

KATIE REYES M.ARCH FINAL STUDY SPRING 2020

WOMEN AND CHILDREN'S HEALTH HUB



SITE LOCATION: PROSPER, TEXAS

Dedicated to:

I thank God for always being with me in every situation. Finally to my family, my gratitude and affection can not be expressed through writing for all that you have done to raise me to be the person I am today. I thank my mother, and I dedicate this book to you, and to all the mothers who are here with us, and to those who are no longer here. May we live lives that always make you proud of the people we are, and are going to be.

ACKNOWLEDGEMENTS

Committee:

I wish to express my gratitude for all of the Texas A&M faculty and to the design professionals who offered their design knowledge and feedback for the creation of this final study. My committee members, who contributed to this project in that they constantly pushed my design for its improvement. I would also like to offer gratitude to my classmates who have been very supportive throughout this process and in our time at design school.

CONTENTS

04 INTRODUCTION
MATERNAL HEALTH

05-07 RESEARCH
BIOPHILIC DESIGN
DESIGN DEVELOPMENT
PROCESS

09-12 FINDINGS/CONCEPT
PROJECT LOCATION

13-21 SITE/CONTEXT

22-25 DESIGN
FACADE
TECHNICAL INFORMATION
STRUCTURAL
MECHANICAL
WORKS CITED

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Women's Health Maternal Mortality

From the Global to The US perspective

There is the issue of maternal mortality, many women face complications during their labor. In some cases these difficulties become so severe that they lose their lives, after they give birth to their infants. In 2017 there were "approximately 808 women that died from preventable causes related to pregnancy and childbirth" daily around the globe (World Health Organization). The health of women and their infants is directly correlated, this may be seen with the birth outcomes. According to Unicef "More than 80 per cent of all newborn deaths are caused by preventable and treatable conditions, including complications due to prematurity or during delivery, and infections like sepsis, meningitis and pneumonia". If these issues are preventable then we must provide buildings that offer these health services and education, so they may be a mediator for these health complications.

Global

75% Of all maternal Deaths Caused by:

Severe bleeding (mostly bleeding after child-birth)

Infections (usually after childbirth)

High blood pressure during pregnancy

(pre-eclampsia and eclampsia)

Complications from delivery

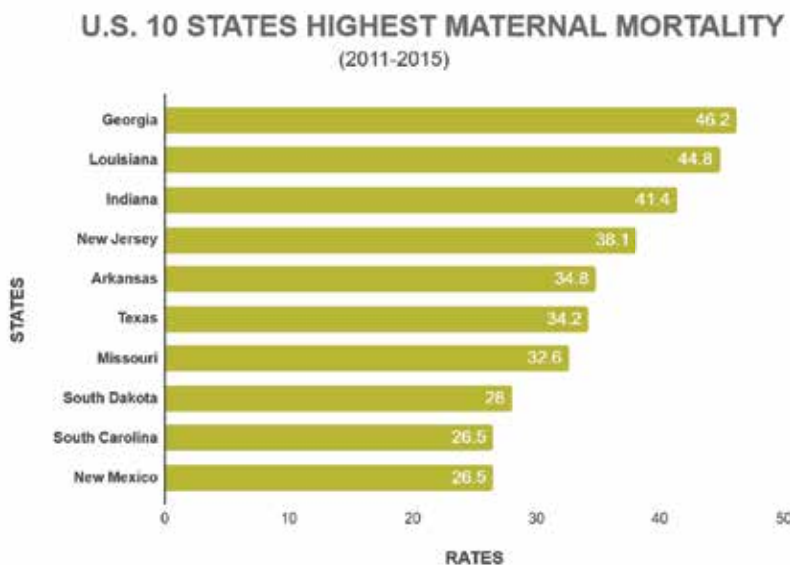
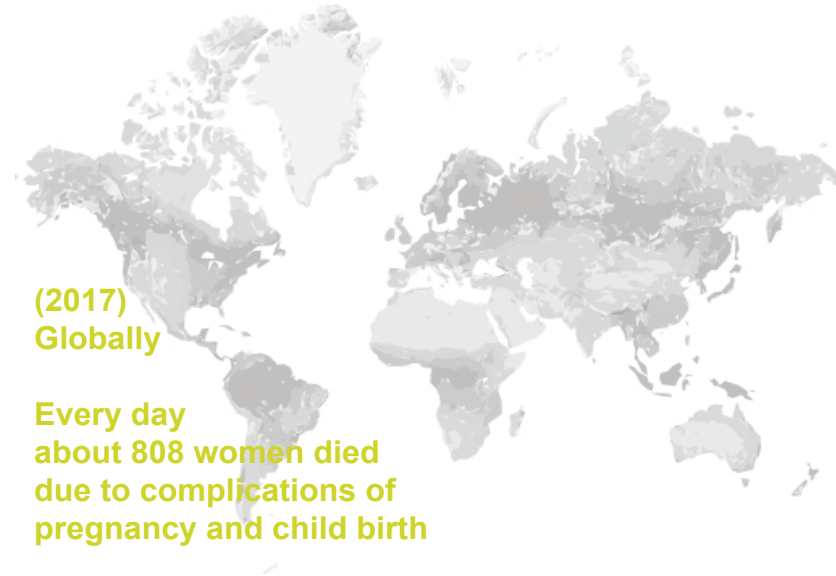
Unsafe abortion

U.S.

Maternity death rate has doubled in the past 25 years

(2011-2015)
U.S.
10 States
Highest
Maternal
Mortality rates

(Deaths Per 100,000 Live Births)

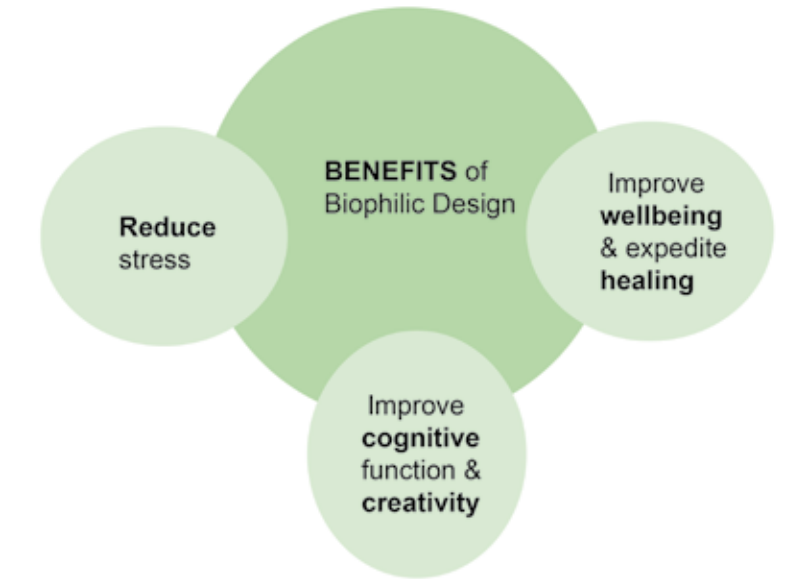


BIOPHILIC DESIGN

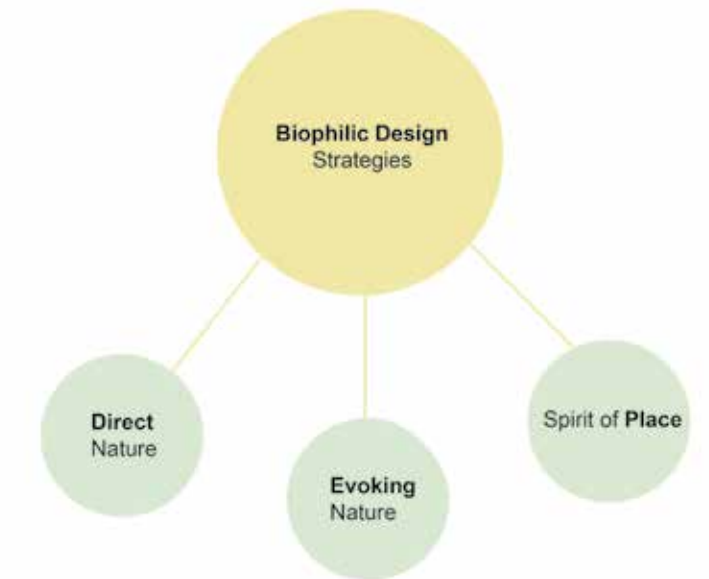
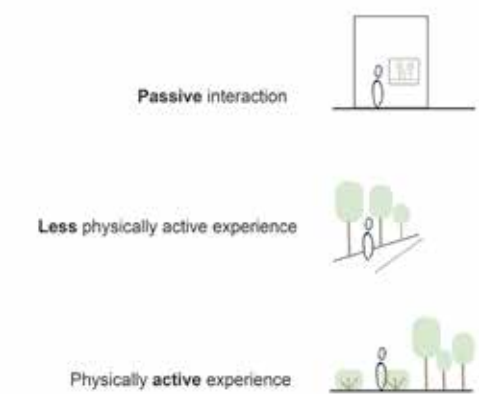
Nature, Health, Architecture

There is a unique relationship between nature, health, and architecture. I believe that architecture if designed to do so may aid to elevate people's physical and mental health. Similarly, nature has been proven to reduce an individual's stress, restore attention, and allow the body to heal at an increased rate than in its absence. Architecture if designed intentionally may foster this relationship that people have with nature (Wilson, 1984, Biophilia). Thus, becoming an aspect that may aid in the healing process. Architecture that is designed to heal.

After research, investigation, and case studies architectural and landscape design strategies were chosen for this project. The design strategies were derived from biophilic design, the elements are the spirit of place, the direct use of nature, and evoking nature. These design strategies were utilized for this project, the direct use of nature was by the use of the landscape/therapy gardens. As well as evoking nature through the building's facade floral pattern. The spirit of the place was done by utilizing the front porch pattern, wayfinding inspired the local geography and flora, and by establishing connections between the site and the building through the facade material chosen for the building.



TYPES OF ENCOUNTERS WITH NATURE



(Wilson 1984, Kellert, 2008)

DESIGN DEVELOPMENT

Nature, Health, Architecture

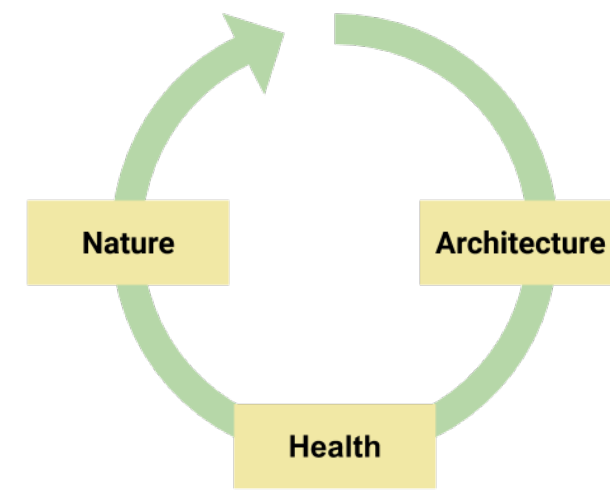
In health facilities stress may be particularly compromising because of the health conditions of the patients, and the delicate work that must be done by the staff in their daily tasks. Patients who have their physical body compromised are going to be more susceptible to emotional stressors. Nature may be used as a mediating tool to allow people to receive positive distractions, and physical activity that provide opportunities where they may relieve stress. There have been multiple studies that display that viewing and interacting with nature does reduce biological markers of stress, such as reduced blood pressure and lowered heart rate. In design this is manifested as Biophilic design.

B I O P H I L I C
D E S I G N
P R I N C I P L E S

What is Biophilia?

“Biophilia is the inherent inclination to affiliate with natural systems and processes, especially life and life-like features of the non-human environment.”(Kellert, p. 3).
“We regard biophilia (which literally means love of life) as key to creating places imbued with positive emotional experiences....that are the precursors of human attachment to and caring for place” (Heerwagen and Gregory, p.227).

(Browning et al. 2014, www.researchgate.net)



FOCUS

Design

Biophilic design
The spirit of place,
The direct use of nature,
Evoking nature

Architecture & Site context

Home; defines roof
Establishing a homelike setting

Pattern language

Idea of home:
Front porch,
How the front porch may be used on a vertical scale.
Roof as shelter
(Alexander, Silverstein, Ishikawa).



DESIGN- SKETCH A

PRINCIPLES AND PATTERNS OF BIOPHILIC DESIGN

Biophilic Design Principles	Nature in the Space	Natural Analogues	Nature of the Space
Design Narratives	Visual Connection with Nature	Biomorphic Forms & Patterns	Prospect Refuge
	Non-Visual Connection with Nature	Material Connection with Nature	Mystery Risk & Peril
	Non-Rhythmic Sensory Stimuli	Complexity & Order	
	Thermal & Airflow Variability		
	Presence of Water		
	Dynamic & Diffuse Light		
	Connection with Natural Systems		

WHERE RESEARCH AND DESIGN MEET

“evidence-based healthcare designers make critical decisions, together with informed clients, on the basis of the best available information from credible research and the evaluation of completed projects “
(2008, K.Hamilton)

Research has shown that sterile, and cold facilities may be made more habitable by having them become a setting that is more familiar to people, such as a homelike setting. Thus this investigation continued with what does a homelike setting look like in this area of North Texas? In the southern United States the front porch has been utilized as a central location for social gatherings. This transition space from indoors to outdoors becomes an extension of the home. It is important as it is a place to see the activity that is occurring outside of the home, to be seen by others, but also may be a place where one may go to for solitude. The idea of home and the front porch typology was central to developing the architectural spaces.

(Alexander, Silverstein, Ishikawa, Pattern Language)

- LANDSCAPE DESIGN STRATEGIES**: Front Porch, How to the front porch may be used on a vertical scale?
- ARCHITECTURAL DESIGN STRATEGIES**: In site Context, Campus, Roof as shelter
- IDEA OF HOME**: A place of comfort, rest, functional, meets your logistical needs, and emotional needs, have choice and freedom

T H E
V A L U E O F N A T U R E
F O R
P A T I E N T S ' S T R E S S

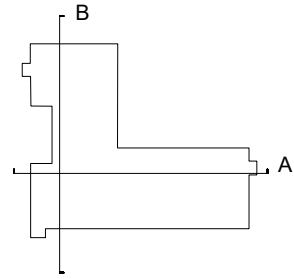


FORM DEVELOPMENT



WEST SECTION B

This section displays the interconnectivity of the indoor and out relationships established by the balconies.

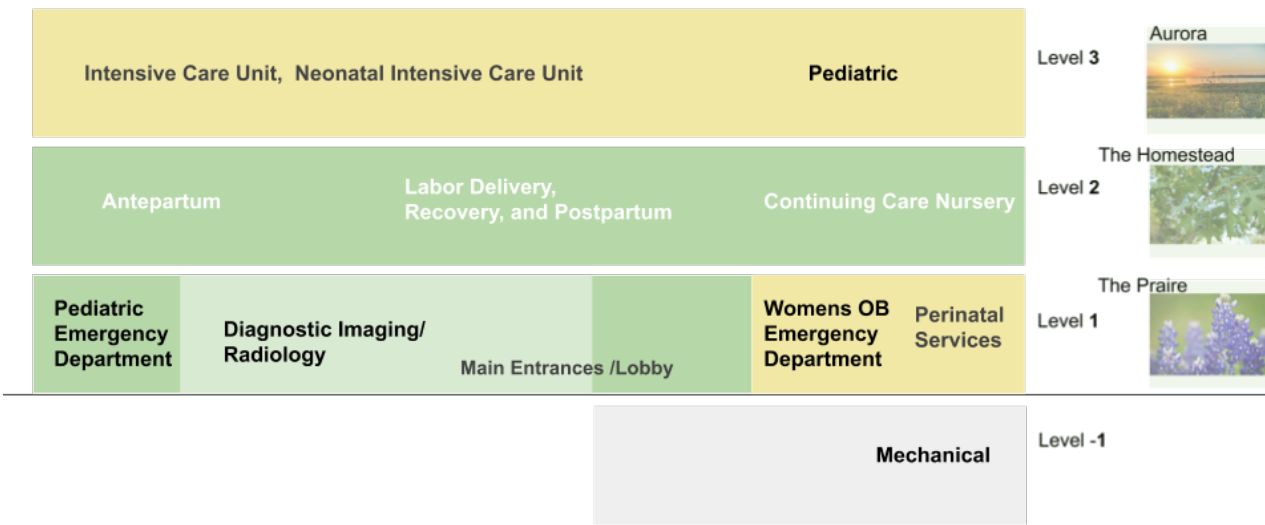


Process

This project began with first gaining an in-depth knowledge of the site and climate, the population being served, the program, and biophilic design strategies. Then taking that information and making it applicable to the site and scope of the project.

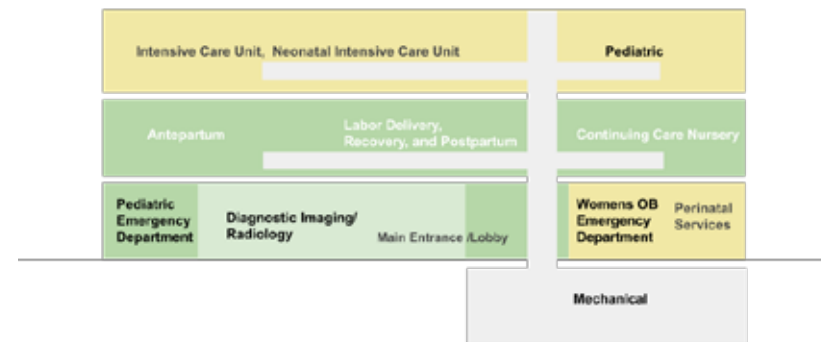
Findings

The findings were based on needs that the population being served had, and reviewing established practices of how to meet those needs through the design. This was done as a process that ever changed the design. In the floor plans for example there is a balance of meeting the logistical and functional needs to offer the health services, but only finding what could be done to meet the psychological health of the families, patients, and staff.



PROGRAM

SYSTEMS



DESIGN- SKETCH B

WAY FINDING + BIOPHILIC DESIGN

Images of nature from Texas's Native Landscape were chosen to become wayfinding elements for the users.

The bluebonnet was adopted as the official state flower by the Texas Legislature in 1901.



“AN **ENTRANCE TRANSITION** IS THE AREA BETWEEN THE STREET AND THE FRONT DOOR OF A BUILDING. WHEN IT IS MADE WELL, IT MAKES A **TRANSITION** FROM PUBLIC TO PRIVATE, AND THE OUTDOOR SPACE ALLOWS YOU TO BE COMFORTABLE ...”

PEDIATRIC MAIN ENTRANCE

SITE

This is the vehicular drop off area for the Pediatric Entrance. This view also displays the inner garden that is adjacent to the two main entrances.

SITE/CONTEXT

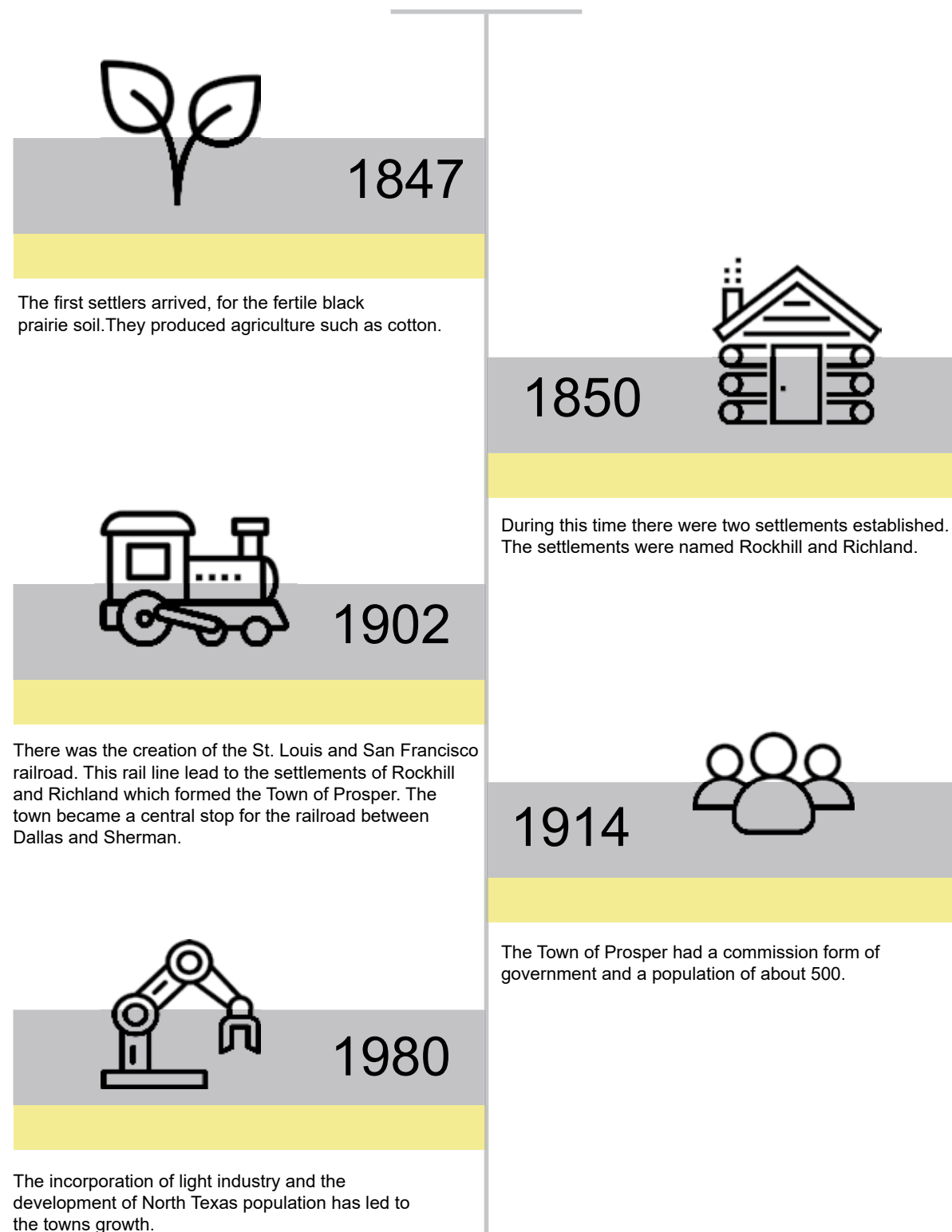
Prosper, Tx USA

The site is located in North Texas in the small yet growing town of Prosper, Texas. This town resides between the counties of Denton and McKinney. The site is unique in that it is a part of existing Cook Children Medical facilities. The facilities include an Urgent Care center, and a primary care facility. The addition of the new building will be the hospital for women and children.

Location

- North of Dallas, Prosper is located 32 miles from the Dallas/Fort Worth International Airport, 35 miles from Downtown Dallas, 14 miles from the Collin County Regional Airport and 55 miles from Fort Worth

HISTORY OF PROSPER TEXAS



WOMEN AND CHILDREN'S HEALTH HUB

Why Prosper, Tx?

A review of the statistical data for maternal mortality in the US shows a variation across the different states.

One of the reasons for such disparities between states is the absence of health services for women in these areas in the areas of higher mortality.

The March of Dimes states these areas are counties "in which access to maternity health care services is limited or absent, either through lack of services or barriers to a woman's ability to access that care". These areas are present all over the United States, but more so in rural areas in comparison to their urban counterparts.

PROSPER, TEXAS

Prosper is a town similar to many across North Texas that is developing rapidly, thus the town is in need of essential services for the community. In rural areas there are challenges, such as many reside far from where health services are located, and limited or no access to providers of obstetrics services. Design has the power to intervene in this issue by aiding in providing those services to these underserved populations.

Information

- As of January 1, 2019, the population was estimated at 25,630.
- The Land Area is 27 square miles.
- Located 25 minutes from 2 major airports.
- This area is defined as the blackland prairies, for the soil is made of dark black to light grey clay

Women and Children

In life our mother is our first home, it is where we develop and grow, thus one's health and life is dependent upon our mother's initial health status. Many negative health outcomes for women and their infants may be avoided if women are given maternal health resources.

According to the March of Dimes one in every 10 infants in the US is born prematurely (2019). By placing health services closer to where communities are may aid in keeping communities healthy, by offering preventive care measures, and treatment that is easily accessible in rural areas. As a stakeholder, architecture may become a platform to influence the health status for not only women, but their entire families as well.



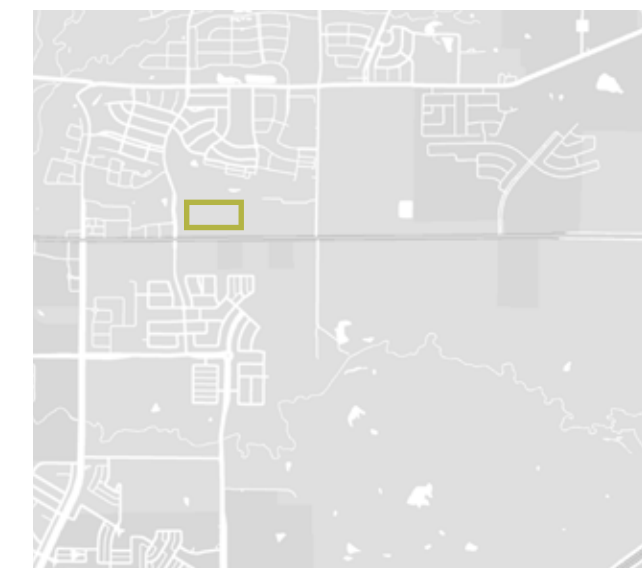
Site Context

City scale



Site Context

County scale



Site Context

Outline of the site

Demographics and Transportation

The site is located adjacent to a main highway as is the current primary means of transportation. Thus, it was necessary to view other means of transportation such as bike routes and public transportation for the health of the environment and the growing metropolitan areas of North Texas. The site does not have an established public transportation system, so for the site planning and development there will be a bus route implemented. The design of the site plan also placed two bus stops for the public to utilize.

CURRENT TRANSIT ROUTES (2019)



- 01 CAR ROUTE
- 02 BIKE ROUTE
- 03 BIKE FRIENDLY ROUTE

POPULATION PROSPER, TEXAS 2019



Total Population
25,630



Under 35 Population
51%



Under 18 Population
35.6%



Under 5 years old
8.1%

WOMEN AND CHILDREN'S HEALTH HUB



SITE PLAN

" THE STRENGTH OF GOOD DESIGN LIES IN OUR OURSELVES AND IN OUR ABILITY TO PERCEIVE THE WORLD WITH BOTH EMOTION AND REASON"(ZUMTHOR, 1998, P. 57).

The Contributions of Nature to Health and the Environment

What are the Benefits of Nature for people and their environments ?

The site is located adjacent to a main highway as is the current primary means of transportation. Thus, it was necessary to view other means of transportation such as bike routes and public transportation for the health of the environment and the growing metropolitan areas of North Texas. The site does not have an established public transportation system, so for the site planning and development there will be a bus route implemented. The design of the site plans two bus stops for the public to utilize.

Vegetation such as trees have many positive benefits to the environment, they include: improving the microclimate for an area, filtering air pollution and debris, provide oxygen, reducing storm water runoff ensuring the the reduction of pollution into water systems, provide a habitat for many life forms ensuring the this aids maintaining the equilibrium of food webs. Trees may also reduce the effects of flooding.

THE PRESENCE OF NATURE IN THE ENVIRONMENT AND HEALTH



Health Benefits

Roger Ulrich's Research from (1984) and continued studies have found views to nature

Reduce hospital stays from 2.6 to 3.67 days, particularly with patients suffering from bipolar disorder or depression

Increased daylight in patients' room can reduce depression and pain

Reduce the need for anesthesia,

Increase patient and family satisfaction

Reduce stress

Improve clinical outcomes

May help to counteract a buildup of psychological stress, thus reduce the impact of stress on physical and mental health.



Economic Benefits

"Integrating views to nature into an office space can save over \$2,000 per employee per year in office costs, whereas over \$93 million could be saved annually in healthcare costs as a result of providing patients with views to nature."



Workplace Benefits

"Findings suggest that the quantifiable benefits of the biophilic workplace go beyond measurable physiological indicators.

Greenery and daylight may play a major role in the occupants' health and cognitive function, and both could be assessed through the measurement of subjective and objective parameters."

Citations

Ulrich, R. "View through a Window May Influence Recovery from Surgery." *Science* 224, no. 4647 (1984): 420-21. <https://doi.org/10.1126/science.6143402>.

"Trees in the Small City Retail Business District ...," n.d. http://www.naturewithin.info/City-Biz/BizSmitTn3Ps_Ifor.pdf.

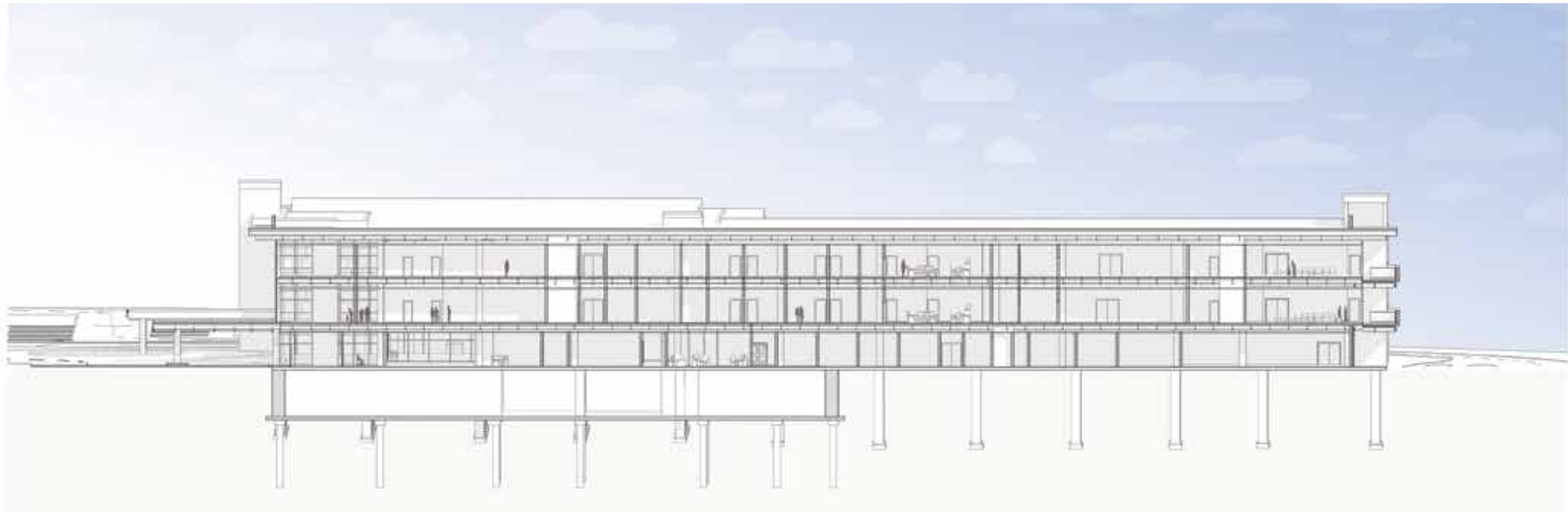
"The Economics of Biophilia." Terrapin Home - Terrapin Bright Green, May 1, 2014. <https://www.terrapinbrightgreen.com/reports/the-economics-of-biophilia/>.

Newman, Peter, and Jana Soderlund. "Biophilic Architecture: a Review of the Rationale and Outcomes." *AIMS Environmental Science* 2, no. 4 (2015): 950-69. <https://doi.org/10.3934/envirosci.2015.4.950>.

"Quantitative Improvement in Workplace Performance through Biophilic Design: A Pilot Experiment Case Study." *Energy and Buildings*. Elsevier, August 13, 2018. <https://www.sciencedirect.com/science/article/pii/S0378778818306194?via=ihub#ec0022>

Brown, Daniel K., Jo L. Barton, and Valerie F. Gladwell. "Viewing Nature Scenes Positively Affects Recovery of Autonomic Function Following Acute-Mental Stress." *Environmental Science & Technology* 47, no. 11 (2013): 5562-69. <https://doi.org/10.1021/es305019p>.





SOUTH SECTION A

Implemented to Design

Project goals

Provide environments that treat/ restore children and women's health
Enable/ foster unstructured play for babies and children
Provide access* to nature

Respect* the environment

Access to nature- amount of trees and vegetation in the window view, the number of live plants indoors and the outdoor landscape

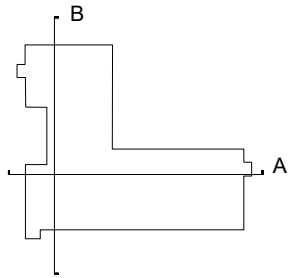
*Respect-to show consideration for site's existing resources and utilization them in a manner that does not compromise those resources for future generations

Establishing a Homelike setting:
The Architecture of home

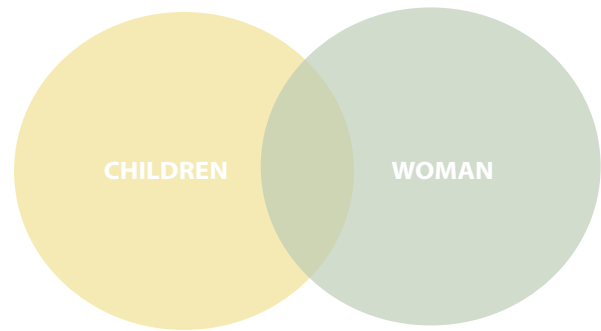
Based upon investigations from previous healthcare projects, it is crucial to balance the functional requirements needed to allow for spaces to work efficiently, have less, medical errors, and control infection.

There is also the necessity for these spaces to be habitable, to make the spaces less stressful so patients may heal and staff may work more efficiently.

Utilizing ideas and concepts from design for aging, as well as recalling design practices that stated how spaces may feel "homelike". These include a sense of ownership, ability to personalize the space, ability to have friends/family near, especially regards to meal times, a sense of privacy, and a sense of control.



POPULATION



LEVEL 1 BUILDING SERVICES



PROGRAM

LEVEL -1

BUILDING SERVICES

LEVEL 1

- OUTPATIENT CLINICS
- DIAGNOSTIC/TREATMENT
- BUILDING SERVICES
- PUBLIC/ ADMINISTRATIVE
- OUTPATIENT CLINICS

LEVEL 2

- DIAGNOSTIC/TREATMENT
- BUILDING SERVICES
- PUBLIC/ ADMINISTRATIVE
- PATIENT CARE UNITS

LEVEL 3

- DIAGNOSTIC/TREATMENT
- BUILDING SERVICES
- PUBLIC/ ADMINISTRATIVE
- PATIENT CARE UNITS



LEVEL 2 MATERNAL SERVICES

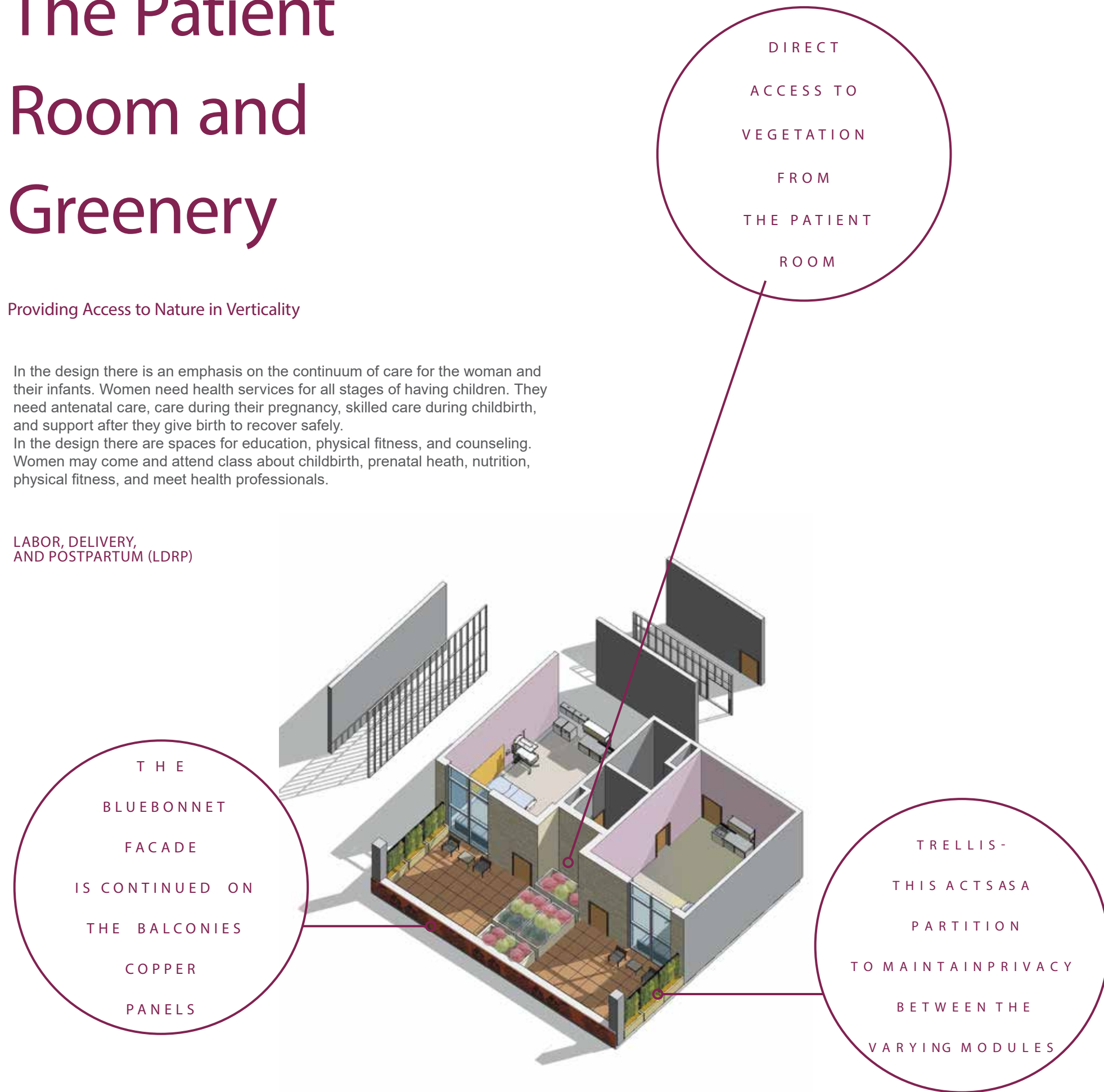


The Patient Room and Greenery

Providing Access to Nature in Verticality

In the design there is an emphasis on the continuum of care for the woman and their infants. Women need health services for all stages of having children. They need antenatal care, care during their pregnancy, skilled care during childbirth, and support after they give birth to recover safely. In the design there are spaces for education, physical fitness, and counseling. Women may come and attend class about childbirth, prenatal health, nutrition, physical fitness, and meet health professionals.

LABOR, DELIVERY, AND POSTPARTUM (LDRP)



WOMEN AND CHILDREN'S HEALTH HUB

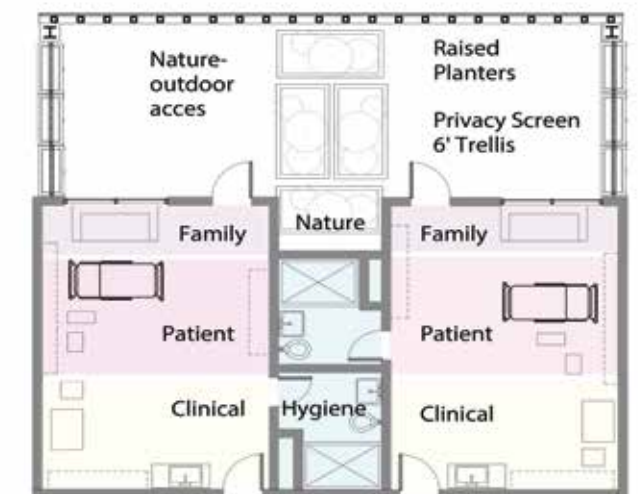


VIEW- SOUTH FACING BALCONIES

Collaboration, Communication, and Care

The endeavors of establishing a design with access to natural light, views of nature, effective control of acoustics, and providing areas of respite are aimed to improve the health and wellbeing of the staff. In the development of the design of the floor plans, the spaces were designed so that nurses stations could have views to the outdoors, and that the areas of respite for the staff had views of the landscape of the site.

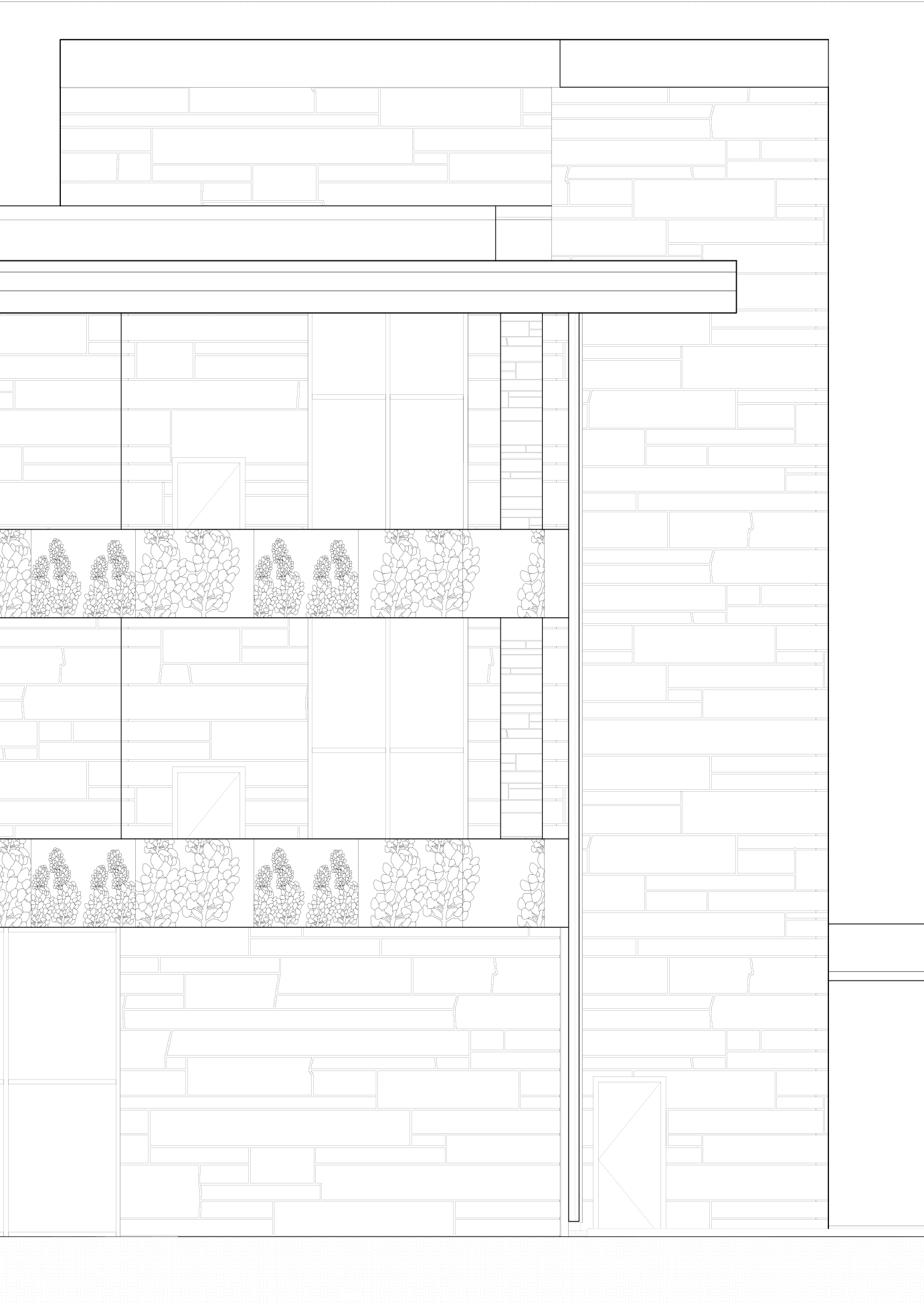
The team based care model for staff and the benefits of this model were received and implemented into the establishments of the floor plans. This model is becoming more prevalent in pediatric and obstetrics care for many specialists who are working more closely together to coordinate and access for the health of the patient.



LEVEL 2

LABOR, DELIVERY, AND POSTPARTUM (LDRP)

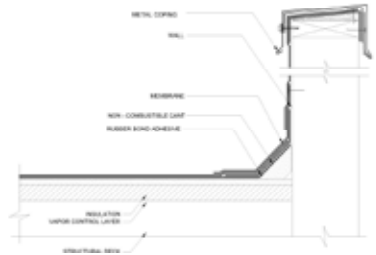
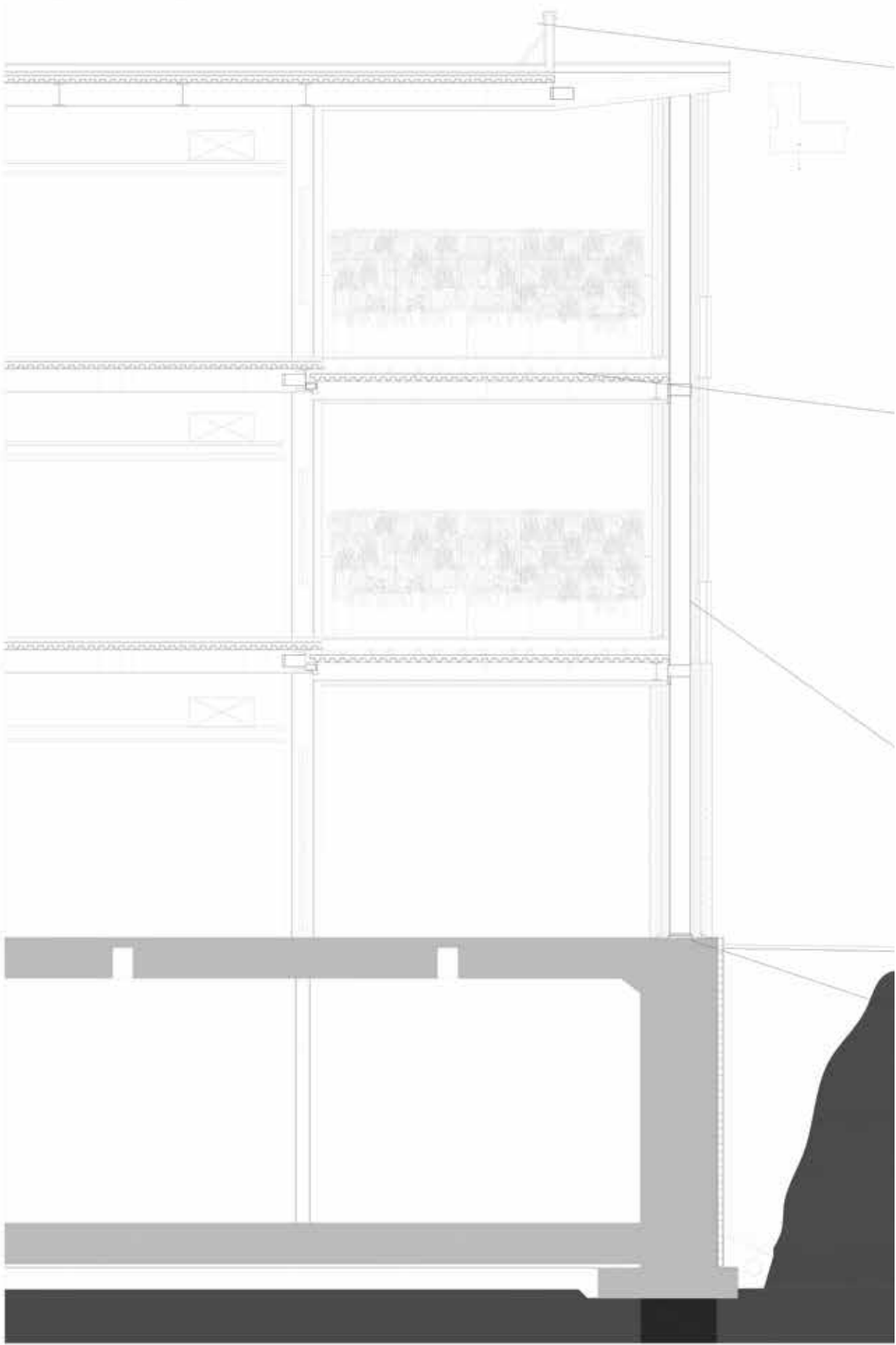
North Elevation



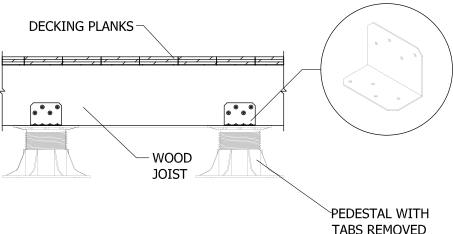
The wall section on the following page displays the foundation in relationship to the dark clay soil found in this region of Texas. This needed to be adjusted to allow for the continuity between the basement and the upper levels.

The balconies required additional design to support the additional loads of the planters. The lateral bracing, for the balconies may be seen in drawing 06. The water drainage for vegetation was addressed by the variation in the floors structural beams, the beam may be displayed in the building section. This as well as the raised floor decking allowed for the trantisont space to the exterior.

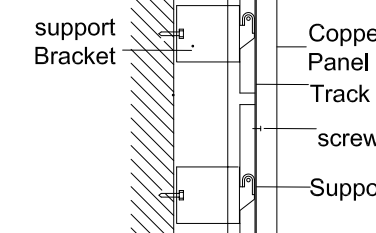
The Wall Section



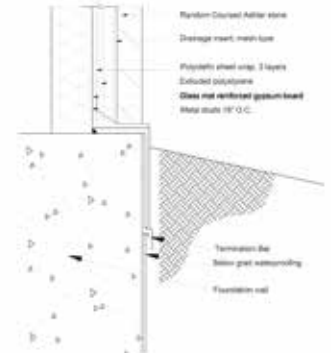
01



02



03



04

The building is classified as construction type IIB, and an occupancy of I-2, by the 2018 IBC. The structure is class A structural steel, with columns, beams, and girders. The floor is light gauge steel joists with 2" metal decking with a 6" sitecast concrete slab. The floor to floor height is 14', there are 4 levels.

The design of the labor and delivery units were reviewed to meet the spatial and programmatic requirements of the codes set in place by Texas. The purpose of this was to provide spaces with higher levels of obstetrics care that would be able to accommodate for a wide range of situations, given its context in a rural area. In order to provide the community hospital with a high level of care that is in close proximity to growing populations.

The spaces are designed to accommodate for various inpatient flows, for the floor plans have future patient rooms if there is an increase in the patients that the hospital is having.

In order to meet all the needs for various situations, there are bereavement rooms placed in the LDRP zone to give mothers privacy and respect. There are also areas for families to gather outside the patient rooms, where they may meet together to provide the patient with social support.

Nature
Due to infection control purposes many facilities may not wish to have landscape designs that have water features. Thus the water features in this project were placed at a greater distance in terms of the building location on the site. In a similar manner there is the concern of pathogens growing from the soil in vegetation that is placed in the interior of buildings, for patient safety. The design of the balconies mediated this by allowing patients to have unhindered access to vegetation that was still outside the building, but in close proximity to their rooms.

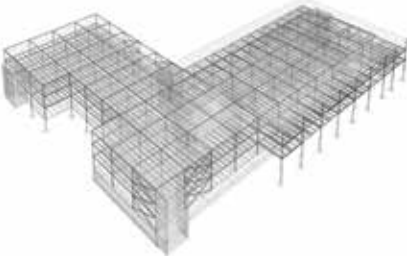
Technical Information

The elements that composed the facade are listed below

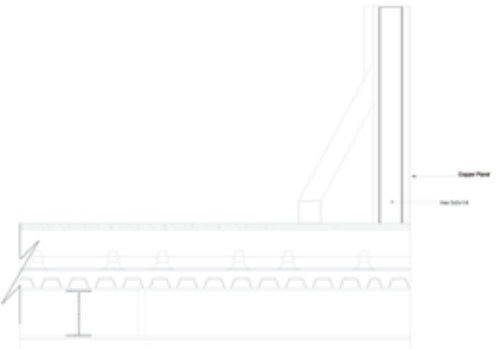
- 1. DETAIL: ROOF PARAPET
This detail illustrates how to roof assemblies and roof parapet meet
This BIM model displays connections of the steel wide flange beams and columns and the lateral bracing
- 2. DETAIL: DECKING
This detail is of the floor assembly for the decking for the balconies
- 3. DETAIL: COPPER FACADE PANELS
This detail is of the additional support needed for the copper panels
- 4. DETAIL: STONE FACADE
This detail is of the assemblies that establish the stone facade
- 5. STRUCTURE MODEL
- 6. DETAIL: WALL ASSEMBLY BALCONIES
This detail shows how the lateral bracing was addressed for the balcony walls
- 7. DETAIL: WALL ASSEMBLY BALCONIES
The facade assembly with the subassemblies



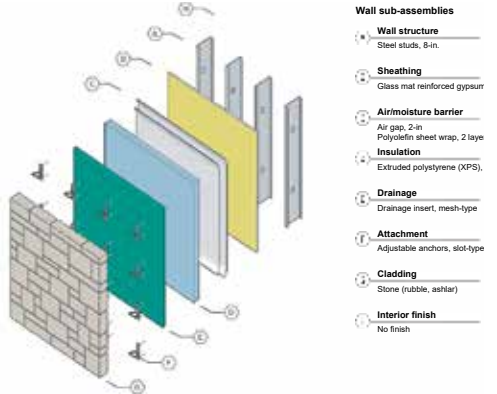
05



06



07



Stone veneer on 8-in. steel stud backing
glass mat reinforced gyp. bd. Sheathing, 2 layers polyolefin sheet wrap, XPS insulation, mesh-type drainage insert, slot-type adjustable anchors, no interior finish

MUDB.ORG

" ARCHITECTURE HAS ITS OWN REALM;
IT HAS A SPECIAL RELATIONSHIP WITH LIFE "
(ZUMTHOR, 1998, P. 14).

WEST VIEW- MAIN ENTRANCES

SITE
This is the vehicular drop of area for the Pediatric Entrance. This view also displays the inner garden that is adjacent to.

The Facade

The Biophilic design strategy that was implemented for the facade was evoking nature.

The facade consists of ashlar masonry with horizontal and vertical copper panels, on the Northern facade there is a rhythm that is established between the copper panels and the glazing.

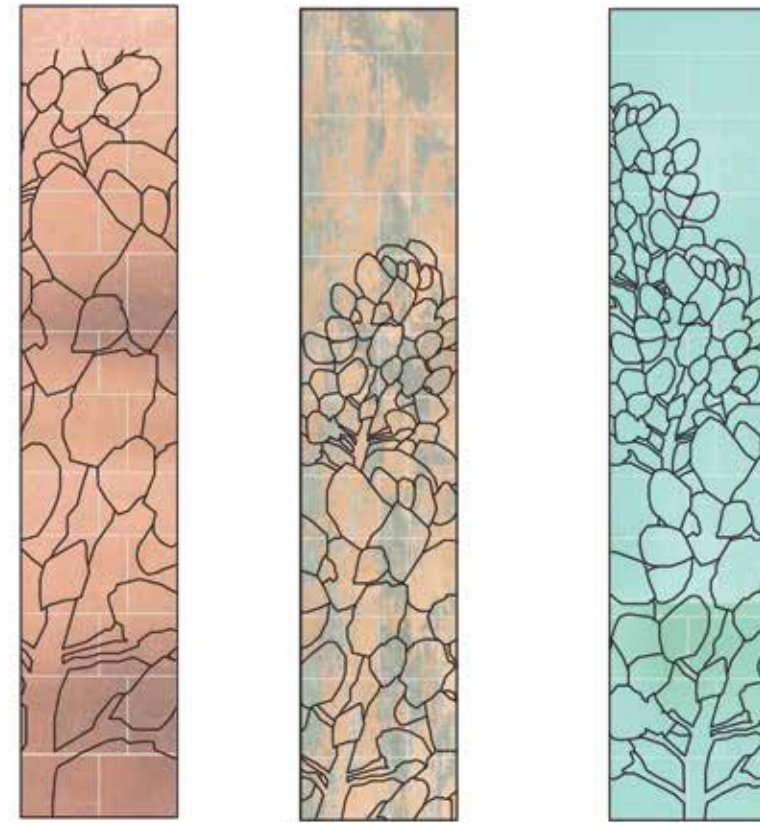
Copper was chosen for the facade because of its longevity as a building material in comparison to other materials. Similar to nature, its appearance alters with the changes of the seasons and time. The drawing to the left (COPPER- WEATHERING OVER TIME) displays the appearances as it would weather with the passing of time.

COPPER FACADE PANELS

PATTERN: BLUEBONNET (TEXAS STATE FLOWER)

In order to reinforce the unique sense of place, that is Texas's culture and history, the bluebonnets was chosen as the pattern for the facade. This species grows naturally only in Texas, thus it represents the Texas as the official state flower. The pattern for the facade varies in scale and design, this depends if it is used vertically or horizontally. The vertical pattern has 3 variations of designs, the scale is enlarged, meant to be viewed upon arrival for the building's users. The scale for the horizontal pattern is smaller, the copper panels wrap the individual balconies of the patients. This was done to remind the viewer that each balcony is designed with vegetation for the users. The landscape was designed to meet them where they are.

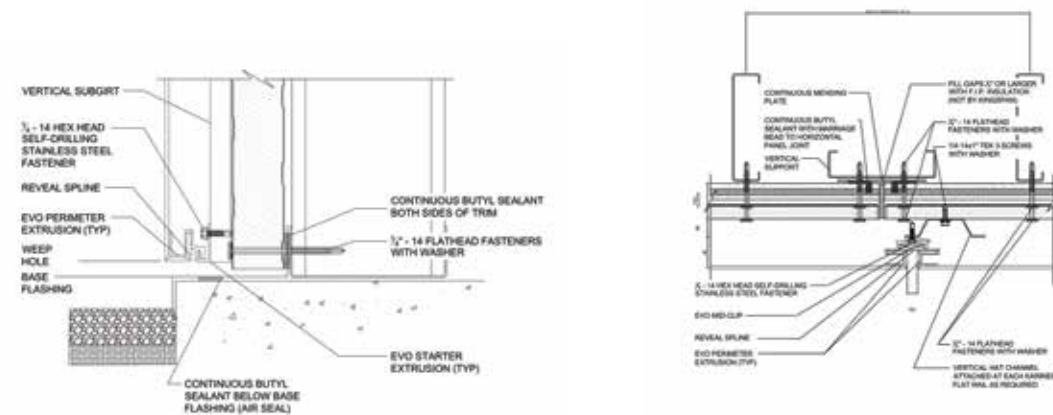
COPPER- WEATHERING OVER TIME



PANEL A 0 years
PANEL B 7-10 years
PANEL C 25-30 years

DETAIL: COPPER FACADE PANE SIDE VIEW

DETAIL: COPPER FACADE PANE TOP VIEW



DESIGNING ARCHITECTURE THAT AIDS IN THE HEALING PROCESS IS POSSIBLE IF DESIGNERS COMMUNICATE AND LISTEN TO UNDERSTAND THE NEEDS OF THE USERS OF SPACE

VIEW- MAIN ENTRANCES

SITE

This is the vehicular drop of area for the Women's Entrance.

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