

HEALTHCARE FACILITIES IN MEXICO

Providing a Supportive and Restorative Environment for Patients and Staff

Carlos Antonio Martínez Amador
Architecture and Urban Design, MSc



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Examiner: Peter Fröst
Supervisor: Christine Hammarling



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Author: Carlos Antonio Martínez Amador

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Chalmers University of Technology
School of Architecture
Department of Architecture and Civil Engineering
412 96 Göteborg
Sverige

Cover page: Perspective from 12th Street towards the hospital building

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To my parents, thank you for all the support and love you gave me;

Thank you for always believing in me...

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ABSTRACT

Mexico, like many countries around the globe, is forced with an increasing demand for healthcare facilities, which prove to be scarce and inadequate. In recent years, the Mexican Healthcare System has undergone an extensive upgrade process to meet international standards in terms of procedures, qualifications and attention provided to the patients: nonetheless, there is ample room for improvement. Unfortunately, the term healing or healthy architecture is not a widely known or practiced concept within the public sector in Mexico, and thereon research is basically non-existing. Moreover, few are the facilities that adhere to international design standards or provide a good environment for both patients and staff.

If we are to solve this problem, we must first explore and understand the current needs and demands for healthcare centers in Mexico and take the Scandinavian healthcare principles, such as Evidence Based Design, Greenery Within and Healing Architecture as point of departure. We need to have a clear panorama of how users inhabit the indoor spaces and what they think they should comprise in order to be better. It is important to actually consider the final user as much as possible if we want to improve the way they live those spaces, and to provide the appropriate high quality facilities.

We must devise and adapt a plan to improve and develop treatment centers all around the world with proven, high-quality standards from a developed country such as Sweden, and contribute to the improvement of the patient's physical and mental health by offering a homelike environment of wellness, care, and comfort.

The main purpose of this research is to encompass the Mexican and Swedish architectural tradition, deliver a design project at a design development phase, and have a further understanding of what needs to be improved and how to do it, in terms of quality and user experience, within the facilities currently in use; following a structured methodology, based on a theoretical framework to study in further detail the Mexican healthcare system, make a comparison with its Swedish par to understand their differences and similarities, case studies from around the world, and finally, an analysis and translation of the information provided in order to be able to deliver a design proposal that relates with the context and addresses this ongoing problem.

Keywords:

Improving conditions, Healing Architecture, Exploring Benefits, Mexican Architecture, Scandinavian Architecture, Evidence-Based Design, Greenery, Supportive and Restorative Environment

ABOUT THE AUTHOR

CARLOS ANTONIO MARTÍNEZ AMADOR



Hometown:	Coatzacoalcos, Veracruz Mexico
Date of birth:	May 02, 1990
Nationality:	Mexican
E-mail:	acarlos@student.chalmers.se
Website:	www.carlosmartinezarquitecto.com
Mobile:	072 030 4328

EDUCATION

2015 - 2017	<u>Chalmers University of Technology</u> Gothenburg, Sweden Architecture and Urban Design, MSc Progr
2009 - 2014	<u>Instituto Tecnológico y de Estudios Superiores de Monterrey</u> Monterrey, Mexico B.A. of Architecture

DESIGN BACKGROUND (CHALMERS UNIVERSITY OF TECHNOLOGY)

October 2016	<u>Healthcare Architecture</u> Peter Fröst
February 2016	<u>Housing Inventions</u> Ola Nylander
October 2015	<u>Senior Housing</u> Inga Malmqvist

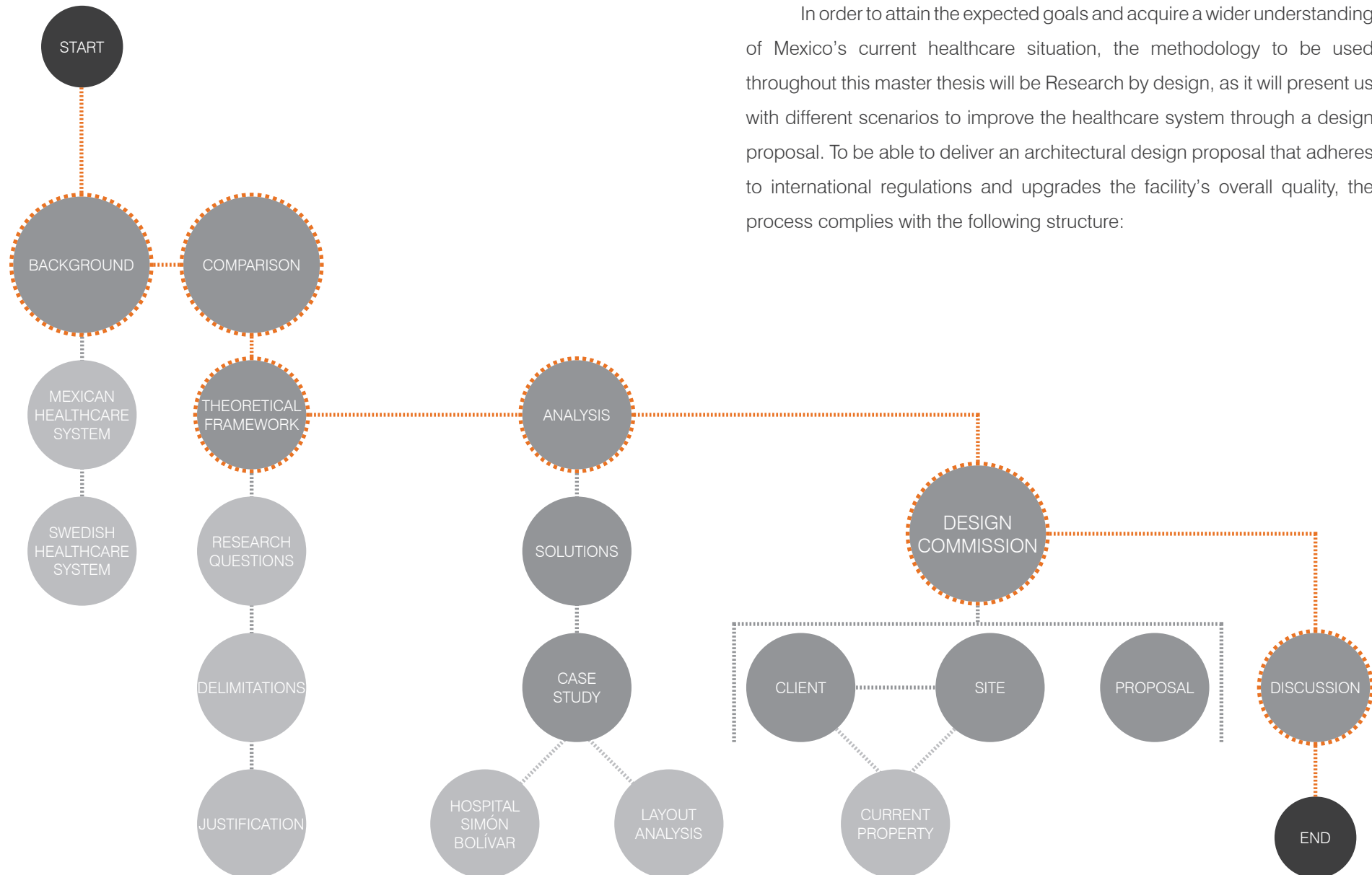
INTRODUCTION

The Mexican Healthcare System has proven to be quite complex and diversified in terms of processes, approaches, technology, research and, above all, design. With a number of state-funded healthcare sub-systems and a set of private facilities covering approximately 10 percent of the population (OECD, 2016) the attention provided to patients, its standards and parameters behind it, and the processes involved differ between them, causing great disparity among each other but leaving way for improvement.

Such facilities have developed apart from each other from an architectural point of view. Some, if not most, consist of outdated, burdened structures that have managed to cope with current needs but will not be able to meet future requirements in terms of technology or patient demands. Despite attempts to meet international standards on patient treatment and workflow, these facilities need to be upgraded before providing a good working environment for staff, a comfortable atmosphere for patients and relatives, and be adaptable for the upcoming technologies and procedures. (OECD, 2016)

Unfortunately, limited research on this matter has been done in Mexico, and international concepts need to be imported and adapted in order to enhance not only our hospitals and clinics, but also the approach we have on treatment and health promotion. We need to review these institutions as places that facilitate our recovery process and serve as bases for research and innovation, while procuring a positive impact on health.

In order to attain the expected goals and acquire a wider understanding of Mexico's current healthcare situation, the methodology to be used throughout this master thesis will be Research by design, as it will present us with different scenarios to improve the healthcare system through a design proposal. To be able to deliver an architectural design proposal that adheres to international regulations and upgrades the facility's overall quality, the process complies with the following structure:



THEORETICAL FRAMEWORK



1.1. BACKGROUND

- 1.1.1. MEXICAN HEALTHCARE SYSTEM
- 1.1.2. SWEDISH HEALTHCARE SYSTEM
- 1.1.3. PURPOSE / AIM
- 1.1.4. RESEARCH QUESTIONS
- 1.1.5. JUSTIFICATION



Established in 1943, the Mexican Healthcare System (MHS) is a state network with the mission of providing high-quality medical service to the Mexican population, regardless of socio-economic background or employment status. It is directed by the Ministry of Health (Secretaría de Salud SSA), a complex entity comprising nine state funded institutions and a wide range of private organizations that, as a whole, cover around 80% of the population. (Gómez Dantés, Sesma, M. Becerril, M. Knaul, & Frenk, 2011)

Public institutions provide health insurance to workers:

- IMSS (Instituto Mexicano del Seguro Social), for private sector workers
- SSA (Secretaría de Salud)
- ISSSTE (Instituto de Seguridad y Servicios Sociales para los Trabajadores del Estado), for most state workers
- PEMEX Salud (Petróleos Mexicanos – Servicios de Salud)
- SEDENA (Secretaría de la Defensa Nacional)
- SEMAR (Secretaría de Marina)
- SPS (Seguro Popular de Salud), for the population with no access to IMSS or other
- SESA (Servicios Estatales de Salud)
- IMSS Oportunidades (IMSS-O)

Private institutions provide health insurance to anyone that can afford their insurance or treatment fees.

- Private hospitals and clinics
- Primary care facilities

Table 1. Public and private institutions providing healthcare services in Mexico. (OECD, 2016) (Gómez Dantés, Sesma, M. Becerril, M. Knaul, & Frenk, 2011)

Unfortunately, the MHS has proven to be an inefficient and expensive network unable to offer an adequate, reliable and universal health and welfare assistance, thus providing a low quality service (in comparison with other OECD countries) to its 121 005 816 inhabitants, out of which 51.20% are women and 48.80% men (INEGI, 2015).

For example, in 2013 Mexico invested only 6.2% of its GDP on public health sector, compared with the OECD average of 8.9%. Therefore, each household has to allocate 4% of its budget to out-of-the-pocket expenditures on health services. The low public spending and investment on health is linked to the limited human resources available in Mexico: 2.2 licensed doctors VS 3.3 OECD / 1000 inhabitants and 2.6 licensed nurses VS 9.1 OECD / 1000 inhabitants (OECD, 2016).

One of the system's disadvantages is the disparity between sub-systems. Each receives a specific annual budget for equipment and medicines, as well as human resources depending on their size and patients

per year, but such inequality becomes evident when it comes to research, quality, staffing and infrastructure. Low quality service, ageing facilities, staff's constant labor disputes and notoriously long wait times are just some of the consequences of this fragmented model.

This, in addition to the scarce economic resources not being used efficiently, outdated facilities that do not adhere to international standards or that have been adapted to serve a timely purpose, inefficient workflows and procedures, an underdeveloped primary care system, a non-existing universal healthcare service, and administrative costs soaring to an impressive 8.9% (2013) according to the 2016 OECD report on health services, translates into a deeply flawed healthcare system that needs to be re-thought and re-evaluated in the way it provides medical services to its citizens. (OECD, 2016)

Mexico would benefit from a unified system that makes an efficient use of the allocated resources, and to meet each entity's needs on technology, research, staff and infrastructure. It needs to be a universal, structured, sustainable and high quality system that focuses on the user's experience rather on the sole purpose of the system only. (OECD, 2016)

Opposed to the Mexican Healthcare System, its Swedish homologue is an entirely publicly-funded decentralized administration that serves all legally registered citizens regardless of their age or employment status.

It allocates 11.1% of the country's GDP on providing medical attention for the Swedish population and it is divided into 20 Regional and 290 Local administrations; each having autonomy and following the state's goals and aims for the country's healthcare development (OECD, 2013) (SALAR, 2015).

At a state-wide level, the system is responsible for setting the main goals and giving direction to each regional administration. It sets and oversees the national application of laws and regulations on healthcare and monitors all levels of care through the National Board of Health and Welfare.

Each regional administration (20 in total) bears the responsibility to provide high-quality treatment to its citizens in all three levels of healthcare: Primary Care, Specialty Hospitals and Highly Specialized University Hospitals. Finally, each municipality sees upon providing good elderly care and after-treatment care for the population. (OECD, 2013) (SALAR, 2015)

First level of attention - Primary care

- Outpatient care centers
- General medicine
- Primary care clinics (Vårdcentraler)
- Local Hospitals

Second level of attention - Hospitals

- Specialty hospitals
- 20 facilities across Sweden
- In-patient care

Third level of attention: Highly specialized hospitals

- Highly specialized care centers
- 7 university hospitals in Sweden
- Education and research centers

Table 2. Levels of medical attention in Sweden. (VGR, 2017) (SALAR, 2017)

From an international perspective, the Swedish Healthcare System (SHS) is perceived to be on top of the pyramid in terms of medical outcomes, cost and staff efficiency; and is commonly set as an example for the rest of countries to follow (OECD, 2013) (SALAR, 2015).

As Sweden's priority is to be able to provide high-quality treatment for its residents, a set of parameters based on international standards

from the World Health Organization (WHO), the Organization for Economic Cooperation and Development (OECD) and the European Union (EU) have been established to accurately measure the system's performance from a local and international standpoint, and to validate the system's use of the resources derived from Swedish taxpayers (SALAR, 2015).

We must acknowledge though, that the SHS is not perfect and has room for improvement. Among the challenges it currently faces is the lack of a state-wide information system that enables a high degree interoperability and cooperation between regions or municipalities. To this date, some counties still handle hard-copy files or rely on transferring patient's information from one city to another, a long and time consuming process.

On top of that, accessibility is regarded as a weakness within the system as the government has failed to provide a proper solution in terms of procedures, policies and infrastructure. To that end, the amount of information on the population with disabilities is unreliable and sometimes non-existing; and at least 12% of the Swedish nationals aged 16 to 84 struggle with some type of physical or psychological disability, for example, dementia (Lilja, Månsson, Jahlenius, & Sacco-Peterson, 2003). Though some progress has been made, the Swedish Healthcare Administration still needs to address this subject in order to become a more inclusive society.

But even with all this on the table, Sweden has managed to strive in terms of quality management, efficiency and overall development through a constant assessment of the processes and a defined set goals ranging from *user experience* to *future needs of its population* (SALAR, 2015). It is, as some organizations say, a model for us to follow in terms of healthcare and welfare.

The main purpose of this thesis is to analyze and encompass the Mexican and Swedish architectural tradition in order to deliver a design proposal in favor of having a further understanding on the challenges and opportunities the Mexican Healthcare System poses.

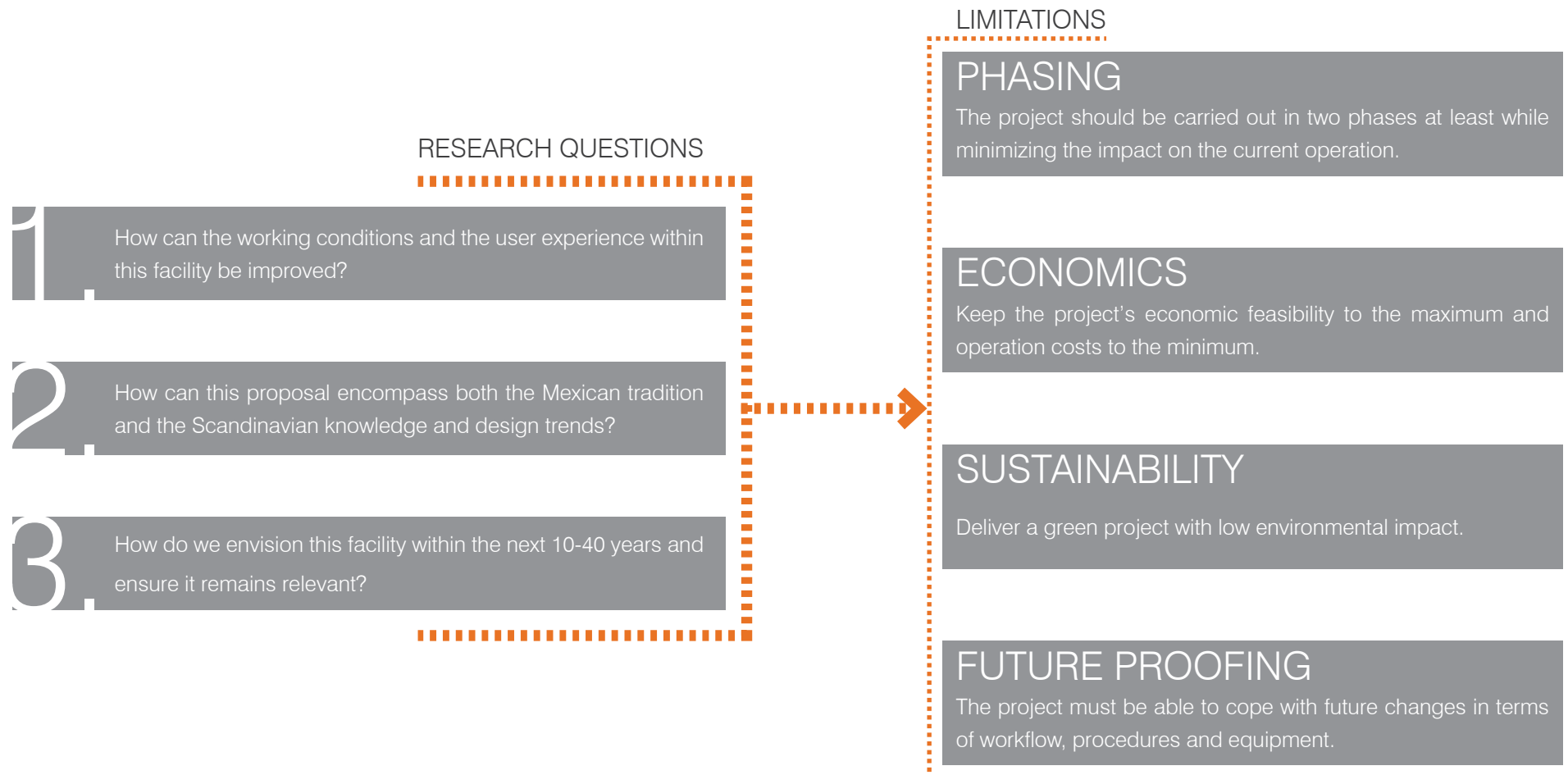
Thus, upon examining the existing facility and the system's structure, a set of goals or aims were outlined in order to ensure the desired outcome and expectations of this master thesis:

1. Design a sustainable healthcare facility in an economical, societal and environmental fashion that can cope with future needs and demands from the population and technology. To achieve this, the facility must:
 - Be able to produce its own renewable energy and reduce energy loss and consumption,
 - Use ecologically-friendly materials,
 - Address current needs from the hospital, such as a Day Surgery Department and a proper Research Center,
 - Have an efficient layout that reduces transportation times between departments, enables a collaborative environment for the users and translates into a simple and clear arrangement for the technical department and equipment, and
 - Be future-proof to handle upcoming changes in terms of technology, workflows or procedures.

2. Provide a restorative and supportive environment for the patients, relatives and staff, enable the patient's recovery process and reduce the overall environmental impact from the building through:
 - A homelike atmosphere with warm and welcoming spaces,
 - Well-lit, serene and dynamic rooms,
 - Nature and landscape as part of the healing process, and
 - Local and ecologically friendly materials and renewable / green energy.
3. Incorporate the Healing Architecture design process within the Mexican Healthcare System, through:
 - Materials and spaces that nurture the patient's healing process,
 - A design concept that enables the patient and self-empowers him or her, and
 - A Patient-Centered perspective to allow the patient play an active role during the treatment and recovery process.

RESEARCH QUESTIONS

After analyzing Mexico's historical, economical and societal background, as well as the international trends in terms of welfare and healthcare architecture, three research questions and limitations to be considered while developing the project came to mind:



Poor and inefficient conditions within the Mexican Healthcare Institutions demonstrate that there is a patent need of knowledge and facilities to improve not only the attention given to the patients but the way staff works and inhabits the spaces as well. As a Mexican citizen, I have the obligation to bring the knowledge acquired in Sweden and sketch a plan to address the critical problems within the Mexican Healthcare System. I see this as an opportunity to challenge myself and prove that I have the necessary skills to translate international standards and expertise and bring it back to Mexico where it is needed.

From an academic perspective, Chalmers provides the knowledge and expertise to deliver good and comprehensive solutions that can set a milestone and be catalysts for change. Moreover, taking all the research and knowledge from Swedish experts on Healthcare Architecture back to Mexico and other countries around the globe would mean that more people will be able to have a dignified space for recovery and to carry out their responsibilities as staff members.

I consider myself an organized and structured architect, skillful enough to deliver a high quality project that addresses the current needs and demands of the market and competent enough to keep up with the current trends in terms of design and technological advancements. Finally, having both parents within the medical field, comes with the responsibility and obligation to give something back to their practice.

A well-suited solution, as I mentioned before, will secure a perfect retribution to their years of commitment towards my academic growth and will set a milestone in a much larger scale within the healthcare institutions and our community. Thereby, this thesis will result with an architectural proposal that adheres to international standards, provides a healthy atmosphere for the patients and staff, is friendly with the environment, is rooted within the site and addresses current and future needs in terms of medical treatment and functions.

1.2. COMPARISON

1.2.1. STATISTICS

1.2.2. HEALTHCARE COVERAGE



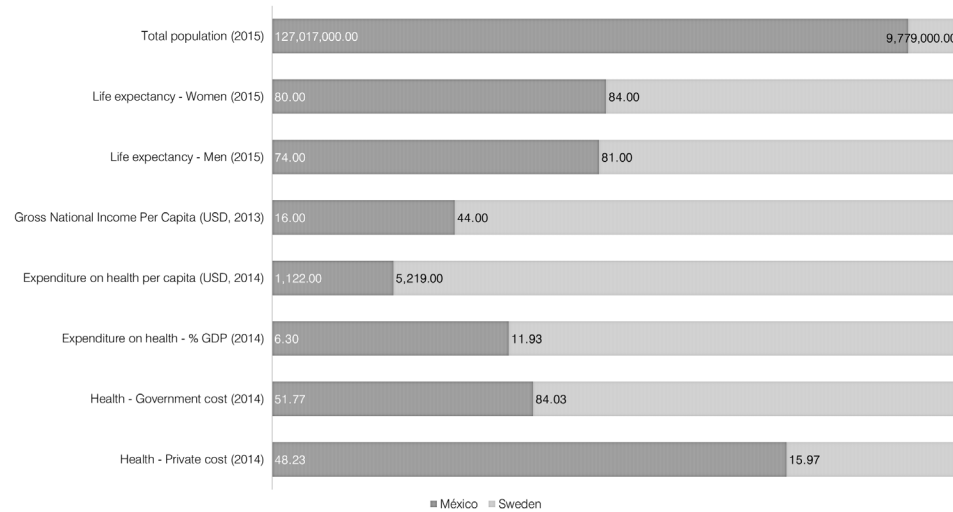


Figure 1. Mexico and Sweden in numbers based on the OECD and the World Health Organization indicators. (Martinez, 2017)

Throughout the years, Mexico has greatly improved its quality of life but still remains below international standards according to OECD and WHO's reports on education, jobs and health. Though placed third within the civic engagement scale just behind Denmark and Australia (OECD, 2016), Mexicans are still displeased, or rather dissatisfied, with their lives in comparison with the rest of the OECD countries.

On the other hand, Sweden has shown a steady above average performance on most of the OECD indicators, such as health, jobs, education, civic engagement work-life balance and personal safety (OECD, 2013). It stands fifth within the health indicator from the OECD, behind New Zealand, Canada, Australia and Switzerland; and it allocates approximately 11% of its GDP (2015) on healthcare.

HEALTHCARE COVERAGE

Within international standards and indicators from the WHO and OECD, the Mexican Healthcare System falls way behind the ideal or minimum levels in terms of Health vs GDP ratio and access to healthcare services. In Mexico, this is determined by your employment status, economic background and age; this represents a big issue if the country wants to overcome socio-economic disparities among its population.

Sweden on the other hand, provides a universal healthcare system to all lawfully registered citizens, funded through state investments and taxpayers and where one is free to choose the healthcare facility of his or her choice. The system is divided into 1 national administration, 20 regional managements and 290 city councils, each with full administrative autonomy but attaining to state regulations.

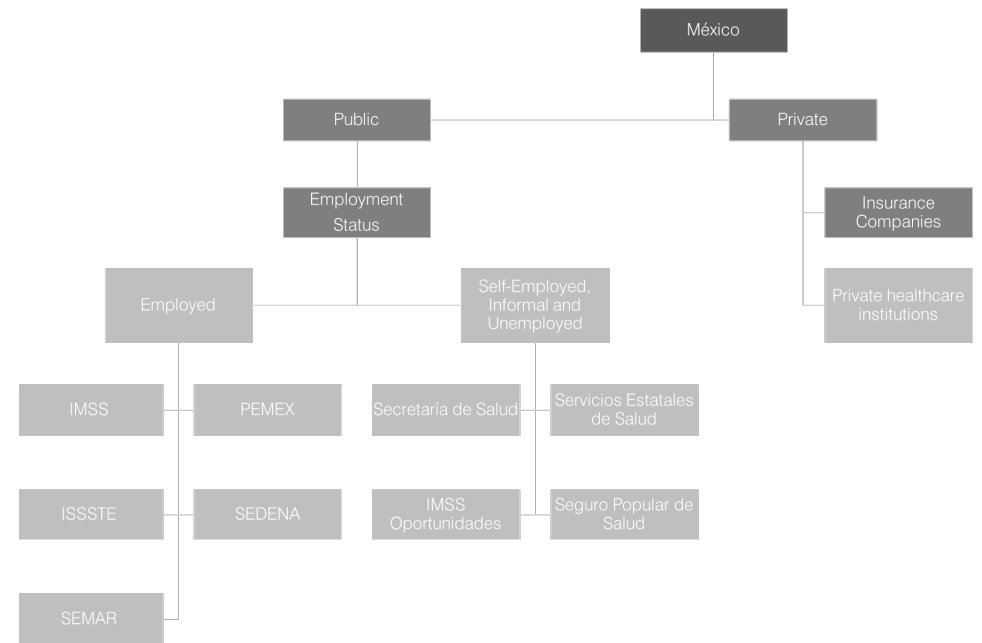


Figure 2. Mexican healthcare system.
National structure by funding and administration. (Martinez, 2017)

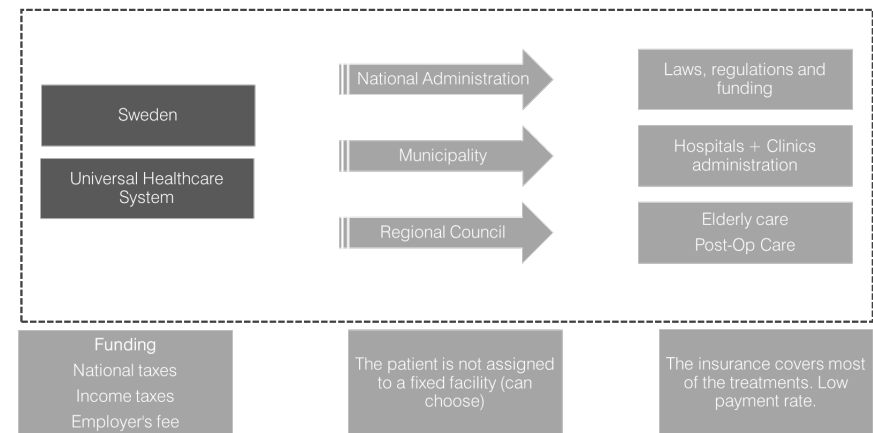


Figure 3. Swedish healthcare system.
National structure based on VGR and SALAR regulations. (Martinez, 2017)

1.3. ANALYSIS

- 1.3.1. ANALYZING HEALTHCARE FACILITIES IN MEXICO
 - A. CASE STUDY 01: CENTRO MÉDICO ZAMBRANO HELLIÓN (MONTERREY, MX)
 - B. CASE STUDY 02: CENTRO MÉDICO ABC - CANCER CENTER (MEXICO CITY, MX)
 - C. CASE STUDY 03: HOSPITAL CENTRAL SUR DE ALTA ESPECIALIDAD (MEXICO CITY, MX)
 - D. CASE STUDY 04: HOSPITAL GENERAL 2 / 33 (MONTERREY, MX)



ANALYZING HEALTHCARE FACILITIES IN MEXICO

Identifying the problem within the Mexican Healthcare System has proven to be problematic, if not difficult to find. Nonetheless, it is clear to me that one of the biggest challenges this administration faces is the inability of their current facilities to further develop and cope with current and future trends, equipment and workflows. This is more noticeable within the public sector in which the vast majority of the units were built between 1950 and 1970 without a proper master plan nor a future-proof concept in mind (Gómez Dantés, Sesma, M. Becerril, M. Knaul, & Frenk, 2011).

However, some of the administrations -such as IMSS and PEMEX- have been expanding or refurbishing their facilities in an attempt to meet international trends and standards and be able to provide a high-quality service to their beneficiaries. But despite the efforts, more work is needed in order to deliver the intended quality level and improve not only the patient's health but the working conditions as well (OECD, 2016).

In 2013, there were approximately 25,000 healthcare units in the country being 89% within the public sector and just over 10% private institutions. Looking deeper into these numbers, I acknowledged that out of the 4,400 hospitals available, only 30% are open to the public sector but provide over 65% of the total beds available in the system (131,900 beds in total). This number though, remains fairly below the World Health Organization standard: with 1.6 beds per 1,000 inhabitants; and such from Sweden with 2.5 beds per 1,000 inhabitants. (OECD, 2016) (Secretaría de Salud, 2016).

Bearing all this in mind, we can agree on saying that the main problem the Mexican Healthcare System faces is being a diversified and complex administration that comprises a network of sub-systems with immense inequalities and disparities between them, the lack of economic and human resources, a low level of collaboration among each other and both inefficient and outdated facilities built upon old healthcare models that have not been able to adapt or evolve to our present time.

Therefore, in order to address this situation and provide a proper solution, we must to take a step backwards and analyze some case studies within our country and reflect on the good qualities upon them and identify what needs to be improved or learned from them.

CASE STUDY 01: CENTRO MÉDICO ZAMBRANO HELLIÓN

FACTS

Location: Monterrey, México
Surface: 152,000 m²
Architecture: LEGORRETA+LEGORRETA, Alejandro Mendlovic Arqs. & FLAD Architects
Construction: Ibarra Aragón Arquitectos
Interior design: LEGORRETA+LEGORRETA, Alejandro Mendlovic Arqs.
Landscape: HARARI Landscape Architecture
Year: 2011
Type: Private hospital

CONTEXT

Located within the metropolitan area of the city of Monterrey, MX, the Centro Médico Zambrano Hellion was designed upon the new healthcare principles of healing architecture and Evidence Based Design. Nonetheless, medical treatment in this facility is provided only to those who can afford the fees or that hold a comprehensive insurance plan and grants them access to this facility. The Mexico City based firm, Legorreta+Legorreta was commissioned to this project along with Alejandro Mendlovic Architects and FLAD Architects as the Healthcare Consultants. The project strives to reach a level where not only the patient but the visitors and staff engage into a serene and restoring atmosphere through warm and welcoming spaces (Legorreta+Legorreta, 2011).



Figure 4. Aerial perspective from the hospital.
Retrieved from Legorreta+Legorreta. - March 2017



Figure 5. Motor Lobby - Centro Médico Zambrano Hellión.
Retrieved from Legorreta+Legorreta. - March 2017

CASE STUDY 01: CENTRO MÉDICO ZAMBRANO HELLIÓN



Figure 6. Motor Lobby - Centro Médico Zambrano Hellión.
Retrieved from Legorreta + Legorreta. - March 2017



Figure 7. Lobby view - Centro Médico Zambrano Hellión.
Retrieved from Legorreta + Legorreta. - March 2017

ANALYSIS

Positive

- Warm and welcoming architecture
- Efficient and provides a good working environment for the staff
- Allows future changes and further expansion
- Designed based on a master plan
- New healthcare model: Healing Architecture and EBD
- Nature and light play an important role

Negative

- Private facility with high admission / service fees
- Available only to those who can pay or have a comprehensive insurance plan
- Some departments that should work together were placed apart from each other; long distances between wards.
- Closed to the public from an urban perspective.
- Accessible through car only

CASE STUDY 02: CENTRO MÉDICO ABC - CANCER CENTER

FACTS

Location: Mexico City, Mexico
Surface: 6,200 m²
Architecture: HKS Architects
Year: 2009
Type: Private hospital

CONTEXT

Located in Mexico City within its metropolitan area, this specialized center for cancer treatment constitutes one of the efforts from the private sector to move forward and re-invent patient treatment in Mexico. The project holds both a sense of uniqueness and homogeneity as it holds a personal identity while unifying the urban context in the area.

Designed upon the Healing Architecture principles, light, greenery, warmth and scenic views play a major role in the project and provide the ideal atmosphere for the staff and patients to collaborate and recover. This Center conveys all major supporting services for the Cancer Department and caters optimal spaces for synergy between staff and patients. However, despite of being an epitome for cancer treatment in Mexico and with its warm and bold interiors, this facility remains out of reach for the majority of the population as it is funded through private initiative and accessible only through a comprehensive insurance plan.



Figure 8. Main entrance - Centro Médico ABC Cancer Center.
Retrieved from HKS Architects - March 2017



Figure 9. Façade details - Centro Médico ABC Cancer Center.
Retrieved from HKS Architects - March 2017

CASE STUDY 02: CENTRO MÉDICO ABC - CANCER CENTER



Figure 10. Waiting areas and circulation core - Centro Médico ABC Cancer Center.
Retrieved from HKS Architects - March 2017



Figure 11. Chemotherapy lounge - Centro Médico ABC Cancer Center.
Retrieved from HKS Architects - March 2017

ANALYSIS

Positive

- Warm and innovative architecture
- Fits in the context and reinforces the urban identity: city hospital
- Light plays a major role, providing well-lit and warm spaces inside
- Views were deemed to be of great importance and focused accordingly in order to maintain a sense of openness while respecting the patients' privacy
- Warm materials were used in order to create a cozy atmosphere
- Synergy: the center conveys all supporting services for the department within the premises and creates collaborative spaces for staff
- Restoring and supportive environment for patients and visitors
- The center is placed within an entire medical complex

Negative

- Private hospital with high fees
- Although centrally located, the building is somewhat distanced from the rest of the departments
- The area is prone to high traffic volume due to the large number of schools in the vicinity

CASE STUDY 03: HOSPITAL CENTRAL SUR DE ALTA ESPECIALIDAD

FACTS

Location:	Mexico City, Mexico
Beds:	140
Examination Rooms:	75
Operation Theaters:	9
Year:	1984
Type:	Public hospital
Owner:	Petróleos Mexicanos (PEMEX)

CONTEXT

In 1984, Petroleos Mexicanos opened a new central hospital that would alleviate the increasing demand on medical services from the population living to the south of Mexico City and the rest of the country. The building per se possesses a strong institutional character related to its pure and robust architecture.

The two cylindrical volumes standing out from the complex are clad with pre-fabricated concrete panels and house all the medical functions. Though this project is a good example concerning the Modern Movement in Mexico and kindles the dynamism and purity from the Guggenheim Museum in New York City, it bestows upon the area where it sits a sense of estrangement and roughness.



Figure 12. Main entrance - Hospital Central Sur de Alta Especialidad
PEMEX Mexico City - March 2017



Figure 13. Street view and Main Entrance - Hospital Central Sur de Alta Especialidad
PEMEX Mexico City - March 2017

CASE STUDY 03: HOSPITAL CENTRAL SUR DE ALTA ESPECIALIDAD



Figure 14. Street view from Línea 4 Street - Hospital Central Sur de Alta Especialidad PEMEX Mexico City - March 2017



Figure 15. Aerial perspective - Hospital Central Sur de Alta Especialidad PEMEX. Retrieved from Revista Líderes Médicos - March 2017

ANALYSIS

Positive

- City hospital, condensed layout
- Close to city services and main streets
- Fits within the urban fabric
- Possesses an unique character: a city landmark
- Deals with sun conditions through its curved façade
- Cladding allows a long life span with low maintenance
- Central services located on the basement supporting both volumes
- High-end technology on site

Negative

- Heavy volumes
- The facility is perceived as outdated and unwelcoming
- Green areas: insufficient or far from the patient rooms
- Rough texture on the façade
- Dark volumes with no daylight into the building except on smaller cylinder
- Not the ideal layout in terms of wayfinding
- Institutional, cold feeling
- Long distances between departments sitting in opposite volumes
- Has reached its limit for future expansions
- Closed architecture, not open to the public

CASE STUDY 04: HOSPITAL GENERAL DE ZONA 2 / 33 - IMSS

FACTS

Location:	Monterrey, Mexico
Architect:	Unknown
Type:	General Hospital
Year:	1960-1970
Type:	Public hospital
Owner:	Instituto Mexicano del Seguro Social (IMSS)

CONTEXT

This General Hospital sits in the city of Monterrey, relatively close to the downtown district. Built between 1960 and 1970 to serve the increasing demand on healthcare services, this facility has outgrown its capacity and remained unchanged since it began operations. Based on an archaic healthcare model, this building houses different departments spread out on several volumes throughout the site.

The architecture *per se* reminds us of an unfinished and tasteless trend that has outlived its time and prevailed to this date. The volumes constitute one of the biggest challenges on this project as they prevent daylight from getting into the building and isolate the departments which result in long distances for the patients and staff.



Figure 16. Street view towards in-patient building - Hospital General de Zona 2 / 33 IMSS. Monterrey, MX - March 2017



Figure 17. Street view towards Hospital General de Zona 33 IMSS. Monterrey, MX - March 2017

CASE STUDY 04: HOSPITAL GENERAL DE ZONA 2 / 33 - IMSS



Figure 18. Street view towards in-patient building - Hospital General de Zona 2 / 33 IMSS. Monterrey, MX - March 2017



Figure 19. Street view towards hospital complex - Hospital General de Zona 2 / 33 IMSS. Monterrey, MX - March 2017

ANALYSIS

Positive

- City hospital, Pavilion-building layout with an in-patient tower
- Easy access to and from the city
- Public hospital, serves approximately 70% of the insured population

Negative

- The facility is perceived as outdated, untidy and unwelcoming
- Green areas: insufficient or far from the patient rooms
- Rough texture on the façade
- Dark volumes with no daylight into the building
- Not the ideal layout in terms of wayfinding
- Long distances between departments
- No room for expansion
- Low ceilings
- High maintenance costs due to its age
- Ex profeso adjustments resulting in “bumps”
- Designed upon an old architectural and healthcare model
- Does not provide spaces for collaboration
- Lack of warm and welcoming spaces for the patients, visitors and staff



1.3. ANALYSIS

1.3.2. THE SCANDINAVIAN ARCHITECTURAL TRADITION

- A. CASE STUDY 05: PSYCHIATRY BUILDING (UPPSALA, SWEDEN)
- B. CASE STUDY 06: ÖSTRA SJUKHUSET CHILDREN'S HOSPITAL (GOTHENBURG, SWEDEN)
- C. CASE STUDY 07: NEW PSYCHIATRIC DEPARTMENT, AABENRAA HOSPITAL (DENMARK)



THE SCANDINAVIAN ARCHITECTURAL TRADITION

As mentioned before (Chapter 1.1.2), the Swedish Healthcare System provides medical attention to all registered Swedish citizens regardless of their age or employment status. Budget constraints, efficiency levels and a dynamic patient model known as the “Stockholm Model” -in which the patient has the opportunity to decide whether to go to a specific hospital or not- have had a great impact on how Swedish, if not Scandinavian architecture, has evolved (Hjertqvist, 2002).

From an international standpoint, healthcare in Sweden is perceived to be among the best in terms of procedures, treatments, quality, staff efficiency, costs, and architecture (Swedish Association of Local Authorities and Regions, 2015). To some extent, these aspects have transformed the Scandinavian Style into a functional, competitive, human and innovative architectural style and has been influenced by the Swedish expertise on Healing Architecture and Evidence Based Design. Through them, designers have been able to provide warm and welcoming spaces for the patients, visitors and staff while keeping the costs within budget and the efficiency levels to a maximum.

If we dissect the Scandinavian Style to its bare essentials, we will notice nine typological, functional and architectural traits present in most of the Scandinavian buildings, especially those within healthcare. These characteristics will be further analyzed through three case studies from across the Nordic countries, presented later on this text.

Low-rise buildings

- Architectural compositions consisting of low-rise buildings enable a proper integration with the context and reduce stress levels and fear on the users (Alexander, Ishikawa, Silverstein, & Jacobson, 1977). Moreover, most of the urban fabric in Sweden is built up upon a four floors limit and all the volumes are in dialogue with each other.

Extended footprints (Pavilion Style)

- Following the creation of a healthcare network and services being decentralized in Sweden, most of the units have now been divided into separate buildings or pavilions, each for a specific department or institution. This translates into an extended footprint within a city grid or rather embedding the hospital into the city layout.

Green areas

- Evidence Based Design has shown the great nature has on the patient's recovery process as it stimulates all the core senses in a therapeutic way, reduces stress levels, provides a safe environment, reduces pain and improves the patient's mood (McCullough, 2010).

THE SCANDINAVIAN ARCHITECTURAL TRADITION

Warm / Human atmosphere

- Warm and welcoming facilities have a positive impact on the patients and staff. They improve the patient's mood, create a sense of security, privacy and home-likeness through daylight, furnishing and materiality. A human character can be achieved through social areas, a patient-centered philosophy and a close connection between staff and patients/relatives, for instance by avoiding any sort of physical barriers between them or placing the nurse stations close to the patient areas (McCullough, 2010).

Open / Transparent spaces

- Open or transparent spaces allow the user to have a clear connection with its surroundings -especially if there is nature close by-, create dynamic environments, empower the patient and remove the sense of estrangement associated with hospitals. In other words, the user will be able to easily navigate through the building and will not feel confined or lost (McCullough, 2010).

Balance between Formalistic and Functional Architecture

- When it comes to healthcare architecture, future-Proofing, flexibility and adaptability bear a heavy weight on the project as it must be able to adapt to future technology and space requirements. Furthermore, if the administration wishes to

rearrange the existing layout, this has to be done in an easy and cost-effective way. Finally, the building has to keep a delicate balance between functionality and formalism, as aesthetics and formal principles should never be discarded as they come with positive effects on the users.

Healthcare Network

- Reduce large / central hospital and instead create a network where healthcare is provided through different actors depending on the ailment and type of procedure. Home care plays a bigger role as senior citizens or people with disabilities need special care. Finally, portable technology and Telemedicine makes it possible for medical staff to perform long-distance procedures or examinations (E-Health)

Patient-Centered Treatment

- Today, the patient plays a bigger role in the treatment and recovery process as he or she is aware of what is happening, the course of treatment, the specialists involved and any other further actions that need to be taken. This is to both empower the patient and to make a better use of the resources allocated to a specific unit or facility, thus translating into and increased efficiency, a reduction on transportation times and clinical mistakes due to poor follow-ups.

CASE STUDY 05: PSYCHIATRY HOSPITAL - UPPSALA



Figure 20. Main entrance - Psychiatry Hospital Uppsala
Retrieved from Tengbom Arkitekter (Photo: Kaspar Hammarling)



Figure 21. Main lobby - Psychiatry Hospital Uppsala
Retrieved from Tengbom Arkitekter (Photo: Åke E:son Lindman)

FACTS

Location:	Uppsala, Sweden
Architect:	Tengbom Arkitekter
Type:	Psychiatry Hospital
Year:	2008-2012
Surface:	34,000 m ²
Qualities:	Low-Rise Warm/Human Atmosphere Open/Transparent Spaces Balance between Formalistic + Functional Arch.

HIGHLIGHTS

- Patient-Centered Architecture
- Human scale, adapts to urban fabric
- Clear and open structure with dynamic spaces
- Well integrated within its context
- Allows the staff and patients to create synergy
- Cross-collaboration among staff
- Encompasses teaching, research, in-patient and outpatient on every floor
- Spaces full of light and dynamism
- Warm, welcoming and positive environments
- Strong connection between the users, the functions and the context
- Light and openness as main ideals

CASE STUDY 06: ÖSTRA SJUKHUSET CHILDREN'S HOSPITAL - GOTHENBURG

FACTS

Location:	Gothenburg, Sweden
Architect:	White Arkitekter
Type:	Children's Hospital
Year:	2010-2016
Surface:	33,000 m ²
Qualities:	Low-Rise, Warm/Human Atmosphere Open/Transparent Spaces, Green Areas Balance between Formalistic + Functional Arch.

HIGHLIGHTS

- Patient-Centered Architecture
- Human scale, adapts to urban context (Hospital City)
- Clear dialogue between the new and existing architecture
- Warm and serene atmosphere
- Dynamic, chameleonic and harmonious spaces
- High level of privacy and security. Single rooms.
- Greenery, daylight and an open layout provide a sense of tranquility
- Unique character: balance between the old and the new
- Tinted façade blends with the landscape and context
- Improves staff efficiency and patient wellness
- Provides the patient and relatives everything they need for a long or short stay
- Meet current and future requirements (technology and procedures)



Figure 22. New Children's Hospital rendering - Östra Sjukhuset.
Retrieved from White Arkitekter (Photo: White View)



Figure 23. New Children's Hospital Courtyard rendering - Östra Sjukhuset.
Retrieved from White Arkitekter (Photo: White View)

CASE STUDY 07: NEW PSYCHIATRIC DEPARTMENT - AABENRAA HOSPITAL



Figure 24. Aerial perspective - New Psychiatric Department Aabenraa Hospital.
Retrieved from White Arkitekter (Photo: Adam Mørk)



Figure 25. Courtyard and Lobby view - New Psychiatric Department Aabenraa Hospital
Retrieved from White Arkitekter (Photo: Signe Find Larsen)

FACTS

Location:	Aabenraa, Denmark
Architect:	White Arkitekter
Type:	Psychiatric Hospital
Year:	2011-2015
Surface:	20,000 m ²
Qualities:	Low-Rise, Extended Footprint Warm/Human Atmosphere, Green Areas Open/Transparent Spaces Balance between Formalistic + Functional Arch.

HIGHLIGHTS

- Patient-Centered Architecture
- Human scale, adapts to topography
- Extended footprint allows segmentation of the treatment process
- Main spine connects seven volumes with different functions
- Functionality + Aesthetics = Aabenraa Hospital
- Environmental vision
- Bolsters patient's confidence. Promotes contact with the outside.
- Private and public spaces. Serene and dynamic rooms
- Close relationship between inside and outside
- Connection with the surroundings
- Greenery/outdoor/open spaces as main actors
- Boosts social interactions



1.3. ANALYSIS

- 1.3.3. UNDERSTANDING THE SCANDINAVIAN AND THE MEXICAN TRADITION
- 1.3.4. CASE STUDY 08: SWEDISH ARCHITECTURE IN COLOMBIA - HOSPITAL SIMON BOLIVAR



UNDERSTANDING THE SCANDINAVIAN AND MEXICAN TRADITIONS

Comparing and analyzing the Mexican and the Scandinavian traditions is not as simple and straightforward as it may seem. In fact, the term is not properly understood as we commonly associate it with an established set of practices deeply rooted within a community or society under the assumption that they have always been part of them. Tradition goes beyond regular habits or inheriting customs; it comprises the historical and temporality aspects of life –or in this case, architecture– as well (Eden, 1942). Tradition is related to local identity and external forces acting upon it; moreover, involves resilience and adaptability. Ultimately, tradition is a matter of history, time, evolution, dynamism, and synergy.

Consequently, we have to examine these two architectural styles closely in order to understand their relationship and their influence on each other. On chapter 1.3.2. The Scandinavian Architectural Tradition, we recognized eight characteristics associated with healthcare projects and with Scandinavian Architecture overall. In regards of healthcare architecture, a successful proposal will be in constant dialogue with the context and stimulate the senses through nature, will promote a sense on openness and transparency, will encompass hospitality and human scale, and convey a perfect balance between aesthetics and function.

Over 9,000 kilometers away, Mexican Architecture has been shaped throughout time by local and international movements, history and politics; especially during the years after the Second World War (1945-1953) (Eggenger, 1999). Modern architecture has been present in our country for over seventy

years and has evolved through time; it has inspired architects and designers -from Luís Barragán to Mauricio Rocha-, and has a substantial take on what we call now the Mexican Style. Naturally, Modernism was not the only force acting on Mexican Architecture.

In fact, it would be accurate to say that Mexico has been an architectural synthesis consisting of a number of styles and movements that came together to hatch a local design language. Hence, when analyzing and discussing the Architectural Discourse in Mexico, we will identify attributes from Vernacular and Modern Architecture along with local and international practices that have merged and immensely influenced the Mexican Architectural Tradition.

From the four case studies on chapter 1.3.1. Analyzing Healthcare Facilities in Mexico, we can single out the different components that influence and constitute the Mexican Architectural Discourse:

- High-Rise Buildings
- City Landmarks
- Condensed Layouts
- Urban Context
- City Structure
- Institutional and Hierarchical Design
- Closed and Restrictive Architecture
- Form < Function

UNDERSTANDING THE SCANDINAVIAN AND MEXICAN TRADITIONS

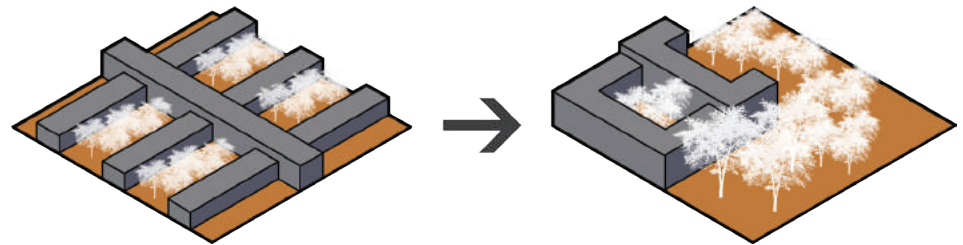
High-rise buildings, City Landmark

- Mexico has grown fond of High-Rise buildings as they display technological and economic development and social stability. Moreover, they fulfill not only their specific function (healthcare, education, residential, etc.) but act as city landmarks or references for pedestrians and drivers and the community usually takes pride on them.



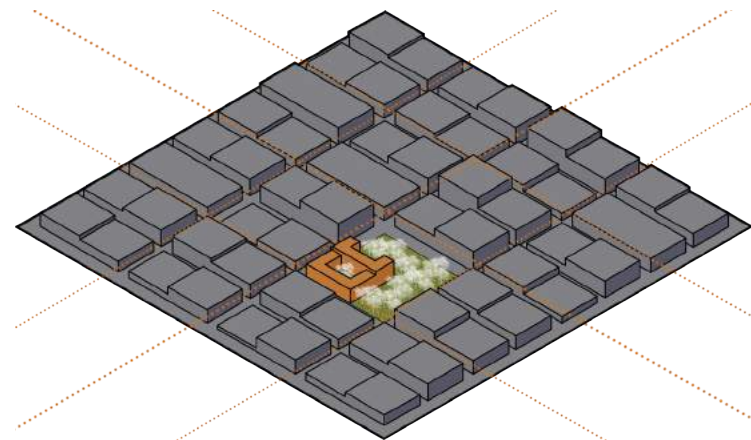
Condensed layouts

- City hospitals are changing the traditional Pavilion Style Architecture for a condensed layout, as it fosters an efficient flow of services and reduces transportation times from one department to another. This layout enables future expansions -both horizontally and vertically- and creates a collaborative environment as it brings different specialties together under the same structure and circulation core.



Urban / City Structure

- New facilities have been designed in connection with the adjacent context, city grid and urban skyline. Today, these projects are seen more like regular buildings instead of healing environments or healthcare institutions; they seemingly adapt to the urban fabric and become beacons or reference points for users passing by.

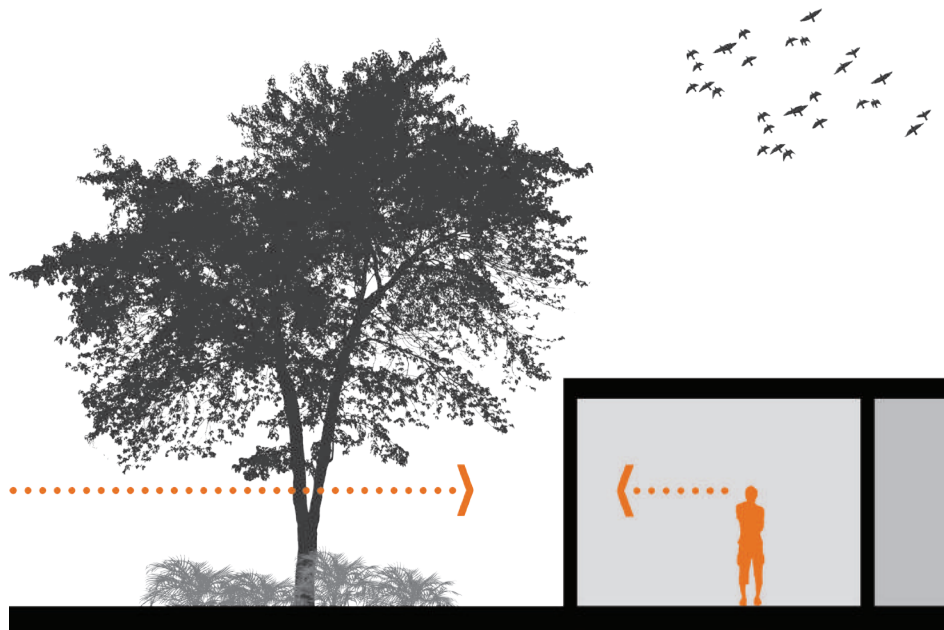


UNDERSTANDING THE SCANDINAVIAN AND MEXICAN TRADITIONS



Institutional and Hierarchical Design

- In public hospitals, there is a shortfall of human contact and a flourishing sense of hierarchy within the staff. Both public and private spaces tend to be cold instead of warm and homelike; patients feel intimidated and belittled, and disgruntled personnel distances from them behind a desk. Moreover, there is a plausible disparity among staff as it is common for managers or chiefs to have bigger offices than their subordinates.



Closed and Restrictive Architecture

- Opposed to the Scandinavian Tradition, healthcare architecture in Mexico is closed, restrictive and unwelcoming. In general, these institutions dissociate themselves from the city life through physical barriers on their perimeters. Additionally, this language prevents the user from having any sort of interaction with the outdoor environment or nature while waiting for a procedure or performing administrative tasks.
- The inner spaces are usually perceived as dark, dull and unappealing. There are, of course, exceptions to this rule where bright and welcoming atriums house several patient functions and provide a different character to the building.

UNDERSTANDING THE SCANDINAVIAN AND MEXICAN TRADITIONS

Form < Function

- Future-Proofing is now heavily discussed among hospital managers and designers as the demand for medical treatment has increased in recent years. A proper master plan and contingency plans should be sketched from an early stage to provide room for future growth.
- Finally, the projects used to undermine the formal value and prioritize functionality. Today, there must be a balance between how the building works and how it looks and provide a nurturing, safe and restorative environment for the patients and staff.

In order to deliver a proposal that is relevant and encompasses both architectural styles, we need to compare them and sketch a third one that brings the best qualities of the other two. We must reflect on how they influence and affect each other to fully understand how they will better complement each other and address the local needs and traditions.

Finally, to fully realize how the Scandinavian Tradition has been influenced by other Latin American styles and vice versa, I will refer to a case study in Colombia by White Arkitekter as it touches several aspects related to this thesis and the Mexican-Scandinavian Style in healthcare architecture.

SELECTING THE BEST QUALITIES FROM MEXICO AND SCANDINAVIA			
COMPONENT	MEXICO	SCANDINAVIA	NEW HOSPITAL
Low-Rise Buildings			
Extended Layout			
Green Areas			
Warm / Human Atmosphere			
Open and Transparent Spaces			
Balance Form and Function			
Healthcare Network			
Patient-Centered Philosophy			
High-Rise			
City Landmark			
Condensed Layouts			
Urban / City Structure			
Institutional and Hierarchical			
Closed and Restrictive			
Form < Function			

CASE STUDY 08: HOSPITAL SIMÓN BOLÍVAR



Figure 26. View towards the existing hospital
Bogotá, Colombia - March 2017



Figure 27. Main entrance plaza - Hospital Simon Bolivar
Retrieved from White Arkitekter (Photo: White View) - April 2017

FACTS

Location:	Bogotá, Colombia
Client:	Hospital Simón Bolívar, Swedish Ministry for Foreign Affairs, Nordic Investment Bank
Architect:	White Arkitekter
Type:	General Hospital
Year:	2015
Surface:	65,000 m ²
Qualities:	High-Rise / City Landmark, Warm/Human Atmosphere, Open/Transparent Spaces, Green Areas, Balance between Formalistic and Functional Architecture, Urban Structure, Condensed layout,

CONTEXT

Community-Centered Design and Patient-Centered + Healing Architecture are two of the design premises that White Arkitekter sought to fulfill on this commission. The existing hospital is surrounded by a dynamic landscape and an impoverished neighborhood within a hectic urban environment; this provided the perfect subject - the perfect place for a social and urban intervention along with a new healthcare facility. The proposal encompasses three main functions: social/urbanistic, hospital and technical. They find themselves bond together through a green atrium and a public plaza that enables further social and urban interactions between the hospital

CASE STUDY 08: HOSPITAL SIMÓN BOLÍVAR

and the community. Patient-Centered and Healing Architecture translates into bright, dignified and functional spaces that fulfill technical and spatial requirements and provide a warm atmosphere for the patients, visitors and staff.

A second key factor from this commission was the phasing process. One of the restrictions was that the construction development had to be carried out while the existing facility remained open to the public; the architects solved it by dividing the new hospital into two phases: the first one being the L-Shape volume that houses most of the functions, and the second one consisting of an additional volume that ties the building and provides a green atrium for the users and the community.

Finally, this project conveys the Scandinavian and Latin American traditions in a way that it transforms itself into a City Landmark, adapts to the urban fabric in a condensed layout, shows a balance between aesthetics and functionalism and provides open, transparent, green and warm spaces with a human touch. All in all, this commission brought together the best of both worlds and delivered a proposal that adapts to its context and provides a supportive and restorative environment for those within.

Source:

White Arkitekter AB & Nordic Investment Bank NIB

Feasibility Study for Hospital Simon Bolivar; Bogotá, Colombia (2015)



Figure 28. Ambulance lobby - Hospital Simon Bolivar
Retrieved from White Arkitekter (Photo: White View)



Figure 29. View towards green atrium - Hospital Simon Bolivar
Retrieved from White Arkitekter (Photo: White View)

CASE STUDY 08: HOSPITAL SIMÓN BOLÍVAR

ANALYSIS

Highlights

- Patient-Centered Architecture
- Community-Based Design
- Human character and scale
- City scale: adapts to urban fabric
- Provides a healing environment for the users
- Green spaces: reconnect with the natural environment
- Structure: logic, clear and transparent
- Adaptability: urban fabric, security and climate conditions
- Boosts social interactions
- Transparent and dignified spaces
- Human contact / Less institutional feeling
- Balance between aesthetics and function
- Remains a city landmark with improved spaces and functions for the community
- Improves the neighborhood's living conditions and aesthetics
- Improved functionality and layout (staff, visitors, patients, community, technical)
- Fosters city and user mobility
- User wellness and interaction
- Sustainable and flexible proposal
- Open > Restrictive architecture
- Phasing: construction to be carried out while operating the building



Figure 30. Corridor view - Hospital Simon Bolivar
Retrieved from White Arkitekter (Photo: White View)



Figure 31. Patient room - Hospital Simon Bolivar
Retrieved from White Arkitekter (Photo: White View)

DESIGN COMMISSION



2.1. BACKGROUND INFORMATION

- 2.1.1. THE CLIENT: PETRÓLEOS MEXICANOS
- 2.1.2. THE CONTEXT: MINATITLÁN, MX
- 2.1.3. THE EXISTING HOSPITAL
- 2.1.4. THE HOSPITAL NEEDS



A PATIENT-CENTERED PROCESS

The design commission for this New Regional Hospital aims to start a dialogue within the architectural community and deliver new design possibilities in terms of healthcare facilities in Mexico. Therefore, its main purpose is to become an exemplary model throughout the region and act as working platform for medical attention, research and innovation.

This commission encompasses Evidence Based Design and Healing Architecture principles and translates them into a design proposal that places the final user –patients, staff and visitors- in the center of the process as each individual will inhabit and experience these new spaces differently. Thus, to support the project's design goal, the design guidelines lean towards providing a dynamic and welcoming environment through well-lit and open spaces with panoramic views towards green areas and with cozy atmosphere.

Finally, it is my main goal as an architect to deliver a proposal that will influence healthcare architecture within the Mexican context and provide dignified and functional spaces while reaching a social, urban and environmental cohesion with the community.

THE CLIENT

PETRÓLEOS MEXICANOS

HEALTHCARE SERVICES ADMINISTRATION



Petróleos Mexicanos (PEMEX) is a state-owned company in charge of producing, refining and distributing crude oil, natural gas and petroleum products (PEMEX, 2017). Upon its creation in 1901 and expropriation from foreign investors in 1938 by President Lázaro Cárdenas del Río, Pemex has monopolized the oil and gas industry in Mexico (PEMEX, 2017).

The Healthcare Services Administration was created in 1938 attaining to the current legal structure and health regulations. Up to this day, it provides treatment and social security services for all Pemex's employees and their immediate family. It follows a hierarchical structure similar to the Swedish Healthcare System in terms of levels of attention and specialization yet remains an autonomous institution but adhering to the state's regulations on health and welfare.

As of April 10, 2015, PEMEX Health and Welfare Administration comprises 211 healthcare facilities throughout the Mexican territory. Specifically, this commission seeks to provide a design solution for one of the six regional hospital in the system. Located in the city of Minatitlán and surrounded by an industrial, yet urban landscape, the Hospital Regional de Minatitlán started operating in 1967 and has been providing medical attention to the neighboring community for over 50 years.

The facility was expanded in 1985 to give way for the Pediatrics, Surgery, Emergency, Specialist Care Center, Administration and Patient Hotel Departments; and in 2012 the Emergency Center was upgraded to deliver an enhanced service for the patients. Throughout the years, the institution has been recognized for providing high-quality treatment based on the ISO Standard and the Mexican Healthcare System Standard (2000, 2005, 2006, 2008), a Smoke-Free Environment (2011) and Safe Environment for the Family (1994, 2006) (PEMEX, 2017). In terms of medical attention, the hospital serves approximately 150,000 patients throughout the region with a workforce consisting on over 1,000 medical, administrative and support staff.

THIRD LEVEL – HIGHLY-SPECIALIZED TREATMENT	
Central Hospitals	2
SECOND LEVEL – SPECIALIZED TREATMENT	
Regional Hospitals	6
General Hospitals	12
FIRST LEVEL – PRIMARY CARE	
Area Hospitals	3
Clinics	4
Primary Care Centers	31
Healthcare unit at workplaces	153

Table 3. PEMEX Healthcare System Structure. (PEMEX, 2017) (Martinez, 2017)

THE CONTEXT: MINATITLÁN, MX

MINATITLÁN, MÉXICO



Country	Mexico
State / Region	Veracruz de Ignacio de la Llave
Municipality	Minatitlán
Population	153, 393 Inhabitants (INEGI, 2015)
Founded	1822
Neighboring Cities	Coatzacoalcos (30 KM)
	Las Choapas (65 KM)
	Agua Dulce (65 KM)
Time Zone	UTC -6 (UTC -7 Summer)
Altitude	20 meters above sea level



Figure 32. Map of Mexico, state of Veracruz in orange.
Map of Veracruz, municipality of Minatitlán in orange. (INEGI ,2017) (Martínez, 2017)

THE CONTEXT: MINATITLÁN, MX

CLIMATE AND RAINFALL

SUN ANALYSIS

Climate	Tropical Wet / Dry
Rainfall	All-Year (June to January)

Month	Minimum	Mean	Maximum	Rainfall
January	17° C	27° C	42° C	105 mm
February	17° C	28° C	44° C	61 mm
March	19° C	31° C	42° C	38 mm
April	21° C	33° C	43° C	36 mm
May	22° C	35° C	43° C	86 mm
June	22° C	34° C	44° C	255 mm
July	22° C	33° C	40° C	273 mm
August	22° C	33° C	40° C	298 mm
September	22° C	32° C	43° C	429 mm
October	21° C	31° C	43° C	362 mm
November	19° C	29° C	39° C	208 mm
December	18° C	27° C	39° C	138 mm
Mean Temperature: 28° C Annual Rainfall: 2,289 mm				

Table 4. Temperature and precipitation levels in Minatitlán. Sistema Metereológico Nacional 2017

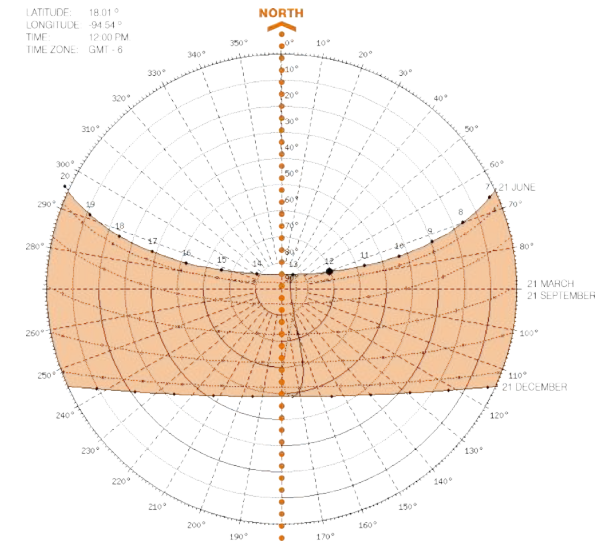


Figure 33. Sun path for the city of Minatitlán, MX (Martínez, 2017)

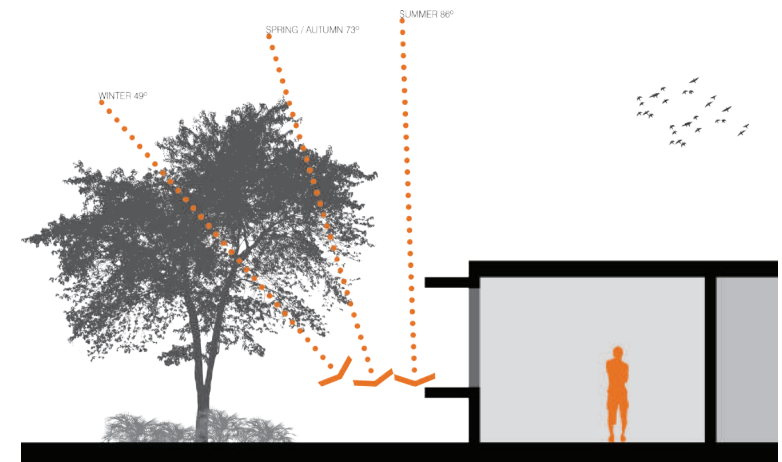


Figure 34. Sun angles (Altitudes) for the site. (Martínez, 2017)

THE CONTEXT: MINATITLÁN, MX

Part of the municipality's agenda is dedicated to the ongoing security crisis that embattles the Mexican Government. Spread all over the territory, drug-related crimes and violence have struck the Mexican population having an extensive impact on their lifestyle.

For example, in 2015 state officials reported 17,013 homicides compared to the 15,653 from the previous year (Sistema Nacional de Seguridad Pública, 2016); most of them related with the current war between drug cartels and the government.

The following diagram (*Figure 35*) illustrates the main actors and reasons that threaten the state of peace and security within the region and the repercussions they have in local architecture.

As designers, we must analyze the impact that insecurity has on our proposals. For instance, security check-points and fences are commonly associated with three main components of insecurity: informal business, soliciting and drug war; and pose a risk to the economic and social welfare as they drive retailers, service providers and individuals to an enclosed and sheltered environment where they remain oblivious of what is happening outside their refuge.

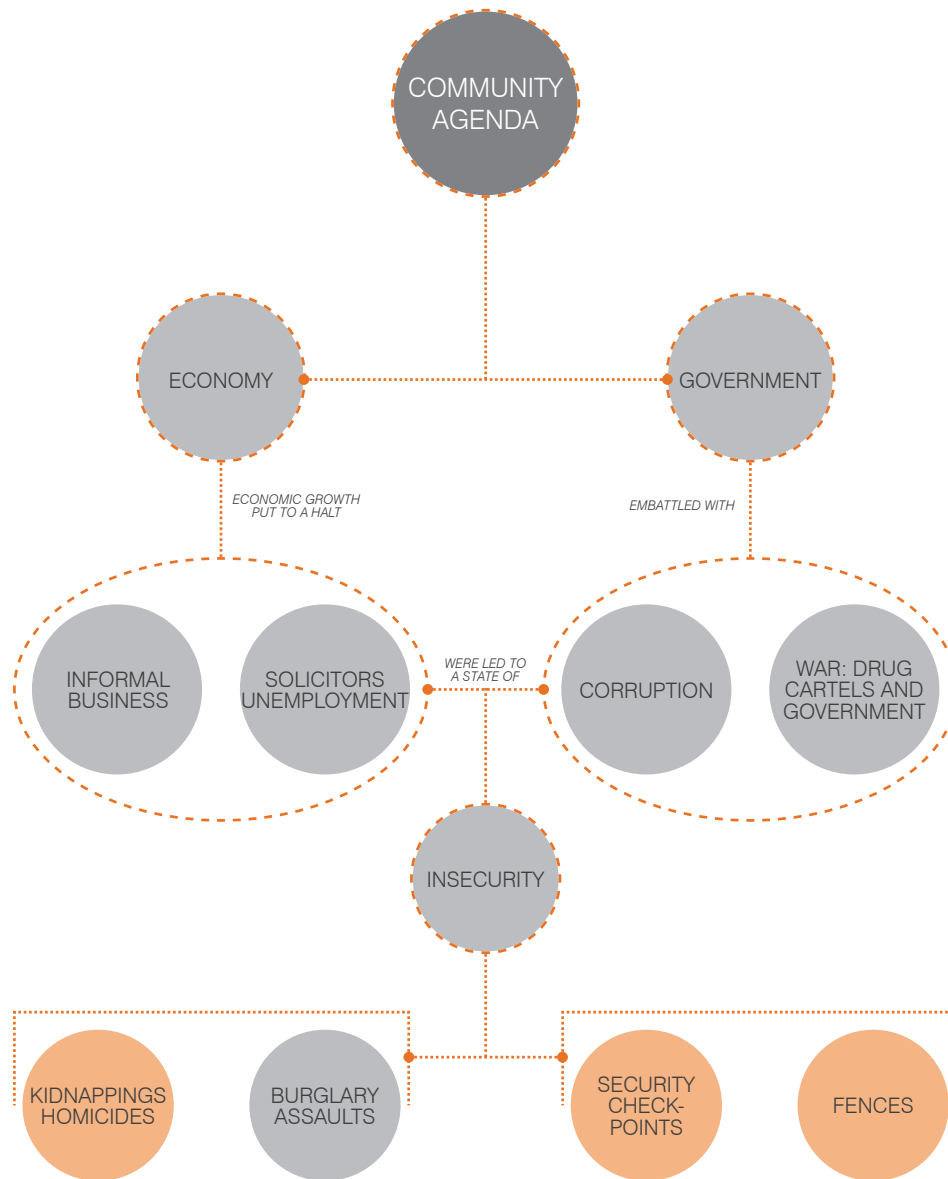


Figure 35. Insecurity: reasons and consequences (Martínez, 2017)

THE CONTEXT IN PICTURES

Minatitlán is an industry-oriented municipality with a low-rise skyline and constructions soaring up to two or three levels. This, along with the large number green areas, bestows upon the town a warm and suburban character. Nonetheless, the influx of people commuting to the city on a daily basis to do business, has led to an increasing car culture that sustains an immense environmental impact on the city.

From an architectural standpoint, the buildings bear an unwelcoming and restrictive character upon them and are usually blind towards the street. As a response to the increased number of burglaries, kidnappings and insecurity in general, architecture had to adapt to these conditions in order to provide a so-called *secure environment* for the users.



Figure 36. Coatzacoalcos-Minatitlán Highway.
Main Street - March 2017



Figure 37. Coatzacoalcos-Minatitlán Highway
Main Street - March 2017



Figure 38. View towards Heróico Colegio Militar Avenue before
entering the hospital district - March 2017

THE CONTEXT IN PICTURES



Figure 39. Heróico Colegio Militar Avenue
Green zones and retail areas - March 2017



Figure 40. View towards Parque Reforma from
Heróico Colegio Militar Avenue - March 2017



Figure 41. Retail buildings (Oxxo and Crediland) and parking lot adjacent to the plot. View from
Heróico Colegio Militar Avenue and 12th Street - March 2017



Figure 42. Parking Lot, Crediland (Retail Building) and Residential
area adjacent to the plot. View from 12th Street - March 2017

THE CONTEXT IN PICTURES



Figure 43. View from C Street towards Parque Reforma and Residential Zone next to the plot - March 2017



Figure 44. View from 18th Street towards Residential Zone behind the plot - March 2017



Figure 45. Mixed-Used buildings (Retail and Residential) along 12th Street and facing the existing hospital - March 2017



Figure 46. View from 12th Street towards Parque John John - March 2017

The existing regional hospital is located within the city center of Minatitlán, Veracruz. It can be reached through private and public transportation -such as bus lines and taxi- and it is one of the city landmarks as it constitutes a reference point for both the people transiting through the area and city locals.

The plot is surrounded by a mixed-use district consisting of housing, retail and industrial areas in the proximity; specifically single and multifamily housing blocks, shops, restaurants and health-related services such as gymnasiums, pharmacies, private practices, among others.

Though the hospital has a strong link with the community and has a huge impact on its daily life, their relationship fails to be completely successful. The physical barriers and poor of urban integration prevent the building and its users from creating a clearer and more cohesive liaison and cooperation.

The size of the plot and the increasing demand on health services provide the client with an opportunity to create an open hospital that addresses the current and future needs in terms of technology, flows, processes and design. Moreover, the proposal must be able to adapt to forthcoming requirements, be flexible, resilient, and foremost, place the patient in the center of the process.

One of the challenges from this project is the possibility to enable the building to easily adapt to future changes when it comes to technology or procedures. Throughout time, the structure has suffered several upgrades and modifications to allow new technology inside. Nonetheless, it is no longer possible to grow or provide qualitative architecture that complies with current requirements for it is not economically or logistically feasible to do so. Therefore, a masterplan needs to be sketched in order to address these pressuring problems.

Likewise, the unit shows a high amount of mixed flows, especially between patients and staff. Hence, the new hospital must have a better flow control to avoid undesired mixing between patients, visitors, staff, technical and goods and provide a safer environment for everyone.

Finally, the environmental impact the current building has on the community must be taken into consideration and reduced. Nowadays, the facility shows a considerable amount of energy loss through cooling and electricity in direct relationship with the existing -or rather absent- sun control devices. It proves to be important indeed to provide a well-lit environment that remains at a decent temperature for the duration of the work shift. Furthermore, a project of this size must be able to reduce the energy loss and consumption and eventually, satisfy its demands by producing its own energy through solar panels or similar technology.

FLOWS AND LAND USE ANALYSIS

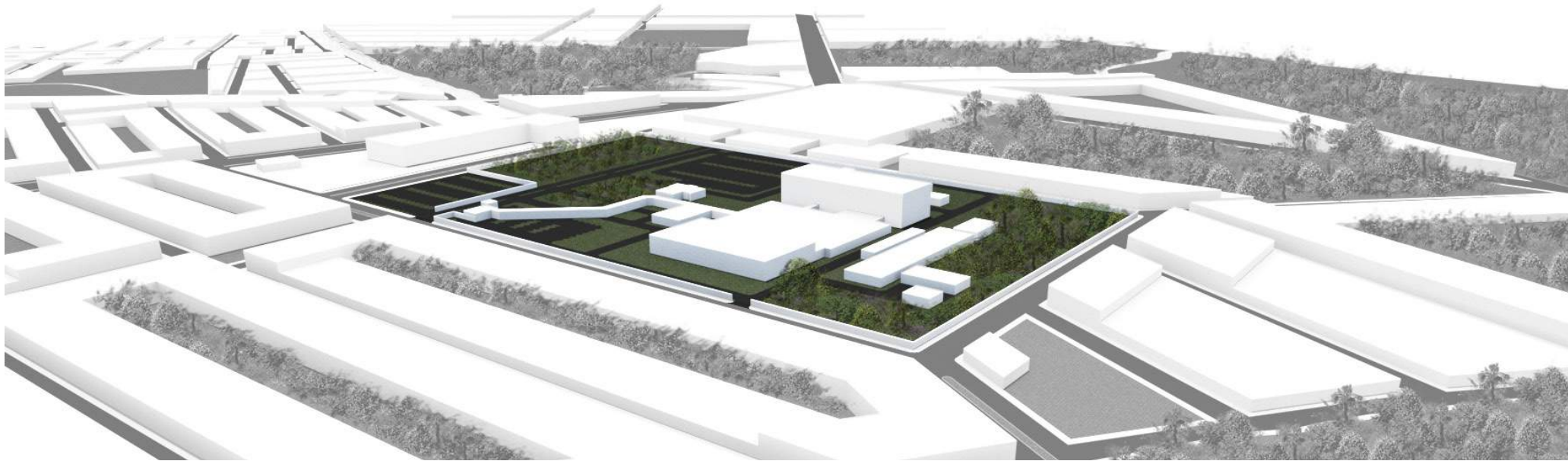
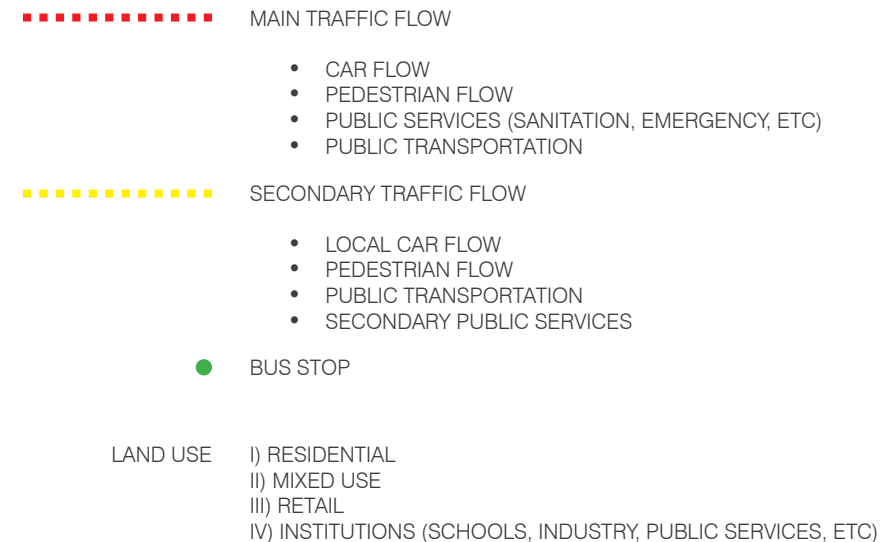


Figure 47. Aerial perspective from the existing hospital. 3D Rendering. (Martínez, 2017)

The land use analysis shows that the facility sits among a diverse district consisting of residential and retail zones with health-related services. Within a 1.0 km radius, the property use ranges from schools, gas stations, restaurants and minimarkets, to pharmacies, medical supplies stores and private clinics. The remainder comprises parks and green spaces, as well as residential areas with no more than two levels built upon the plots.

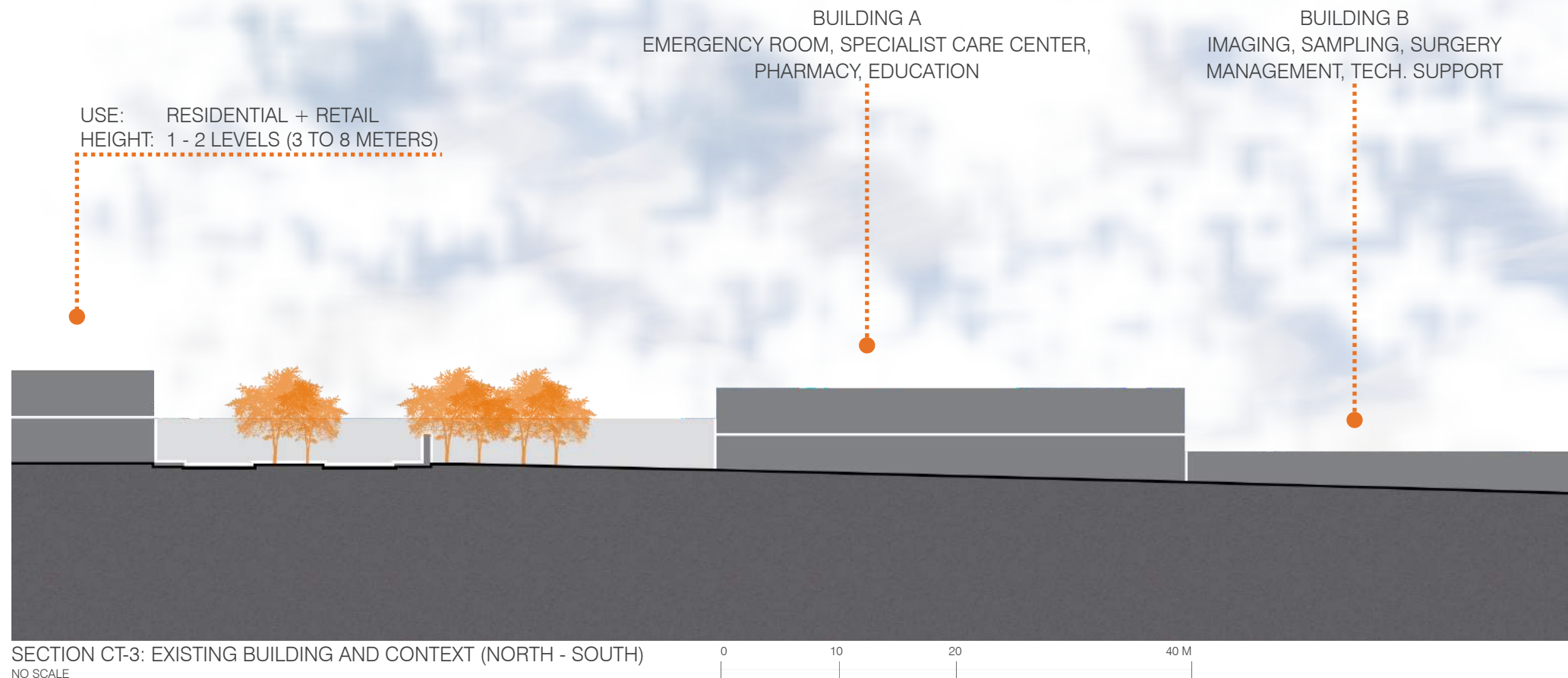
In terms of mobility, the analysis illustrates the two main patterns going around the property: the Main Flow (Red) that comes from the highway into the main street to later feed the Secondary Flow (Yellow) connecting with local streets circling the property. See diagram page 71.





URBAN PLAN
NO SCALE

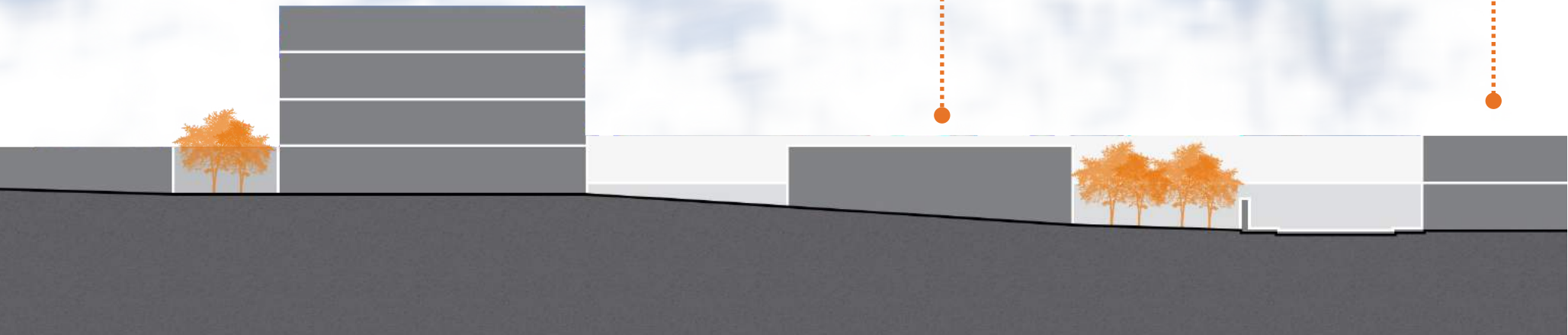
URBAN SECTION



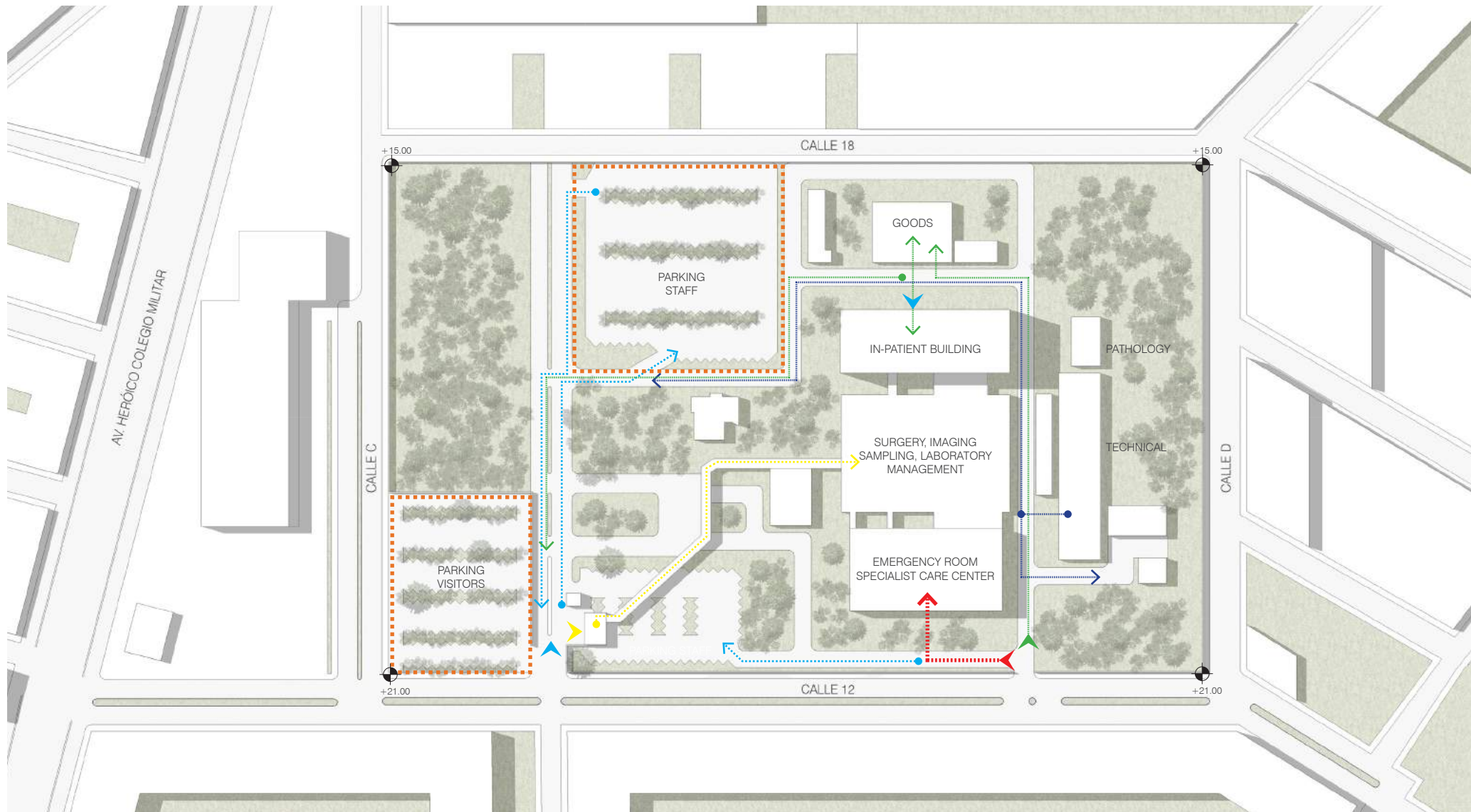
BUILDING C
CAFETERIA, REHABILITATION
TECH. SUPPORT, IN-PATIENT ROOMS

BUILDING D
GOODS STORAGE / PROCESSING
STORAGE ROOM

USE: RESIDENTIAL
HEIGHT: 1 - 2 LEVELS (3 TO 8 METERS)



SITE ANALYSIS



 SITE PLAN
NO SCALE

 PARKING
 PATIENTS

 GOODS
 STAFF

 TECHNICAL
 AMBULANCES

SWOT ANALYSIS

Resilience	Reduce energy loss, consumption and produce energy
Plans towards the future: Grow and Develop	Provide dignified and warm spaces
Highly trained medical staff	Develop the Health Promotion Department
Site: Enough space to grow	Create a Research and Innovation Center
Site: Good location	Create a Rehabilitation Center and Therapeutic Garden within the Traumatology and Rehabilitation Deptment
State of the art technology	Enable retail possibilities
	Connect with the neighboring community
STRENGTHS	OPPORTUNITIES
WEAKNESSES	THREATS
Mixed flows: Goods, Staff, Patients, Visitors, Technical, Emergency	Structure: New technology not compatible with structure / layout
Security concerns: Solicitors, Violence, Privacy	Structure: Ageing structure, insufficient space between floors
Structure: Dimensions, Low Ceilings	Operation: Increasing demand
Structure: Ageing structure, insufficient space between floors	Operation: Maintenance costs
Operation: Increased operating costs	Layout: New workflows / Processes
Operation: High Energy Consumption	Design: Patient-Centered Architecture and Evidence-Based Design
Sun protection: non-existing	
Design: Exposed piping / technical installations towards patient areas	
Design: Poor staff areas, Not a Patient-Centered Design	
Layout: Long distances (Drop-Off to Main Lobby, Between Departments)	
Layout: Can't grow or expand within existing building	
Layout: Not flexible, can't expand or cope with future technology	
Layout: Inconsistent structural layout and window placing	
Layout: Not a logic layout	

THE EXISTING HOSPITAL IN PICTURES



Figure 48. Main Entrance - Hospital Regional de Minatitlán PEMEX
Minatitlán, MX - March 2017



Figure 49. Drop Off - Hospital Regional de Minatitlán PEMEX
Minatitlán, MX - March 2017



Figure 50. Emergency Entrance - Hospital Regional de Minatitlán PEMEX
Minatitlán, MX - March 2017



Figure 51. View from 18th Street - Hospital Regional de Minatitlán PEMEX
Minatitlán, MX - March 2017

THE EXISTING HOSPITAL IN PICTURES



Figure 52. View from inside the property towards the in-patient building
Hospital Regional de Minatitlán PEMEX. Minatitlán, MX. (Martinez, 2017)



Figure 53. View towards the in-patient building
Hospital Regional de Minatitlán PEMEX. Minatitlán, MX. (Martinez, 2017)



Figure 54. Main laboratory, Sampling Department
Hospital Regional de Minatitlán PEMEX. Minatitlán, MX. (Martinez, 2017)



Figure 55. View towards the in-patient building from Level N1 waiting area
Hospital Regional de Minatitlán PEMEX. Minatitlán, MX. (Martinez, 2017)

THE EXISTING HOSPITAL IN PICTURES



Figure 56. Specialist Care Center for Adults. Main corridor to the examination rooms
Hospital Regional de Minatitlán PEMEX. Minatitlán, MX. (Martínez, 2017)



Figure 57. Examination room. Dermatology Department
Hospital Regional de Minatitlán PEMEX. Minatitlán, MX. (Martínez, 2017)



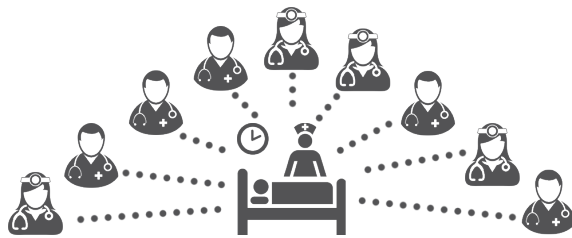
Figure 58. Specialist Care Center for Adults. Staff corridor
Hospital Regional de Minatitlán PEMEX. Minatitlán, MX. (Martínez, 2017)



Figure 59. In-Patient room. Surgery Department
Hospital Regional de Minatitlán PEMEX. Minatitlán, MX. (Martínez, 2017)



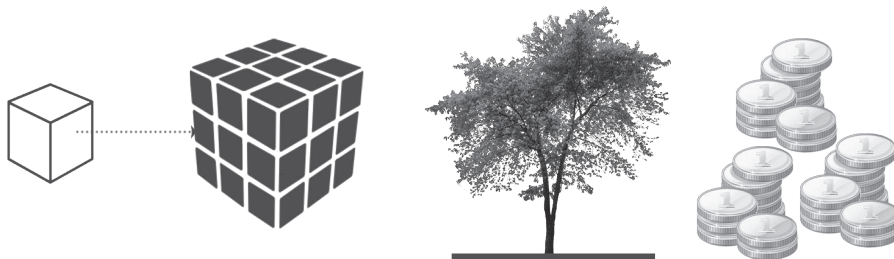
01: Day Surgery and Outpatient Facilities



02: Patient-Centered Treatment



03: Healing Architecture: Proper facilities for patients and staff



04: Adaptability / Flexibility, Economy and Sustainability

DAY SURGERY AND OUTPATIENT FACILITIES

- Provide one or two outpatient surgery rooms, pre and post operation areas and administrative spaces. These can be combined with the standard Surgery Department to make a more efficient use of resources.

PATIENT-CENTERED TREATMENT

- The patient should be placed in the center and be considered throughout every step of the process: empower the patient.

HEALING ARCHITECTURE: PROPER FACILITIES FOR PATIENTS AND STAFF

- Provide a homelike environment for the patients and their relatives with nice views and warm materials that boost the recovery process
- Provide a logic and clear structure that will allow the patient to navigate through the building and increase the efficiency levels on the staff as it will reduce transportation times
- Provide daylight into the building; Human, open and warm spaces for patients and staff where they can perform their daily routines

ADAPTABILITY/FLEXIBILITY : ECONOMY AND SUSTAINABILITY

- Cope with future changes, be able to adapt and reinvent
- Be able to rearrange the floor layout with ease
- Make an efficient use of the resources, reduce energy loss and consumption and increase the lifespan of the building.
- Be flexible, inventive and environmental friendly
- A green hospital that can produce its own energy

DESIGN BRIEF

COMMISSION

The submission should:

- Refurbish the existing building; or
- Propose a new volume to house the hospital functions

EXISTING SERVICES

- | | |
|---|---|
| <ul style="list-style-type: none">• Emergency Room• Rehabilitation and Orthopedics• General and Staff Services<ul style="list-style-type: none">- Lunch Room- Pharmacy- Prayer Room• Learning and Training• Imaging• Pathology• Sampling and Blood Bank• Surgery• In-Patient Wards<ul style="list-style-type: none">- Intensive Care Unit- Neonatal Intensive Care Unit- Gyneco-Obstetrics- Pediatrics- Internal Medicine | <ul style="list-style-type: none">• Nephrology: Dialysis and Hemodialysis• Specialist Care Center• Administration<ul style="list-style-type: none">- Management- Human Resources- Finances & Acquisitions- TI and Telecommunications• Goods and Storage• Technical Areas• Ambulance parking and Dispatcher• Staff parking• Visitors parking |
|---|---|

DESIRED SERVICES

- Day Surgery / Outpatient Department
- Research and Innovation Center
- Health Promotion + E-Health Department
- Morgue
- World-Class facilities for the existing departments
- Staff Parking

GOALS

- Reduce energy loss and consumption and produce its own energy through solar panels. Become a green hospital.
- Be cost effective. Become a role model for similar facilities in the country.

STATISTICS

- Beds
 - In-Patient Beds: 90
 - Non-countable beds: 30
- Staff: 1,000 workers (Doctors, Nurses, Administrative and Support)
- Patients: ca 150,000 from throughout the region
- Parking Places
 - Staff: 246
 - Visitors: 60
 - Ambulances: 10

DESIGN BRIEF: PROGRAM BREAKDOWN

HOSPITAL FUNCTIONS		
DEPARTMENT	UNITS	SURFACE
Emergency Room	10 beds	1,370
Pharmacy		306
Education		582
Sampling		457
Pathology		234
Imaging		200
Surgery (Operation Rooms)	4 OR	482
In-Patient Ward (Surgery)	30 beds	1,730
Specialist Care Center	30 exam	2,000
Gynecology + Pediatrics	30 beds	1,730
Dialysis, Internal Medicine, ICU	30 beds	1,730
TOTAL		11, 396 m ²
SUPPORT FUNCTIONS		
General Services, Linens		48
Kitchen		289
Cafeteria		150
Staff Union		36
Changing Rooms (Staff)	2	128
Pest Control		50
Management		1,095
IT - Telecommunications		134
Transportation		266
TOTAL		5,668 m ²

TECHNICAL FUNCTIONS		
DEPARTMENT	UNITS	SURFACE
Power Plant		224
Emergency Plant		20
Workshops	2	310
Water Treatment		194
Cryogenic Tank	1	
Heaters + Boilers	4	
Cooling Towers	5	
Centrifuges	4	
Administration (Maintenance)		179
Waste (Bio-Hazard, Regular)		136
TOTAL		2,267 m ²
GOODS + STORAGE		
Storage		167
Administration		884
TOTAL		1,051 m ²
PARKING		
P-1: Medical Staff	193	
P-2: Administrative Staff	53	
P-3: Ambulances	10	
P-4: Visitors	60	
TOTAL		316 Places
TOTAL SURFACE		20,742 m ²



2.2. DESIGN PROCESS

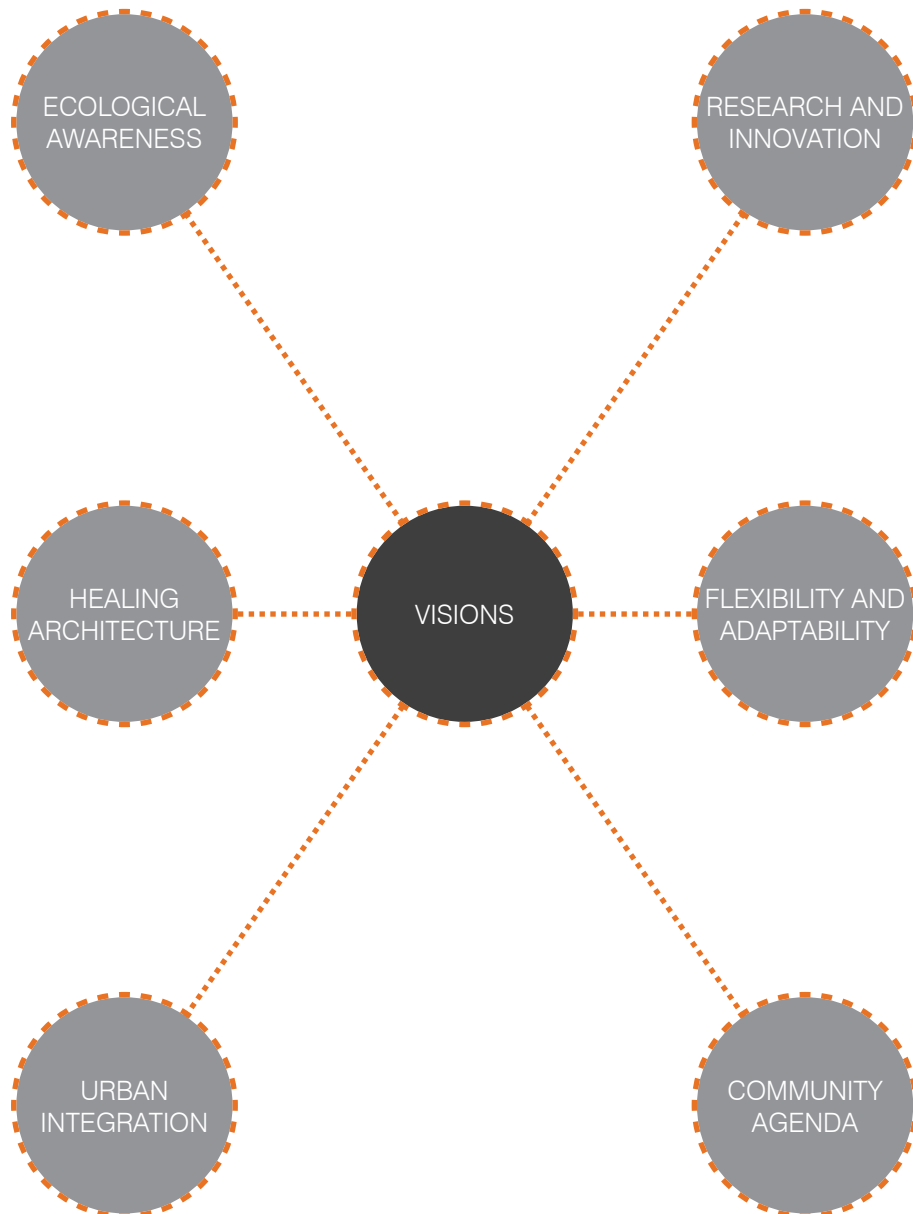
- 2.2.1. VISIONS
- 2.2.2. DESIGN STRATEGIES
- 2.2.3. LAYOUT ANALYSIS



ENVISIONING A NEW FACILITY

In order to provide a supportive and restorative environment for patients and staff, enable the patient's recovery process through healing architecture, reduce the overall environmental impact from the building and deliver a sustainable healthcare facility able to cope with future demands, the new hospital must be designed and built on strong values deeply connected with the community where it stands, in dialogue with the client's philosophy and a commitment towards social responsibility and sustainable development.

Therefore, this design commission has been sketched upon six pillars or values that will guide the project towards a sustainable development, enable a Patient-Centered Philosophy and act as catalysts for change in the future. The main vision for this project is for it to be a model to follow in terms of patient treatment, workplace culture, research and innovation while being able to adapt and evolve to forthcoming changes and procedures.



ECOLOGICAL AWARENESS

Following a green perspective and aiming towards an ecological commitment, the project for the new hospital will encompass different systems that will allow an efficient operation whilst reducing the energy lost and consumed. Moreover, it will promote the use of green energy such as electricity through solar panels and reusing rain water collected from the roofs.

- Reduce the amount of energy lost and consumed through efficient cooling, lightning and glazing; bring daylight into the building to reduce the amount of electricity used on artificial lightning
- Use of solar panels to produce and provide the hospital with green energy
- Collect storm water to be reused for the building services and gardening
- Design green roofs to reduce the amount of heat transmitted through the slabs; use of low-transmittance windows to reduce the amount of heat transmitted to the building
- Promote the use of local materials and building techniques to reduce the environmental impact

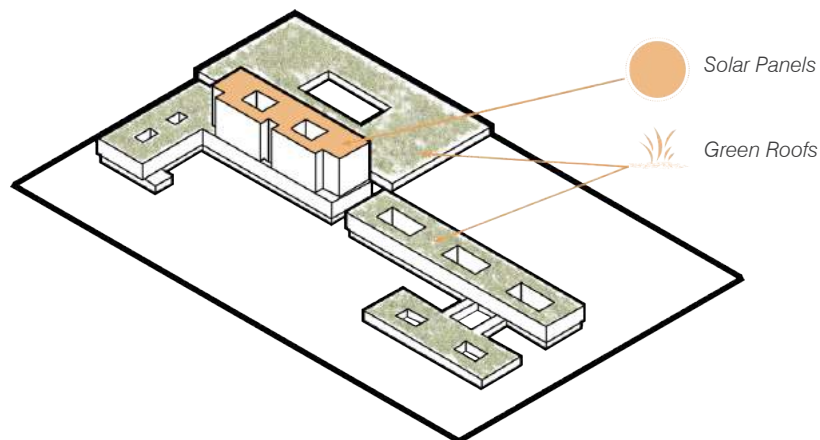


Figure 60. Solar Panels and Green Roofs. Reference image. (Author: Unknown, 2017)

HEALING ARCHITECTURE

DAYLIGHT

Daylight must reach every room within the building through skylights or floor-to-ceiling window panels. Sun protection will be present along the façades (lattices or louvers and low heat transmission glazing) to reduce the indoor temperature and sun exposure and lower the energy consumption linked with the cooling system. Based on EBD and healing architecture theories, daylight will improve the staff's performance and act as catalyst in the patient's recovery process.

WAYFINDING AND PATIENT CENTERED PROCESS

LOGIC AND CLEAR STRUCTURE

Patients must be able to find their way through the patient areas inside and outside the building without additional help or delays. Furthermore, the patient must be in the center of the treatment and recovery process. Staff will benefit from this as well for it will provide an organized and clear structure that translates into an efficient workflow and working process.

SINGLE ROOM: PRIVACY, SENSE OF SECURITY AND WARM ATMOSPHERE

Recent studies have shown that providing single bedrooms instead of the widely used double-bedroom layout enhances the recovery process, strengthens the patient's self-esteem, provides a secure and warm environment and reduces the risk of disease transmission through air or exposure.



Figure 61. Landscape, Nature and Healing Architecture. Reference image (Martínez, 2017; Unknown)

URBAN INTEGRATION & COMMUNITY AGENDA

Evidence-Based Design has stressed the importance of creating a social environment and how these interactions improve our overall health (physically and mentally), mood and quality of life. Hence, the new hospital will strive to have a closer connection not only with the urban fabric but with the community itself through an open and welcoming atmosphere, green spaces and dynamic spots for the users and the neighboring community. Apart from boosting the overall mood from the patients, visitors and staff, this will also set the foundations for a sense of belonging and responsibility with the community and environment.

To understand how social interactions are established and their repercussions on the patients, visitors, staff and community, an urban analysis was carried out throughout the district in order to set the following goals:

- Strengthen the context's identity and remain a city landmark to create an enduring sense of belonging and social responsibility. The hospital should remain as a reference point for the users passing by.
- Provide common and dynamic spaces for the staff, patients, visitors and residents from the neighborhood to secure social interactions between the users and the community. These places should be green, open and provide a visual connection with the street.
- Provide a secure, nurturing and welcoming environment with a human scale and humanistic approach and remove the sense of estrangement or alienation from the user.

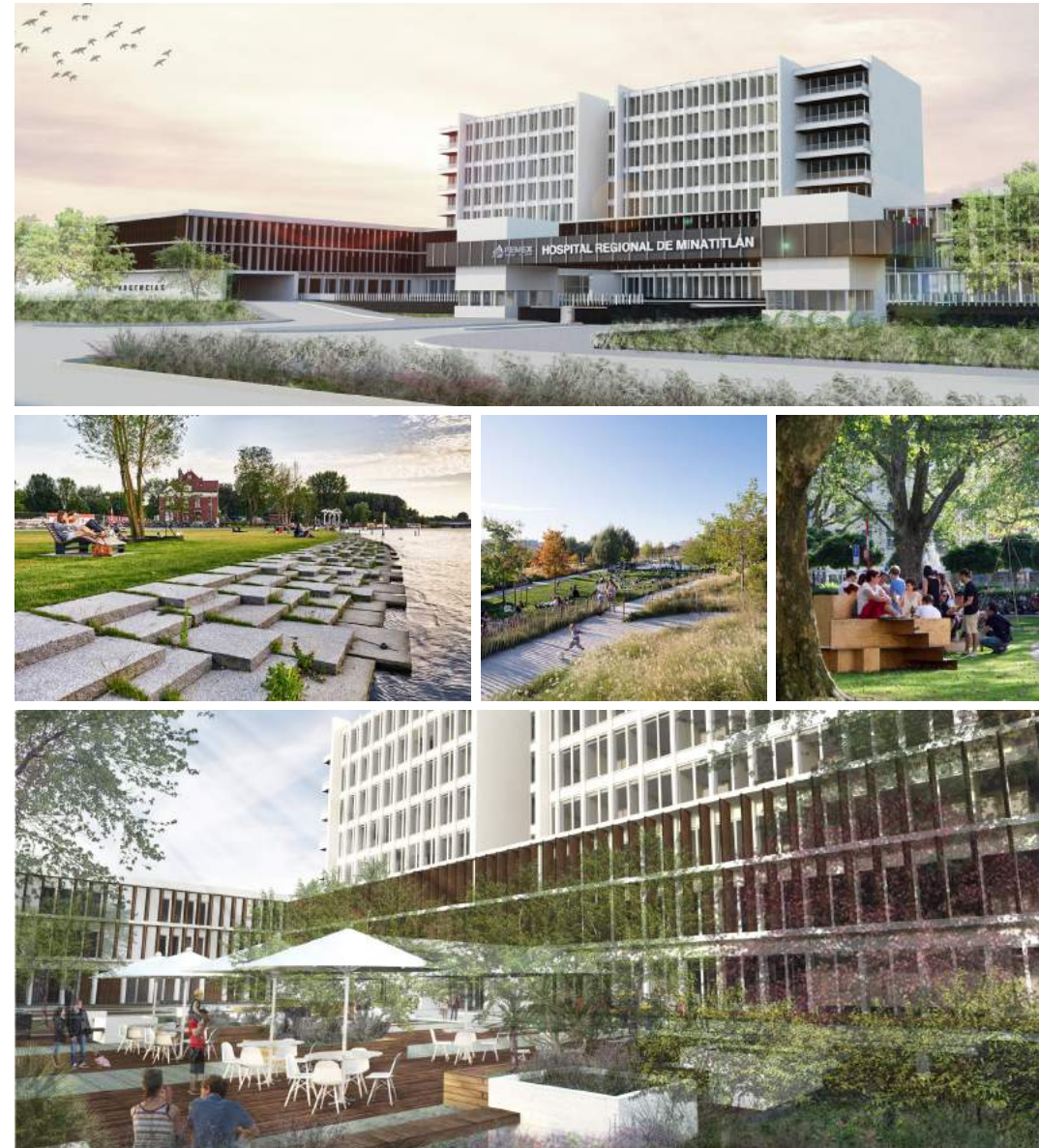


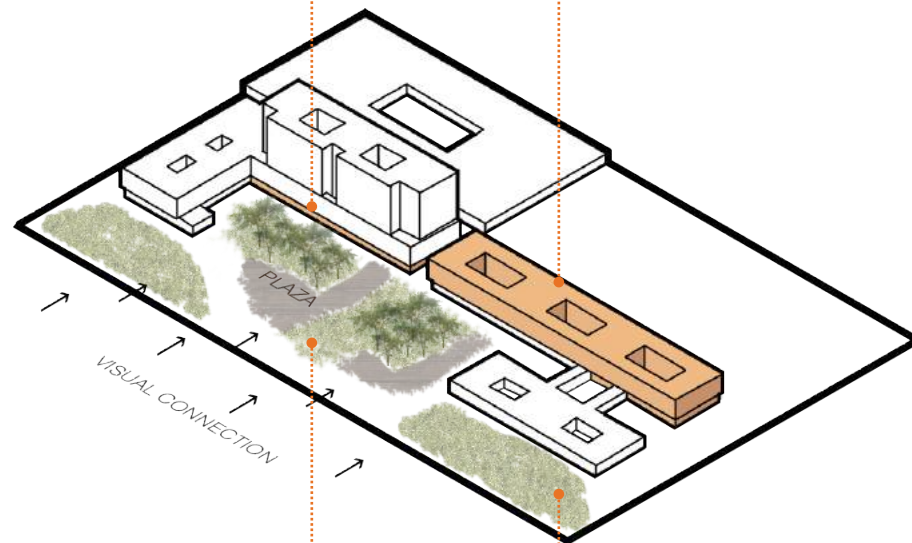
Figure 62. Parks, landscape and interaction. (Ar, 2015; Van Dijk, 2016; Marbacher, 2013; Martínez, 2017)

Open Services
(Staff, Patients, Community)

- Cafeteria / Coffee Shop
- Chapel

Open Services
(Staff, Patients, Community)

- Research Center
 - Media Labs
 - Library
 - Seminar Rooms
 - Auditoriums
- Health Promotion and Education
 - Classrooms
 - Media Labs
 - Counseling and Treatment
- Fitness Center



Open Spaces
(Staff, Patients, Community)

- Access Plaza
 - Retail
 - Social interaction
 - Restorative Space

Open Spaces

- Landscape / Greenery
 - Gardens
 - Courtyards
 - Green Roofs

- Greenery must play a center role into the design as it will filter the views where necessary and nest the different functions being carried out in the access plaza towards the street.
- Keep the patients and the community in the center of the process.
- Employ local workforce or businesses to give something back to the community.
 - The cafeteria, for example, can be managed by a third party.
- Open architecture: favor visual and physical connections towards the hospital and the street.
- Offer several degrees of transparency and dynamism from the building towards the context. This will allow different kinds of interactions depending on the user's location.
 - For example, a patient can decide whether to contemplate the urban skyline from his or her room, take a walk through the access plaza or meet their relatives for a coffee on downstairs.
- The facility should be seen as an open and transparent space that allows social interactions and serves the community.
- Provide open services for the community such as Health Promotion, Research Center, Computer Labs, Auditoriums, etc.

RESEARCH AND INNOVATION

Nowadays, it is imperative for any healthcare facility to become a center of knowledge through practice, research and innovation. Moreover, with new treatments and technology being developed as we speak, it is important for the staff to be continuously trained and kept updated on new medical trends in order to provide a world class service. Finally, patients have entered an era where they play an active role on their recovery process and can, in fact, prevent such ailments through a Health Promotion and Education Program. Hence, the hospital should be designed bearing in mind that such connection with the community should exist in order to prevent and educate people about diseases.

- Develop a Research and Innovation Center
 - Dynamic and creative environments to produce knowledge through research and practice
 - Transform the hospital into a knowledge and innovation hub
 - Collaborate with external researchers and universities within the country and from around the world to establish a network of knowledge and cooperation
- Promote health awareness and illness prevention in the community through a Health Promotion and Education Department with weekly seminars on disease prevention and E-Health and Distance Treatment technology.
- Promote a continued training culture on the staff on relevant topics within their field, new treatments and technologies and how the hospital can benefit from them

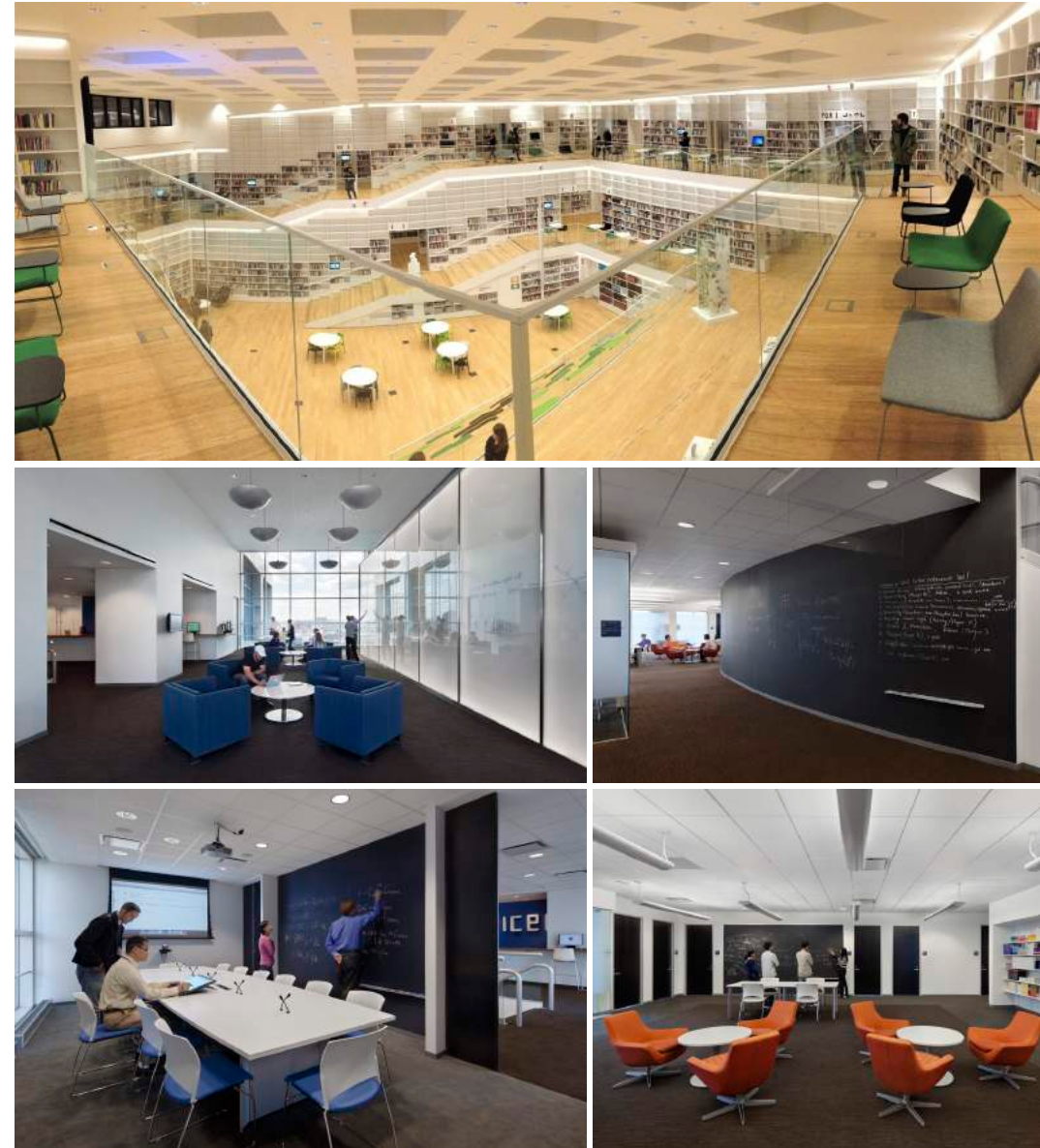


Figure 63. Flexible Spaces, Seminar Rooms and Library. Reference image (Martínez 2016; Moran 2012)

FLEXIBILITY AND ADAPTABILITY

The ability of any given structure to withstand future changes in technology or processes is necessary to guarantee its continuity and sustainability. This new facility will be designed with generality, flexibility and adaptability principles to allow new configurations, procedures and equipment in the future. The hospital must endure an unstable environment politically, socially, economically and environmentally speaking; and be able to be built while the existing building remains in operation.

- The hospital must be able to change and adapt to the current needs and stay relevant and updated in terms of infrastructure and technology
- Future Proofing: the facility can be expanded up to a 30% in the future
- Static cores in the middle of each volume to provide space for installations and circulation cores, making the outer part of the building 100% flexible
- The distances between slabs (4.90 meters) allow the spaces to be easily reconfigured should it be necessary due to bigger equipment.
- The 12 meter grid provides a high degree of flexibility as the basic module can be transformed into examination rooms, dialysis lounges or even operation theaters due to the 1.50 meters sub grid connected with the façade.
- Dynamic spaces for staff and patients that can be reorganized according to their purpose

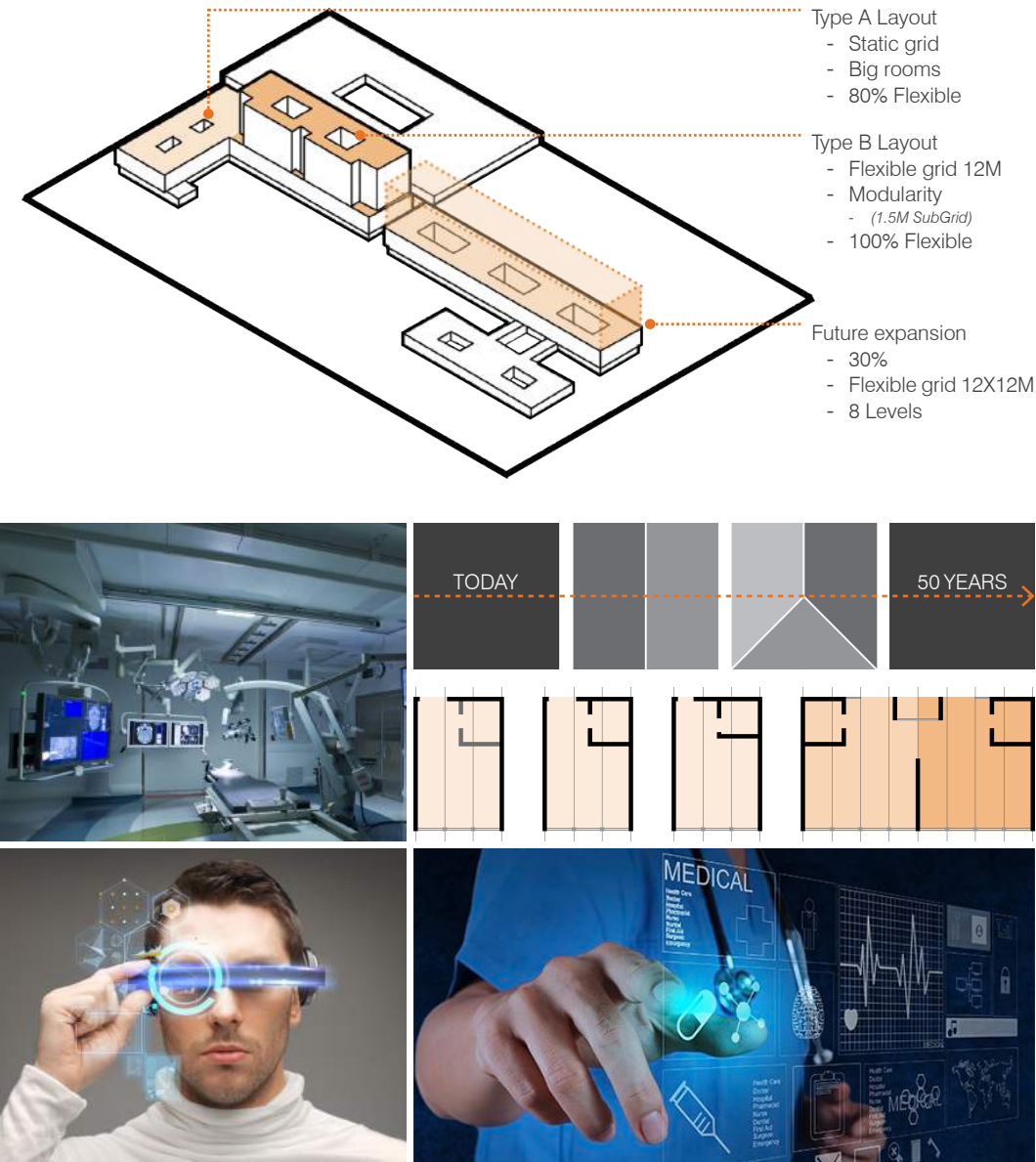
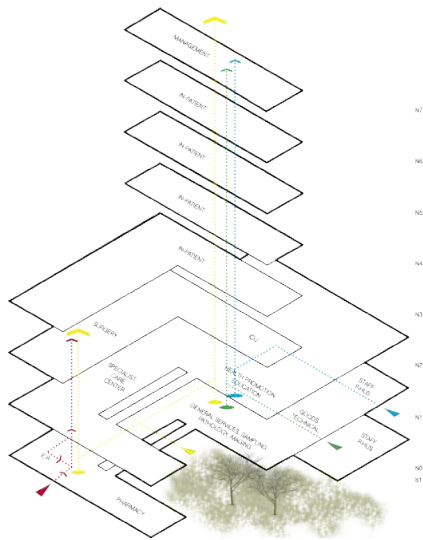


Figure 64. Future Proofing, Modularity and E-Health. Reference image (Martínez, 2017; Unknown)

LAYOUT ANALYSIS V01



POSITIVE

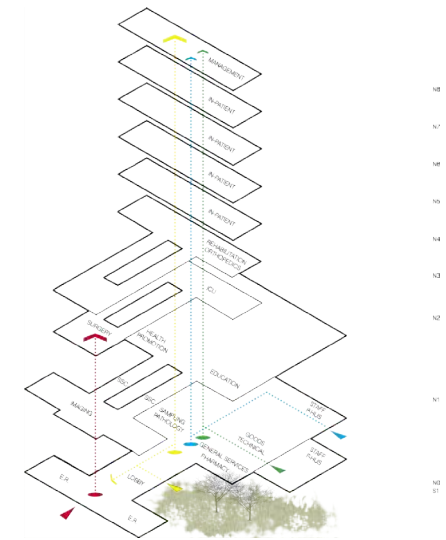
- C-Shape layout with focal points towards the city skyline and landscape
- Green landscape and courtyards
- Condensed layout
- Defined volumes: Action, Treatment and Resting
- Daylight
- Defined flows and entry points

NEGATIVE

- Closed towards the street
- Unwelcoming and restrictive
- Half of the plot surface left unused
- Circulation cores: not an efficient layout in terms of patient and emergency transport
- ER and Surgery are isolated from the rest of the complex and reduce staff efficiency
- This layout proves to be inefficient and increases transportation time and reduces staff efficiency



POSITIVE	NEGATIVE
<ul style="list-style-type: none"> Mixed-Shape layout Defined flows and entry points: Emergency, Patients, Staff, Goods Courtyards, light wells and green areas surrounding the building Condensed layout Dynamic or Treatment areas facing the courtyards 	<ul style="list-style-type: none"> Circulation cores, department placing and distances: Inefficient layout, long distances, transportation times and poor way-finding. Emergency department is isolated from the rest of the hospital functions on ground floor. Oversized public functions on ground floor that break or isolate the departments. 50% of the plot surface left unused. Closed towards the street. Bunker-like feeling: unwelcoming and restrictive Goods cannot be distributed to all the departments Patients have to cross departments to reach their destination





- Visual connection with the street
- Courtyards and functional green roofs
- Possibility to expand to the rest of the plot
- Defined flows and entry points: Emergency, Patients, Staff, Goods
- Defined volume: treatment and resting areas
- Connects with the context and interacts with the urban fabric
- Circulation cores laid out in a way that allow different department configuration

QUESTIONS

- Will the corner plazas be really used?
- How will the Goods arrive?
- How will the hospital expand towards the eastern side of the plot?



ADVANTAGES

- Has a visual connection with the street and invites the people inside to create a social atmosphere
- Has defined flows and entry points for staff, patients, visitors and goods
- Volumes set according to function: Treatment, Recovery, Collaboration and Management.
- Efficient layout with two circulation cores to transport the patients throughout the building, a dedicated core for staff, emergency and bed transport to reduce distances, transportation times and increase efficiency.
- Goods core located on the corner to reach every floor and department.

QUESTIONS

- How will the users inhabit the building?
- How will the community approach the hospital and make use of it?
- How will the hospital expand and cope with future changes?
- Will it be a hub for research and innovation?



■■■■■■■ PATIENTS/VISITORS
 ■■■■■■■ EMERGENCY
 ■■■■■■■ STAFF
 ■■■■■■■ GOODS

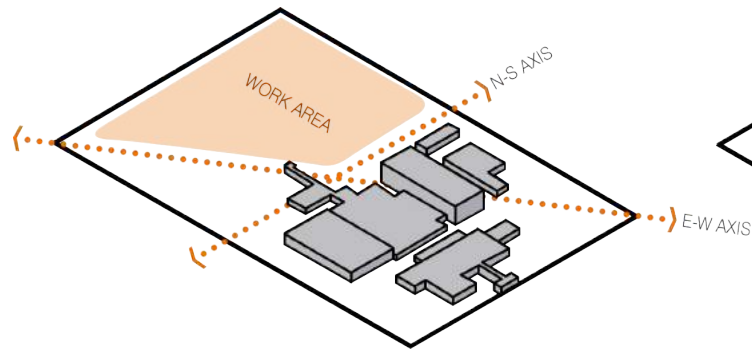




2.3. DESIGN COMMISSION

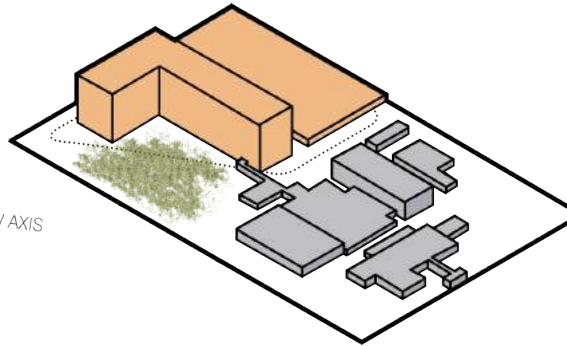
- 2.3.1. DESIGN CONCEPT
- 2.3.2. MASTER PLAN
- 2.3.3. PHASING
- 2.3.4. SCHEMATIC LAYOUT
- 2.3.5. PROGRAM
- 2.3.6. FLOORPLANS
- 2.3.7. ELEVATIONS
- 2.3.8. SECTIONS AND DETAILS
- 2.3.9. MATERIALITY

CONCEPT



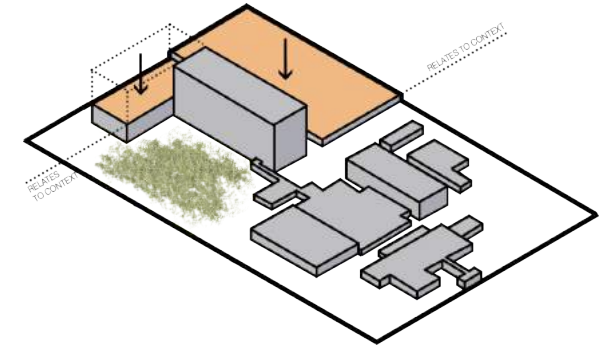
PHASE 01: SETTING THE LIMITS

Two main axes are laid out in order to create a Work Area for the project: a North-South Axis to enable a visual and physical connection between 12th and 18th Street; followed by a secondary axis on a Northeast-Southwest direction where two street nodes meet each other. This axes set the limits for the upcoming volumes and allow them to be built while the existing facility remains in operation.



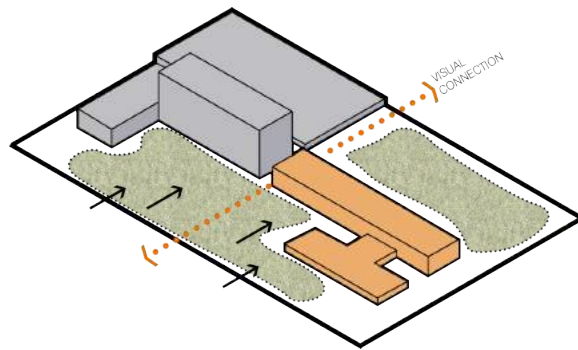
PHASE 02: A NEW VOLUME

A new volume is placed within the site, in constant dialogue with the context and the design guidelines. It should unify the design program and provide qualitative spaces for the user. The L-shaped volume will house the hospital functions while a rectangular volume will serve as the new staff parking building.



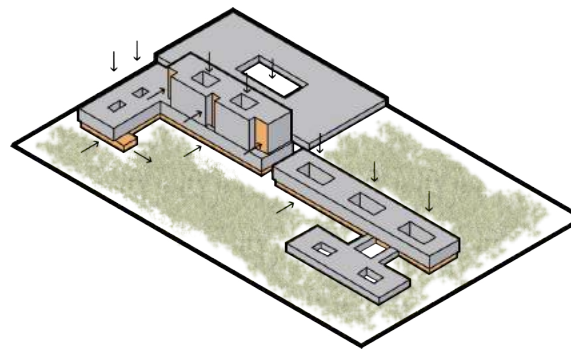
PHASE 03: HUMAN SCALE

It is important to keep a close relationship with the context and the users. Therefore, the proposal adjusts its height to break the volume down and provide a human scale to the complex and to adapt to the existing context and topography.



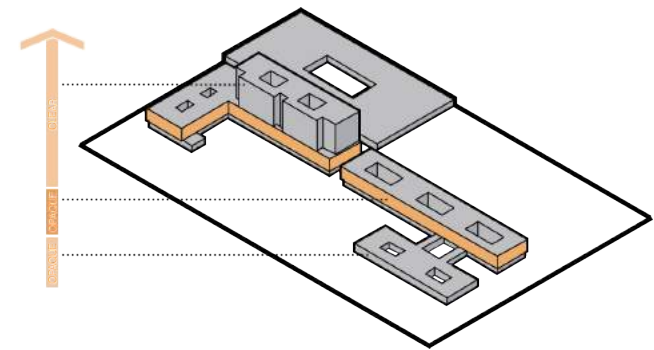
PHASE 04: URBAN INTEGRATION

To provide a cohesive environment and give something back to the community, a Research and Innovation Center will be created in order to link the academic and medical community with the neighbourhood. Volumetrically, this new wing will enclose the plot and create an open courtyard facing the street, therefore linking the hospital with the context and breaking the *bunker-like* feeling.



PHASE 05: SCULPTING

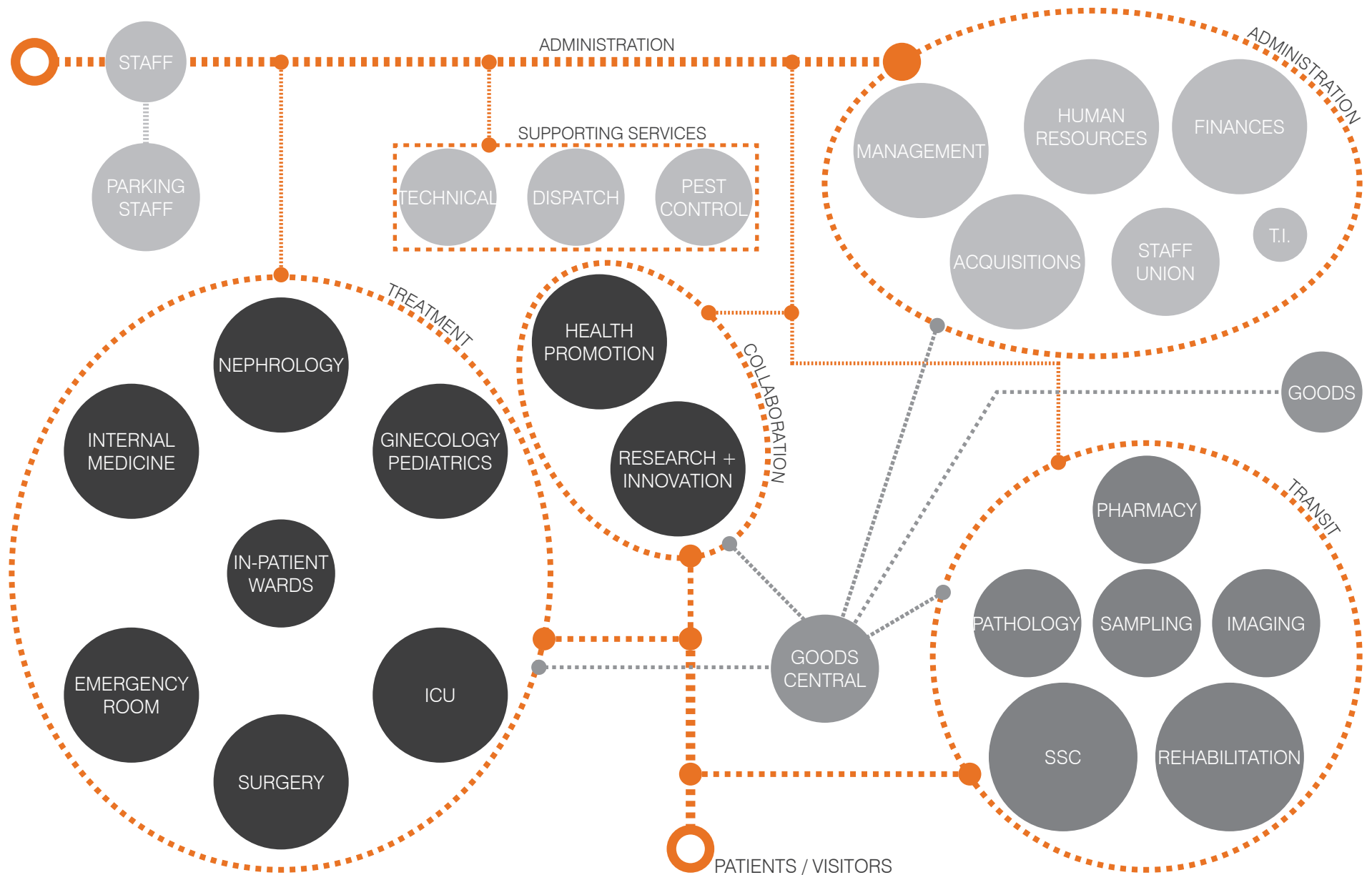
The volume will be further sculpted through awnings, subtractions and voids that will create a more interesting body and, where necessary, bring light into the building and add texture to it.



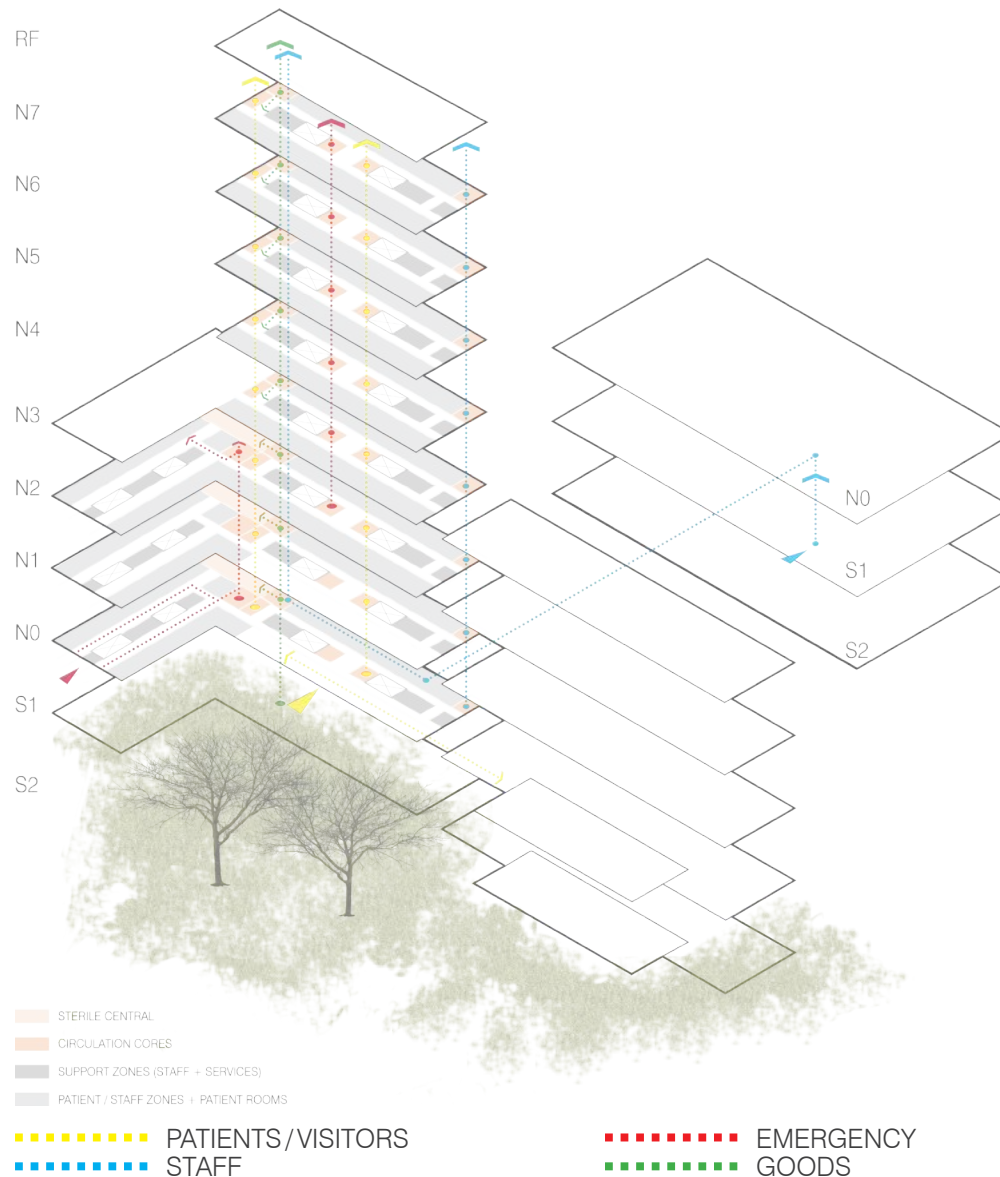
PHASE 05: TEXTURE / WRAPPING

The wrapping will be closely related with the hospital functions inside, provide sun protection and focalize the views towards the city and the landscape. Also, three degrees of transparency will be set depending on the height, functions and views.

SCHEMATIC LAYOUT



BASE LAYOUT: FLOWS AND STRUCTURE



Axonometric layout with circulation cores

STRUCTURE

A 12 x 12 m grid has been established in order to allow a flexible layout for the building and to enable a 1.5 m sub-grid for interior arrangements (modularity), façade cladding, structure and window placing. In section, there is a floor to floor distance of 4.90 m with a free height of 3.20 m from the finished floor level to the ceiling level to leave space for future changes on equipment or services (piping, HVAC, etc).

DAYLIGHT

Four voids located throughout the volumes will bring light inside the building and provide the inner corridors with daylight and a cleaner visual connection with the rest of the levels.

CIRCULATIONS

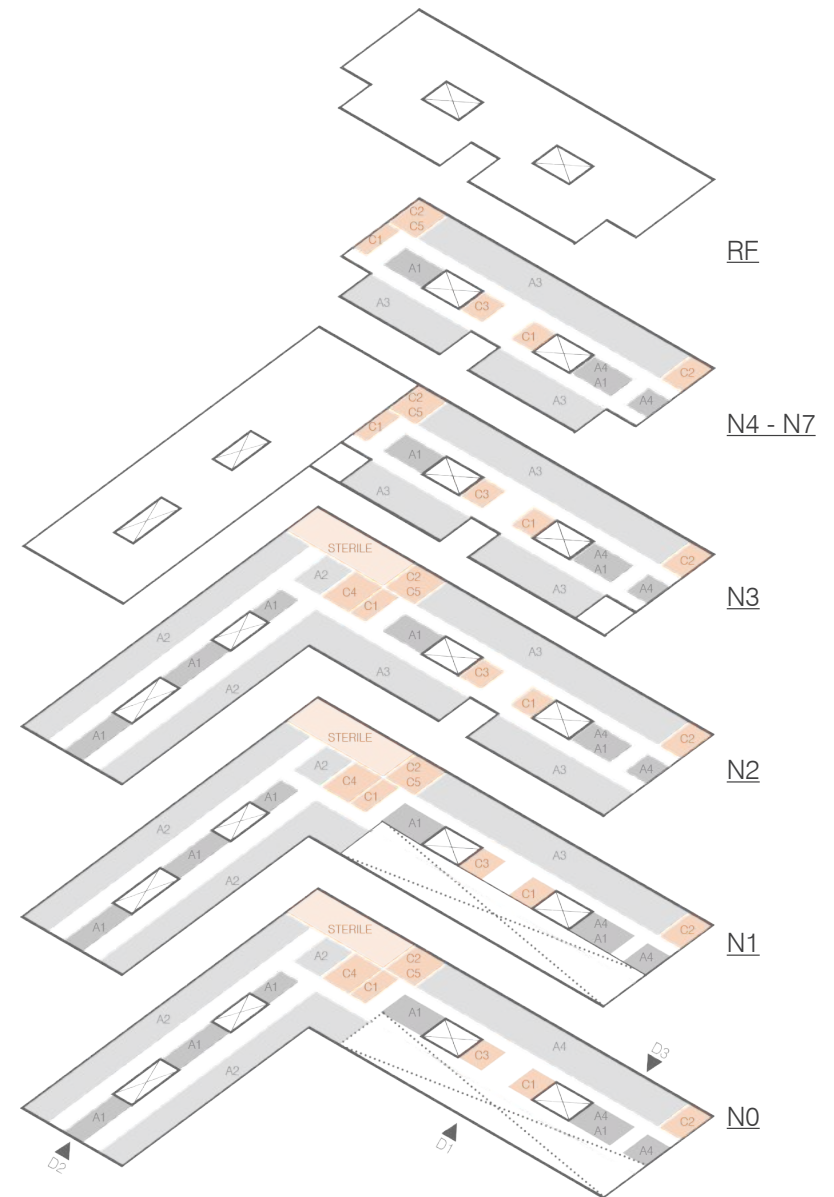
The project has several circulation cores, each of them for a specific user: visitors, patients, beds, staff, goods. A double corridor system constitutes the basic structure of the volume to enable different spatial qualities such as bringing daylight inside the corridors for the surgery department, examination rooms and offices. Patients and visitors can use both circulation cores (East and West) in order to reach the desired destination and to avoid unnecessary crossing between departments.

BASE LAYOUT: FUNCTIONS

To enhance the working environment and provide high-quality spaces for the patients and staff, the functions have been divided into two main areas: dynamic and stand-by zones.

The Dynamic Zone comprises treatment areas that involve constant movement and rarely come to a standstill; e.g. Emergency Department, Sampling and Pathology and Surgery. The Stand-By Zone brings together healing or restorative activities e.g. ICU and In-Patient Wards with activity-based / dynamic departments like Gyneco-Obstetrics and Specialist Care Center; always keeping a North-South orientation with big windows facing the urban landscape to bring light and scenic views inside the volume.

- A1 - Supporting Services / Installations / Storage
- A2 - Dynamic Zone: Surgery / Emergency / Sampling / Pathology
- A3 - Stand-By Zone: Exam Rooms / In-Patient Wards / Specialist Care
- A4 - Staff Zones (Stations + Pantry)
- C1 - Circulation Core (Patients + Visitors)
- C2 - Staff Core
- C3 - Circulation Core (Beds)
- C4 - Emergency Core (ER to Surgery Floor)
- C5 - Goods
- D1 - Main Entrance
- D2 - Ambulance / Emergency
- D3 - Staff (from Parking Building HRM.H1 through skyway)



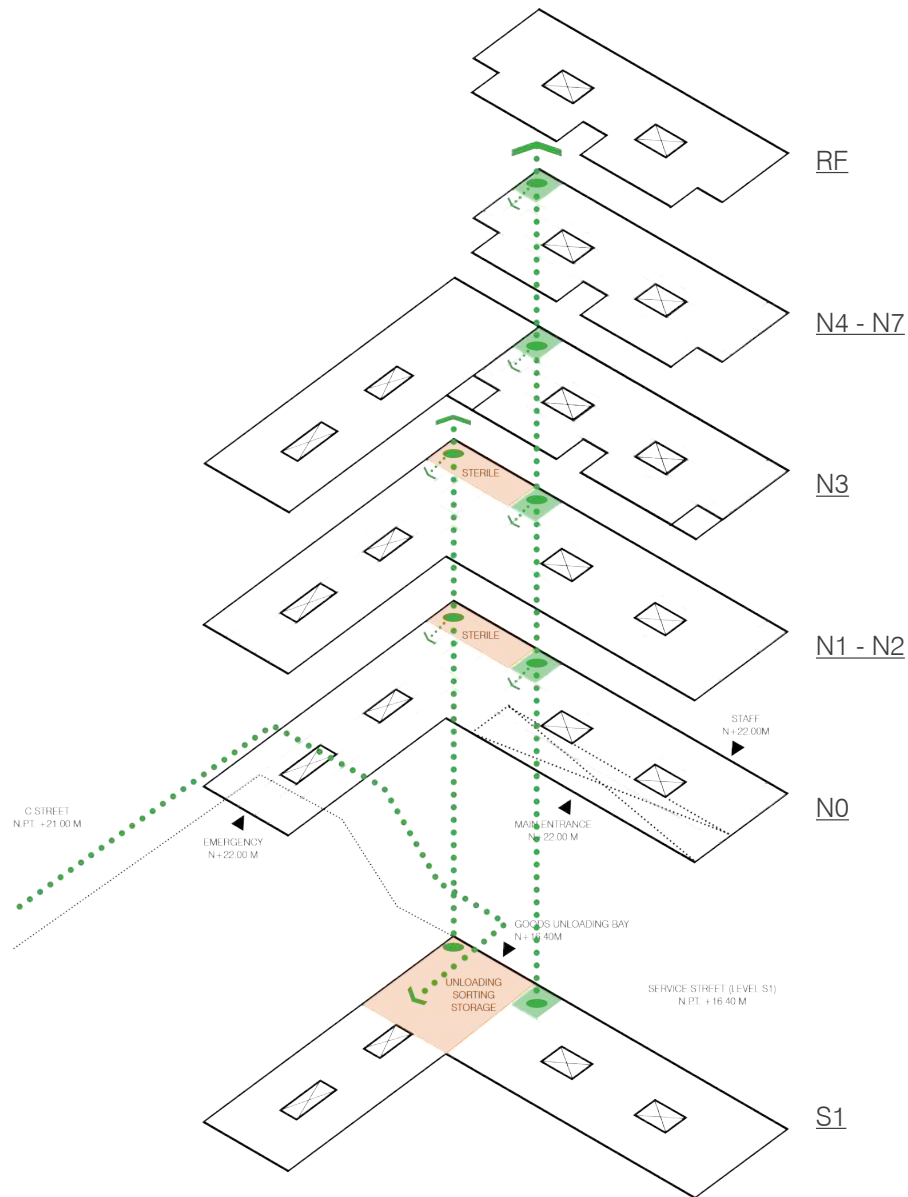
Base layout. Axonometric.

BASE LAYOUT: GOODS

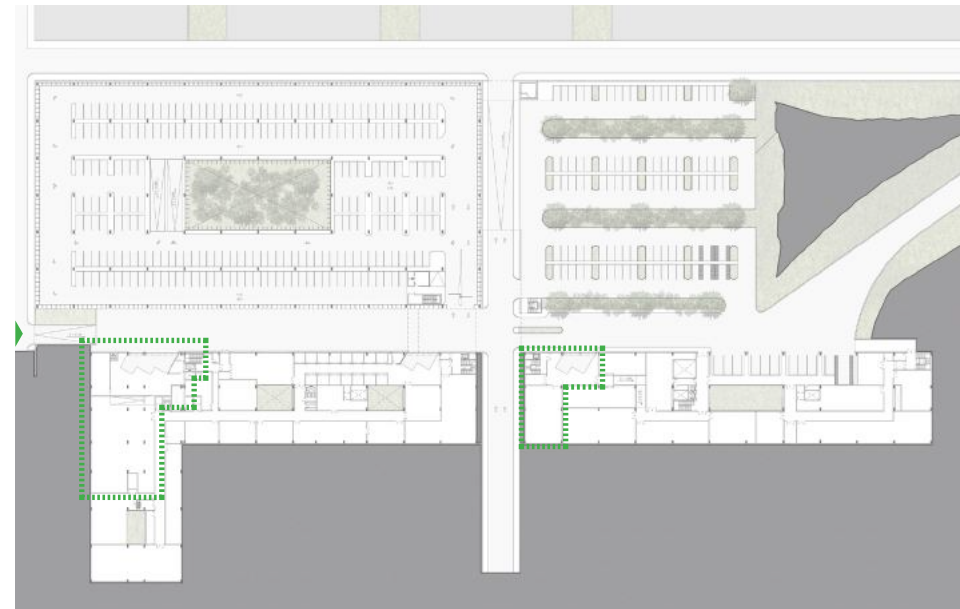
GOODS DISTRIBUTION

Goods will get delivered on both buildings on Level S1. Upon reaching the Unloading Bay, the goods will be unpacked, sorted and transferred through designated elevators to their final destination.

On both buildings, the unloading, unpacking and sorting areas are located on the west side right next to a Goods Core. Sterile Goods will always arrive to the Western Volume and proceed to the designated Sterile Core to be placed into trolleys and later delivered to each department. On each floor, the Sterile Core is located towards the Northwestern Corner of the building (West Wing).

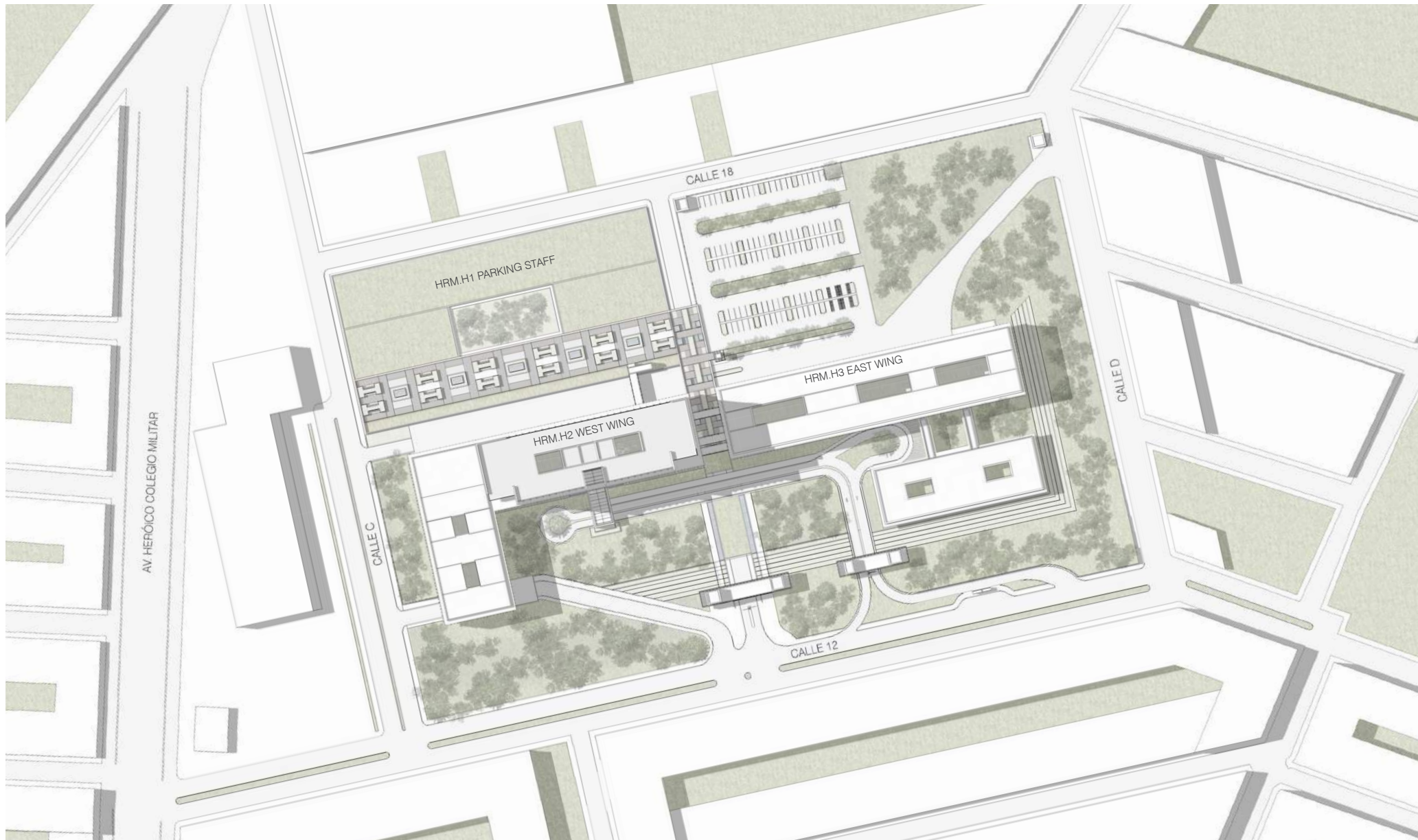


Goods distribution flow. Axonometric.



Goods Distribution Cores - Level S1 Basement +16.40 M

No Scale



MASTER PLAN
NO SCALE

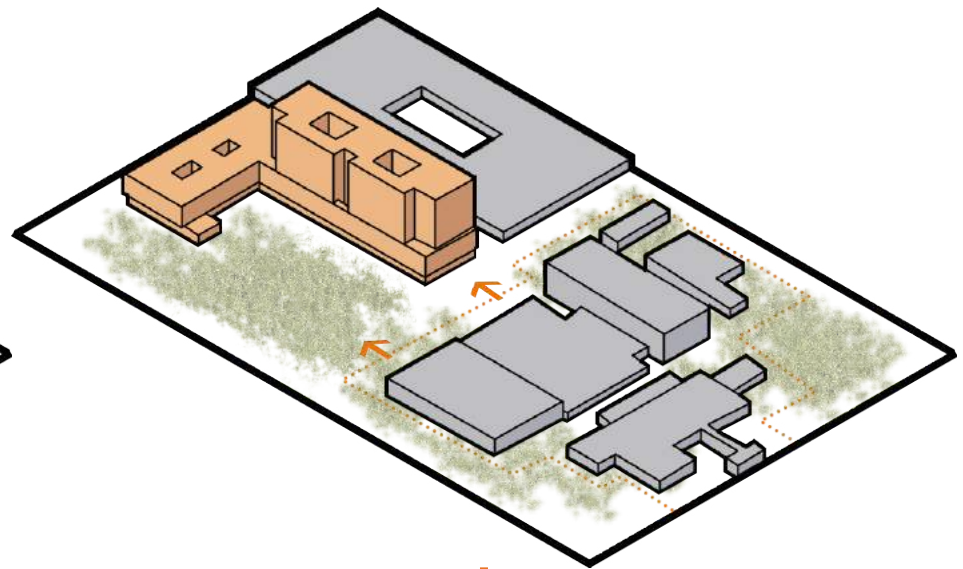
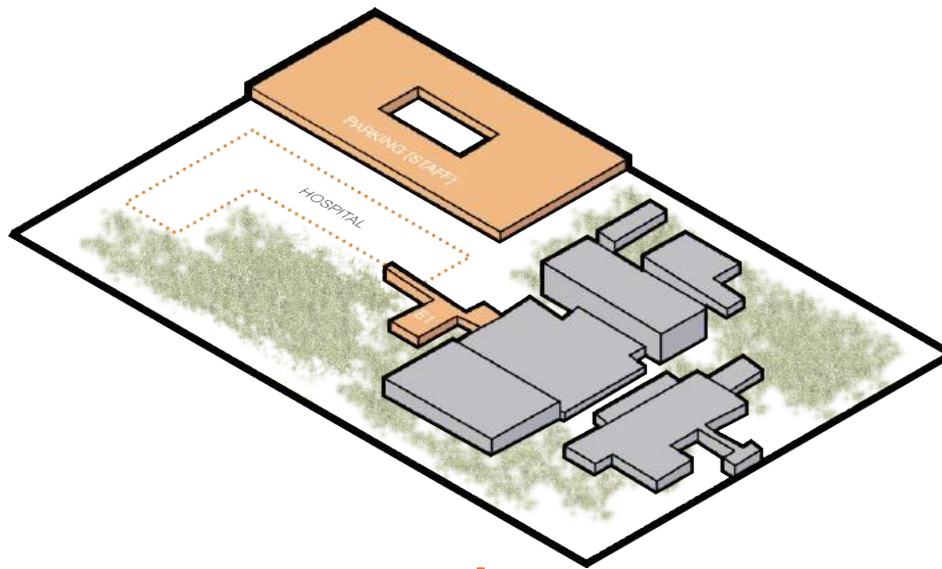
The master plan for the new facilities for the Hospital Regional de Minatitlán – PEMEX comprises three volumes within the plot developed in two phases.

On Phase 01, the new parking building for staff, the Main Hospital Building (West Wing), Goods Reception Area, Technical Zones, Inner Streets, Gates and Drop-Off Areas will be erected. The total surface being built during this stage will be of approximately 70 per cent of the entire development. Upon completion, operation on the existing facility will be shut down and transferred to this new volume.

On Phase 02, the existing hospital will be demolished to give place to the new Research and Innovation Center that will house seminar rooms, auditoriums, training and workshop rooms, a library, computer and multimedia laboratories, offices for the Learning and Education Department, Health Promotion Department and the Orthopedics and Rehabilitation Department fitted with a full size Gymnasium for both the patients and staff. On the Basement Level, Technical Areas and a secondary Goods Central will be placed along with some supporting departments like T.I. and Transportation with parking places for ambulances and busses.

Moreover, a parking area for visitors will be enabled behind this new facility and the access plaza will be completed; hence providing a diversified yet welcoming access gateway for patients, staff, goods and visitors to the new hospital.

PHASING



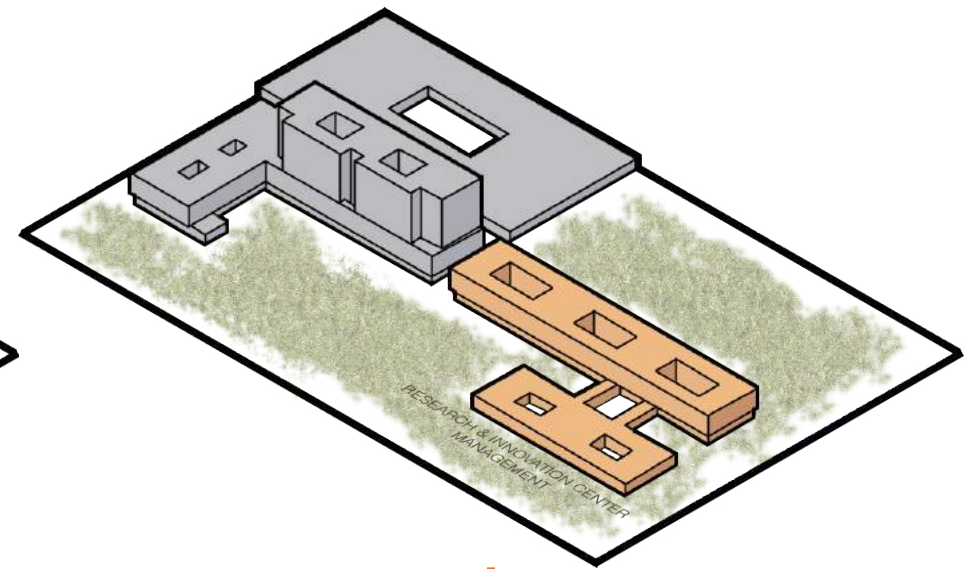
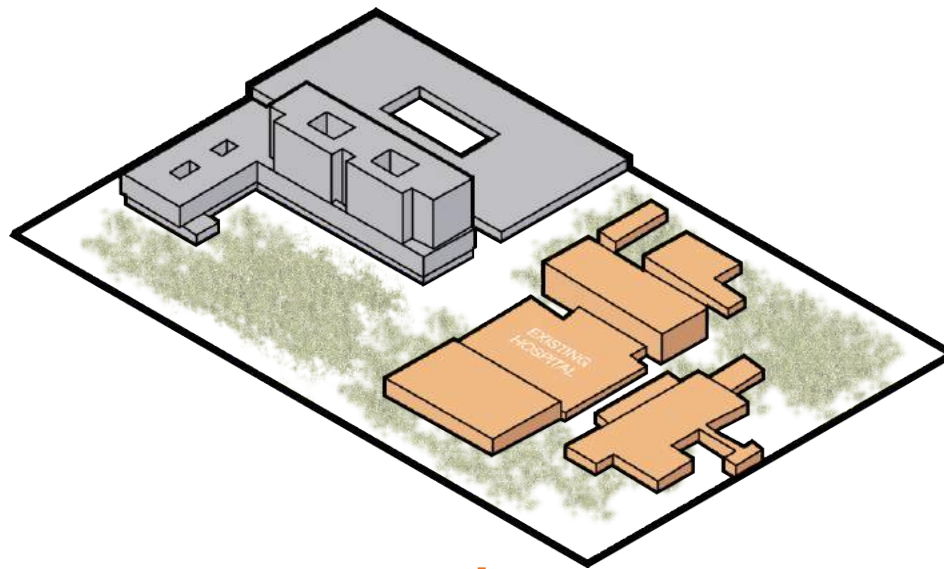
Operation: 70%

PHASE 01

- Demolish the existing pharmacy building, pedestrian walkway and main gate.
- Set the boundaries for the new building and protections.
- Construction process Stage 01
 - Staff Parking Level S1 and S2
 - Hospital Wing Level N0 - N7
 - Technical Areas Level S1
 - Main streets

PHASE 02

- Finish construction process Stage 01
 - Staff Parking Level S1 and S2
 - Hospital Wing Level N0 - N7
 - Technical Areas Level S1
 - Main streets
- Evacuate existing hospital to the new facilities



PHASE 03

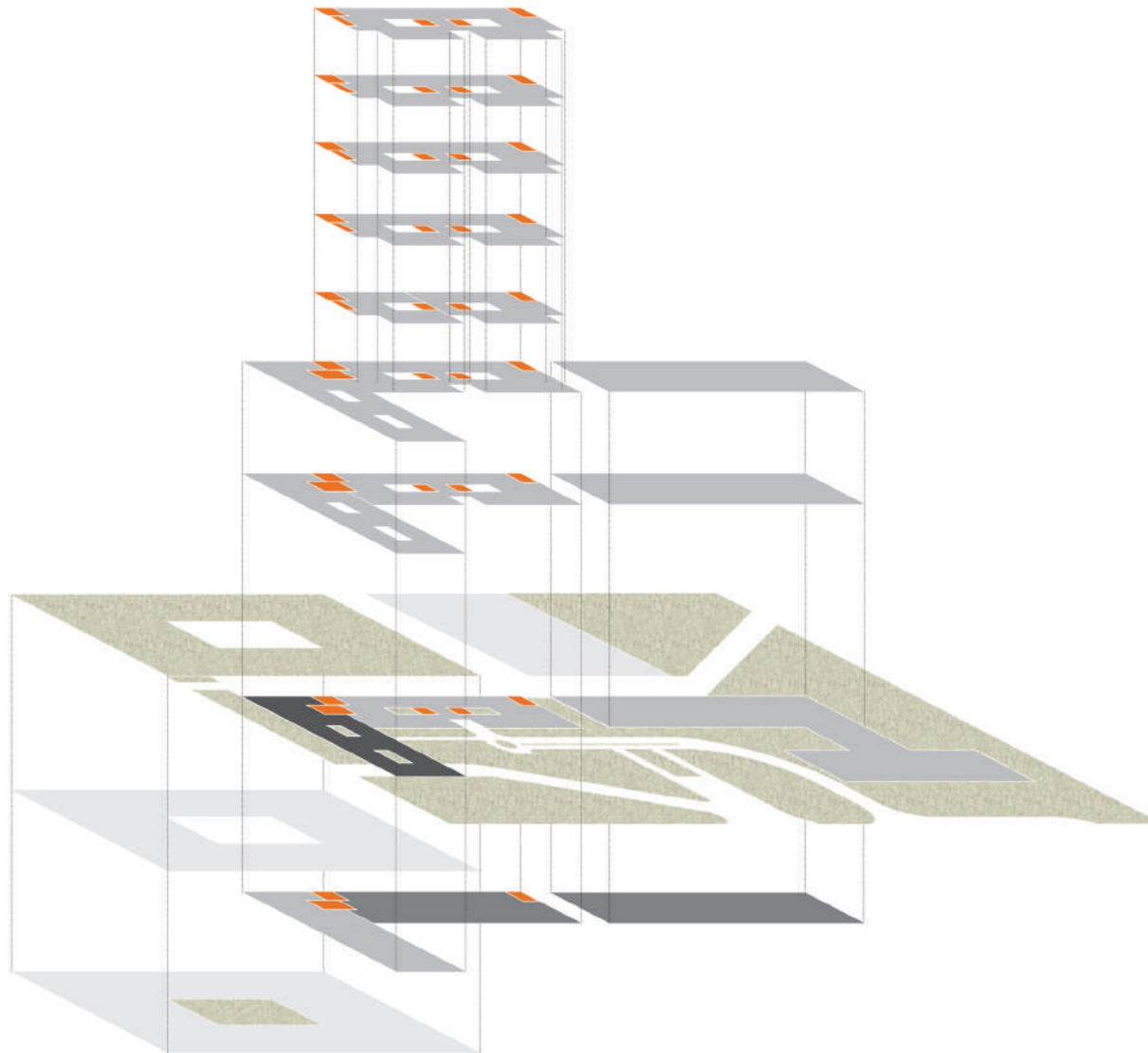
- Clean up and demolishing
 - Existing building
- Construction process Stage 02
 - East Wing Level N0 - N2
 - Management Building Level N0
 - Technical areas Level S1
 - Access plaza and inner streets

PHASE 04

- Finish construction process Stage 02
 - Rehabilitation & Orthopedics
 - Research and Innovation Center
 - Health Promotion and Education
 - Management
- Pending roads, landscape and gates
- Prepare for future changes / expansion

Operation: 100%

PROGRAM



- LEVEL N7
 - Specialist Care Center
- LEVEL N6
 - In-Patient Ward
- LEVEL N5
 - Nephrology, Oncology, Internal Medicine
 - In-Patient Ward
- LEVEL N4
 - Gyneco-Obstetrics, Pediatrics
 - In-Patient Ward
- LEVEL N3
 - Intensive Care Unit
 - In-Patient Ward
- LEVEL N2
 - Surgery
 - In-Patient Ward
 - Research and Innovation Center
- LEVEL N1
 - Pathology + Sampling
 - Imaging
 - Health Promotion
 - Learning and Education Department
 - Auditoriums
- LEVEL N0
 - Main Entrance + Staff Entrance
 - Pharmacy
 - Chapel
 - Restaurant / Cafeteria
 - General Services
 - Emergency Room
 - Rehabilitation and Orthopedics
 - Gymnasium
 - Management
- LEVEL S1
 - Parking - Staff
 - Parking - Visitors
 - Goods
 - Technical
 - Ambulances
 - Morgue
- LEVEL S2
 - Parking - Staff

PROGRAM AT A GLANCE

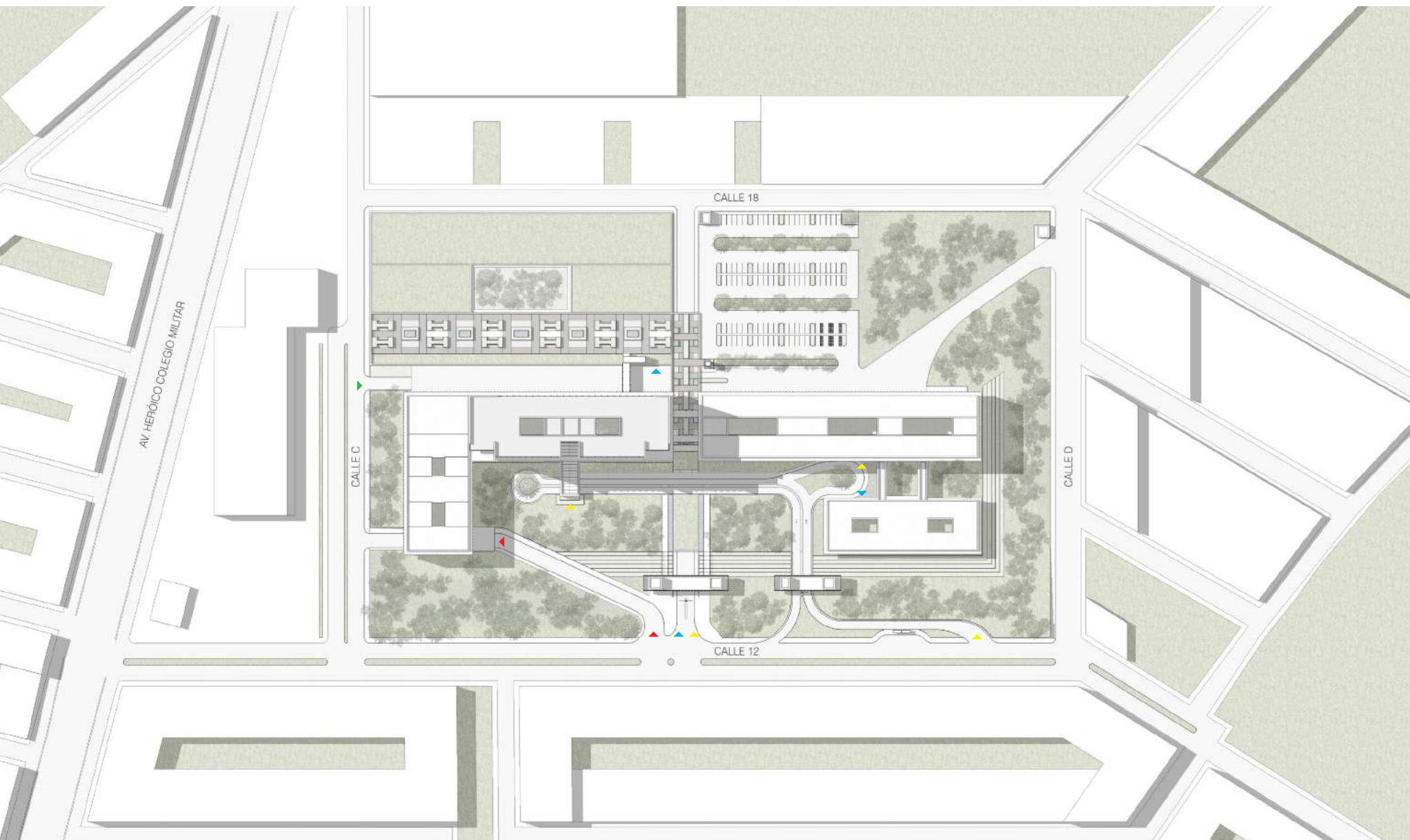
Plot Surface	73,175.95 m ²
GROSS SURFACE	
Project	75,624.00 m ²
Maximum allowed	109,763.925 m ²
CUS (Regulation)	1.5X (Plot Surface)
FUNCTIONAL SURFACE	
Project	64,605.00 m ²
Factor vs Gross	85.43%
BUILDING FOOTPRINT	
Project	26,936.00 m ²
Maximum allowed	58,540.76 m ²
COS (Regulation)	0.80 (Plot Surface)
CAS (Regulation)	0.40 (Plot Surface)
HEIGHT	
Project	42.40 meters
Maximum allowed	44.00 meters
Levels	7 + 2 Basements
Slab-To-Slab Distance	5.60 m (S2 - N0) / 4.90 m (N1 - N7)

Plot Perimeter	1,061.00 m
GROSS SURFACE (BY PHASE)	
Phase 01	54,248.00 m ²
Phase 02	21,376.00 m ²
FUNCTIONAL SURFACE (BY PHASE)	
Phase 01	51,539.00 m ²
Phase 02	13,066.00 m ²
PARKING	
Staff	484 places
Transportation	10 Ambulances + 1 Bus
Visitors	96 places
ROOMS	
In-Patient Rooms	103 Single Rooms
Examination Rooms	45
Operation Theaters	4 Theaters (3 Standard + 1 Day Surgery) 1 Theater (Gyneco-Obstetrics)

GLOSSARY

CAS	ABSORPTION FACTOR (VEGETATION AND WATER ABSORPTION)
COS	OCCUPANCY FACTOR (BUILDING FOOTPRINT)
CUS	LAND USE FACTOR (BUILT SURFACE)

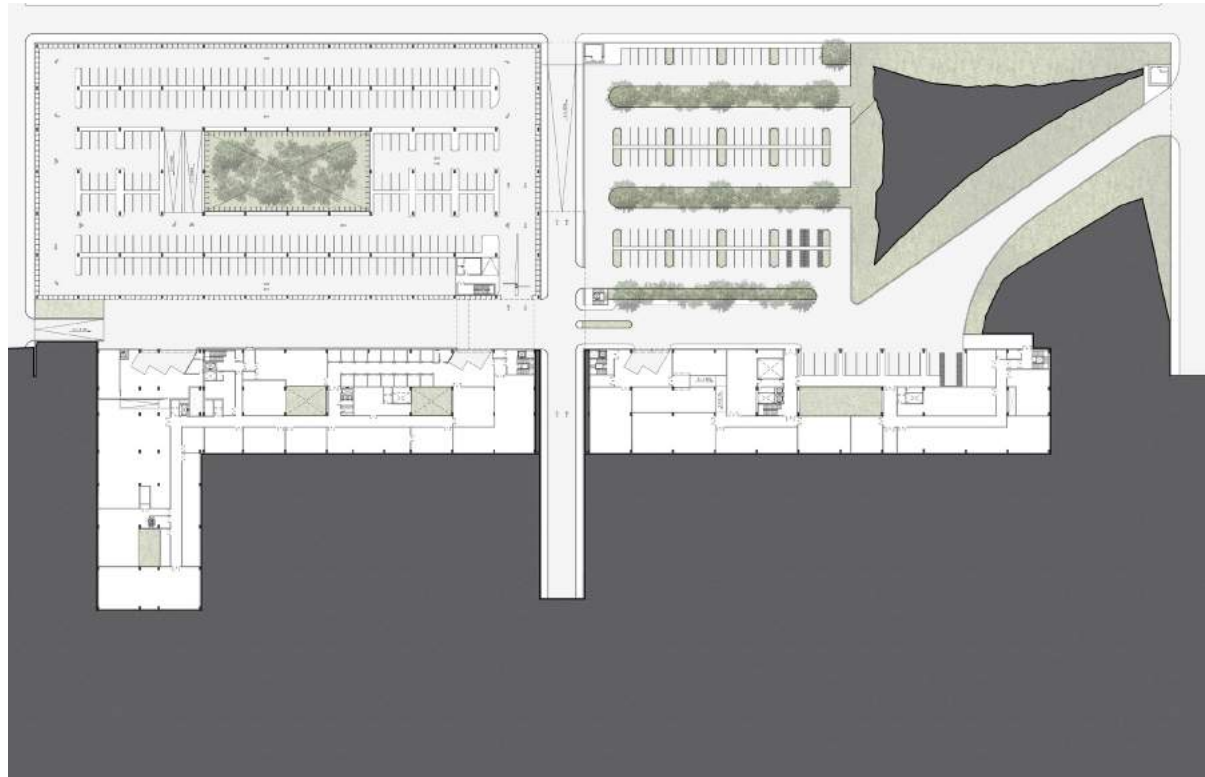




SITE PLAN
NO SCALE

0 20 60 M

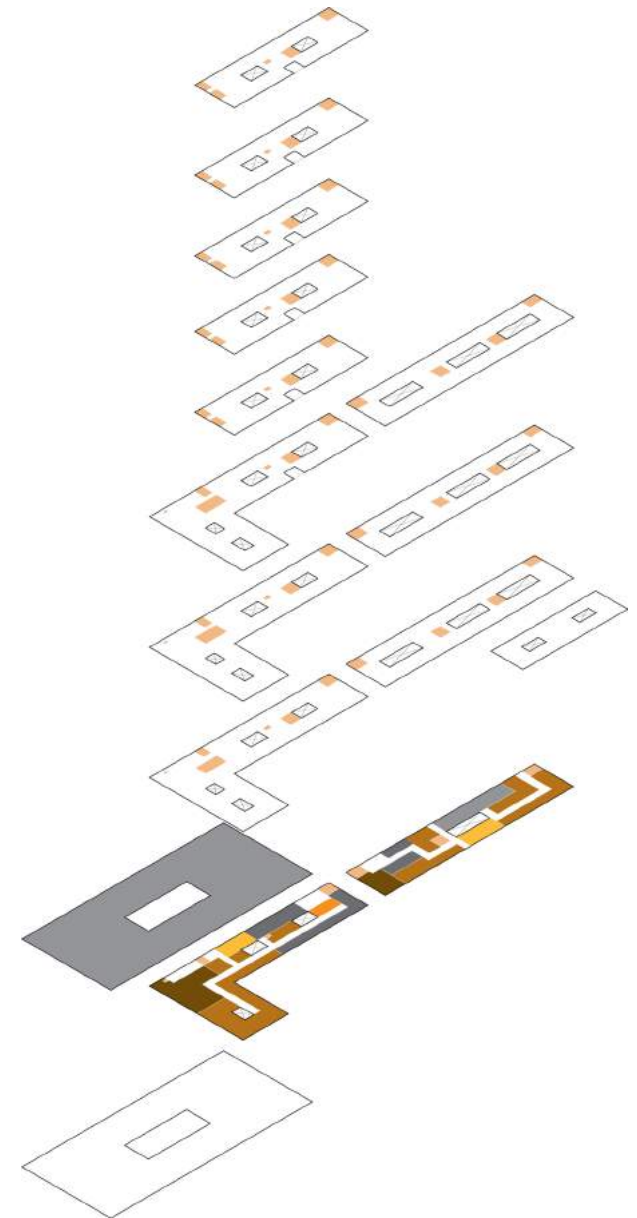
LEVEL S1 BASEMENT

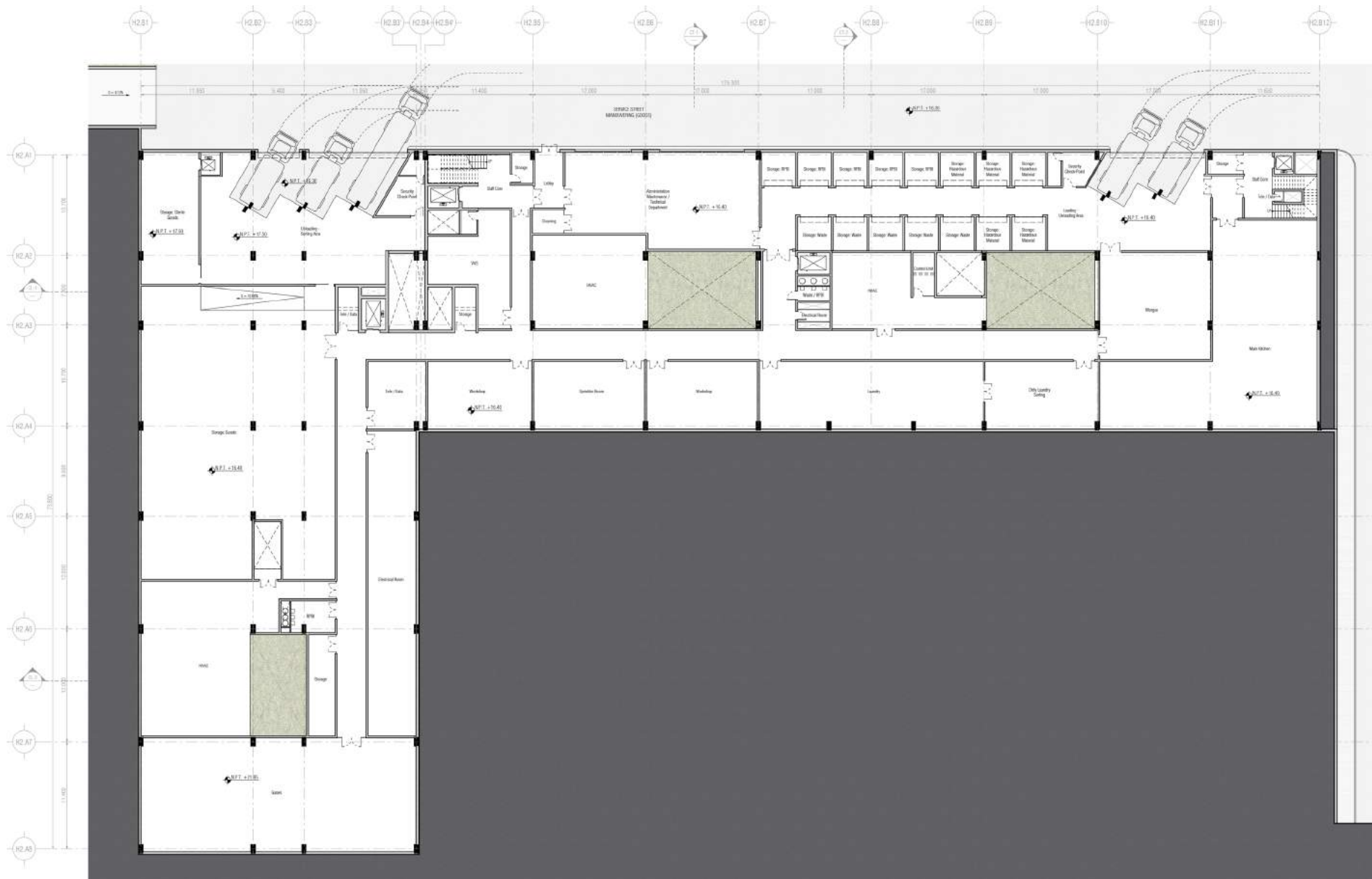


LEVEL S1 +16.40 M
NO SCALE

0 10 40 60 M

- GOODS CENTRAL
- TECHNICAL
- MORGUE
- ADMINISTRATION (TECH. DEPARTMENT OFFICES)
- PARKING (STAFF & AMBULANCES)
- GENERAL SERVICES (KITCHEN, LAUNDRY, WASTE)

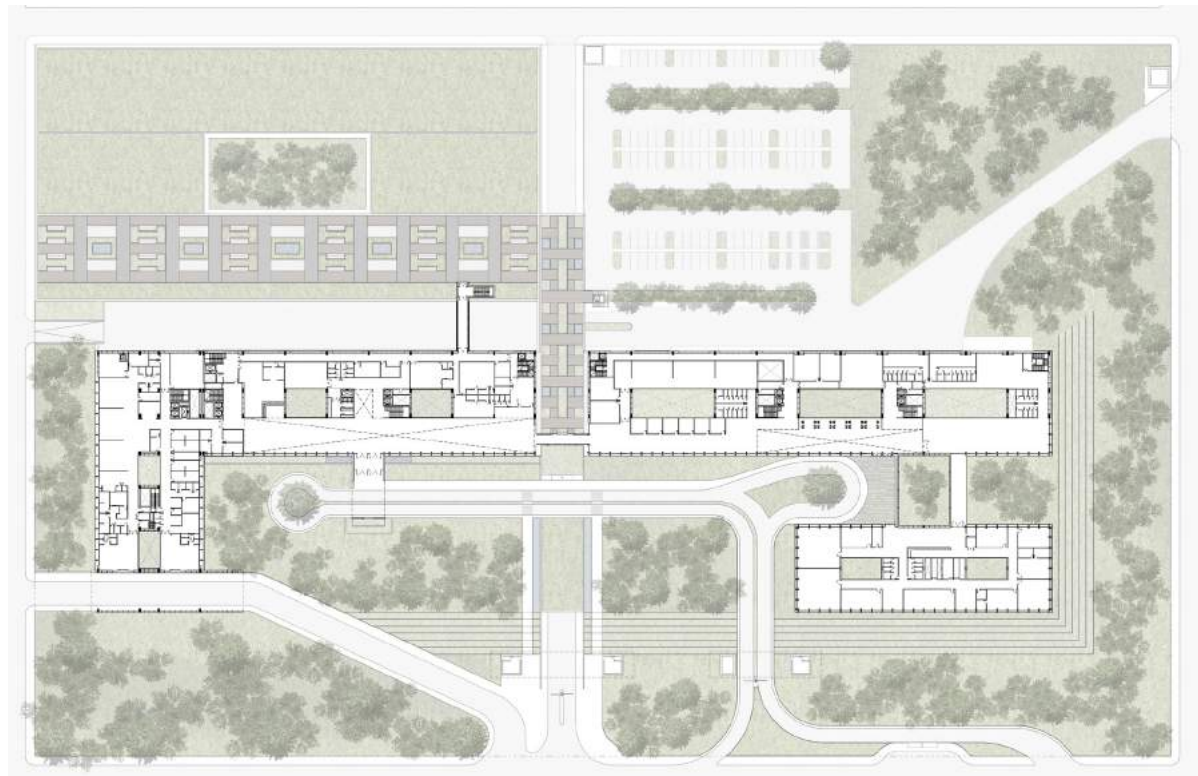




LEVEL S1 +16.40 M
NO SCALE



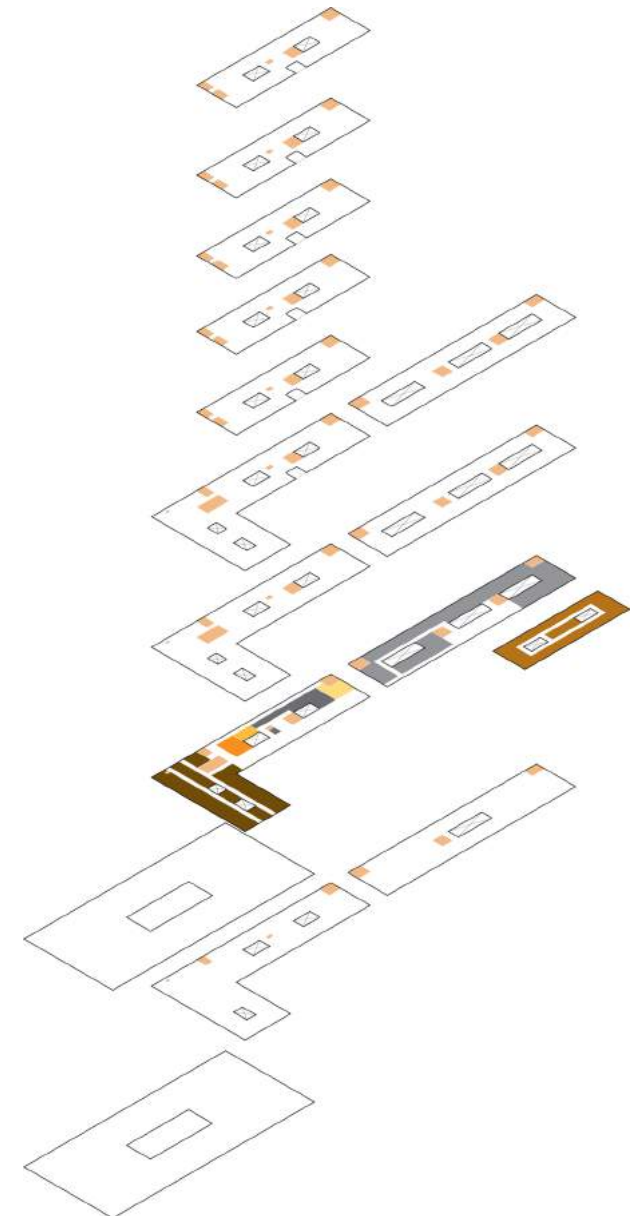
LEVEL N0 GROUND FLOOR

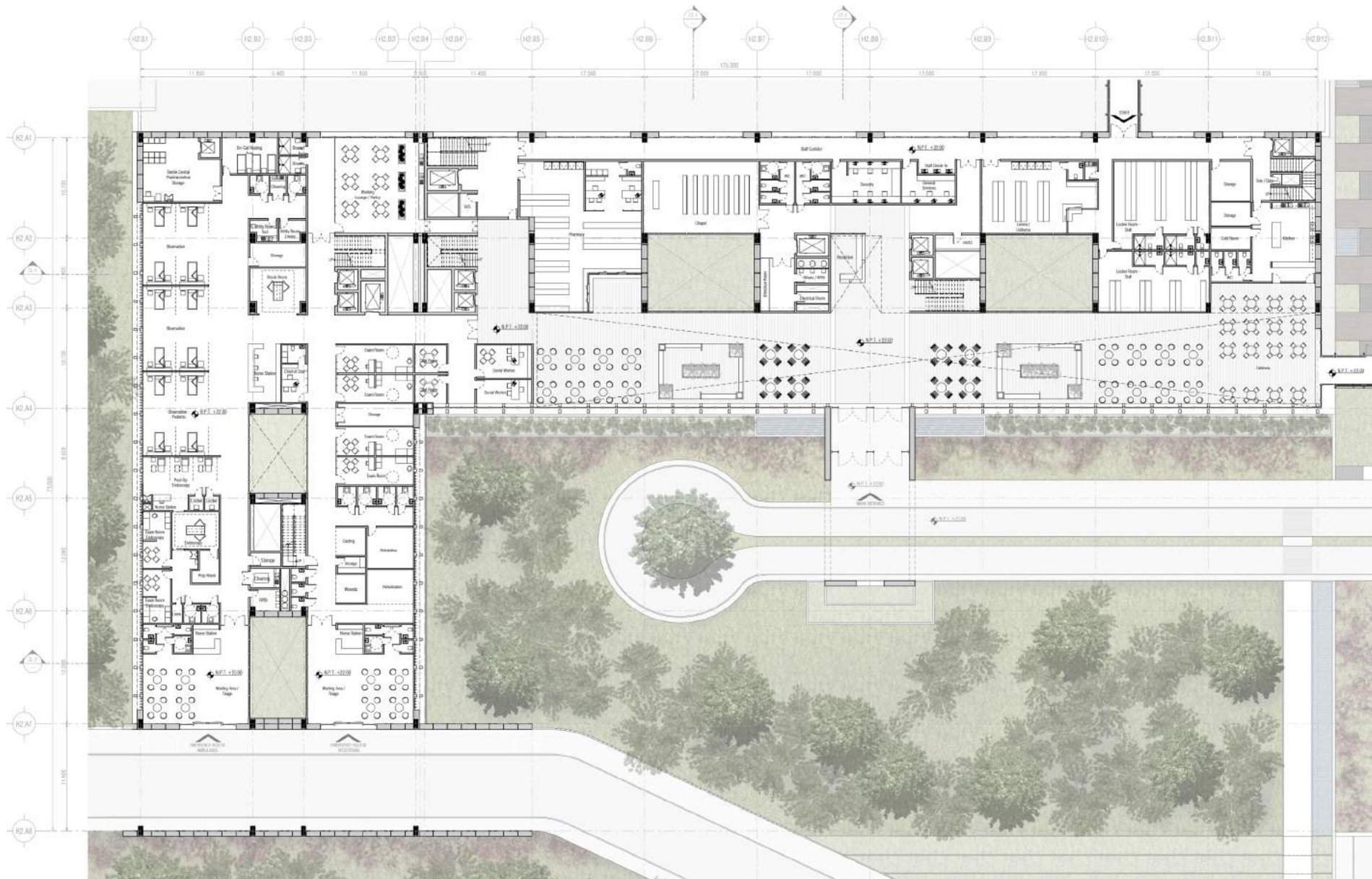


LEVEL N0 +22.00 M
NO SCALE

0 10 40 60 M

- EMERGENCY ROOM
- MANAGEMENT
- PHARMACY
- CHAPEL
- CAFETERIA
- REHABILITATION & ORTHOPEDICS, GYMNASIUM & SELF CHECK-UP KIOSKS (E-HEALTH)
- GENERAL SERVICES (STAFF CHECK-IN, SECURITY, LINENS & UNIFORMS, CHANGING ROOMS)

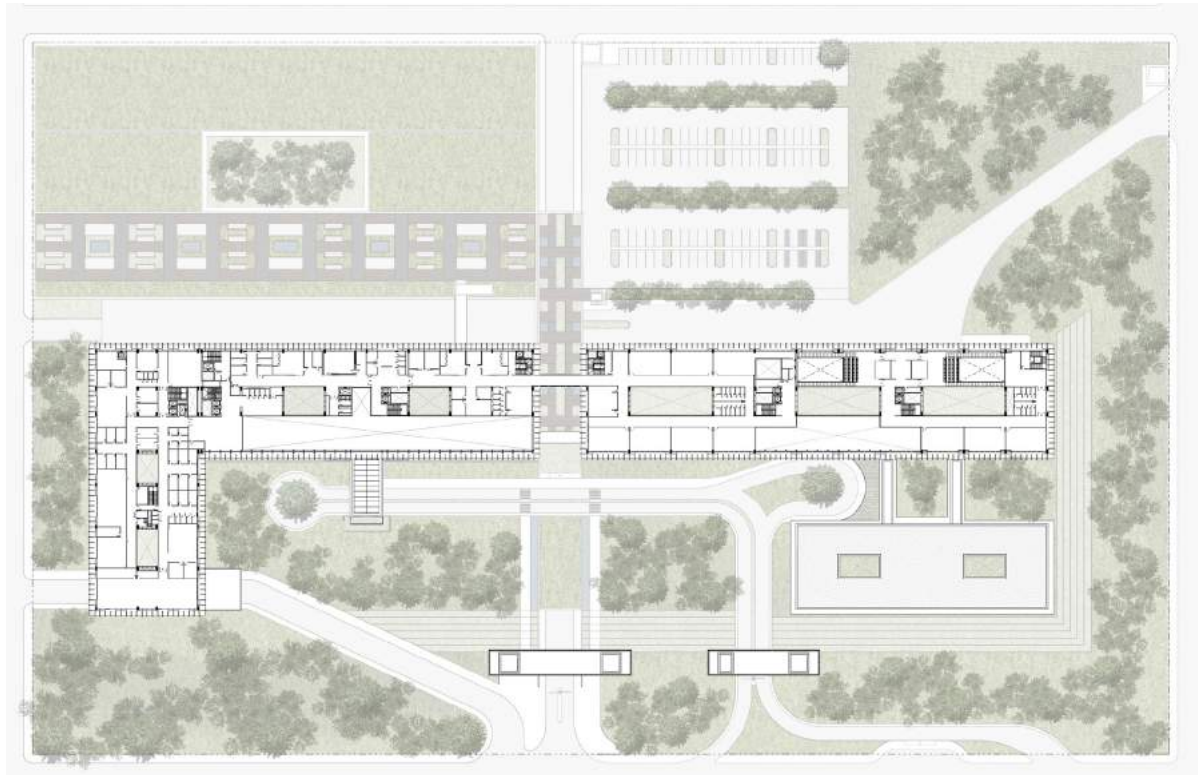




LEVEL N0 +22.00 M
NO SCALE



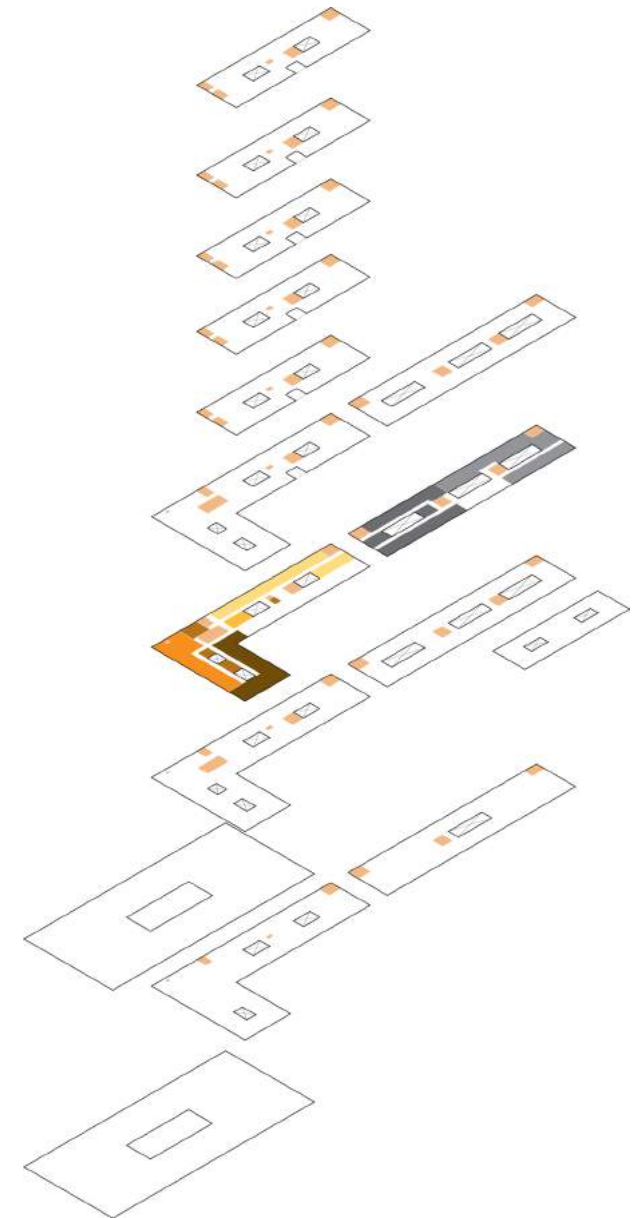
LEVEL N1

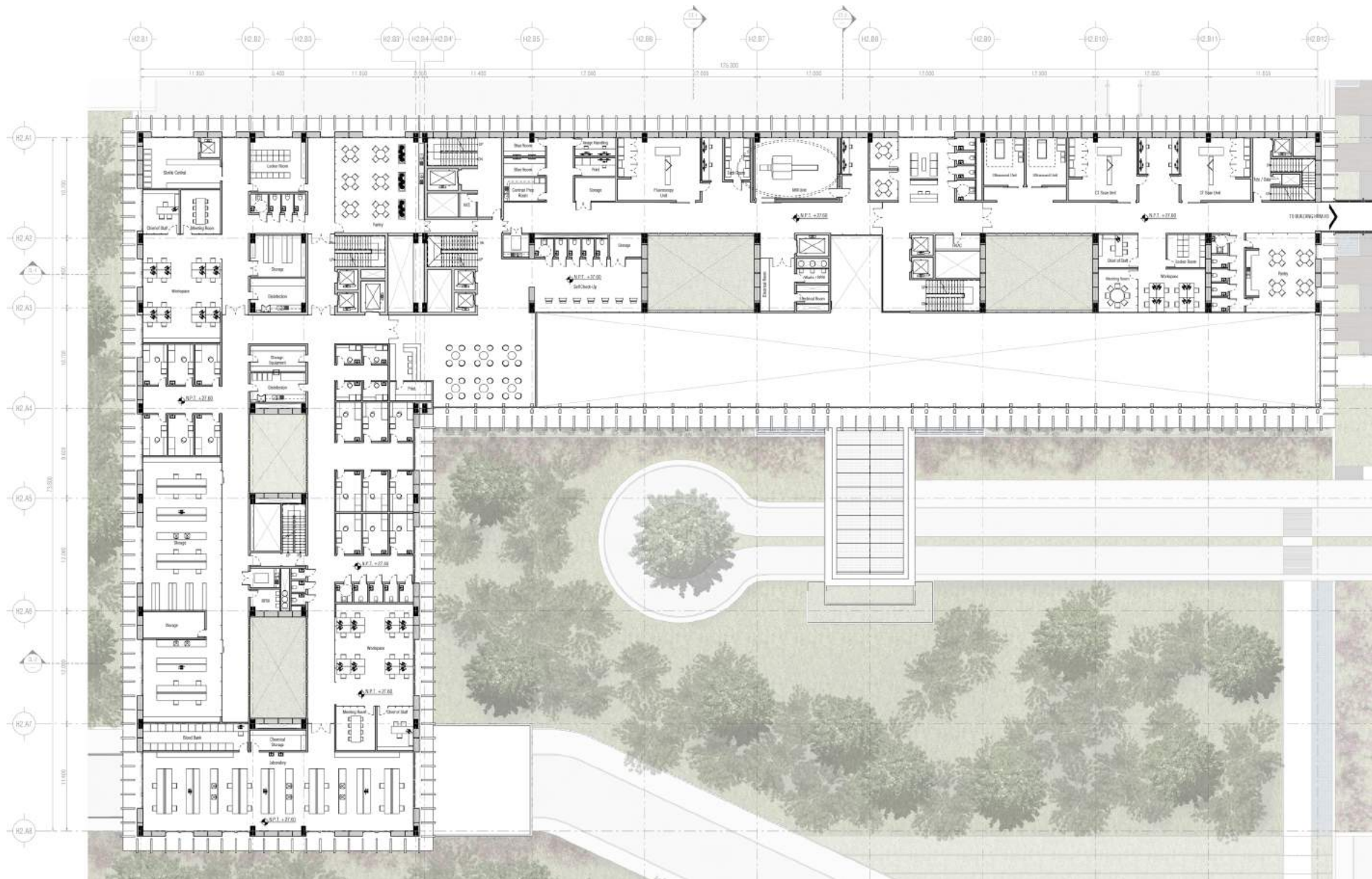


LEVEL N1 +27.60 M
NO SCALE



- SAMPLING + LABORATORY
- SUPPORT SERVICES / STAFF
- PATHOLOGY + LABORATORY
- E-HEALTH
- IMAGING
- HEALTH PROMOTION
- EDUCATION + AUDITORIUMS + SEMINAR ROOMS

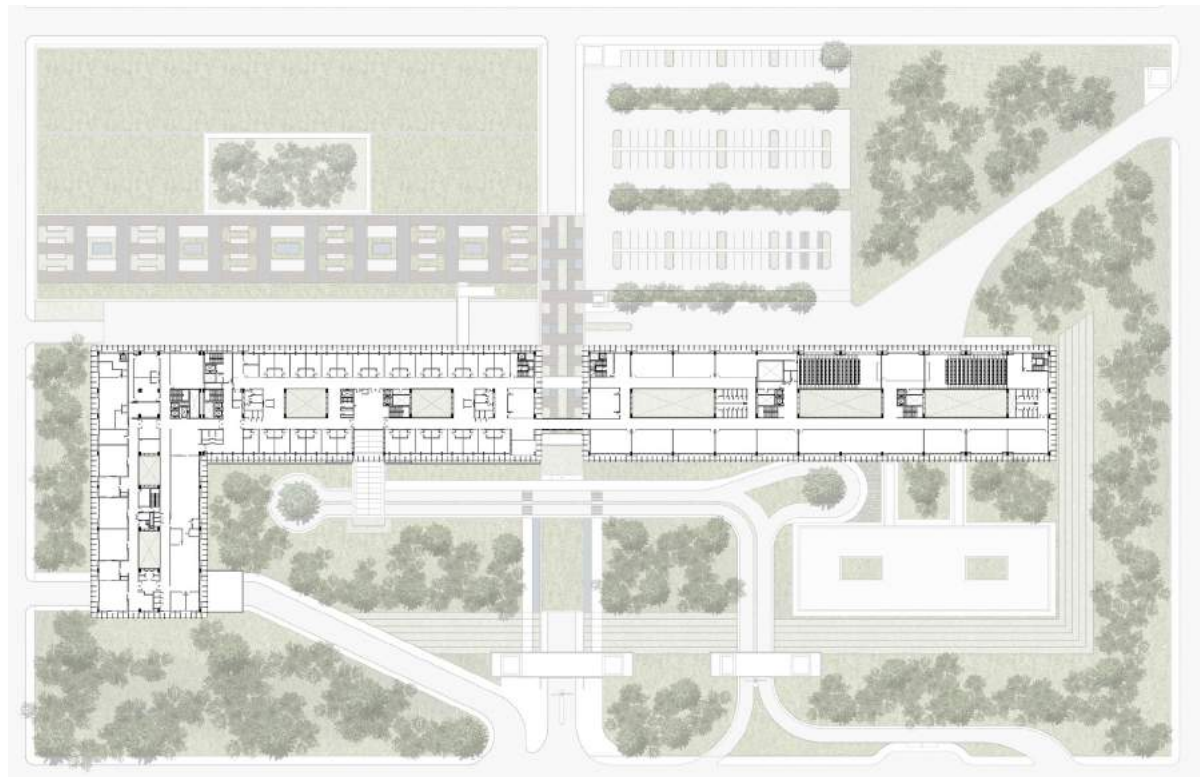




LEVEL N1 +27.60 M
NO SCALE



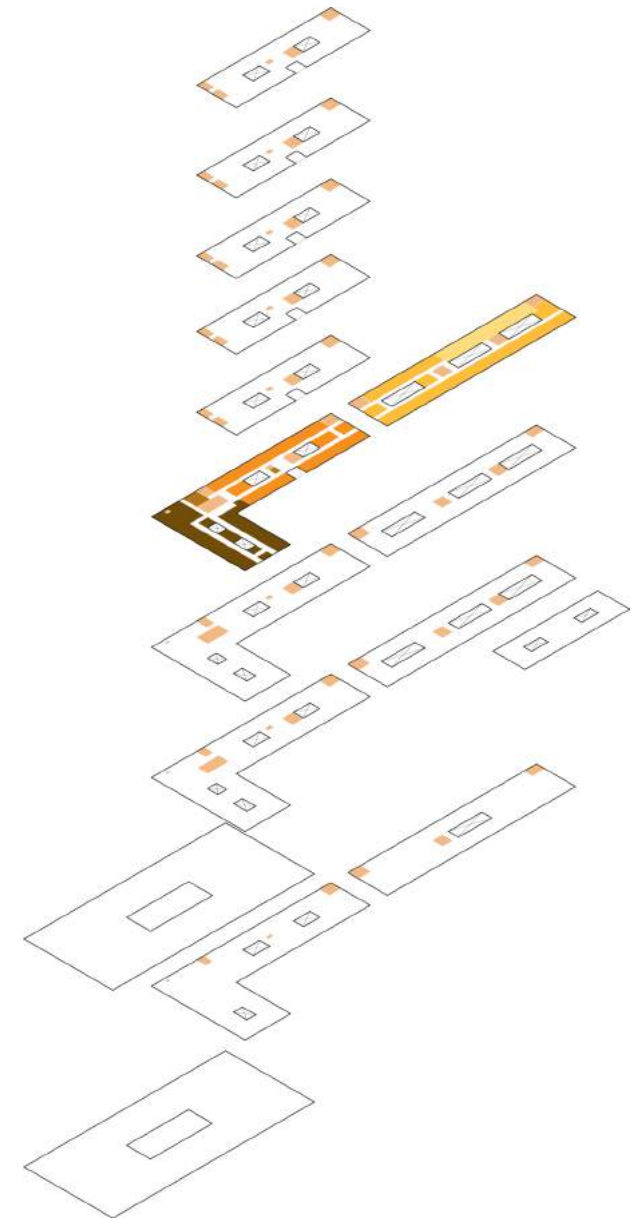
LEVEL N2

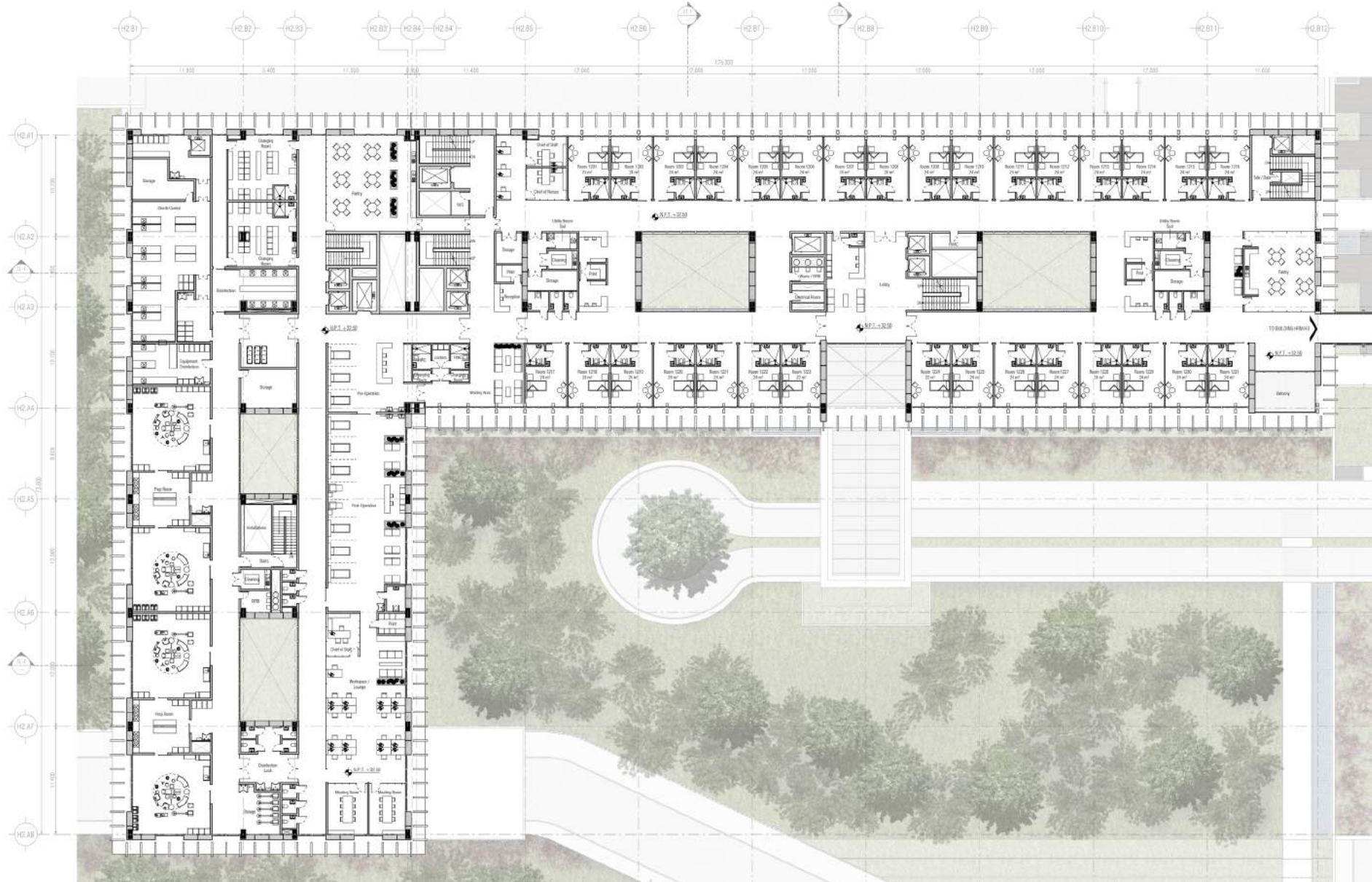


LEVEL N2 +32.50 M
NO SCALE

0 10 40 60 M

- SURGERY (SCHEDULED, EMERGENCY AND OUT PATIENT)
- PANTRY
- IN-PATIENT ROOMS
- RESEARCH AND INNOVATION CENTER
- AUDITORIUMS





LEVEL N3



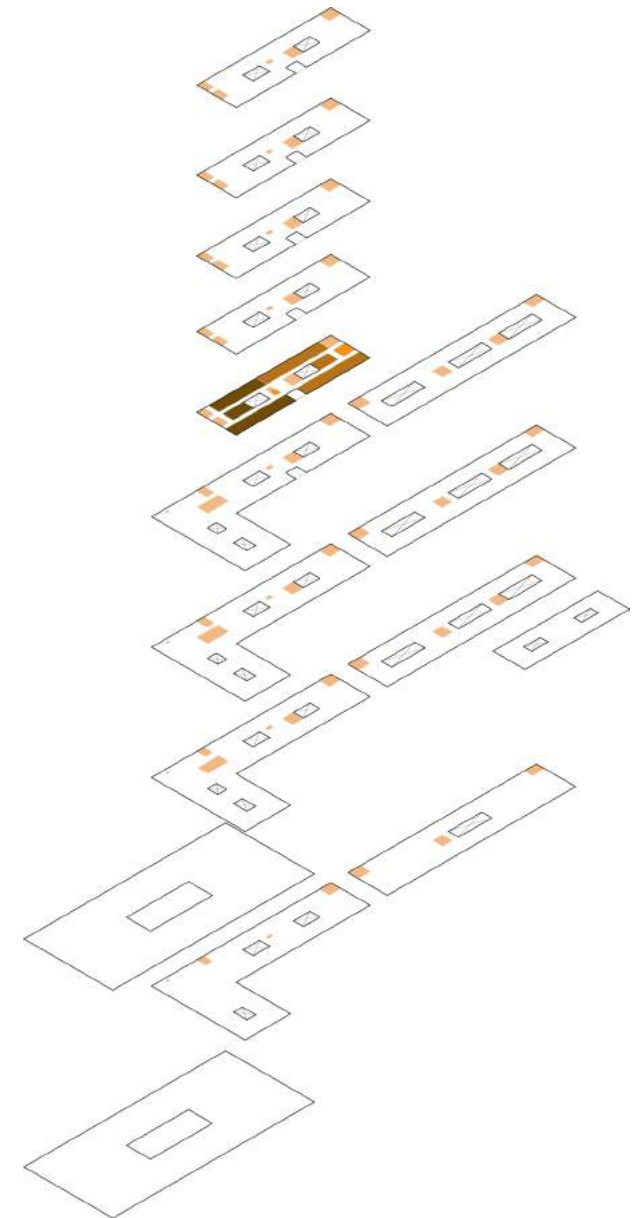
LEVEL N3 +37.40 M
NO SCALE

0 10 40 60 M

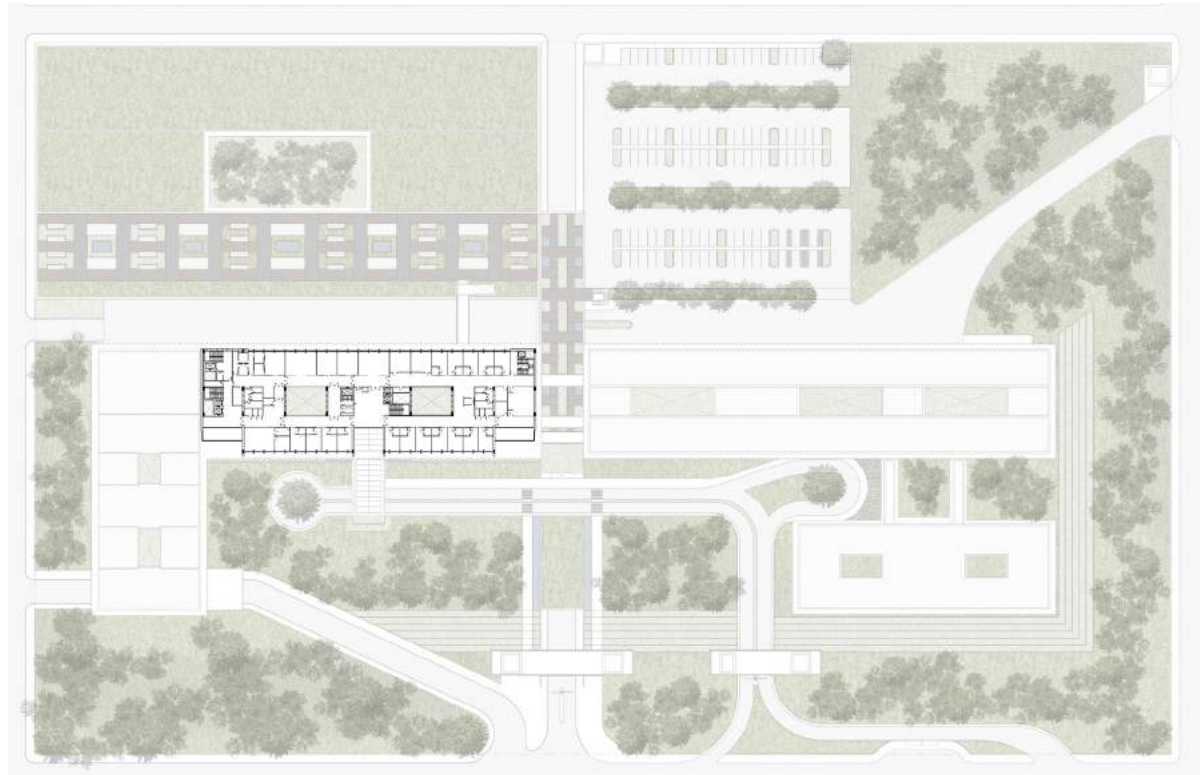
- INTENSIVE CARE UNIT
- IN-PATIENT ROOMS
- PANTRY / STAFF ROOM

The in-patient and ICU rooms have been designed following a modular layout with a 1.50 m grid to enable the possibility of future changes in disposition or number of units.

Warm materials have been selected for the patient rooms and the waiting areas to provide them with a human and homelike character.



LEVEL N4

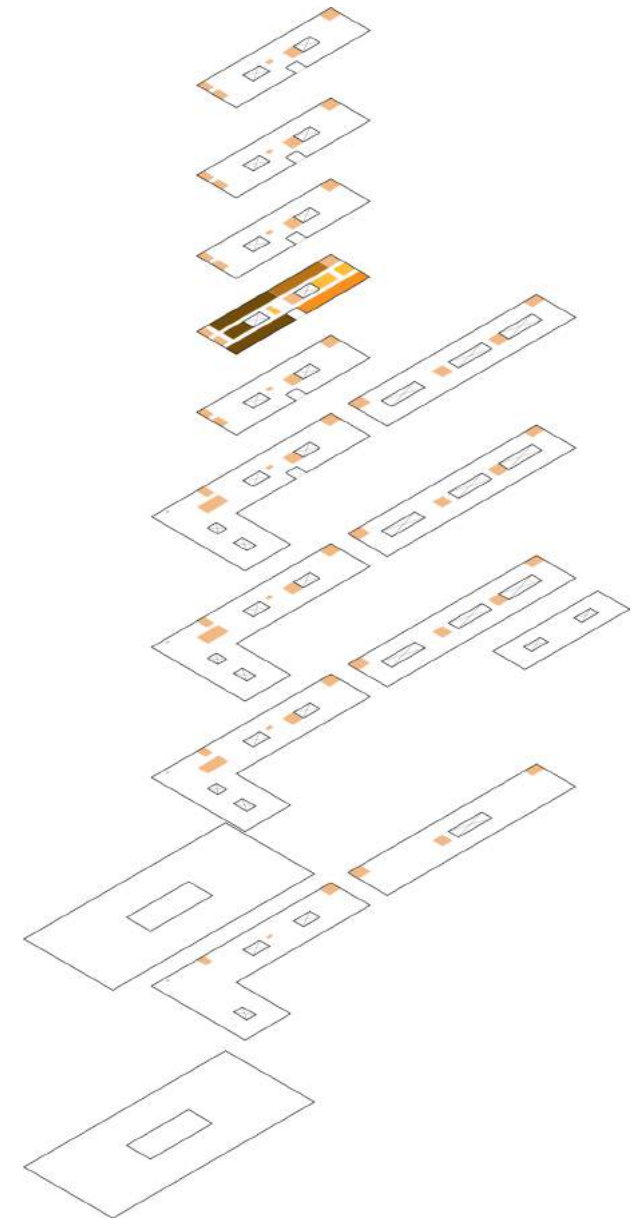


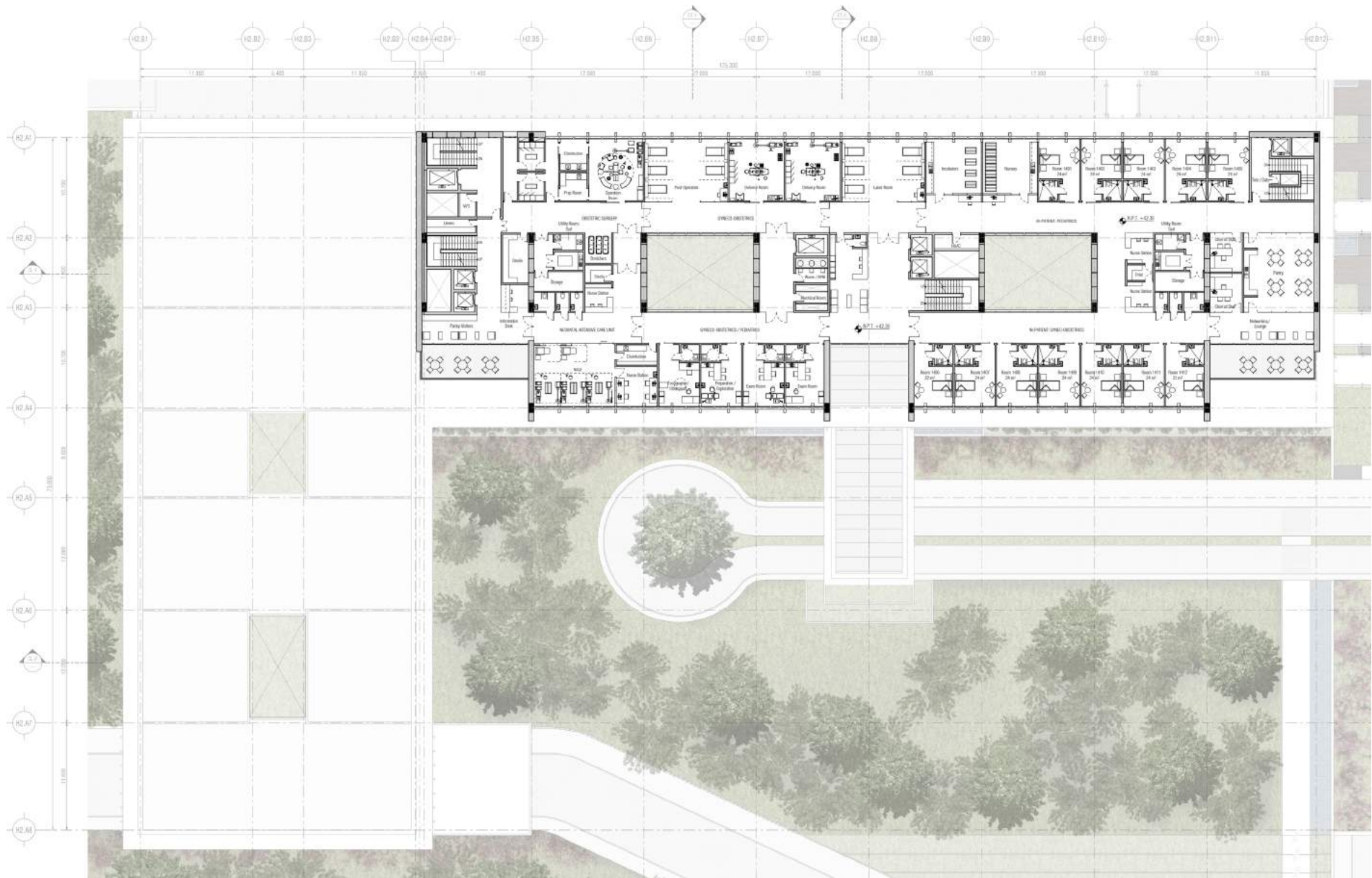
LEVEL N4 +42.30 M
NO SCALE

0 10 40 60 M

- GYNECO-OBSTETRICS
- PEDIATRICS (IN-PATIENT)
- GYNECOLOGY (IN-PATIENT)
- PANTRY / STAFF ROOMS

The Gyneco-Obstetrics Department consists of three specialities: Pediatrics, Gynecology and Neonatal Intensive Care Unit. All of them are connected with the Treatment Area (OBG Surgery) equipped with Delivery Rooms, an Operation Theater and Sterile Central. Twelve patient rooms are provided for the Pediatrics and Gynecology Department.

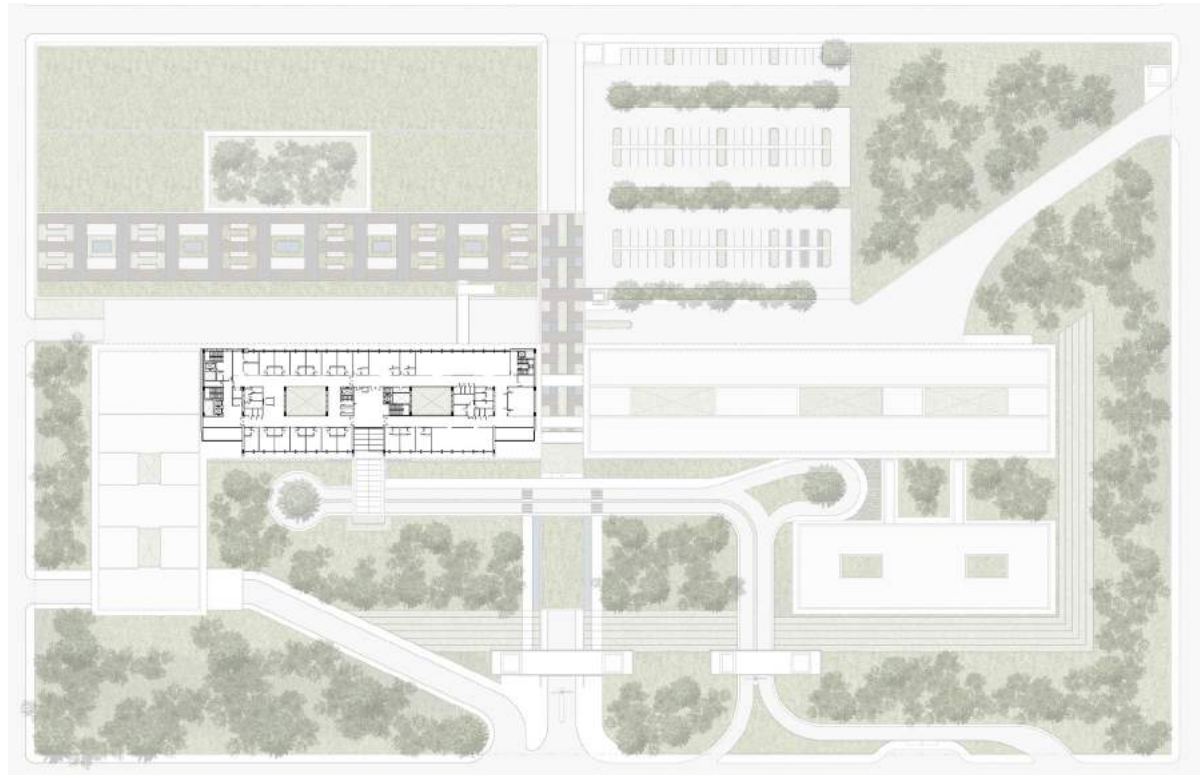




LEVEL N4 +42.30 M
NO SCALE



LEVEL N5



LEVEL N5 +47.20 M
NO SCALE

0 10 40 60 M

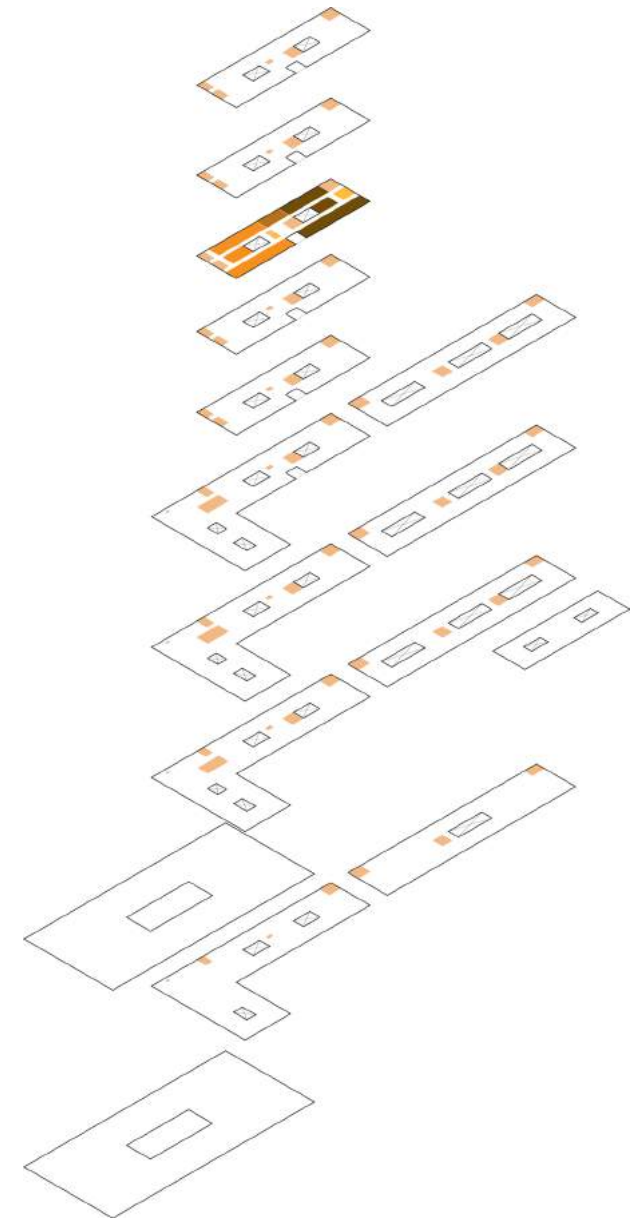
- NEPHROLOGY: DIALYSIS & HEMODIALYSIS
- ONCOLOGY
- INTERNAL MEDICINE (IN-PATIENT)
- PANTRY / STAFF ROOMS

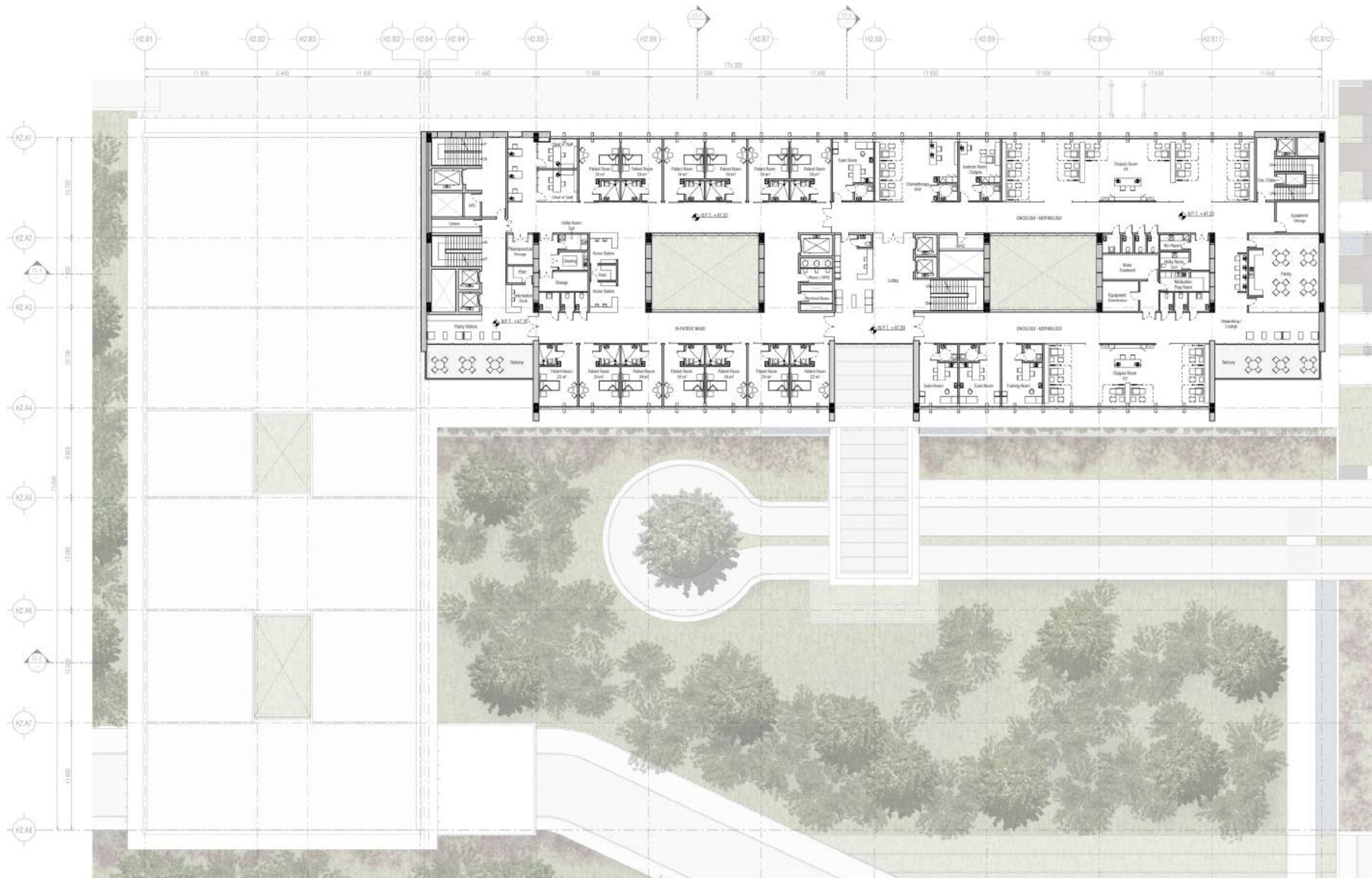
NEPHROLOGY DEPARTMENT: EQUIPMENT

- Peritoneal Dialysis: 8 Units
- Hemodialysis: 12 Units
- Isolation (Hemodialysis): 1 Unit

ONCOLOGY DEPARTMENT: EQUIPMENT

- Chemotherapy: 3 Units





LEVEL N5 +47.20 M
NO SCALE



LEVEL N6



LEVEL N6 +52.10 M
NO SCALE

0 10 40 60 M

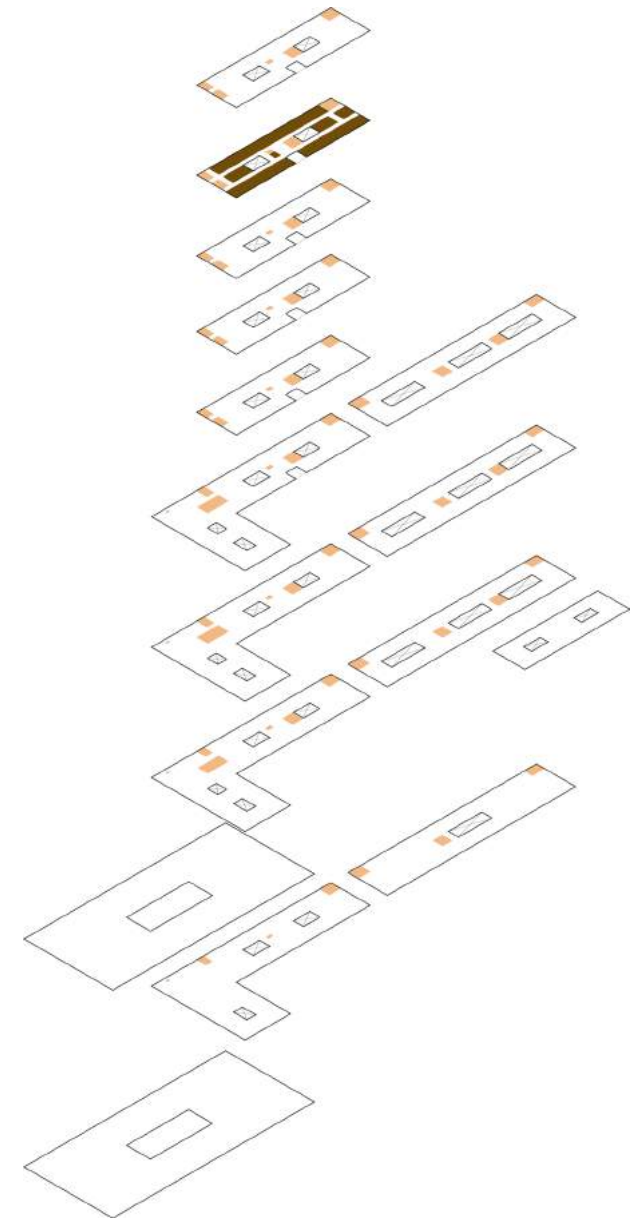
IN-PATIENT (ROOMS AND STAFF AREAS / PANTRY)

This standard in-patient floor has been provided with 30 Patient Rooms following a modular layout to enable the possibility of future changes in disposition or number of units (*See ICU example*).

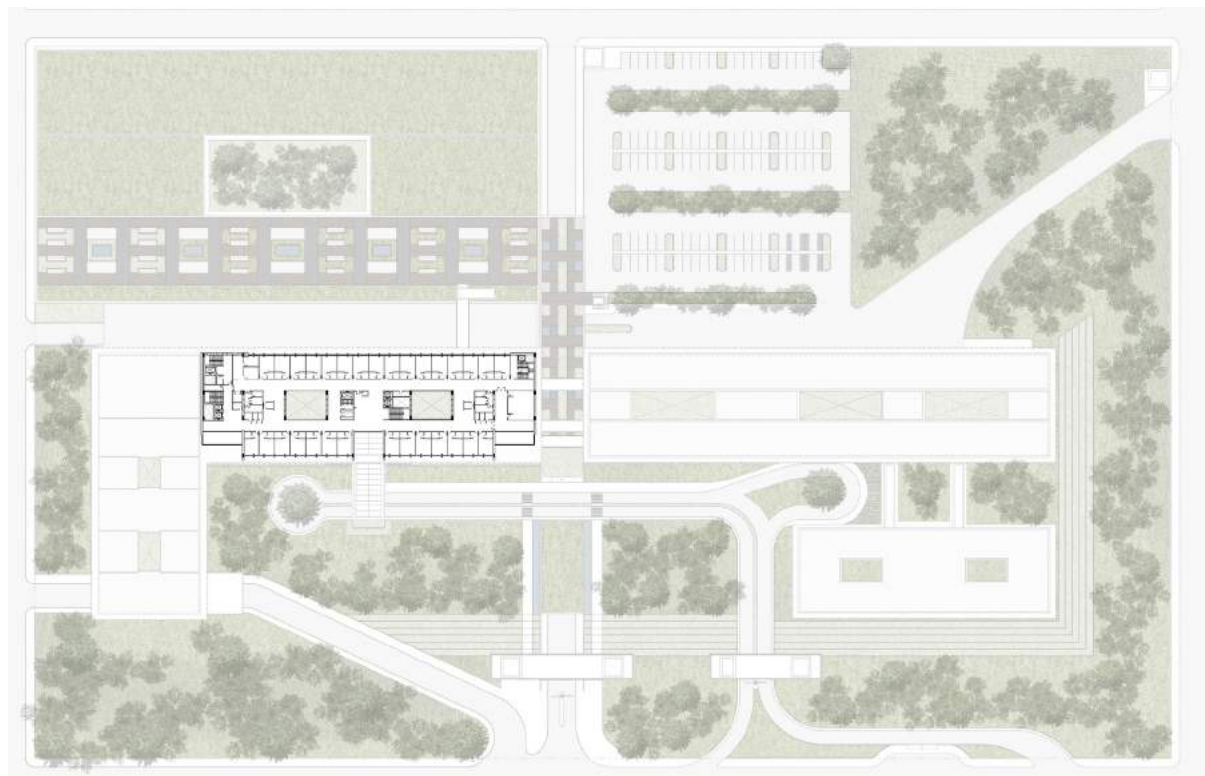
Warm materials have been selected for the patient rooms and the waiting areas to provide them

with a human and homelike character. Daylight will be brought through two light wells located in the middle of the volume.

The Staff Resting Area is located on the same side on each floor, towards the east end of the volume.



LEVEL N7



LEVEL N7 +57.00 M
NO SCALE

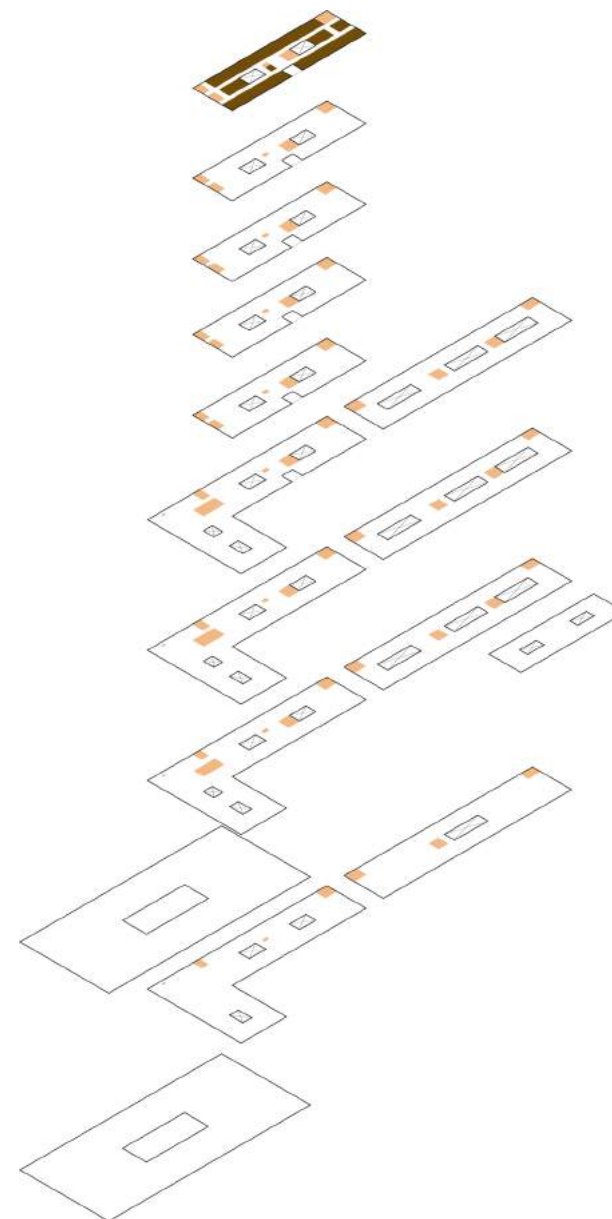
0 10 40 60 M

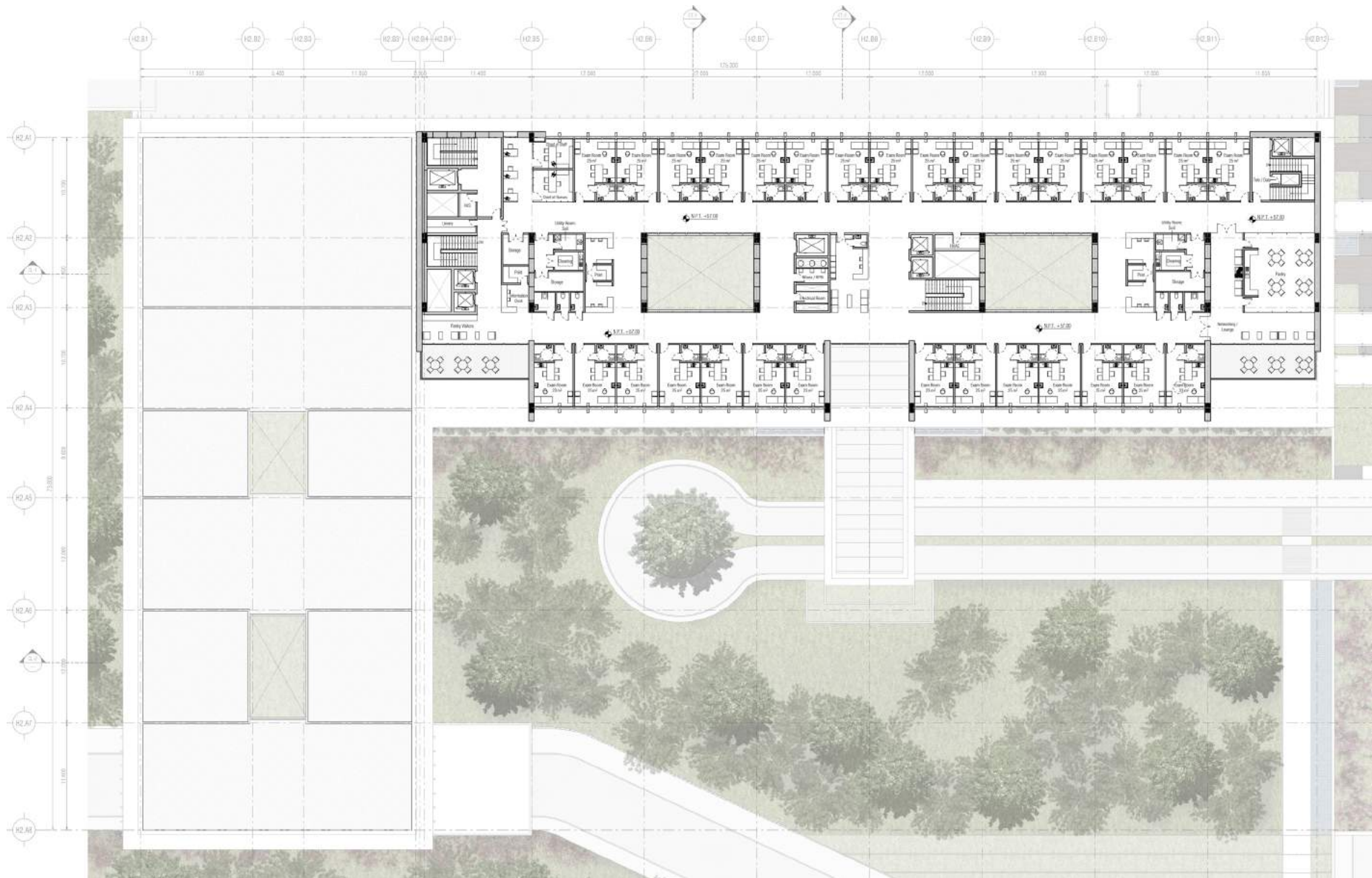
SPECIALIST CARE CENTER (EXAMINATION ROOMS, STAFF AREAS / PANTRY)

The Specialist Care Center Department has been provided with 30 Examination Rooms following a modular layout to enable the possibility of future changes in disposition or number of units.

Designed upon an open floorplan, the patients will be to navigate through the department

by themselves. In terms of healing architecture, daylight will be brought to this floor through two light wells located in the middle of the volume that will bathe the corridors and staff zones. The Staff Resting Area is located on the same side on each floor, towards the east end of the volume.





LEVEL N7 +57.00 M
NO SCALE



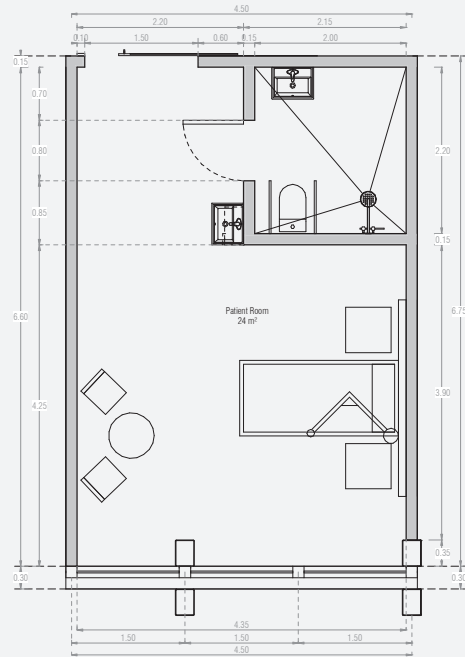




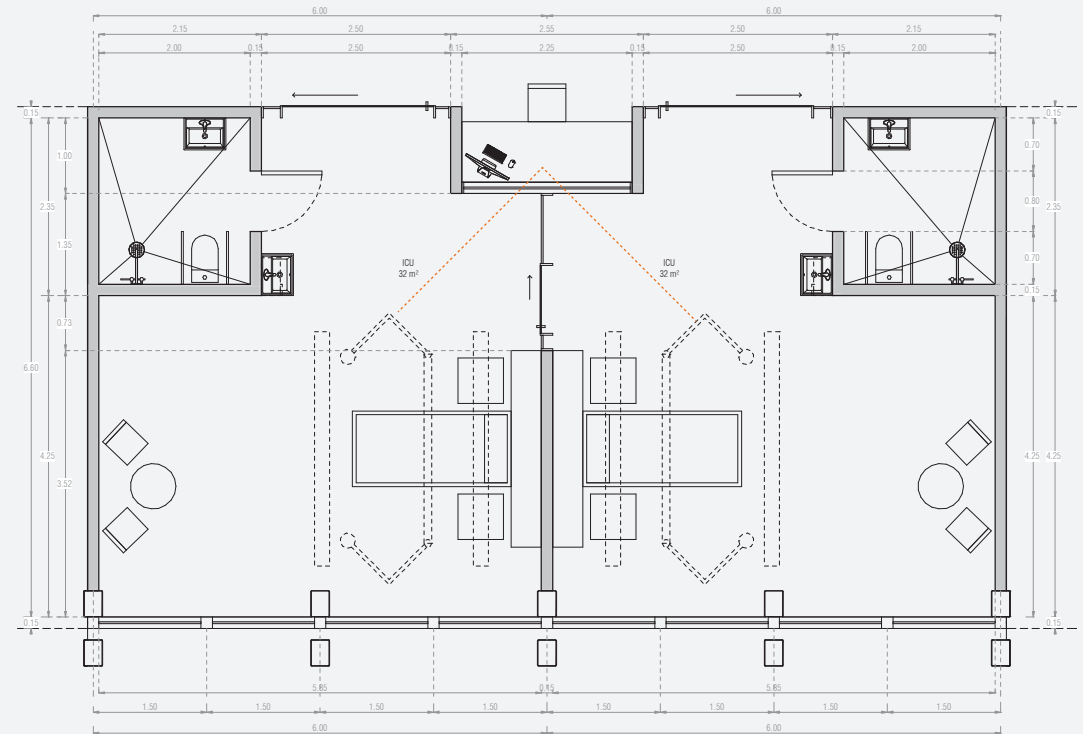




MODULARITY

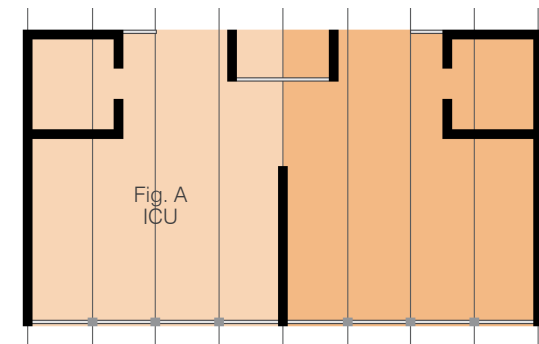
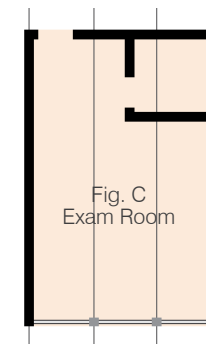
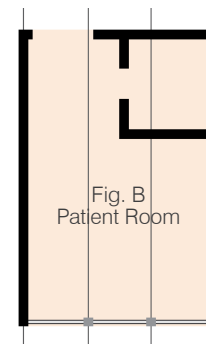
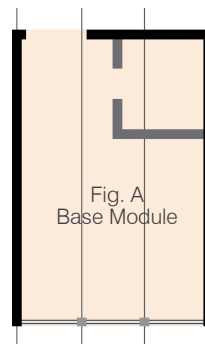


SINGLE PATIENT ROOM
NO SCALE



INTENSIVE CARE UNIT
NO SCALE

A base module was designed to be able to support different functions within the same envelope and cope with forthcoming changes. The unit (Fig A) can be used for Single Patient Rooms, Examination Rooms, Dialysis Lounges, etc. It follows a 1.50 m grid to allow a wider range of configurations without compromising the building's wrapping.





UCI
1317

UCI
1316

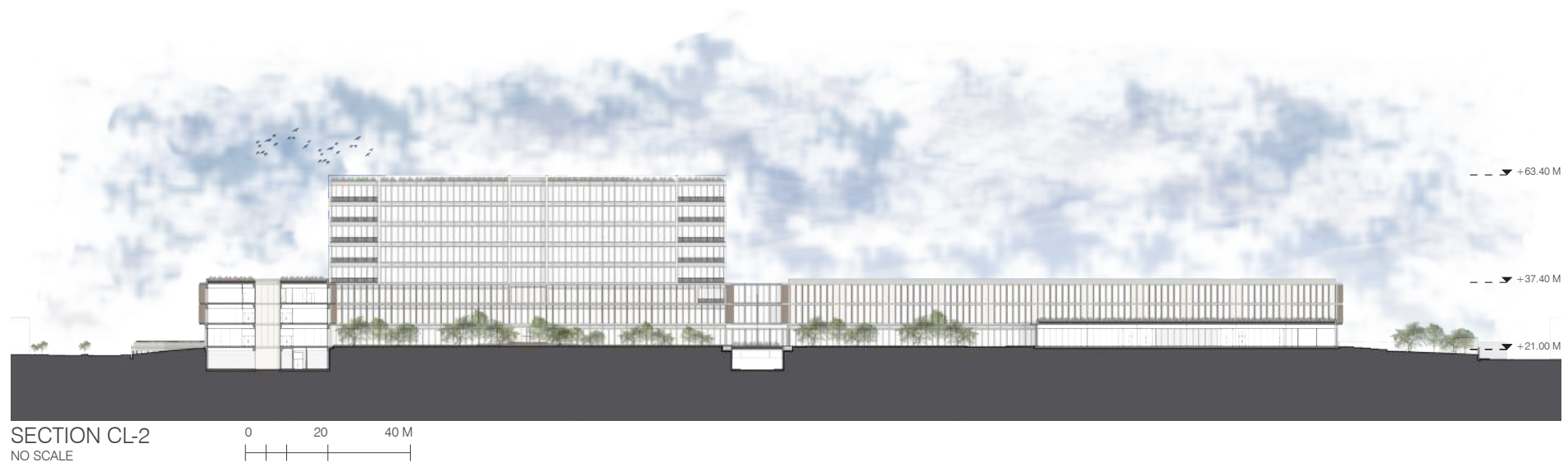
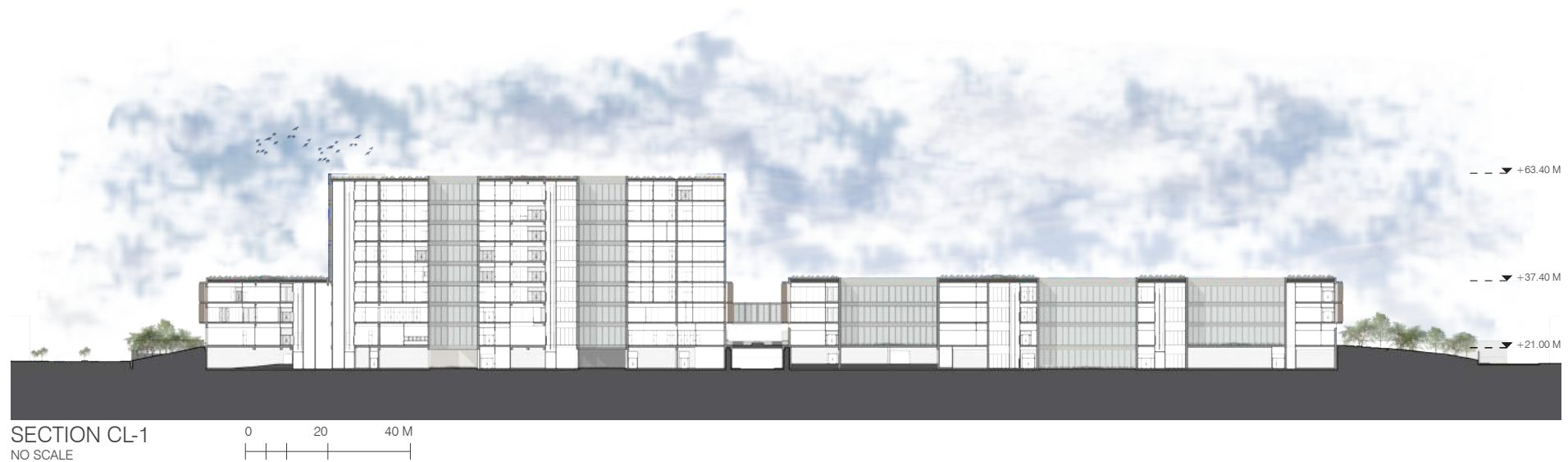




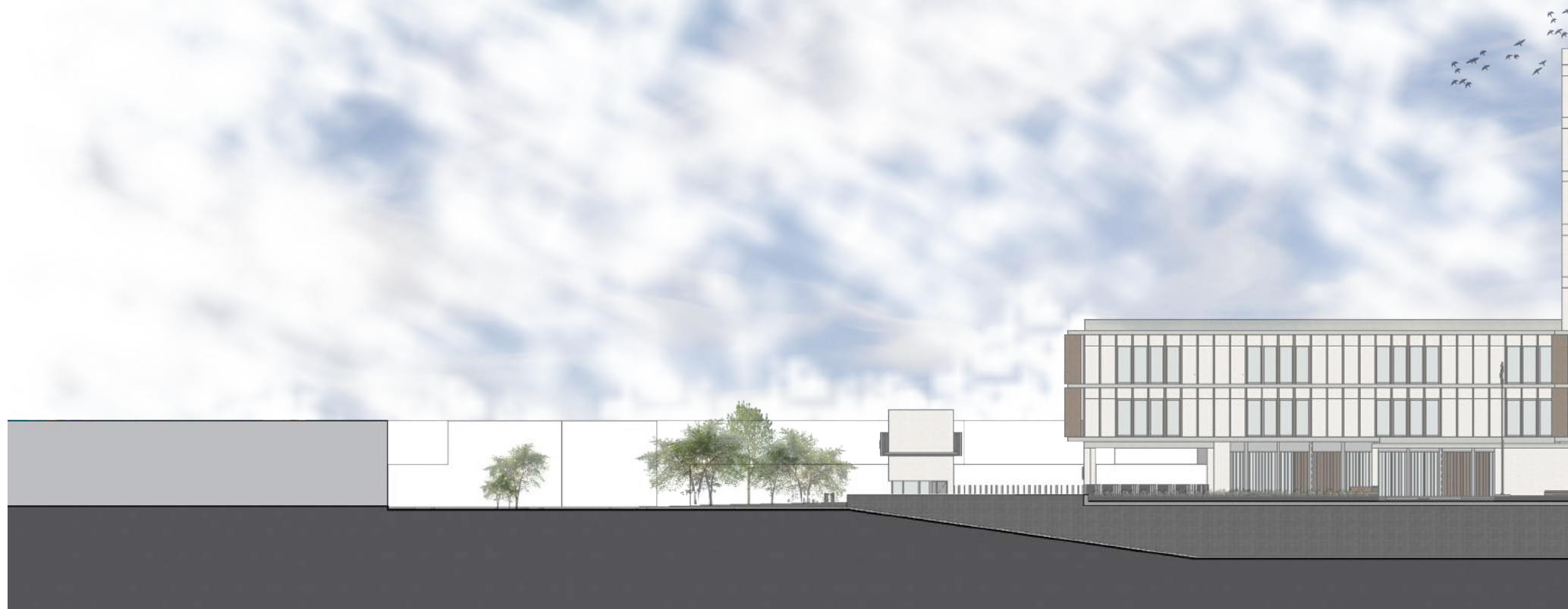
ELEVATIONS



SECTIONS

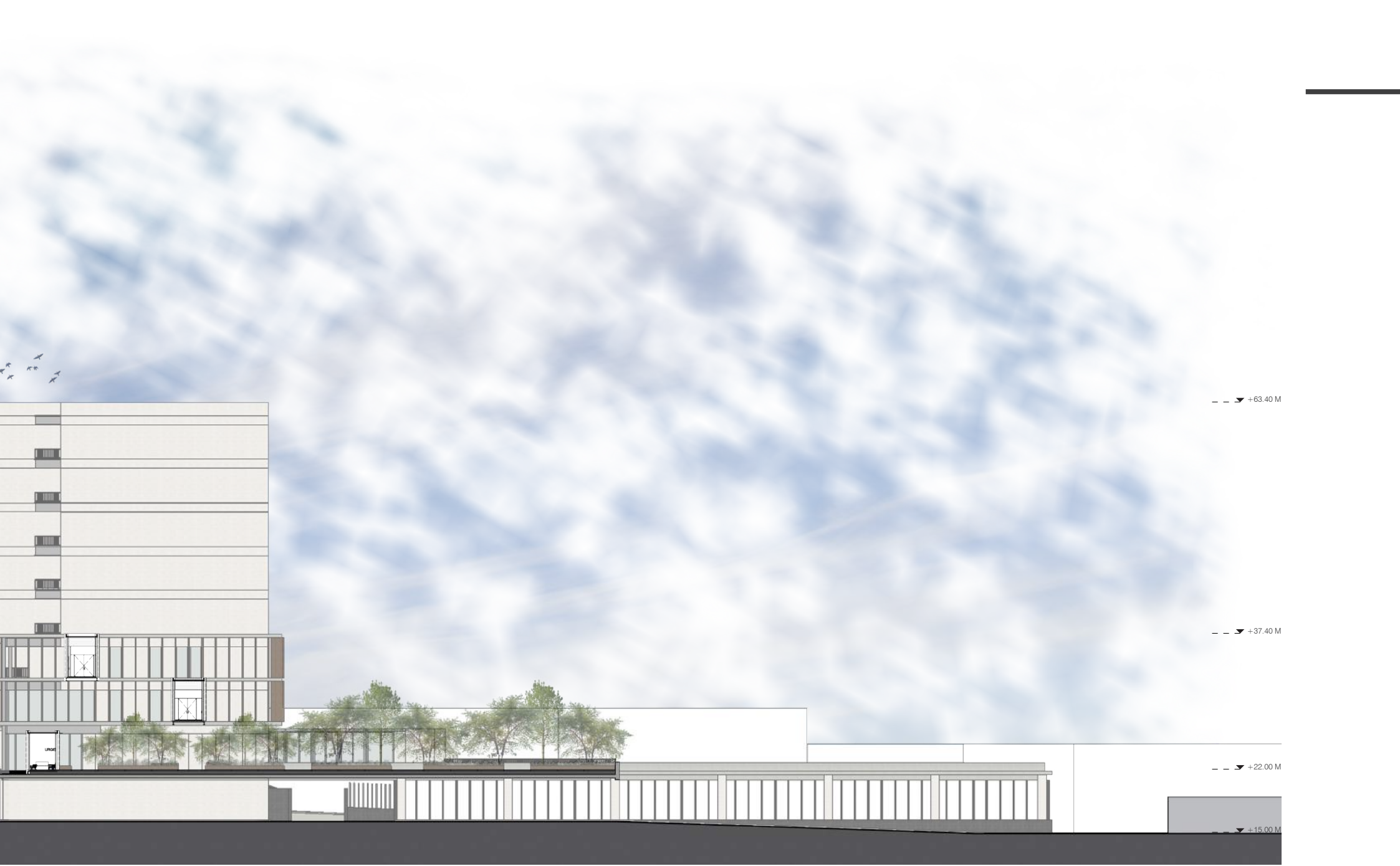


URBAN SECTION



SECTION CT-3 (NORTH - SOUTH)
NO SCALE





MATERIALITY AND DETAILS

A dual character; a double purpose. The following material palette has been chosen as a way to convey the six visions laid out for this project and bestow upon the building a human, warm, welcoming, and light yet lasting character.

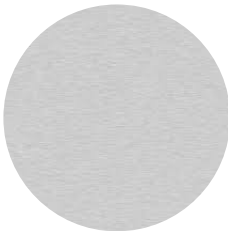
They will remain true to their original properties and touch upon aesthetic and human values such as well-being and beauty, while adding robustness and acting as structural support for the building.

EXTERIOR PALETTE	
MATERIALS	Concrete Panels, Local Stone, Steel, Glass, Walnut Wood
CHARACTER	Durability, Rubustness, Lightness, Temporality, Warmth
INTERIOR PALETTE	
MATERIALS	Oak Wood, Walnut Wood, White Marble, Corian, Black Stone Veneers, Paint
CHARACTER	Warmth, Homelikeliness, Human + Aesthetic, Creativity, Recovery, Cheerfulness

EXTERIOR



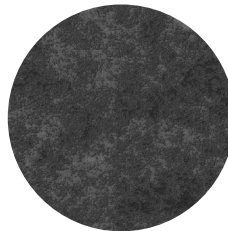
DECK



STEEL PLATES
WHITE COATING



CONCRETE
PANELS



LOCAL STONE
(BLOCKS)



STONE AND
GRASS FLOORING



WALNUT
WOOD

INTERIOR



WHITE OAK
WOOD



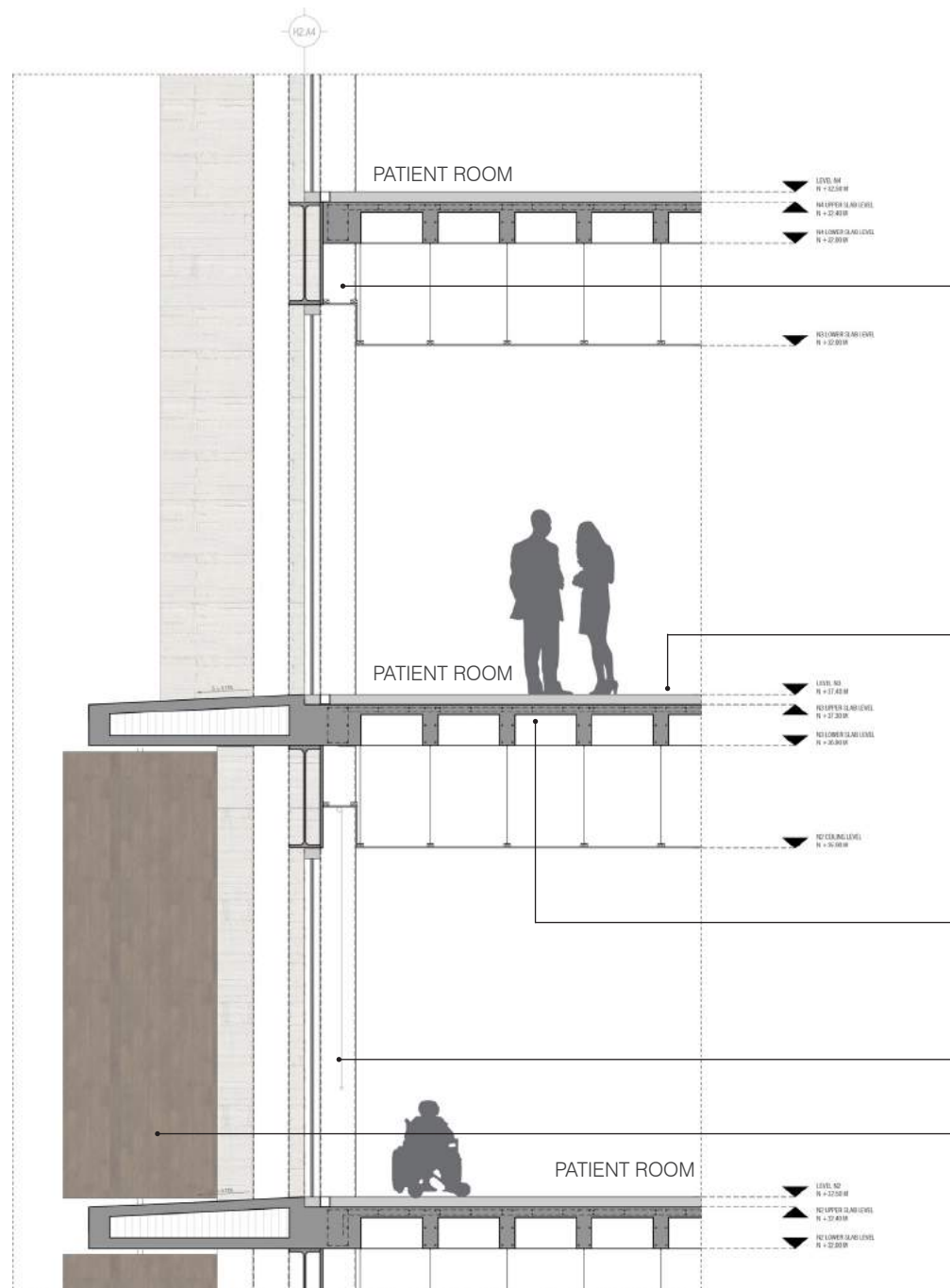
WALNUT
WOOD



WHITE MARBLE
OR SIMILAR (CORIAN)



BLACK STONE
VENEERS



Structural framing F01 W beam 1000x300mm, double column system HSS 300x150 mm, Steel Plate flashing 125mm and mineral wool insulation. Finishing: Metallic paint for exterior color White, 2 layers. See structural detail.

Wooden flooring in Walnut or similar 150x1200m planks over adhesive specified by the manufacturer. Matte finishing. See flooring detail.

Structural slab E01 $t = 400\text{mm}$ with $f'c = 350 \text{ kg/cm}^2$ reinforced concrete. See structural detail.

Window V01 Douvent Termik Low-E / Clear 12mm. See window detail.

Louver Wall W01 with Walnut Louvers 1500x150 mm or similar. Matte finishing and treated for exterior. See detail.

DETAIL SECTION CXF -1
NO SCALE

AN OPEN TOPIC



3.1. AN OPEN TOPIC

3.1.1. CONCLUSION

3.1.2. DISCUSSION / AGREEMENTS



Almost five months have gone by since I started my thesis project and I can say that it has been a tough, yet enriching and enlightening journey. I have learned some valuable lessons on international healthcare design and myself; specifically to have an open mind and always be willing to listen. As an architect, I have always been eager to explore the world and have a deeper understanding on what it entails to conceptualize a healthcare facility; and to some extent, this project served to that purpose.

Healthcare systems around the world must break free from the strict and fixed structure they have been sketched upon on and be open to explore different possibilities if they want to remain relevant and cope with forthcoming challenges. Otherwise, their deficiencies and disparities will become apparent and soon enough succumb upon them. Perfection should not be regarded as the ultimate goal. Every country has its strengths and weaknesses and the important thing is to be able to use them to your favor: be resilient. As a result of this thesis, I would like to underline the following:

Mexico might not be perfect but has always shown strength and the ability to find its way through tough situations. More research and resources should be allocated to the public healthcare in Mexico, as it is in desperate need of assistance, infrastructure and expertise.

Sweden has taught me some valuable lessons on planning for the future, sustainability and the importance of balancing hard and soft values on any project.

Ultimately, I would say I have met my goals and the project meets the requirements I have set along this stage; the next step, though, would be to take it to a full scale laboratory within a real context and environment. Finally, I would like to highlight the following out of my thesis experience and specifically, my project:

- The patient should - and must - always be in the center of the process. A patient-centered facility translates into a human and nurturing environment.
- Daylight -in Mexico or in Sweden- is necessary if we want to ensure our wellbeing. A direct source from daylight is always desirable as it will reduce the amount of electricity used on lightning and improve the staff's daily routines and balance their body cycles.
- Providing a warm, homelike and secure environment for patients and staff is vital. We shouldn't feel estranged but rather welcomed and nurtured, especially if we have to spend a considerable amount of time in such spaces.
- Functionality and aesthetics should always walk together as you can't have one without the other.
- As a country, institution, professionals or individuals: we should be aware that there is always room for improvement and experimentation. We must keep an open mind, be humble and be able to take a break, listen, analyze, be critical and always be willing to be better.



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All drawings (floorplans, sections, elevations), images, diagrams, tables and figures not included in this list have been created by the author of this thesis.

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