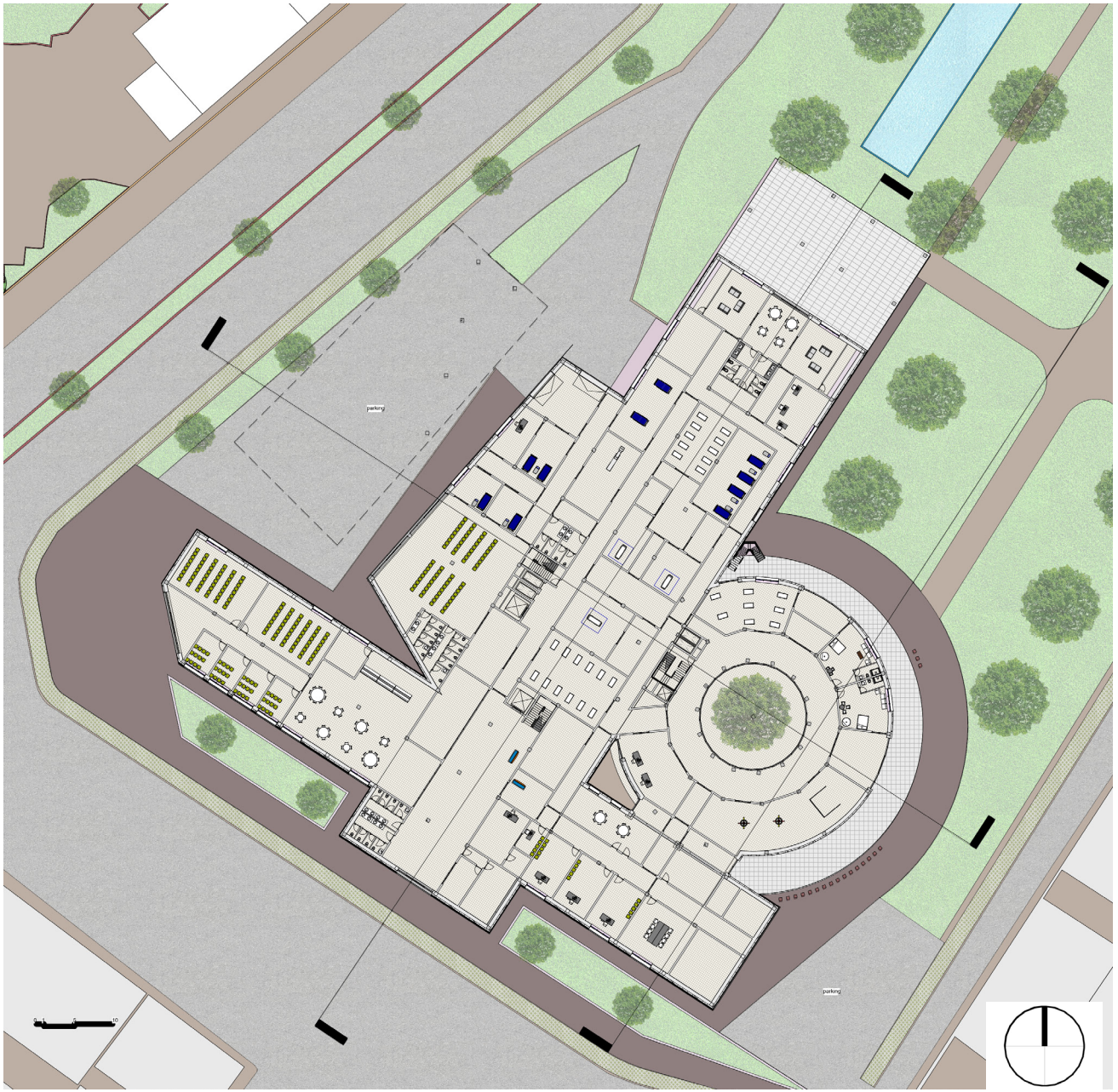


Figure 77:groundfloor plan

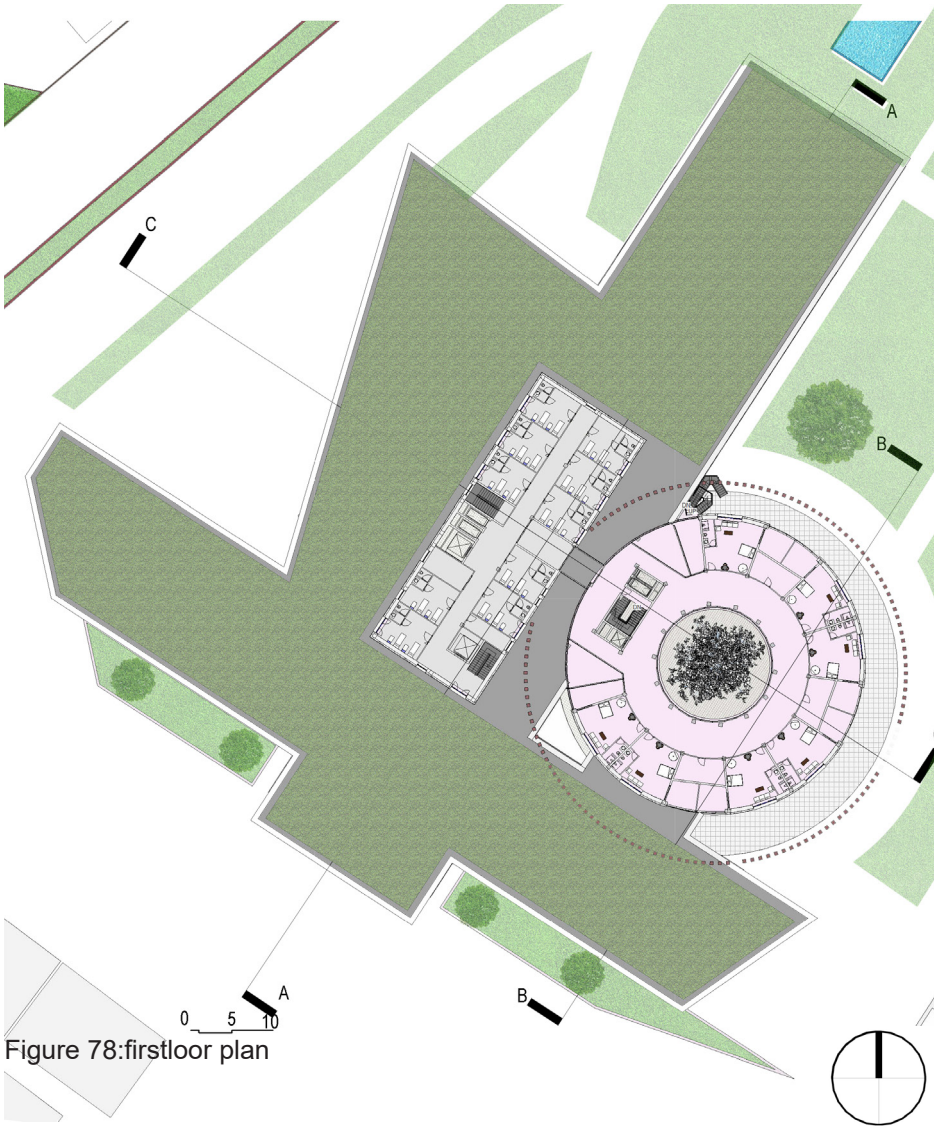


Figure 78:firstloor plan

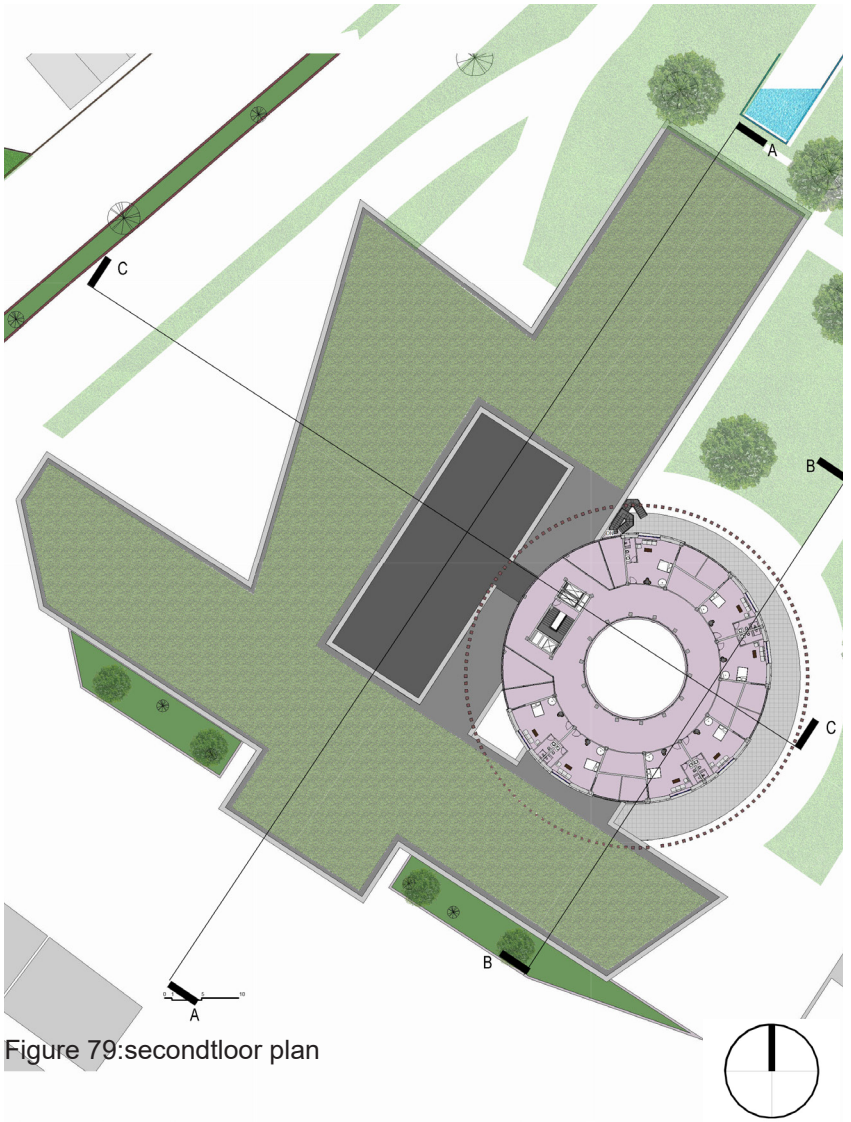


Figure 79:secondtloor plan

Figure 80:exterior render

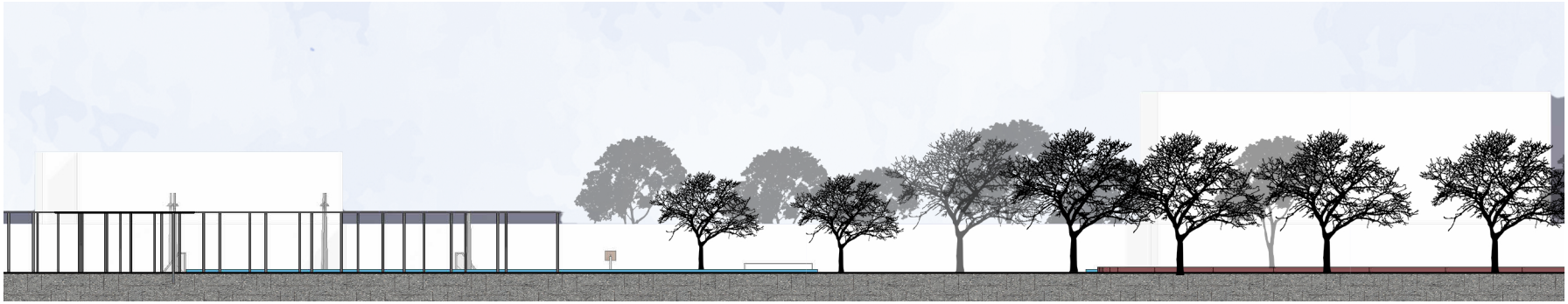
Figure 81: exterior render

Figure 82: interior render birthcenter

Figure 83: render

south view

west view



east view

Figure 85: elevations

north view

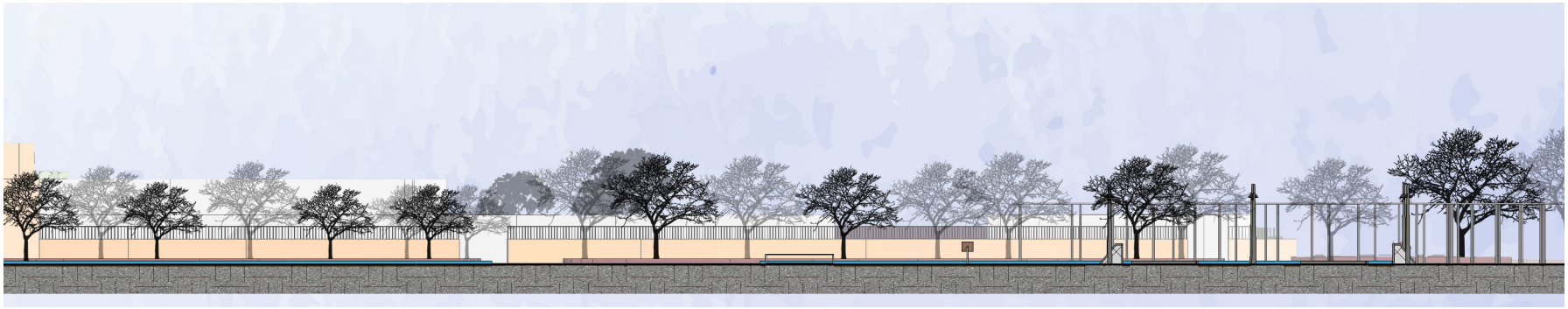
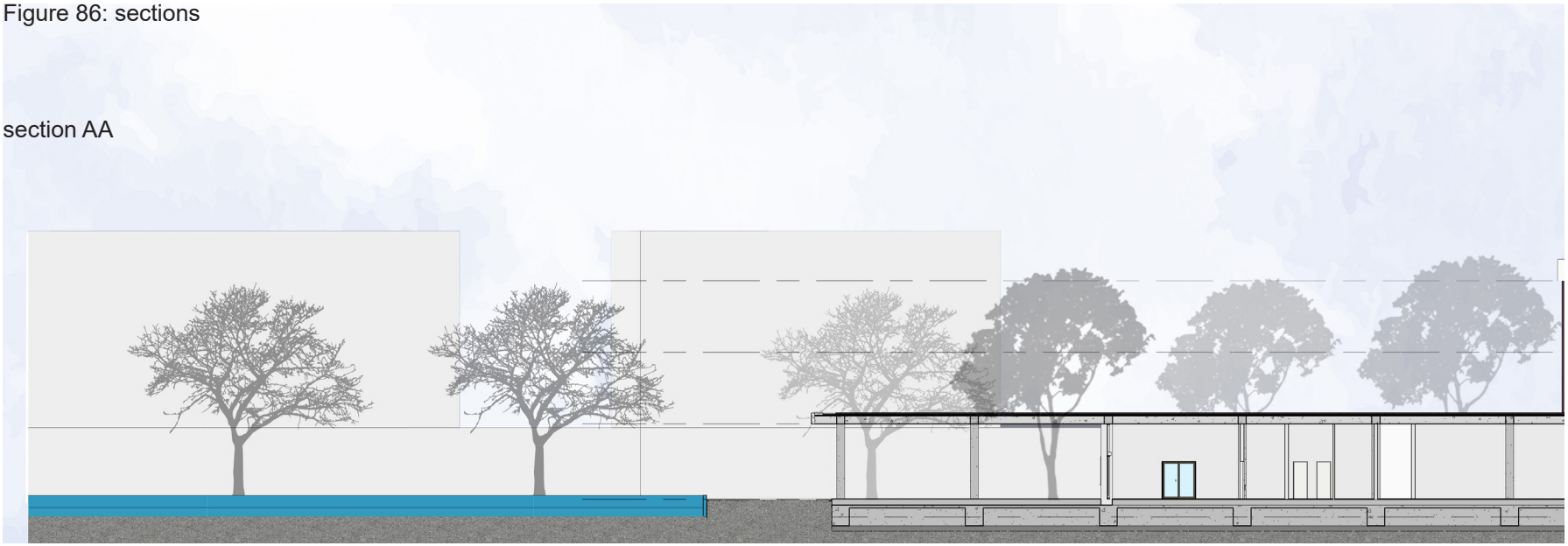
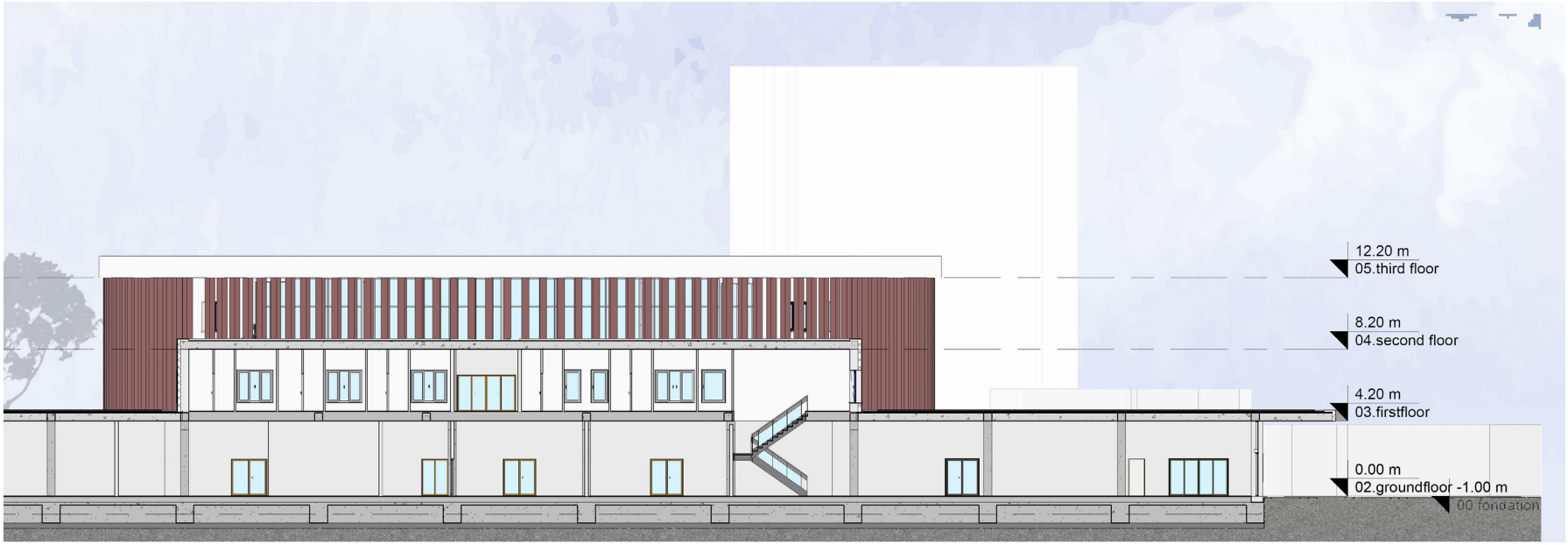


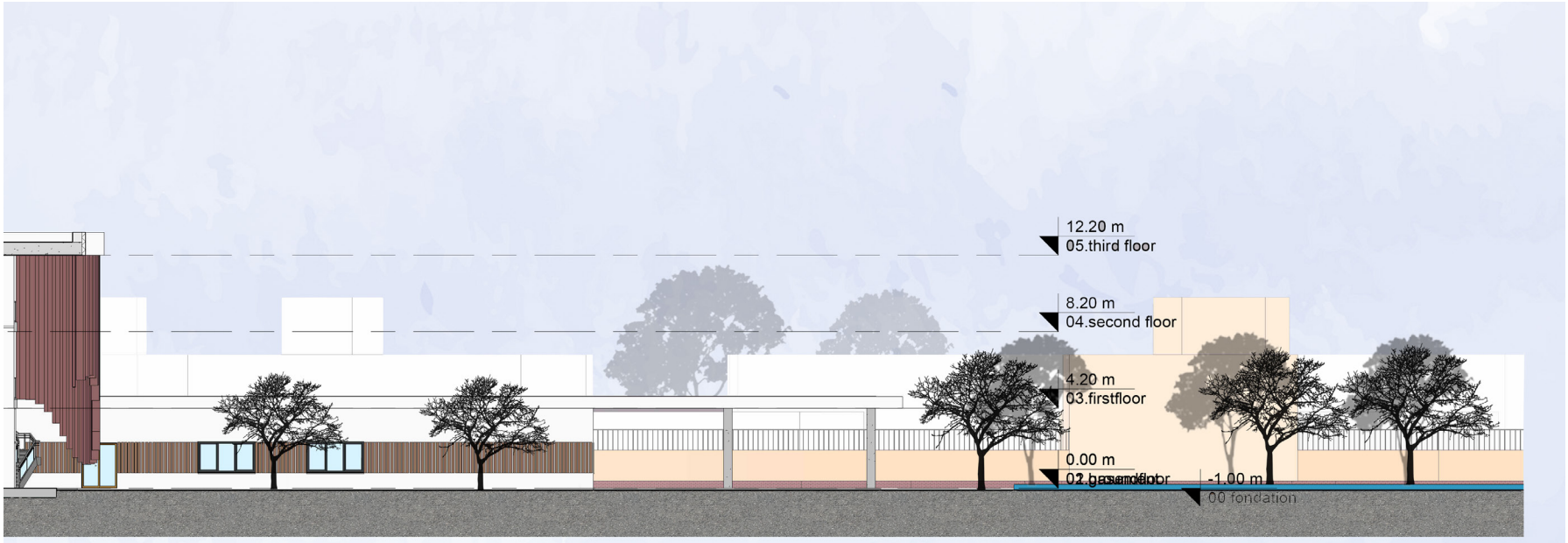
Figure 86: sections

section AA



section BB


12.20 m
05.third floor
8.20 m
04.second floor
4.20 m
03.firstfloor
0.00 m
02.groundfloor -1.00 m
00 fondation


12.20 m
05.third floor
8.20 m
04.second floor
4.20 m
03.firstfloor
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12.20 m
05.third flo
8.20 m
04.second
4.20 m
03.firstfloo
0.00 m
02.ground

section CC

5.4 Structural and Material Considerations:

To construct the foundation of this building, a depth of 1 meter should be excavated. Once the foundation process is completed, columns and the structural ground floor will be added. These elements will be constructed using concrete due to the proximity of production facilities, which makes concrete a more cost-effective material compared to iron. Subsequently, the walls will also be built using the same material. Structurally, this building will be made primarily of reinforced concrete.

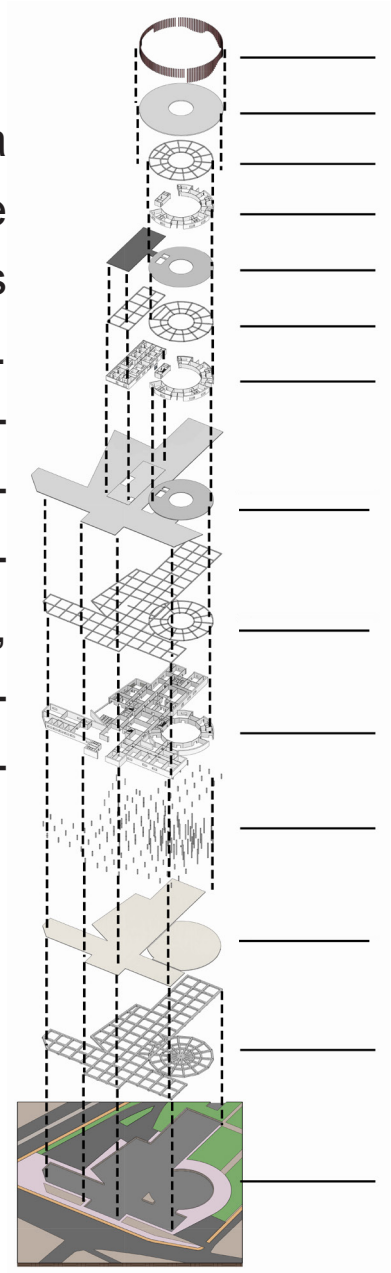

Figure 87: structure explosion

5.4. 1 solar panels

Solar Panel Energy Production

Our total area is 6809.39 square meters the solar power system used comprises 700 panels, each rated at 380W. The total power capacity and energy production are calculated as follows:

Total Power=700×380W=266,000W=266kW

Daily Energy Production: Assuming an average of 5 peak sun hours per day:

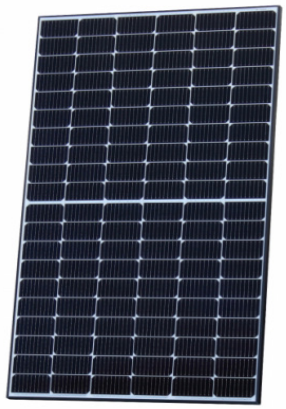

Figure 88: 380W solar panels

Daily Production=266kW×5hours=1,330kWh/day

Annual Energy Production: Over a year (365 days):Annual Production=1,330kWh/day×365days=485,450kWh/year

Hospital Area Supported by Solar Panels:

The electricity required per square meter for hospital operation is estimated between 30–50 kWh/m²/year, depending on the energy efficiency of the facility. The supported hospital area is calculated as:

1. **For Low-Energy Hospitals** (~30 kWh/m²/year):

$$\text{Max Area} = \frac{\text{Annual Energy Produced}}{\text{Energy Consumption per m}^2} = \frac{485,450\,\text{kWh/year}}{30\,\text{kWh/m}^2\text{/year}} \approx 16,182\,\text{m}^2$$

2. **For High-Energy Hospitals** (~50 kWh/m²/year):

$$\text{Max Area} = \frac{\text{Annual Energy Produced}}{\text{Energy Consumption per m}^2} = \frac{485,450\,\text{kWh/year}}{50\,\text{kWh/m}^2\text{/year}} \approx 9,709\,\text{m}^2$$

CONCLUSION

This thesis has endeavored to design a maternity hospital in Borujerd, aiming not just to address the critical healthcare gaps but also to catalyze community integration and urban revitalization. The integration of the maternity hospital into the local context—socially, environmentally, and culturally—underscores the powerful role that architecture can play in enhancing community health and wellbeing.

- Importance of Maternal Care in Smaller Cities: In smaller towns such as Borujerd, maternal care frequently does not obtain the focus on its requirements regardless its crucial importance. This undertaking highlights the need for specialized maternal medical facilities that can furnish comprehensive care and decrease the dangers related to childbirth and neonatal care, which currently oblige women to journey to larger cities for protected delivery choices.

- Community-Centered Project Site: The selected site for this maternal hospital possesses the potential to evolve into a pivotal communal hub. By transforming an underused and neglected area into a thriving public space complete with medical services, markets, and parks, the project aims to enhance the quality of urban living and to promote a sense of community belonging. revitalization is anticipated to encourage more balanced urban progression and increase access to essential health provisions.

- Proposals for Enhancing the Project: To further boost the impact and success of this maternal hospital, several additional actions could be undertaken:

1. In-depth Material Research: Conducting comprehensive analysis on local, sustainable construction materials that could reduce construction costs and environmental impact.

2. Detailed Community Needs Analysis: Engaging with local communities through surveys and focus groups to customize the hospital's design and services to the precise needs of possible users.

3. Cost Estimation and Financial Planning: Developing a detailed budget and financial plan to ensure the project's economic viability and sustainability.

4. Project Management and Timeline Estimation: Establishing a clear project management framework to guide the construction phase, complete with timeline estimates to ensure timely completion without compromising quality.

5. Long-Term Benefits Assessment: Evaluating how the hospital could adapt to future healthcare demands and exploring ways it might influence regional healthcare policies and practices.

Final Thoughts By addressing these areas, the maternal hospital project can not only meet the immediate healthcare needs of Borujerd's residents but also set a benchmark for similar developments in other small cities. The project exemplifies how thoughtful design and targeted healthcare infrastructure can profoundly influence community health outcomes and overall urban quality of life. Through this initiative, it is hoped that the principles laid out in this thesis will inspire further research and implementation of similar healthcare models in regions facing comparable challenges.

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