



# HEALTHY ARCHITECTURE

ALA MASTERS THESIS  
NORTH DAKOTA STATE UNIVERSITY

A DESIGN THESIS BY  
KEEGAN HOVEL





# INTEGRATION OF DESIGN STRATEGIES TO PROMOTE POSITIVE MENTAL HEALTH IN HOSPITALS

A Design Thesis Submitted to the  
Department of Architecture  
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By  
Keegan Hovel

In Partial Fulfillment of the Requirements  
For the Degree of  
Master of Architecture

## North Dakota State University Libraries Addendum

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Buildings 02-10

Campus Map



Buildings Directory

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Key

- Walkway
- Road
- Bus Stop
- Building Entrance
- Public Parking
- Staff Parking
- Hotel Parking
- Children's Parking

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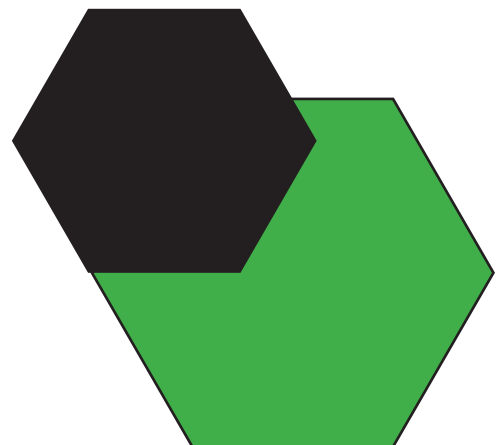
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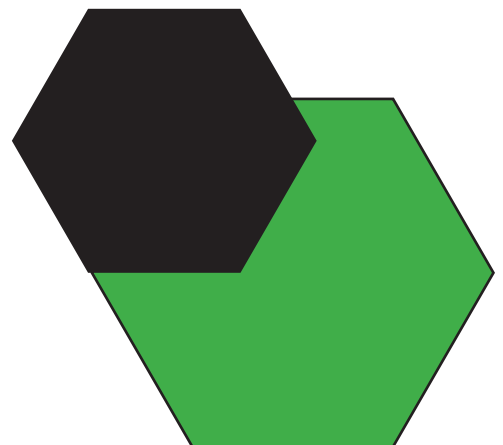
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# THE PROPOSAL





# THESIS ABSTRACT

Healthcare facilities are made for healing. Despite this they come with a negative stigma since people attend them for conditions that can potentially be fatal. These facilities should be viewed in a more positive light as to not have an adverse effect on the mental health of patients who are there to be treated and healed, whether they are there for a few hours or a few weeks. This thesis will examine how a healthcare facility can utilize the implementation of design strategies and green spaces to create an environment that has a positive effect on patients' mental health and the healing process. It will investigate the connection of spaces, the size of spaces, connecting the building with nature, and design choices that promote positive mental health.





# THESIS NARRATIVE

Mental health is something that is very important to take care of, and there is an opportunity in our hospitals to support positive mental health through architectural design. Current facilities often provoke negative reactions in users, and the this thesis will look at how the design of spaces can be improved to invoke positive feelings and a better experience overall. The reason a skilled nursing facility and clinic hybrid was chosen for this thesis was because of the different lengths of time patients visit. The location that was chosen in Fargo, North Dakota as it is near residential areas for easy access and preventing a disconnect from the community, as well as being near major roadways and a larger hospital in the case that any patients would need to be transferred for more advanced care.

## **Premise for Investigation**

Depending on how a space is created it can have different effects on the user. Long, narrow spaces can direct someone from point A to point B, tall, wide-open spaces can accommodate and support large amounts of people gathering and short, thin spaces can make someone feel claustrophobic (Bond, 2017). These spaces can influence how people move and behave within, such as large, open space possibly being uncomfortable to sit and relax in. By using these ideas associated with spatial design when creating the hospital, it is possible to work towards design that promotes positive emotions in patients.

# THESIS NARRATIVE

Color and light can be used to further influence a space. Different colors have been associated with emotions and used as ways to describe how we feel. Blue is often associated with feelings of calm, green with healing, yellow with happiness and so on (Cherry, 2020). Lighting can also affect how a person feels. Both natural and artificial light can change how a space is perceived. Light can be used in a way to direct you through the space, to highlight areas within a space, or to provide lighting for things such as precision work. The amount of light in a space can affect many factors in a person's perception, whether it keeps them awake and productive or is supportive of resting and relaxing. An additional positive is that natural light has been shown to have positive effects on the mind and body (Blume et al., 2019).

Natural vegetation can also be used to further enhance how someone experiences a space. Green spaces have been shown to reduce the amount of mental stress in people (Barton & Rogerson, 2017). This vegetation can be implemented and experienced in several ways. Be it having some potted plants throughout rooms and halls, having walkable, accessible green roofs, or having framed views through windows of outside vegetation. Seeing the plants alive and healthy can have a positive impact on patients (Shechet, 2019).







# PROJECT TYPOLOGY

The typology of this thesis is a hospital, with the major components being a clinic and skilled nursing facility catering to extended care. The goal of this project is to better connect the mental healing aspect that is lacking in current healthcare.

The design focus will look at spaces that promote patients to be able to move around and interact with their environment in a positive way. This will also look at the implementation of vegetation, color, natural lighting and how they are integrated. This typology was chosen for these reasons:

1. The implementation of spaces for promoting positive mental health.
2. The design choices made to help patients feel more comfortable during their stay.
3. The usage of lighting and colors to brighten the mood of patients.
4. The usage of vegetation being a factor in supporting the mental well-being of patients.

By looking at similar design strategies utilized between other hospitals and seeing what works, a better understanding of benefiting patients can be obtained. These examples of what considerations were implemented to promote positive mental health and patient well-being will help better develop methods of designing spaces for patients.

# TYPOTOLOGICAL RESEARCH

## **Things to Consider:**

1. Vegetation: How the usage of plants in the site and in the facilities are applied for the benefit of occupants.
2. Location: How the facility responds to the site and draws from the surroundings.
3. Impact: How the facility effects the community.
4. Design: How the materials and colors used in design benefit the healing process through positive mental reinforcement.
5. Health: How other steps were taken to help patients have a better experience in healthcare.

## **Chosen Projects:**

1. Bendigo Hospital
2. Hefei BOE Hospital
3. St. Anthony Hospital



# BENDIGO HOSPITAL

Typology: Hospital

Location: Bendigo, Australia

Size: 113,600 square yards

Characteristics: Integrated landscaping throughout the architectural design

Elements: Framing views of vegetation, created spaces for tranquility, usage of light and materials to help the wellbeing of occupants

Bendigo Hospital was designed with the future in mind. Community was an important aspect with a large garden, child center, and apartments being a part of the facility. The hospital was also designed with the surrounding community in mind and sized to establish a friendly, human scale.

The effect of nature on healing was a major part of the design approach. Landscaped courtyards were implemented for staff and patients, and secluded gardens provide private spaces for quiet reflection. The usage of woven timber over the internal street provides a connection to nature with the usage of natural material while also providing filtered natural light.

Sustainability was another important factor, with usage of green roofs, solar panels, and rainwater collection. The green roofs both further enforce the inclusion of nature for healing, as well as reduce the heat island effect and boosting the hospital's thermal performance. The collection of rainwater is especially important here due to the hospital being in a drought-prone region.



# BENDIGO HOSPITAL

The hospital makes use of natural lighting throughout the design with windows peppering the facades and usage of glass curtainwalls. The form of the building is designed to both separate and connect different parts of the hospital depending on the uses with wider, shorter masses indicating entrances and passageways and taller masses indicating hospital rooms. The elevations of the hospital show the variety of views provided to the occupants and gives the building a more organic appearance by freeing it from a standard rectangular grid. The main circulation spaces in the building are airy and filled with natural plant life to provide mental benefits to occupants (Caballero, 2020).

## **Takeaways**

This case study showed design intentions that were implemented to support the mental well-being of occupants. The implementation of nature from the exterior to the interior and throughout the site both connects the spaces and provides the mental benefits of having plant life for all to experience. Material usage and natural light were also two choices that were made with the mental health benefits in mind. This project shows great examples of how using more organic design strategies can create spaces that are more comfortable for patients as they differ from the stark norm that people expect.







# HEFEI BOE HOSPITAL

Typology: Hospital

Location: Hefei, China

Size: 231,300 square yards

Characteristics: Smart design, connections with nature, access to natural light, views of a lake to the north, and views of a rooftop garden to the south

Elements: Usage of vegetation and nature to promote healing, access to large amounts of natural sunlight, usage of spaces to increase comfort for users

This project was created with the intent of providing simplicity, high-tech care, and healing gardens with a focus on positive experiences for patients. Gardens are spread throughout the design, as well as views of nature and access to natural light through large windows, taking advantage of design principles to promote healing.

Large amounts of foot traffic were expected and planned for when designing the clinic entrance. The architects refer to the main entrance, which connects to the internal public street, as the medical mall. The mall connects the clinics and hospital, provides retail, and distributes the patients, visitors, and staff in an organized fashion that promotes an efficient, productive facility.



# HEFEI BOE HOSPITAL

Large glass windows are incorporated throughout the facades to provide as much natural lighting as possible with the intent of boosting the occupant's health through the effect that natural light has on people's perception. Simple design structure was used when connecting the forms of this hospital, placing the entrance on a shorter, wider block that connects to four taller blocks, allowing all visitors to enter at the same point and have access to multiple amenities and be able to get to their destination easily (Chen, 2020).

## **Takeaways**

Simple design that eases the guest experience when navigating the facility helps reduce the stress of figuring out where to go, and the design of the main entrance area reflects that of a mall, a familiar, unintimidating view to all. This project is a great example of simplicity to aid in the ease of navigation for patients. The project also succeeds in providing views of nature throughout the design which is great for the associated mental benefits.

# ST. ANTHONY HOSPITAL

Typology: Hospital

Location: Gig Harbor, United States

Size: 27,800 square yards

Characteristics: Emphasis on existing landscape, focus on the connection between health and nature

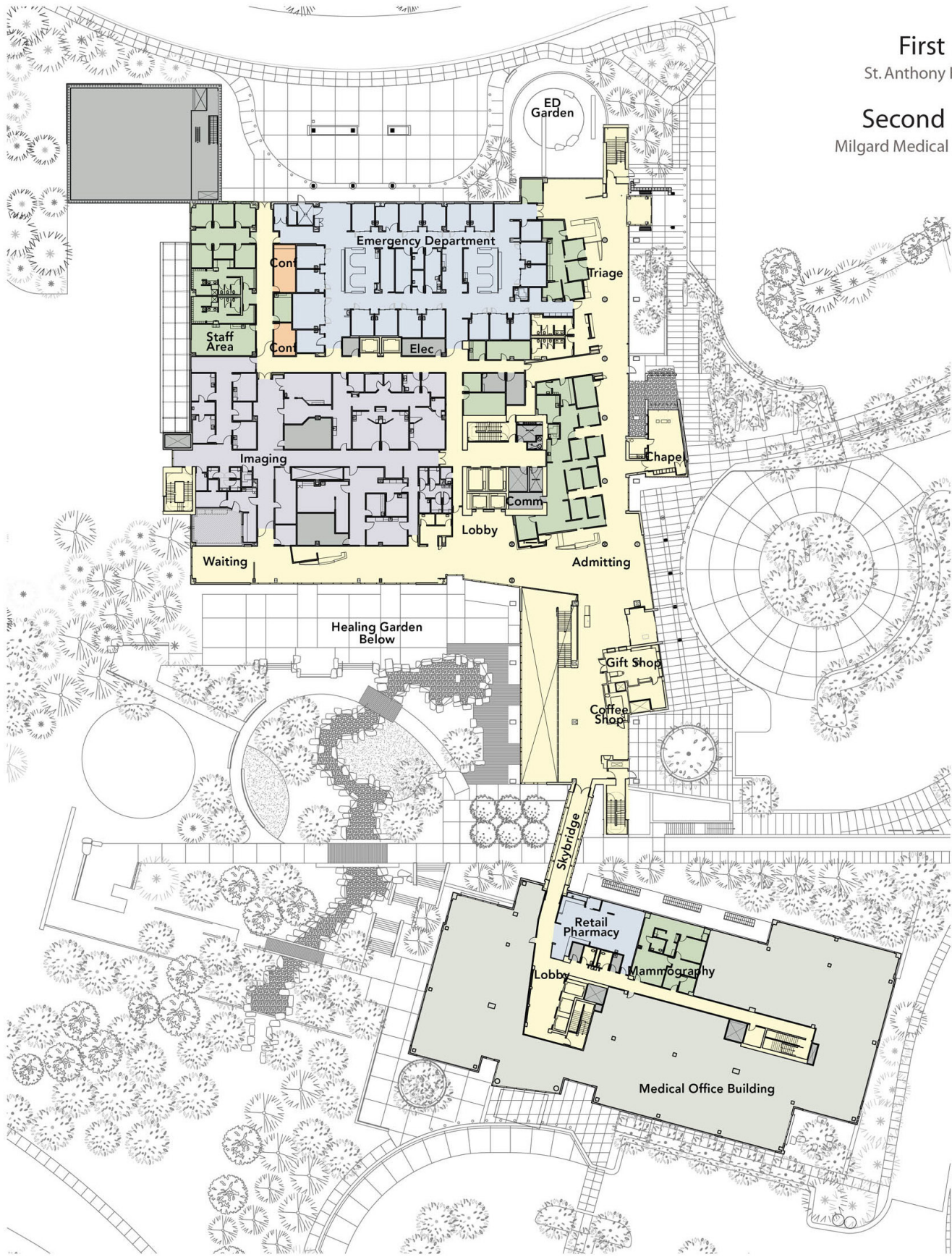
Elements: Access to nature to promote health, materiality and color scheme are warm and inviting, and curtain wall systems allow maximized natural lighting

For this project they worked closely with a landscape designer to better connect nature to the design. The hospital has access to multiple walkable areas for guests to experience and relax in, as well as other areas that provide views from the rooms into untouched nature. The interior of the building was designed with the idea of a high-quality hotel appearance in mind, and uses warm color schemes to provide a very hospitable approach.

The hospital uses natural stone and wood panels throughout the design to reflect the surrounding area. Inspiration was taken from the idea of a boat, running water and views of water throughout. They even used wooden louvers to emulate fins. This promotes tranquility with the idea of a boat floating on a seamless surface.

**First Floor**  
St. Anthony Hospital

**Second Floor**  
Milgard Medical Pavilion



# ST. ANTHONY HOSPITAL

Curtainwalls allow for large amounts of natural light to enter the hospital which emphasizes the usage of natural wood and stone as it bounces off the textured surfaces. The mass of the hospital is formed according to the usage of the space. The mass is combined with the materiality to please the human eye and match with the natural environment. Views of nature are provided throughout the facility. Important surgical rooms are located closer to the emergency entrances for ease of access and patients' rooms are located further above for privacy. Circulation cores are central and have defined pathways leading to and from access points on every floor (Rosenberg, 2010).

## **Takeaways**

This project focuses on the guests experience and does so through making spaces less like traditional hospitals and more like a resort. The design also does a great job of incorporating nature throughout the design via immaculate gardens and views of the surrounding wilderness. The incorporation of water in the design ideology also promotes peace and tranquility in guests. This is a great example of creating an experience for guests that is unlike what most hospitals provide.





# TYPOLOGICAL RESEARCH TAKEAWAYS

The case studies looked at all took an interest in what design strategies could be implemented to better the experience of users through positive mental reinforcement. These ideas support the importance of designing healthcare with the user's experience in mind. The way people feel about healthcare can be vastly influenced by their surroundings so it is important to focus on positive interactions.

Nature is an important concept in every case study. The connection of nature and the healing process was woven into each design through various strategies. The implementation of gardens, walkable greenspaces, connecting green spaces to the interior from the exterior, and having views of nature were apparent in each study.



While Bendigo Hospital and St. Anthony Hospital had their forms develop in an organic fashion in response to their site Hefei BOE Hospital seemed to stick to more of a grid. Even though the forms only put focus on seeing in four directions with their rectangular shape, they still used rooftop gardens and views of surrounding nature to give patients the connection to nature. By using a grid-like design they were able to make the movement through the facility simplified and efficient, which is crucial for easing the user experience.

The relationship between spaces is an important consideration in healthcare, for the sake of the staff and patients. Each case study was able to keep important rooms near emergency entrances and have many access points for necessary movement. Each project was also able to ensure that occupants have many options and amenities to boost positive mental health with the use of vegetation, windows, views, natural lighting, and usage of colors to comfort users.

Overall, these case studies show that there are many improvements that can be made in the design of healthcare facilities to support the healing process. Mental health is shown to be effected by the design of the facility, and there is potential for architecture to craft a better experience for the users that visit these facilities.



# MAJOR PROJECT ELEMENTS

**Entrances**

**Reception**

**Waiting Rooms**

**Circulation**

**Clinic**

**Physical Rehabilitation Center**

**Pharmacy**

**Staff Areas**

**Patient Rooms**

**Walkable Green Roof**

**Gardens**

**Meditation Spaces**

**Public Spaces**

**Dining Area**

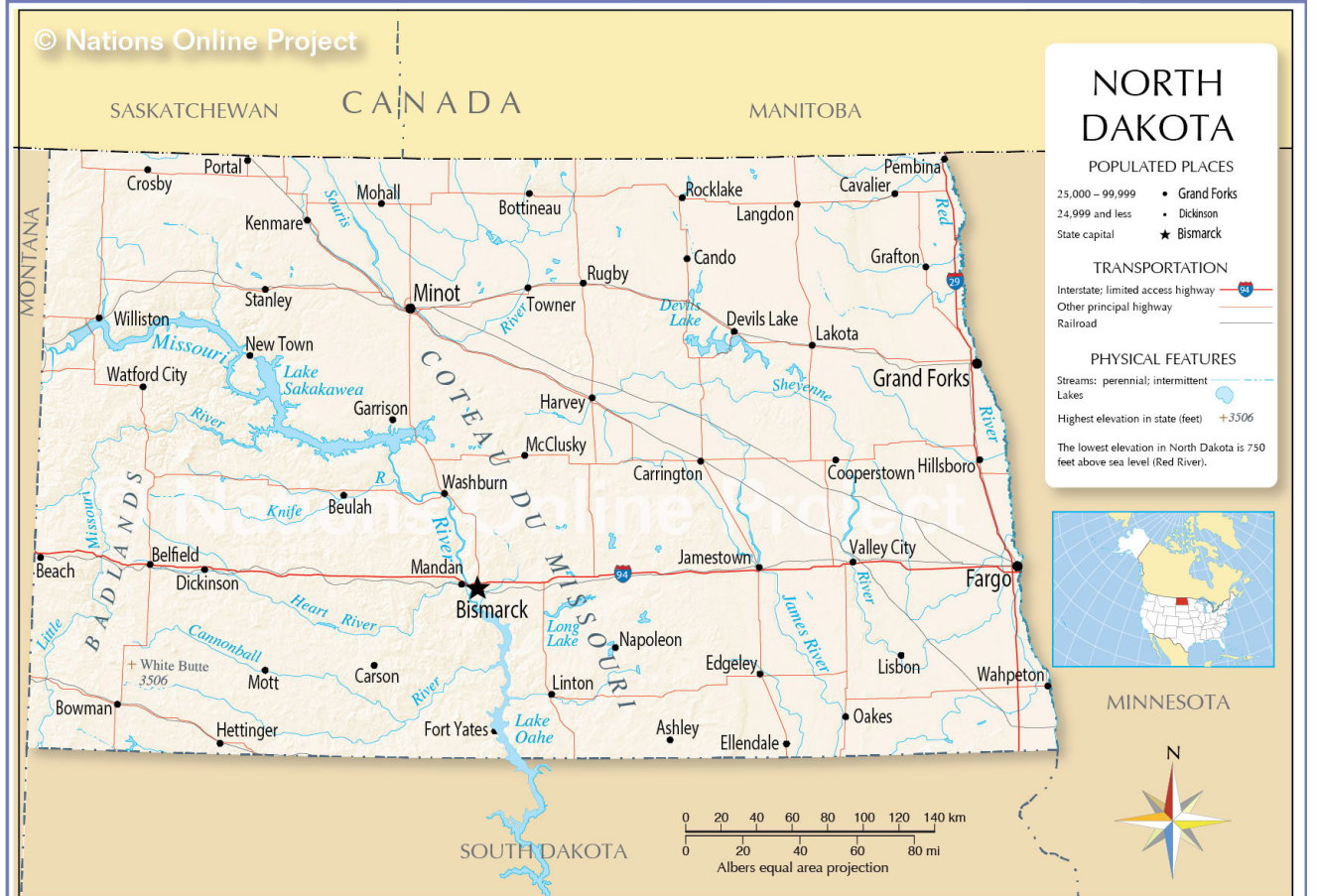
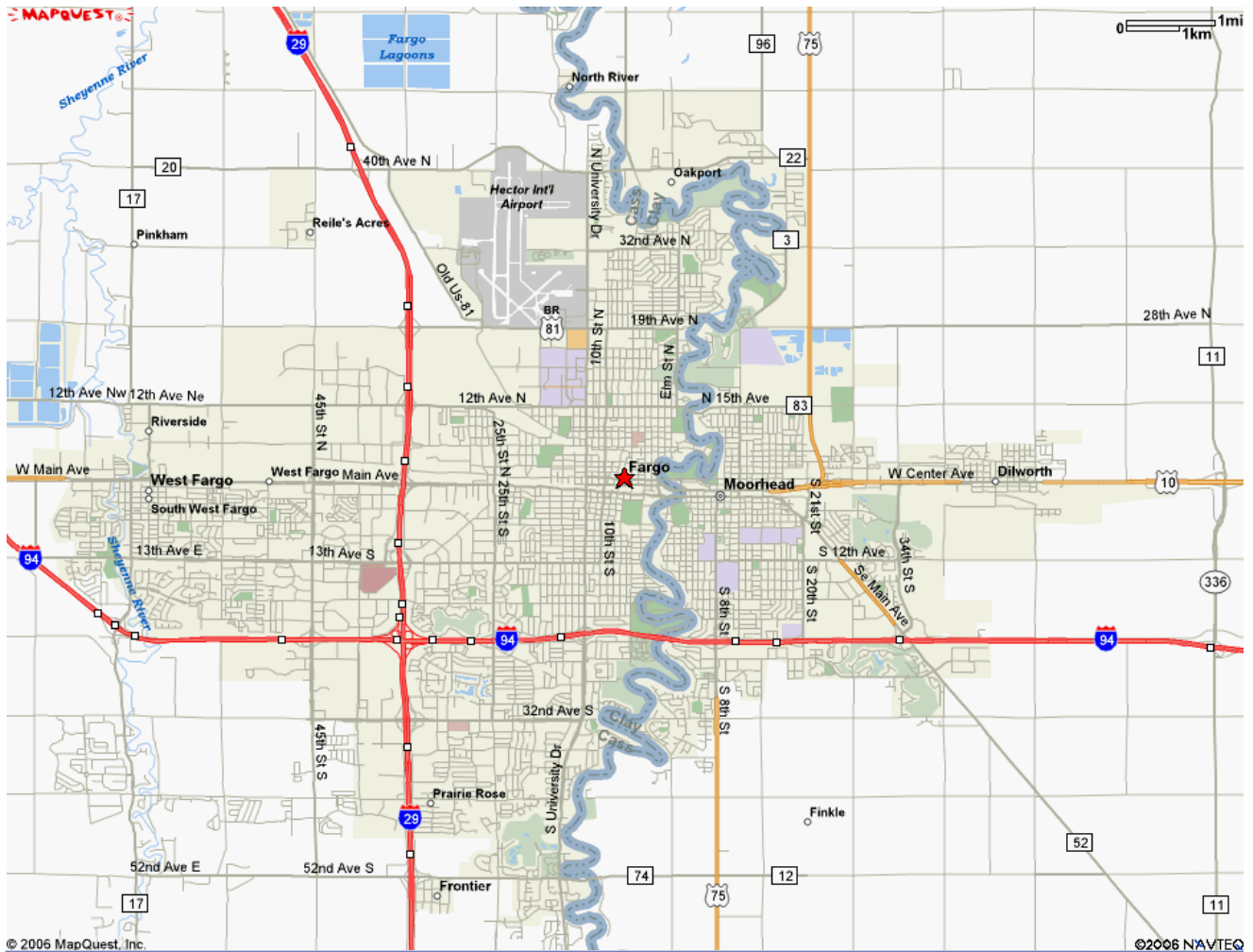
# USER DESCRIPTION

This thesis project is being designed with a focus on the user experience of all occupants, from patients and guests to staff. The hospital will be privately owned with patients consisting of people from surrounding areas and work in collaboration with local hospitals.

The number of users will always vary from time to time. Peak usage of the extended care skilled nursing will be ten patients, and usage of the rest of the facility will work around the different usages throughout. Parking will be necessary for patients and visitors, and a separate parking lot will be available for staff, maintenance, and deliveries. Wheelchair access will also be a necessary aspect to consider throughout the site.

The hospital's exterior and surrounding site will be necessary to consider for the users as well. The exterior will need to be inviting and contribute to giving guests an experience unlike the majority of current healthcare facilities. The site will help tie in the public to the complex to help prevent feelings of isolation and separation for patients that have extended stays. By making the facility more inviting and having the public interact with the complex as well the negative stigma associated with healthcare facilities can be chipped away at.

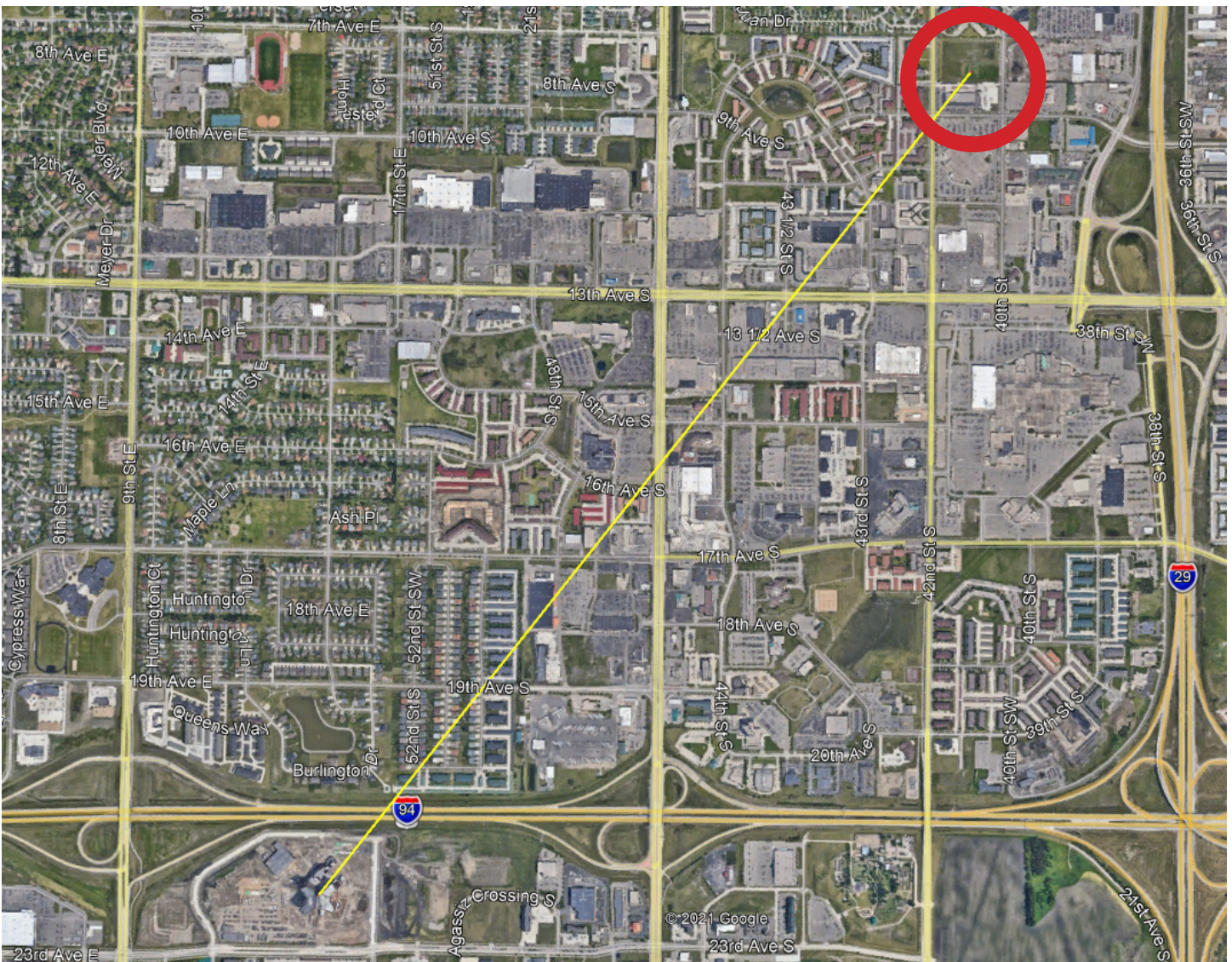


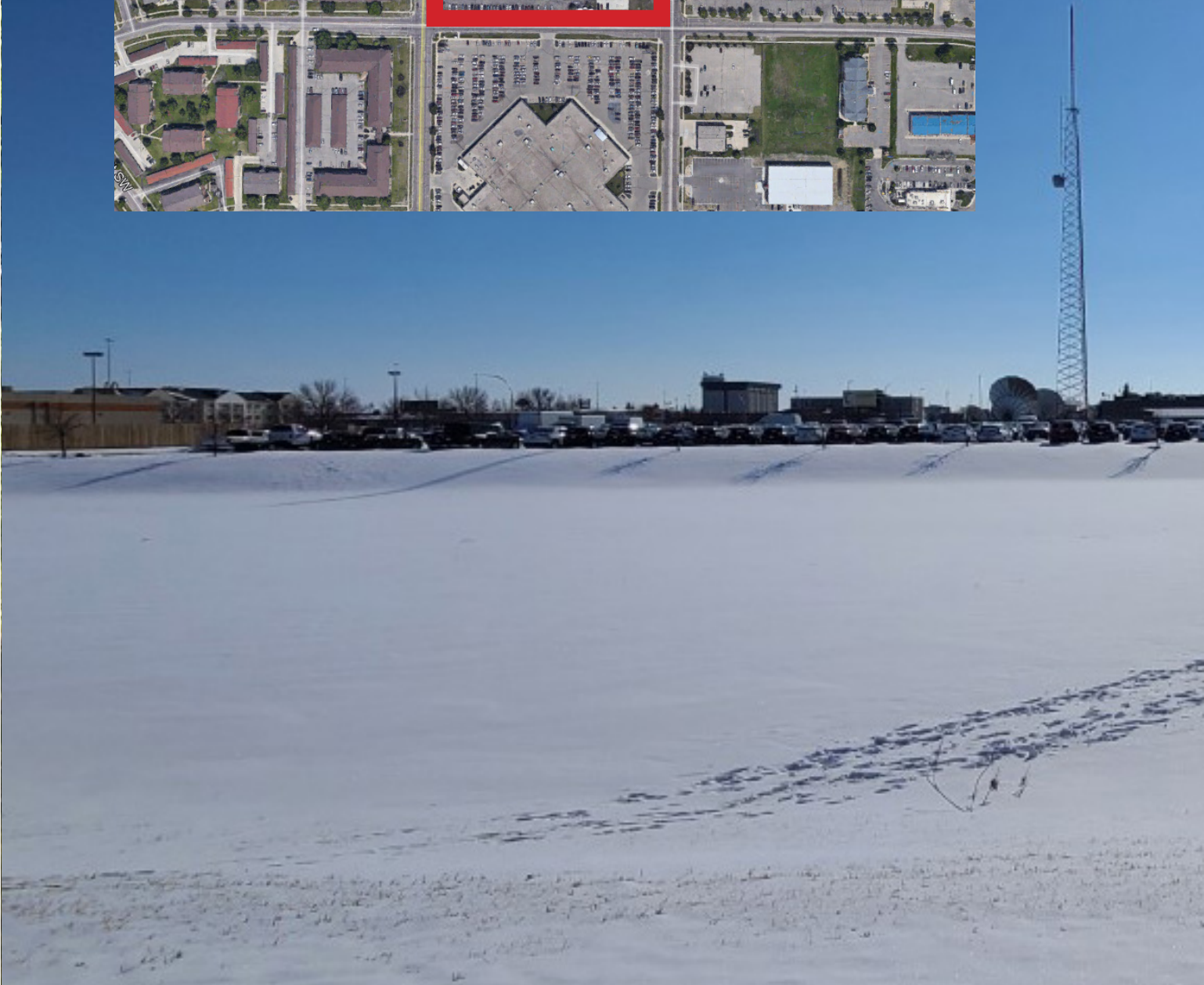
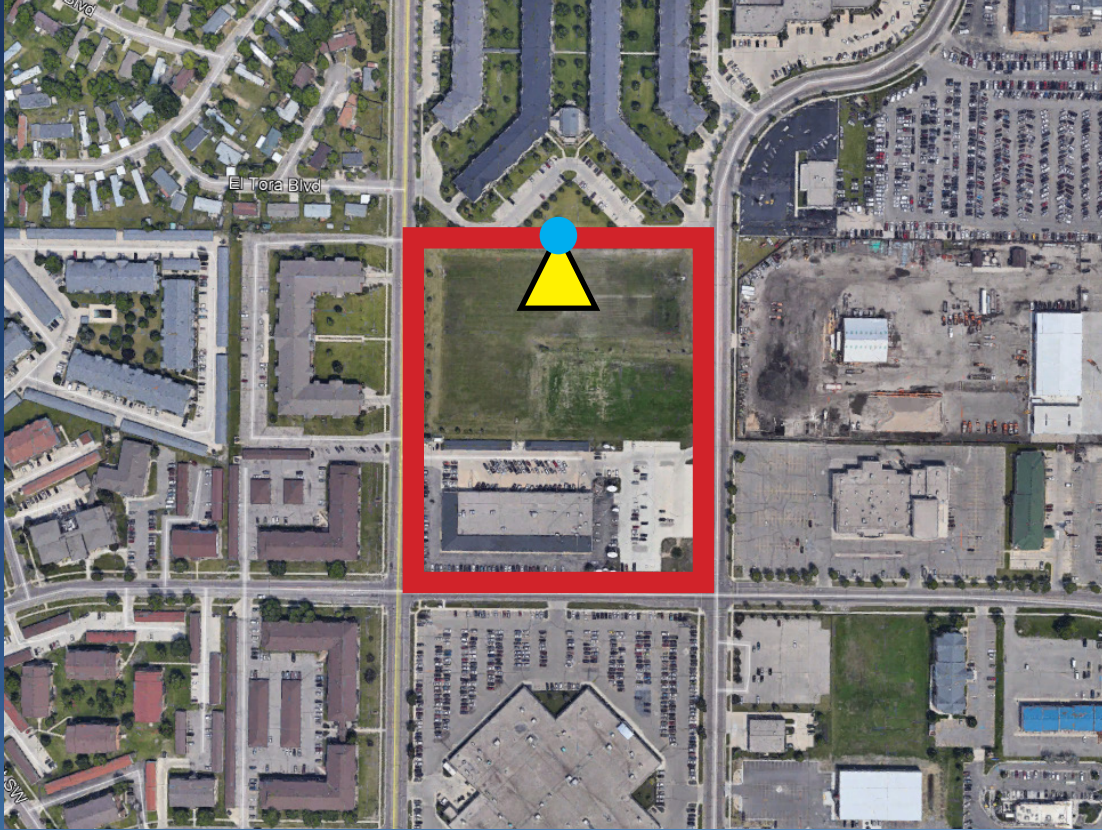




# THE SITE

The site chosen is in Fargo, North Dakota. The site is within close proximity to existing hospitals for collaborative work. This spot is also located near residential areas to provide easy access to those in the area. Hotels are also nearby for those who have family come in from further away, and is located near main roads for easy access to all.







# PROJECT EMPHASIS

## **Master Plan**

The design of spaces are easy to understand and navigate, and they are scaled to provide comfortable space for the allotted occupancy. Having access to spaces that are beneficial to mental health are emphasized throughout the plan.

## **Color Usage**

Colors and materials used throughout the design will be important in influencing positive mental health and helping in the healing process for patients through the calming and healing attributes associated with them.

## **Nature**

Plants have been shown to assist in the healing process and are of major importance in the project's design. The immersion of nature through gardens, windows, natural materials, sunlight, and water features will be beneficial to the mental health of patients.





# THESIS GOALS

People that have spent extended amounts of time in healthcare throughout their lives often have some negative opinions of hospitals and being in them. This project idea was formed with the intention of making healthcare have more positive thoughts and feelings associated with it. Building design presents an opportunity to create a better experience for patients that is memorable for positive reasons when going through healthcare.

The goal of this research is to look at how the application of nature, spaces, light, colors and materials can have a positive effect on mental health. Learning how architectural design can assist with the healing process in healthcare and promote positive mental health will be helpful for the medical profession. Applying this knowledge in the design of future healthcare facilities will cause them to be more positive in the eyes of the visitors and help rid of the negative stigma that has been associated with going to healthcare facilities.

Knowing that the architectural design of healthcare facilities can affect patient mental health will be an important step in the future of healthcare. If something as simple as having a simplified organizational system that highlights nature and color schemes can help boost patient's mental health and aid in the healing process, then the idea should be applied whenever possible. These steps will be taken with the goal of creating positive experiences for patients.

# PLAN FOR PROCEEDING

With the goal of the thesis project being to promote a more positive outlook of healthcare through using architecture to support mental health, the research will be centered around that premise. Work has been done in hospitals to create calming areas for users and strategies are implemented to help support mental health, but this project will take these factors and create a facility that provide unique services that help tie-in mental health to extended healthcare to provide a more total healing experience.

The site where the thesis project will be located will need to undergo site analysis. Seeing how traffic passes through the area, how the site currently responds to its surroundings, and other important things to note about the site for future use. Looking forward it will be necessary to note what surroundings are important to connect to and what others may need to be spaced out from.

In the exploration of what can be done through architecture to support positive mental health in hospitals several strategies will be implemented. Talking to patients that frequent hospitals and professionals, quantitative and qualitative data can be collected and results compiled. Seeing how different people feel about different aspects of healthcare provides important data for moving forward.





# PLAN FOR PROCEEDING

When collecting the information the important points will be documented. This information will then be able to be used to compare and contrast with other data collected to try to find what works best, where there are outliers and why they exist. Research collected through these surveys and looking at past research and examples of other projects will be important to note moving forward with studies like these. The information will also be pertinent to share in order to advance healthcare via architecture.

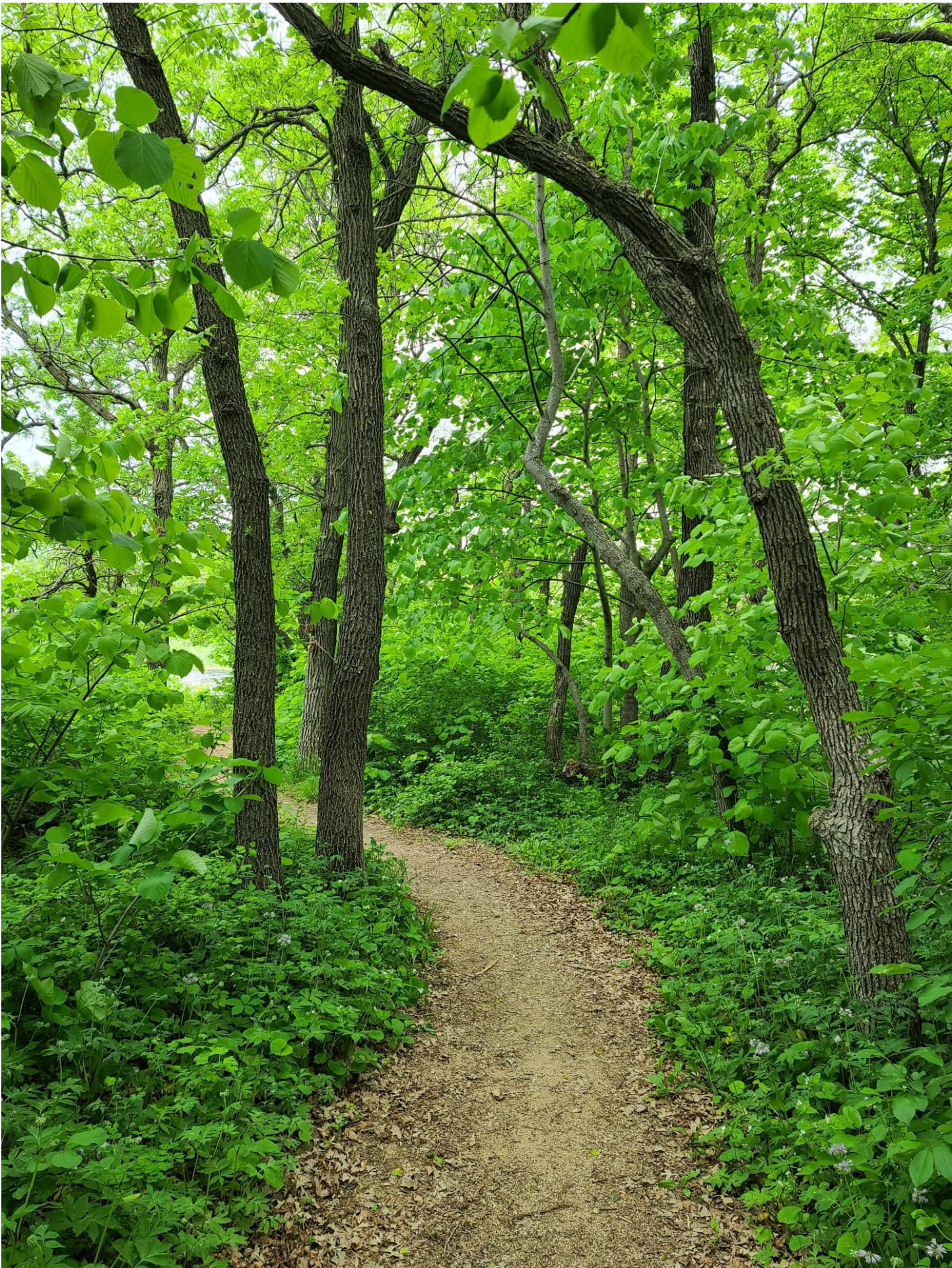
- 10/18 - 11/7.....Research on Similar Projects
- 11/8 - 11/22..... Interviewing Patients
- 11/23 - 12/5.....Interviewing Professionals
- 12/6 - 12/16.....Work on Research Document
- 12/17.....Final Thesis Research Document Due
- 1/13 - 3/7.....Thesis Design
- 3/8 - 3/12.....Mid-semester Thesis Review
- 3/13 - 4/22.....Thesis Design
- 4/23.....Thesis Project Final Exhibit Due
- 5/3 - 5/6.....Final Thesis Review
- 5/10.....Final Thesis Documentation Due
- 5/14.....Final Thesis Book Due





# THESIS PROGRAM





# PROJECT EMPHASIS

## **Philosophical Framework**

The research will develop conclusions based off of case studies and studies conducted through interviews to gather qualitative data. This information will help in seeing what can be done to benefit the mental health of occupants through design choices in the facility.

## **Theoretical Framework**

The goal of my research is to see what steps can be taken in the architectural design of healthcare facilities to promote positive mental health in the occupants. Mental health is important in aiding the healing process and something that should not be ignored, and I believe design choices can be made that help support mental health.

## **Strategies**

The research strategies used involve applicable case studies where the designs of spaces were researched to see how they affected individuals, and where the design of healthcare spaces considered aspects of mental health. Other studies included will look at necessary program elements and their spatial relationships.

## **Tactics**

The tactics used for this research include interviews, comparing studies, and analyzing statistics. The interviews gauge the interactions of people that go through healthcare for various reasons and their thoughts on the design. The studies and analyses help understand the general population's reactions to different design stimuli.

# RESEARCH RESULTS

Healthcare facilities are places for healing. Despite this people have experiences with various healthcare facilities that can hurt their outlook, which in turn can inhibit the healing process. Many existing facilities have spaces that cause occupants unease. The lack of open spaces, private spaces, ease of access, and other various factors that cause discomfort are issues that can be improved on, if not solved. Through my research I learned about different steps that can be taken through design to aid occupants in having positive experiences. I discussed the usage of colors, materials, spaces, lighting, and vegetation in my interviews. Through the results of the interviews and the comparison of the readings I have learned what colors and materials to use, where to implement vegetation, which spaces are liked and disliked, and other influences on the perceptions of spaces.





# LITERATURE REVIEW

This review covers two articles regarding the effects of design on mental health.

## Overview

Connellan et al. (2013) in this article present an overview of research literature regarding the effects that architectural designs of mental health facilities have on users. Some of the consistent terms that surfaced in the literature included light, interior detail, art, patient's rooms, and gardens. These factors are beneficial for me as they are factors I plan to utilize through my design to improve healthcare facilities in caring for mental aspects in addition to physical ailments.

## Light

Light has been shown to have an effect on human behavior, such as mood and perception. It is also important to note that ample light is important for accurate performance when performing visual tasks. Light also effects the circadian rhythm, which is another important thing to consider when regarding mental health as consistent sleep schedules with adequate amounts of rest are shown to have positive effects on mental health. The positive effect of bright light on reducing depression was also mentioned, with the strongest effect occurring in the morning as opposed to the evening.

In one study patients that were staying on the side of a hospital that was more exposed to natural light were exposed to 46% more natural light on average. These patients exhibited lower stress levels, less pain, and ended up with lower pain medication costs. These studies lead to recommendations for windows in patients rooms and staff break rooms with access to natural light with measures taken to provide protection against things like glare and temperature.

Chronobiology is another thing effected by sunlight. The light can effect sleep disorders, seasonal affective disorder, circadian rhythm, and cause work disruptions. Studies also show that light requirements change with age groups, with older adults taking longer to adjust to adverse light conditions when transitioning from one space to another, such as from outside to inside. Because of this it is important to consider glare and flicker when designing spaces and attempting to provide smooth transitions wherever possible.

## **Interior Design**

Interior design includes a variety of elements, from the furnishings and colors to the spatial organization and wayfinding. Patients rooms were a very important thing to consider when regarding mental health, and most considerations fell into three categories: patient perceptions, staff perceptions, and clinical outcomes.

Most of the time outcomes are measured depending on length of stay, physiological responses, behavioral responses, and utilization of narcotics. In one study a hospital went through a redecoration project in one of their wings, going from drab colors and lack of features to a design more typical of a local home. These changes included adding things such as colored wallpapers, paintings, lowered ceilings, more lighting options, adding better curtains to windows, and adding various furniture items. These changes were shown to have positive effects on patients well-being compared to the unchanged wing.

## **Art**

Art is an important thing to consider for mental health. Art is used for some forms of therapy, and is known to have a positive effect on people. One study showed that depression and anxiety levels were lower in group interventions that took had art involved compared to those that did not. With that being said it is important to take in consideration what type of art is implemented. Another study showed that the effects of realistic art of nature had a better effect on patients' mental health than that of abstract art.

## **Gardens**

Gardens are used in a multitude of situations to benefit patients in their recoveries. When designing spaces to promote the healing process gardens are often used as part of the process. It is important that when gardens are designed things such as unwanted demands and harsh noises are absent. These spaces are commonly used for therapeutic reasons, and are for reducing stress and promoting healing through positive mental health.

Studies have also shown that nurses and workers benefit from gardens. The vast majority of those interviewed said that it was important to have the ability to go outside either just to sit, walk around, or eat something. It is important to note that of those interviewed things such as temperature and precipitation would deter them from going outside. Other factors that deterred them were seating options being blocked or in use, and things such as their privacy being compromised.

One study came up with a list of five goals to follow:

1. To provide a safe outdoor environment
2. To provide a place for reflection
3. To provide a place for relaxation
4. To provide a place for socialization
5. To provide a place for people to maintain the hobby of gardening

After implementing a garden with these goals in mind, 96.5% of visitors to the gardens were happy with the design. Suggested improvements by the guests were signage, maps, automatic doors to access the areas, education for staff and volunteers, lawns for families to gather, and more flexible, multi-use spaces.

## **Conclusion**

There are multiple things to consider in design when designing for mental health. While these factors are shown to have positive effects on users, the implementations must be done correctly to benefit users. These aspects will be important to consider in my design as they will contribute to supporting the mental health of all occupants.

## **Overview**

This article from Rakhshani and Nastiezaie (2019) discusses the mental health of residents in a nursing home. The residents were interviewed based on how they felt about the nursing home's spaces and had to have lived there for at least 3 months to participate in the survey. The researchers looked at the effects of the nursing homes' lighting, public space, personal space, access space, and green space on residents.

Including this article is important for my thesis as the elderly are typically more fragile when it comes to health issues and nursing homes typically share similar spaces to that of a hospital, and therefore I think this article points out some important insights that can be used when designing for a healthcare facility.

## **Introduction**

The article begins by talking about how elderly are more susceptible when it comes to mental health problems due to their age and varying disabilities, physically and mentally. Older people in nursing homes are also more likely to have mental disorders than those living in communities. This is something to consider when looking at extended stays in hospitals, as when in a hospital you become disconnected from your usual surroundings and connections, which can affect mental health.

## **Methodology**

The study conducted by these researchers looked at the populations of two nursing homes, totaling to 158 people. The information gathered by the researchers used two questionnaires. The first was a instrument made to survey the design and architecture of nursing homes. The second was the General Health Questionnaire-28.

The researchers used a sample population to determine the Cronbach  $\alpha$  for the categories measured. The variables were lighting, public space, personal space, access space, and green space. The categories measured were somatic symptoms, anxiety/insomnia, social dysfunction, and severe depression. The nursing home residents were questioned separately to gather individual values that were not influenced.

## Results

The population of participants were, on average, sixty-nine years old, and been in nursing homes for twenty-eight years. The researchers used the Pearson correlation test when evaluating the relationship of the mental health of residents and the design of the nursing homes. These were the results:

**Table 1.** Correlation of design or architectural factors with mental health

Variable		Somatic Symptoms	Anxiety/Insomnia	Social Dysfunction	Severe Depression	Total
Lighting	r	-0.334	-0.268	-0.760	-0.173	-0.328
	Sig.	0.001	0.001	0.404	0.029	0.001
Public space	r	-0.419	-0.285	-0.309	340.0-	-0.503
	Sig.	0.001	0.001	0.001	0.001	0.001
Personal space	r	-0.329	-0.107	-0.359	-0.341	-0.404
	Sig.	0.001	0.179	0.001	0.001	0.014
Access space	r	-0.420	-0.219	-0.256	-0.383	-0.471
	Sig.	0.001	0.006	0.001	0.001	0.001
Green space	r	-0.206	-0.164	-0.244	-0.249	-0.318
	Sig.	0.010	0.039	0.002	0.001	0.090
Total	r	-0.515	-0.306	-0.405	-0.463	-0.622
	Sig.	0.001	0.001	0.001	0.001	0.001

(Rakhshani, Nastiezaie, 2019)

The results of the questionnaires show that the different spaces had varying negative effects on the health of the seniors. This study shows how comfortable the seniors were in some areas compared to others, and how they were effected in said spaces.



## **Conclusion**

The information gathered by these researchers shows the importance of considering mental health in design. The fact that this study looked at older people that have been in nursing homes for at least three months is an a crucial comparison to keep in mind when looking at designing hospital spaces. Both situations are similar in the respect that people leave their usual living conditions to stay somewhere else to be cared for. Knowing how the seniors were effected in certain spaces within their residencies gives an idea of what types of spaces need more assistance in design to reduce the negative effects they have on the occupants.

## Summary

The mental state of occupants can be affected by the design choices made in buildings. Everything from what spaces the building provides to the artworks shown in the building affect people and can change their outlook. It is very important to consider all factors of design and what effects they will have on the occupants. When researching current design considerations and how those interviewed felt about different spaces the primary focus was to find what could be done to improve the mental health of occupants through design.

Each element in the design of buildings has an affect on the occupants, with some being larger than others. Light levels are one of the simplest changes to be made. Light level is something that is important to consider for completing complicated tasks, such as in operating rooms, and therefore requires ample artificial lighting. Natural lighting is important for mental health. Studies have shown that it reduces the effect on certain conditions such as depression, and it is important for our bodies clock as maintaining a consistent circadian rhythm has been shown to have positive effects on our health.

The visuals within the rooms are another vital factor. The colors on the walls, the available furniture, the size of spaces, and the available amenities all affect the user. Simplicity seems to be very beneficial to the largest percentage of users, avoiding things like abstract art which can evoke negative emotions, colors that can cause anxiety, and patterns that if installed off balance can bother those with OCD.

Vegetation is another important aid for mental health and the healing process.

It can be used as a smaller presence in someone's room to add color and another living thing in their space, or it can be through gardens that create spaces for people to be with others or alone, providing views and privacy and a variety of opportunities. In areas where plants can be an issue they could instead be viewed through windows.

Overall it has been shown that different factors in spaces can affect the perception of the inhabitants. It is important to take these considerations in mind and use design choices that promote positive mental health in healthcare facilities. The way inhabitants feel in spaces is important and design choices can help people feel more comfortable and prevent potential stressful situations.

# PROJECT JUSTIFICATION

Healthcare facilities are places that people go to throughout their lives to be cared for and to heal. Despite this a lot of people have mental stress when in these facilities. I want to see what steps can be taken through architectural design to promote positive mental health in occupants of these facilities. This project allows me to show the accumulation of knowledge I have gained and combine it in a comprehensive project.

Through this project I will learn more about healthcare design and the effect of design aspects on peoples' perceptions. With the COVID-19 pandemic happening this year hospitals are a widely discussed topic, and with some patients needing to be hospitalized and quarantined for two weeks the mental toll can be draining. Because of this it is important to see what all can be done to help the occupants through these difficult times.

This project is one that is beneficial to its surrounding society as it is located near a residential area, which allows for any patients to not be as separated from the community as they would be in most hospitals. This project will also enrich the area with a larger variety of vegetation through the implementation of gardens and green roofs throughout the complex.

This project started with the goal of looking for how architectural design can effect the perception of healthcare occupants positively. I chose this topic as I have known many others throughout my life that have had to spend extended times in healthcare facilities. I bring a younger generations view on this topic as older generations have shown stigmas and biases towards mental health.

# THESIS CONTEXT

## **Historical Context**

Mental health has long been improperly cared for. It has been subject to more negative stigmatization than other types of illness. In addition to the effects of their mental illness patients have also been effected by prejudices and the social exclusion for being different.

Clifford W. Beers was one of the first big names in America to look into care for mental health. Beers spent several years in hospitals after a self-inflicted injury and was horrified by the treatment of those with mental illnesses. After his time in care he went on to write an autobiography to inspire a reform movement. He then went on to create a committee that eventually became Mental Health America. The organization seeks to improve the attitude toward mental illness, to improve services available for those with conditions, and to help prevent mental illnesses and promote mental health ("Our History", 2020).

Within the last few years more and more changes have been made to benefit the conditions of those with mental illnesses and supporting mental health. There have been steps taken to try and detect threats to mental health in the early stages to better prevent conditions from developing to dangerous levels.

Resources have also become more widely available for people to try to determine if they have any symptoms of mental health conditions, followed up by resources they can use to better care for themselves.

## **Social Context**

Mental health is largely effected by societies. With all the stigmatization and prejudice regarding mental illness people are quick to judge and react to others that are different than them. This varies depending on the condition, with illnesses like schizophrenia being more noticeable than depression. This divide between people with varying mental illnesses and those without can have negative effects on the mental health of those being treated differently.

Many things in today's world have effect on the mental health of our society. The people around us, news, media, and anything we interact with can have anywhere from no impact to devastating effects on our mental health. Since mental health still is ignored by many there are difficulties when it comes to society and how it effects people. Mental illnesses are often shown in negative ways as well, which has negative impacts on those effected by those conditions.

Despite all the issues involved with the lack of knowledge in our society regarding mental health, there are still many resources available to help people. Professionals in the mental health fields are also there to help people through any difficulties that arise regarding how society treats them. While society has not fully acknowledged mental health and everything that goes along with it, awareness is increasing over time.

## **Cultural Context**

Mental health varies from culture to culture on how it is dealt with. Some cultures have influenced beliefs on the origin of mental illness which has led to negative behavior towards the mentally ill. This can add for extra stress to those that already have mental health issues that they are caring for.

These cultural learnings can make it difficult at times when it comes to provide mental health care. Professionals have developed ways to present services in culturally-sensitive ways to help people in these situations. While cultural differences present challenges to aiding those with mental health issues there are still unique ways for care to be given to those individuals.





# SITE ANALYSIS

Fargo, North Dakota

United States

Founded in 1871

Land Area: 49.7 sq mi

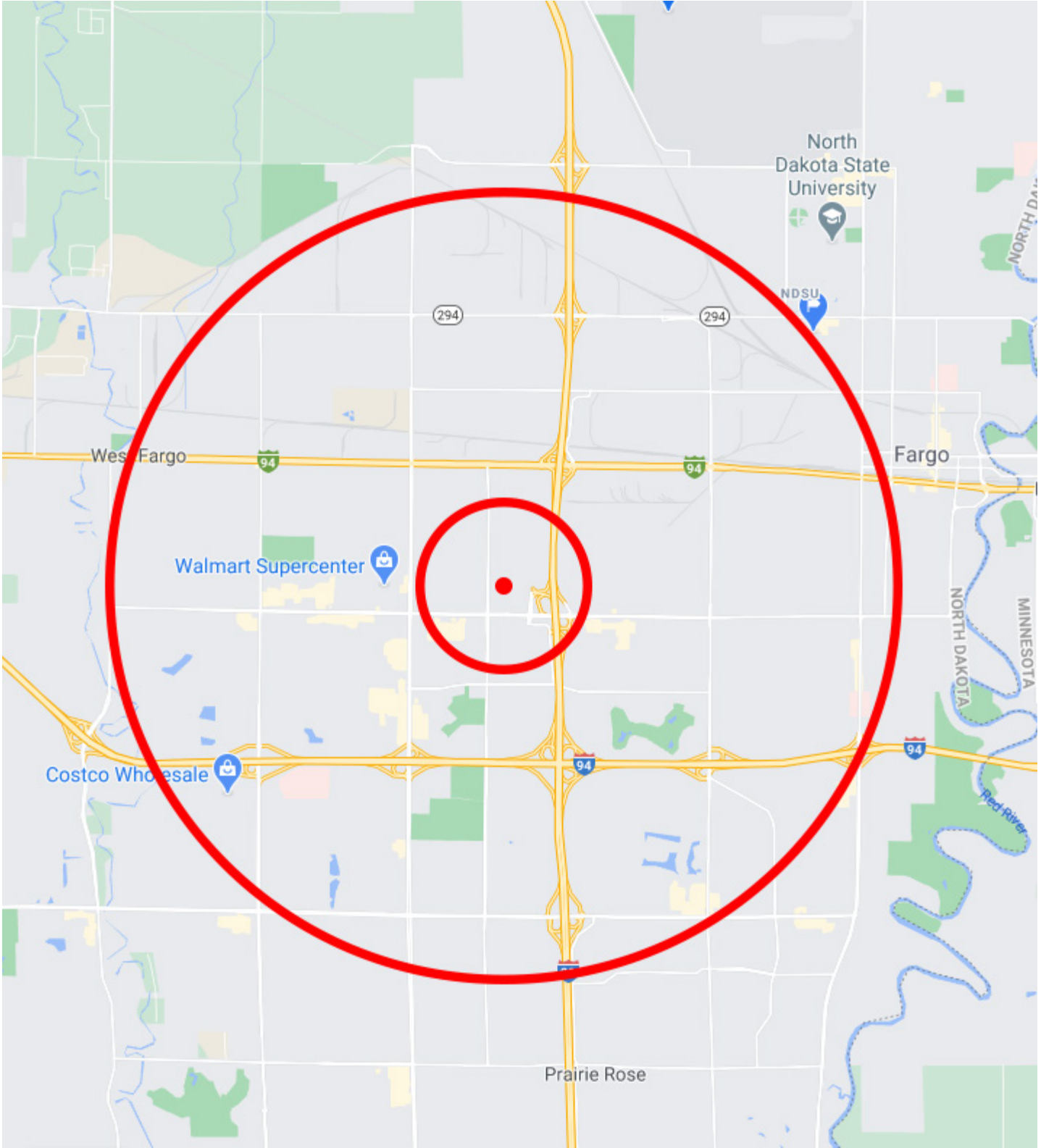
Elevation: 904'

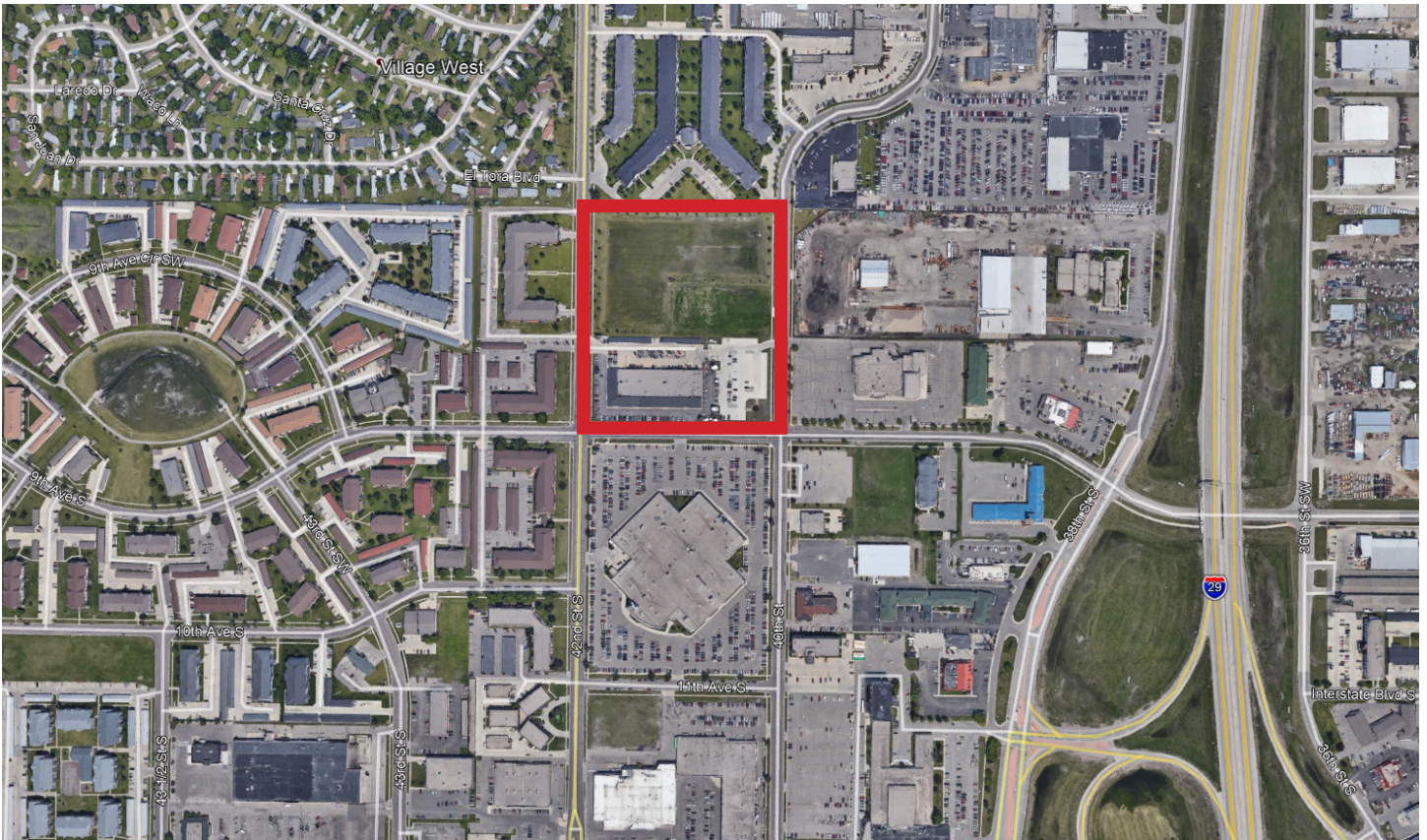
Population (2018): 124,844

Population Density (2010): 2,162 inhabitants per square mile

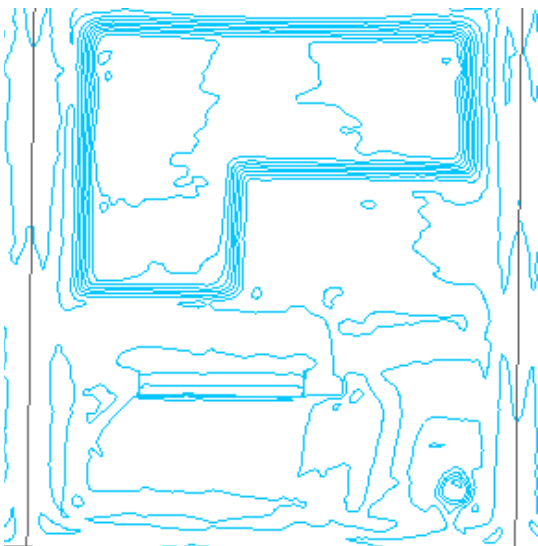
Average Age (2018): 30.4 years

Distance from nearest hospital: 3 miles





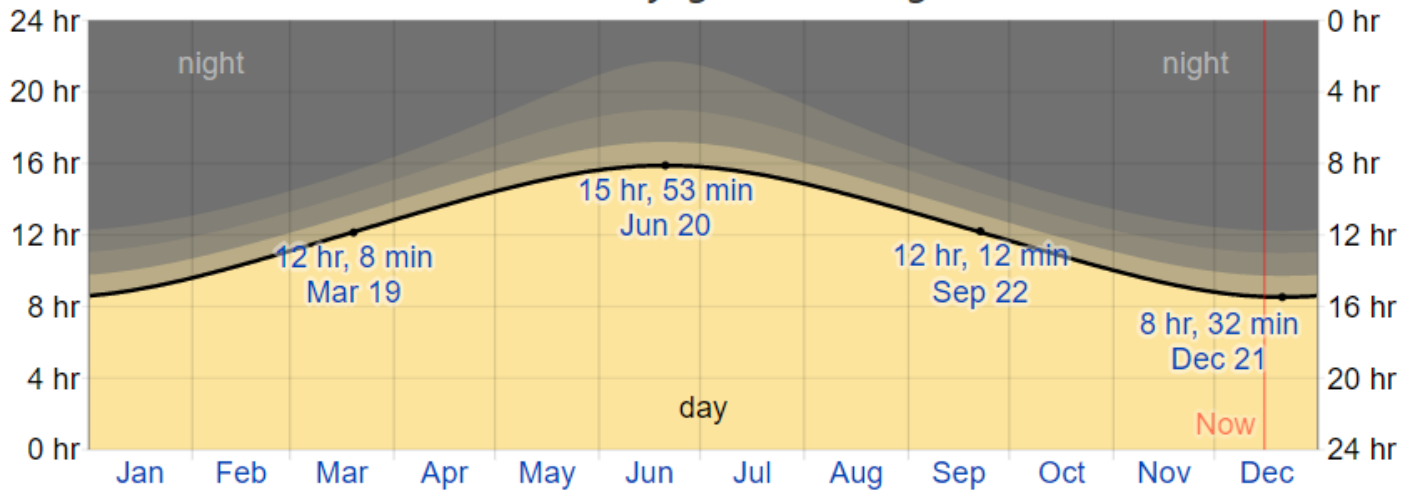
Site Map



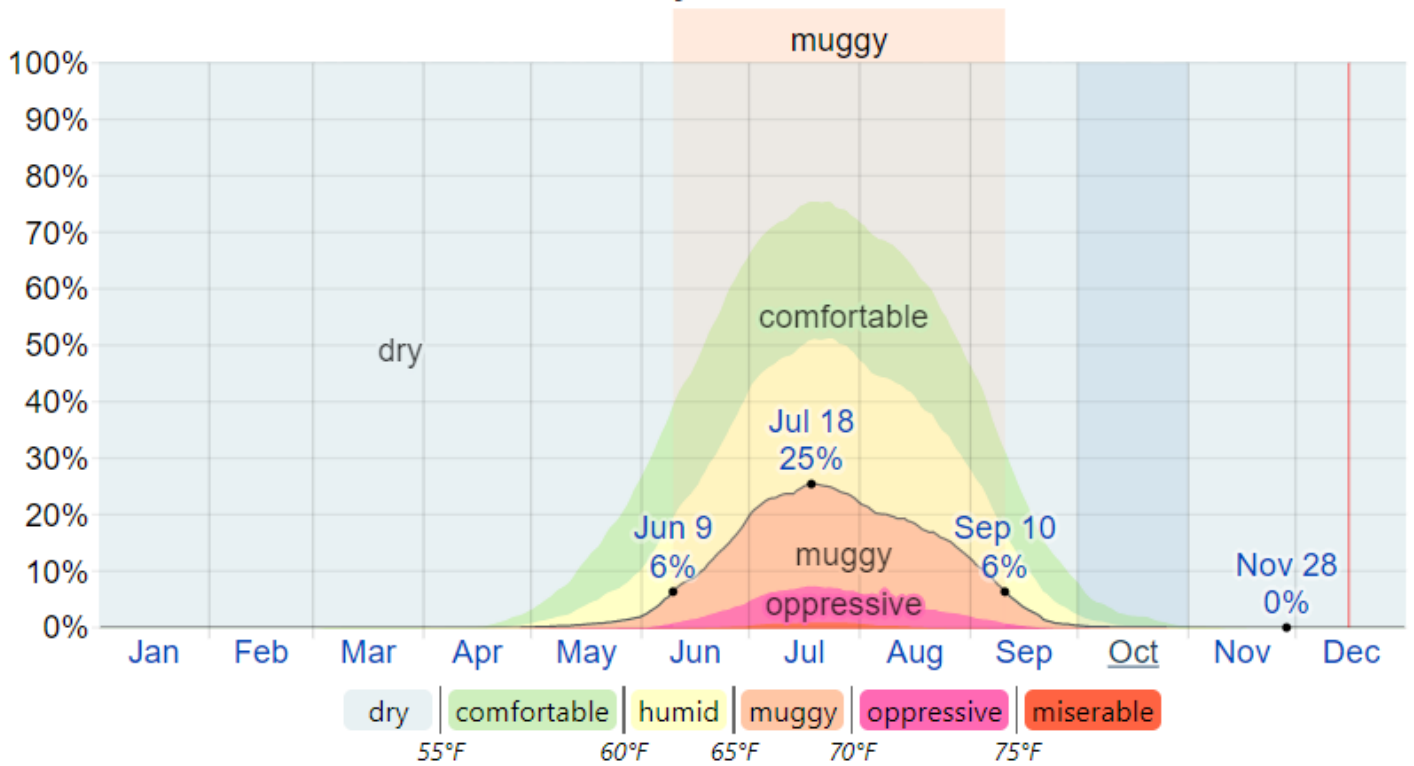
Topography Map

The sloped area on the north side of the site can be used for a water feature within the walkable gardens, and can be modified as needed for new development.

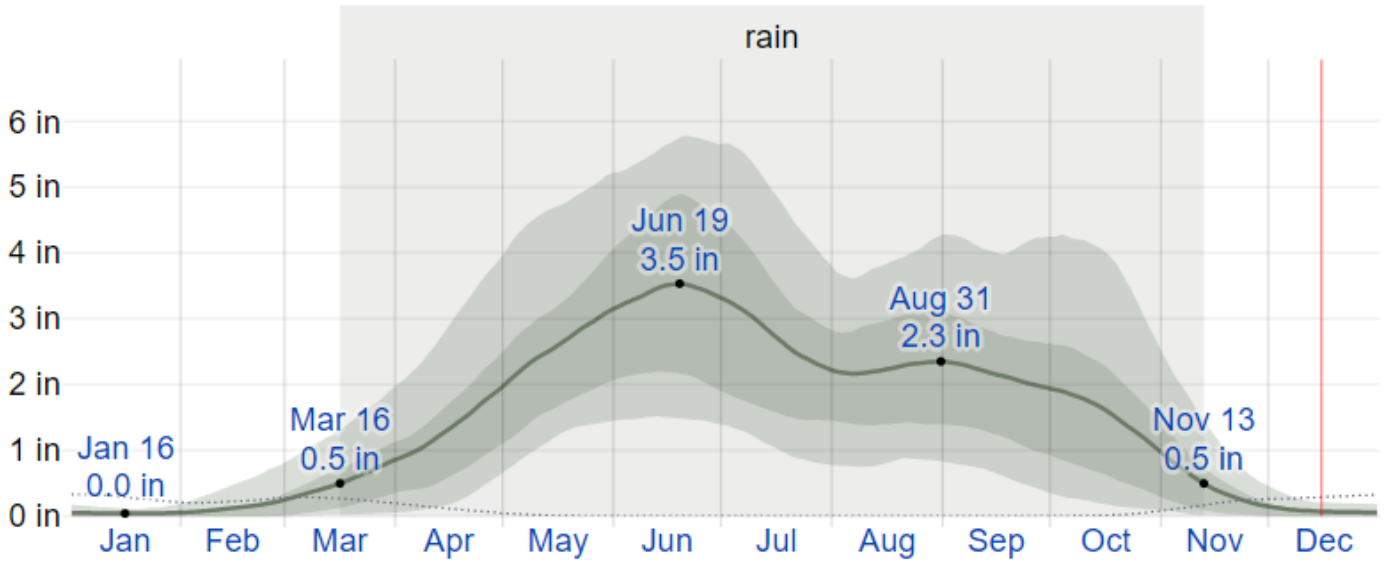
## Hours of Daylight and Twilight



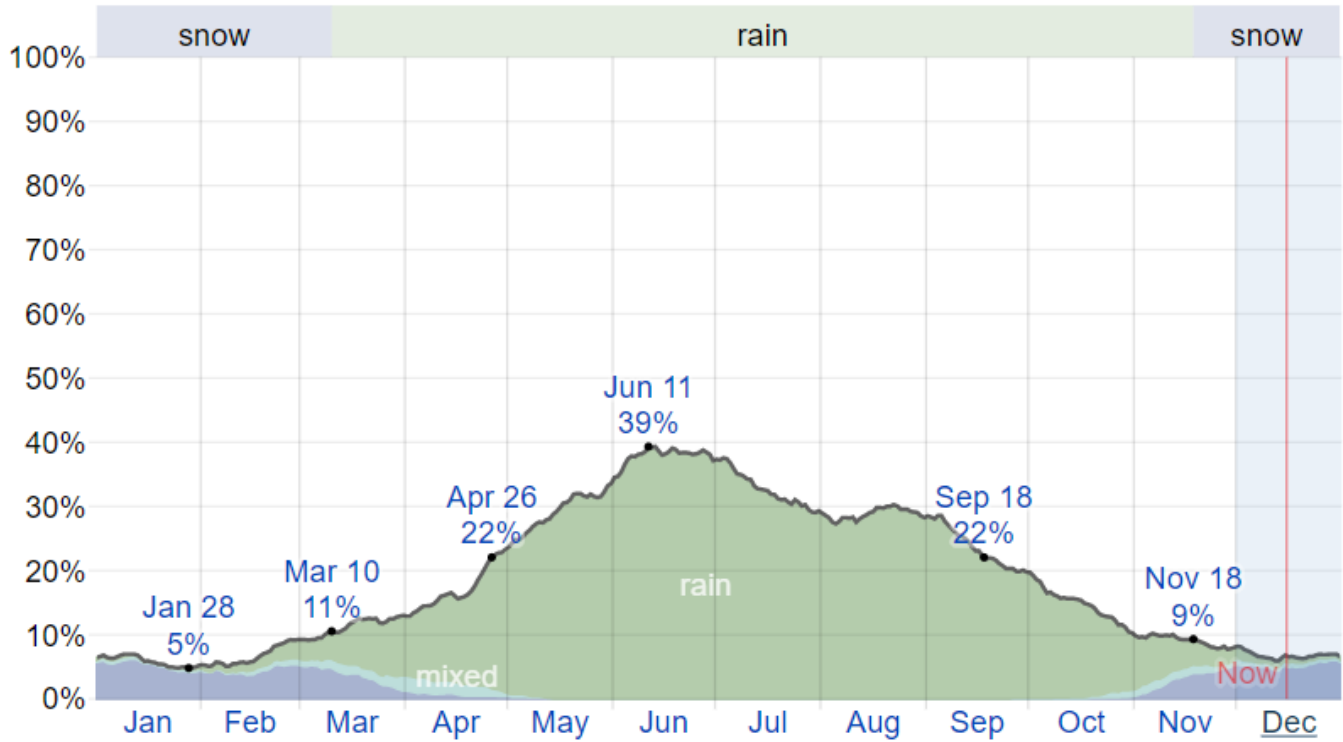
## Humidity Comfort Levels



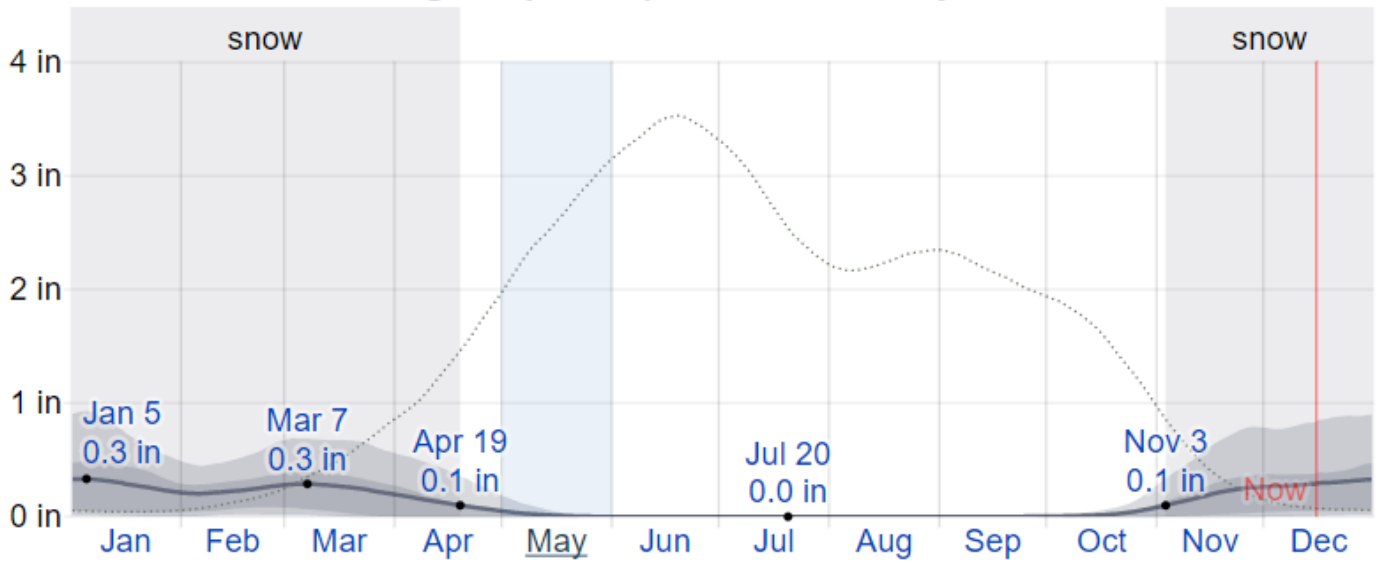
## Average Monthly Rainfall



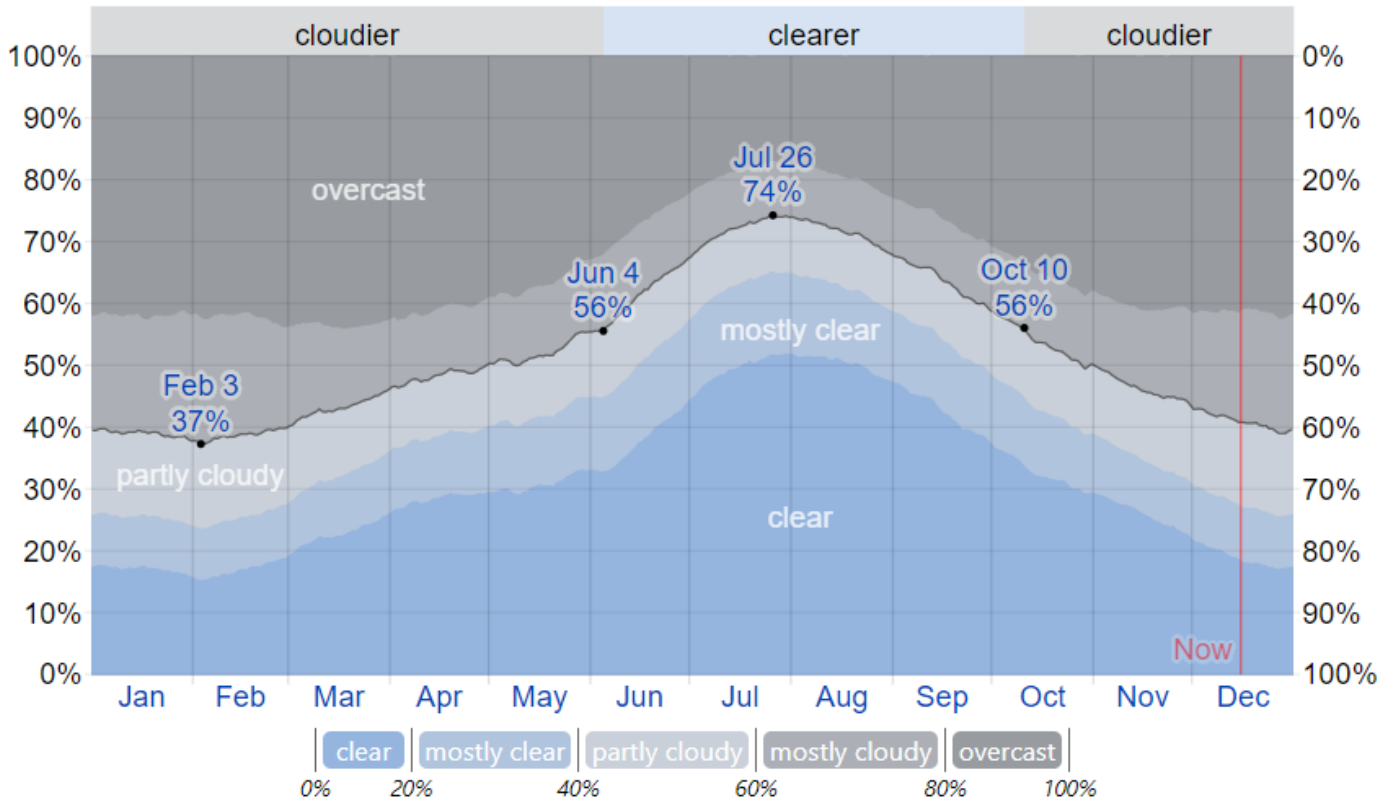
## Daily Chance of Precipitation



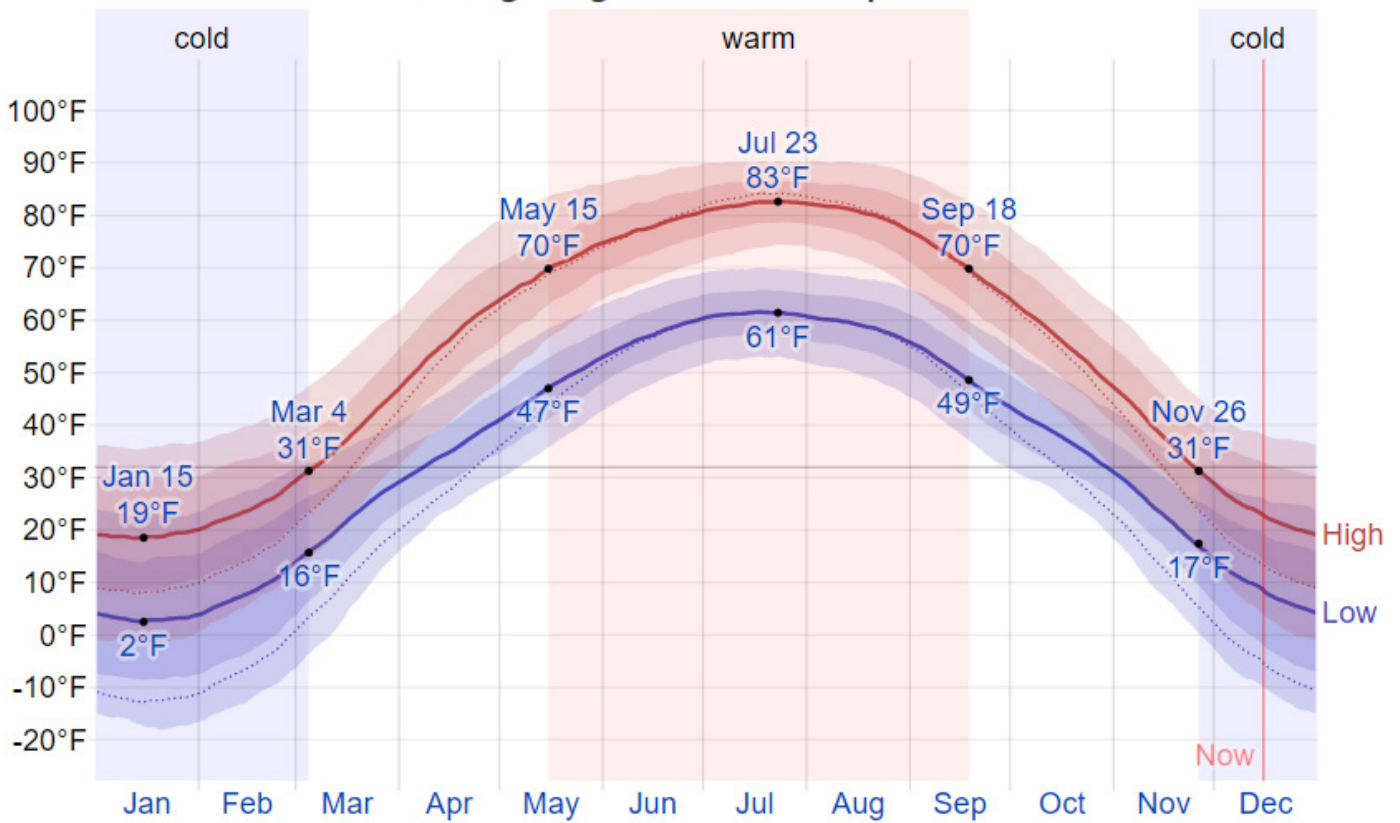
## Average Liquid-Equivalent Monthly Snowfall



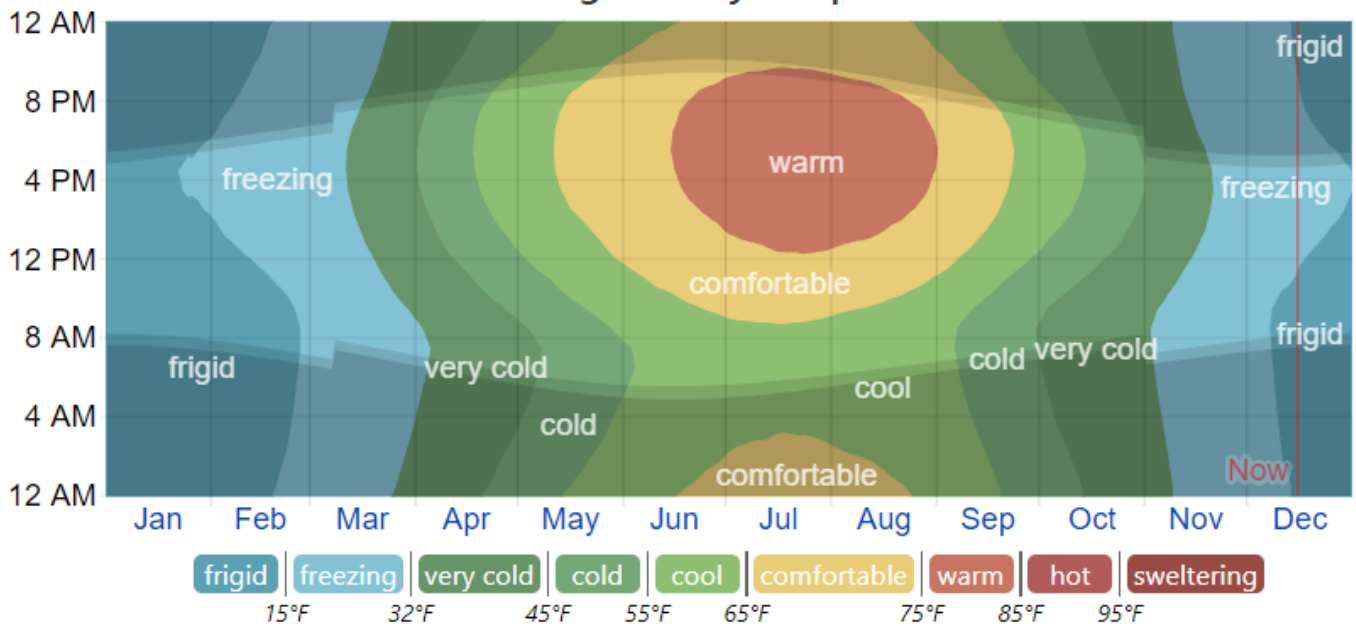
## Cloud Cover Categories



### Average High and Low Temperature

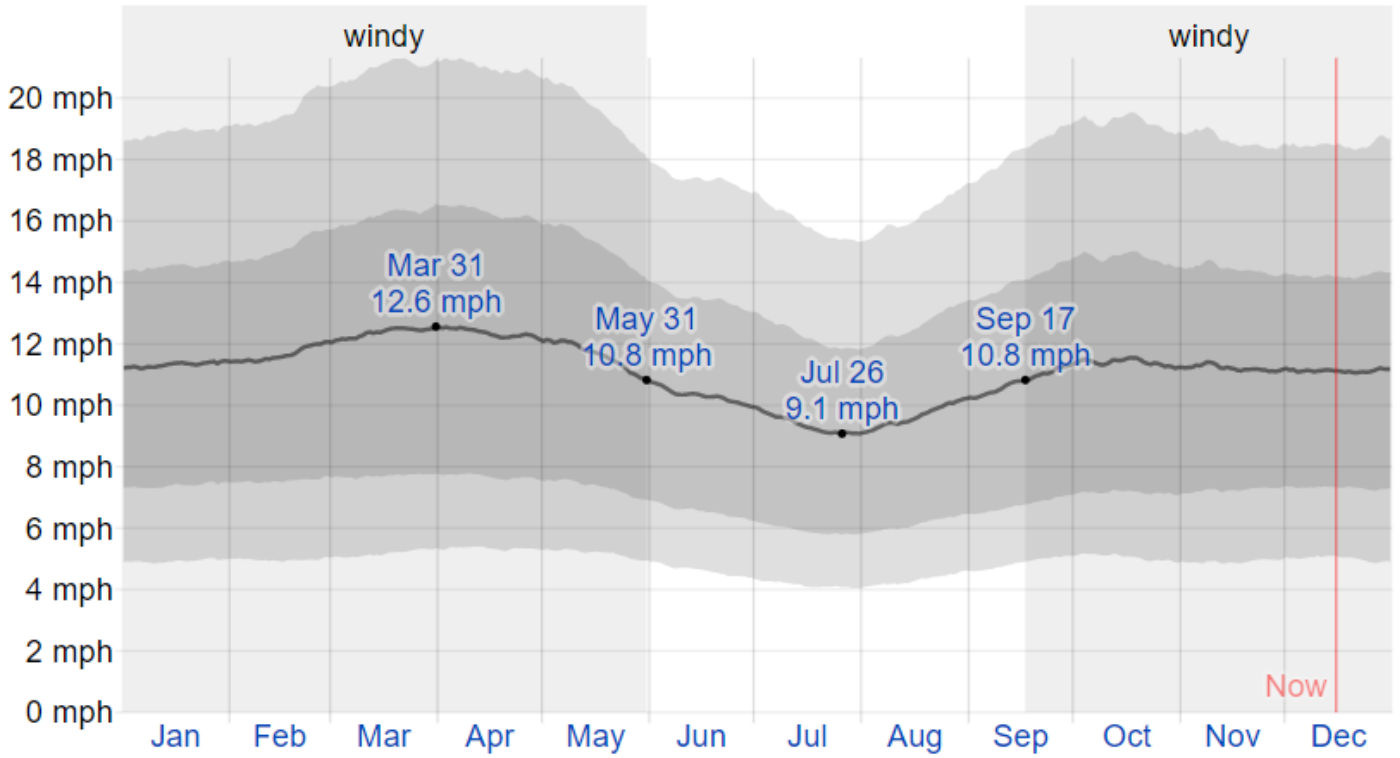


### Average Hourly Temperature

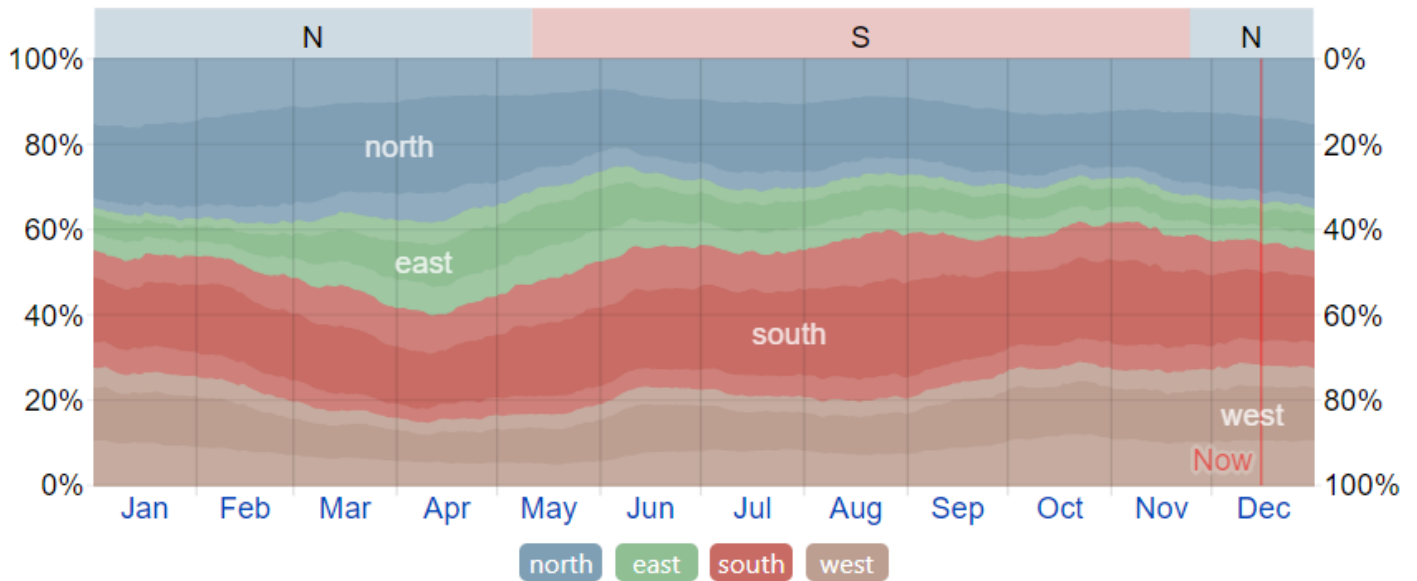




## Average Wind Speed



## Wind Direction



## **Soil Analysis**

Cass County, North Dakota

1900A - Urban Land

0-2 percent slopes

Frost free period: 110-160 days

Not prime farmland

Landform: Lake Plains





# PERFORMANCE CRITERIA

When designing a healthcare facility there are many factors to include. Having spaces for patients, for care, and many other purposes, as well as how everything is accessible are all extremely important for efficiency in helping as many people as possible in the least amount of time. Being that my project is focusing on the mental health of occupants in healthcare facilities I will be focusing on space allocation, behavioral impact, and psychological impact.

## **Space Allocation**

Everything from the main lobby to private meditation areas will be important aspects to include for occupants. The efficiency of the facility is also extremely important. Because of this space allocation is crucial in healthcare design. Determining what spaces are connected and how distanced they are effects the flow of the facility. The size of the spaces and how simplified the organization of spaces is can help ease the mental stress of occupants.

## **Behavioral Performance**

Behavioral performance is an extension to space allocation. Through my research I will be able to see what spaces people enjoy the most and what factors cause them to or to not access certain spaces. This information is important when planning out what spaces should be where.

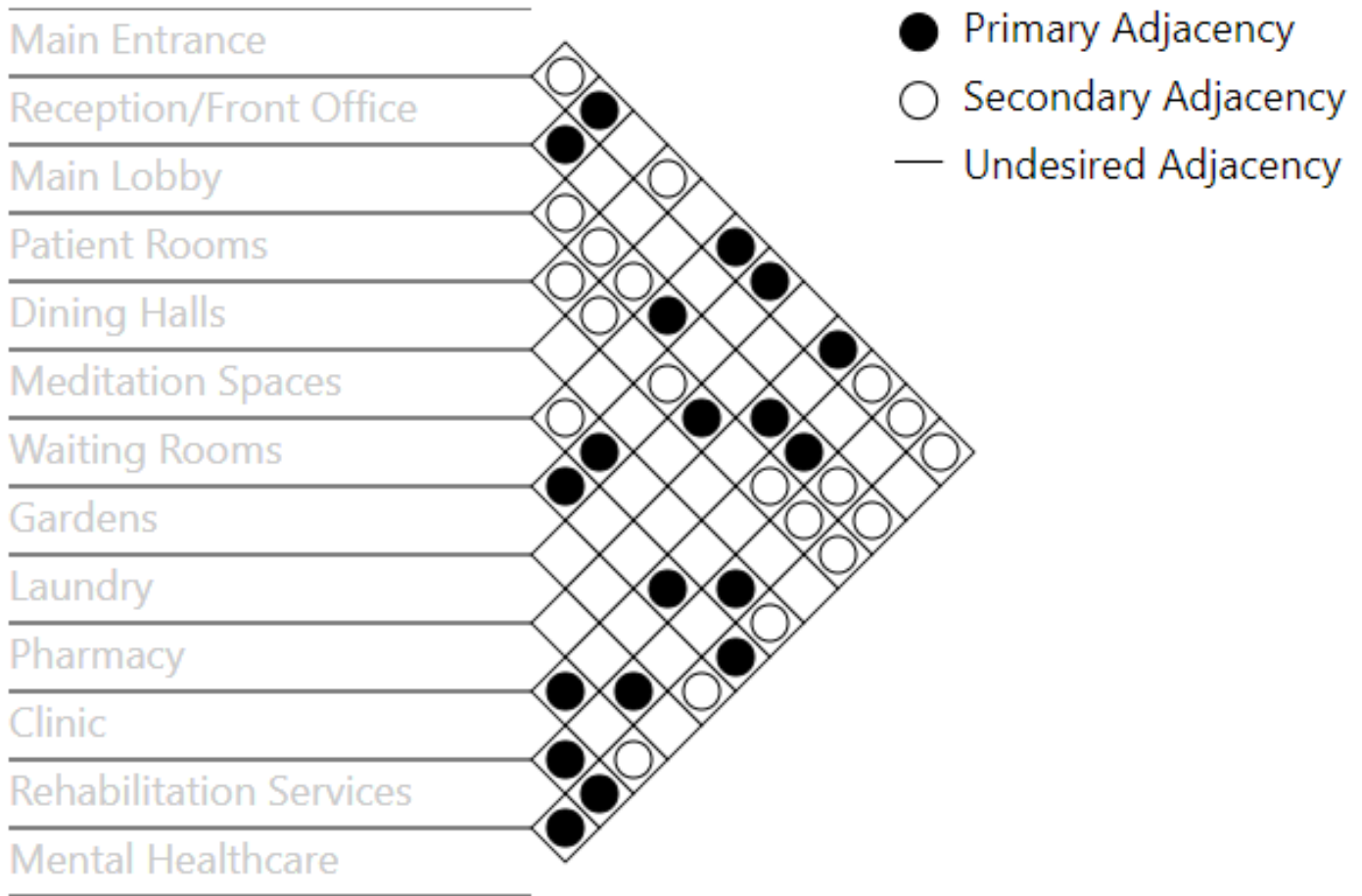
## **Psychological Impact**

This will be one of the biggest focuses of my project. Measured within this category will be the mental health impact of: colors, materials, vegetation, lighting, views, and layouts. The goals of these subcategories will be to design them in a way to best support positive mental health and reduce the mental stress of users.



	sq ft
Entryway	150
Reception/Front Office	1,000
Waiting Rooms	2,000
Circulation	5,000
Patient Rooms	7,500
Walkable Green Roofs	3,000
Gardens	5,000
Meditation Spaces	500
Dining Areas	500
Kitchens	250
Laundry Services	200
Clinical Laboratory Services	200
Radiology & Imaging Services	800
Rehabilitation Services	2,000
24 Hours Pharmacy	300
Dialysis	200
Lab Services	300
Clinic	50,000
Mental Healthcare	20,000
Maternity Suite/Floor	2,000
	100,900

# Space Allocation



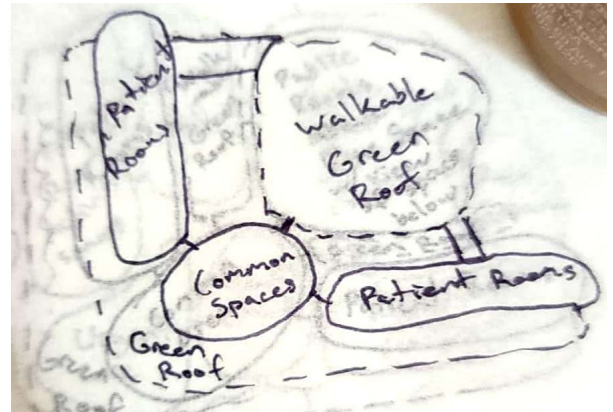
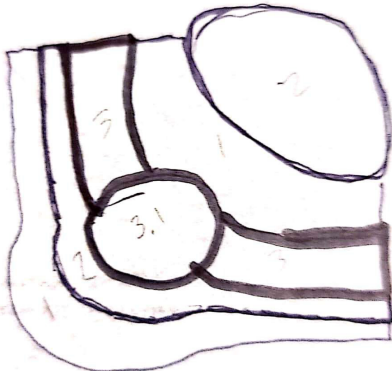
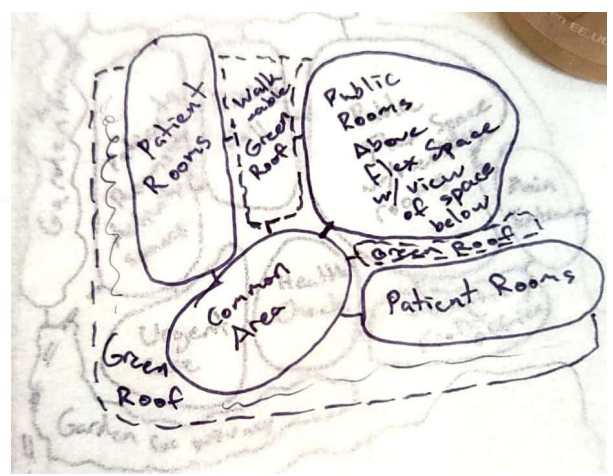
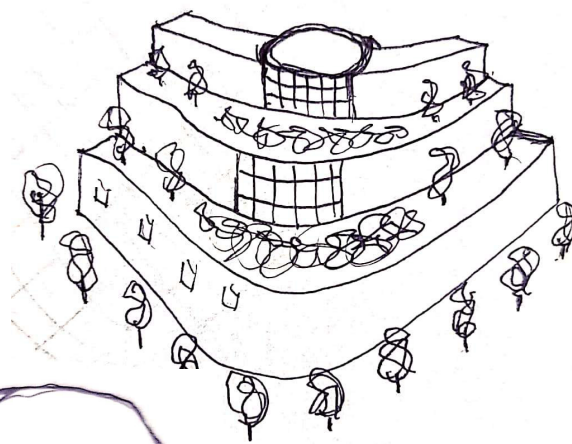
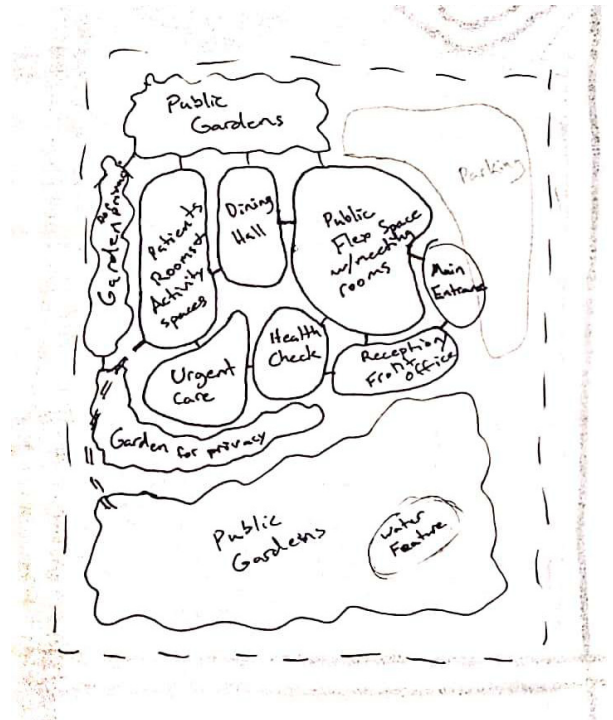
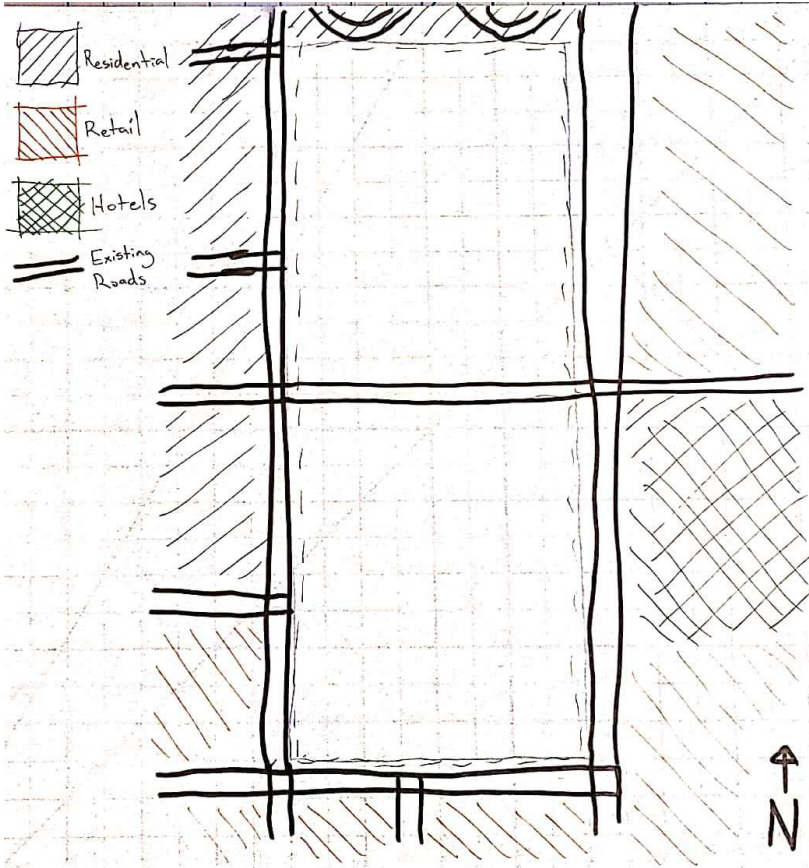
# DESIGN SOLUTION



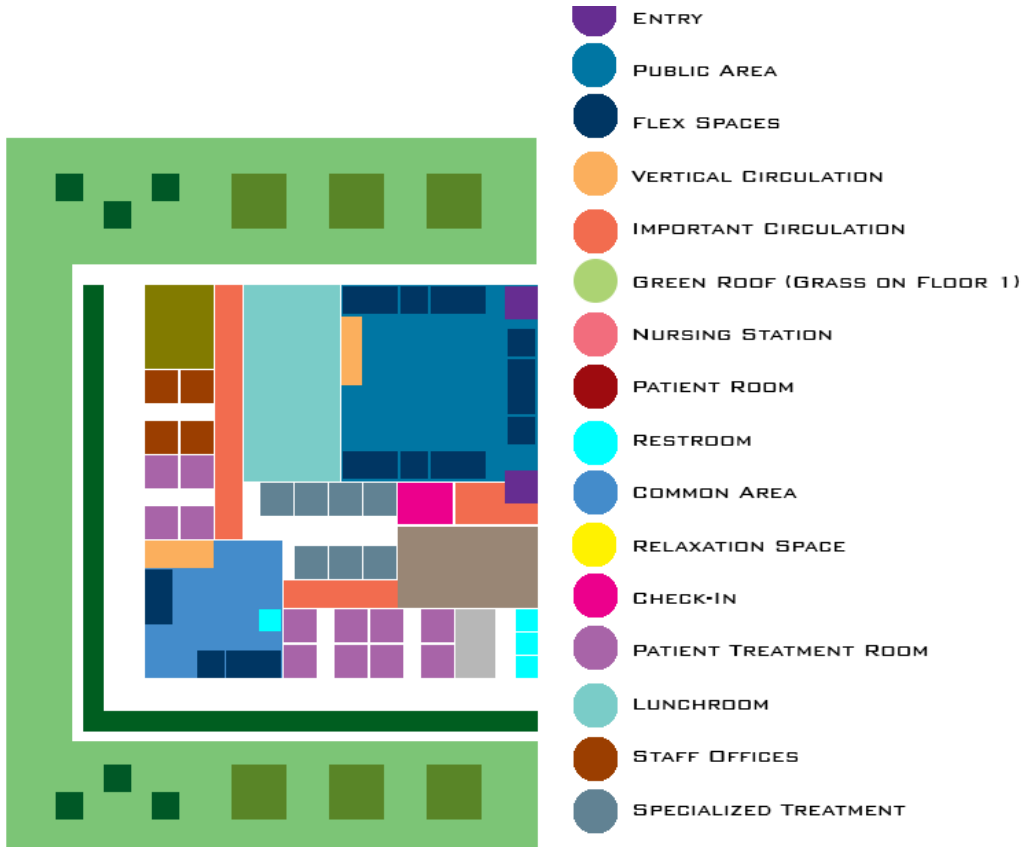




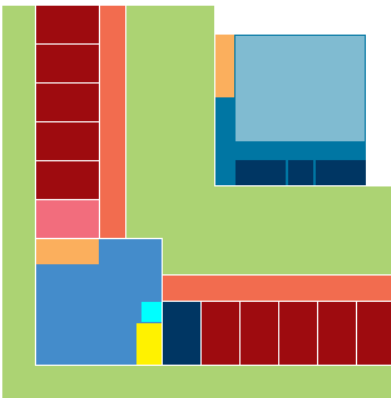
# PROCESS



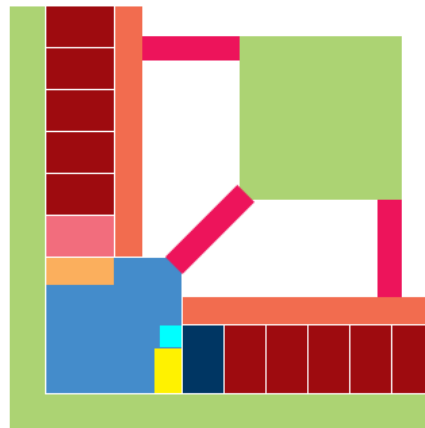
# PROCESS



First Floor Draft

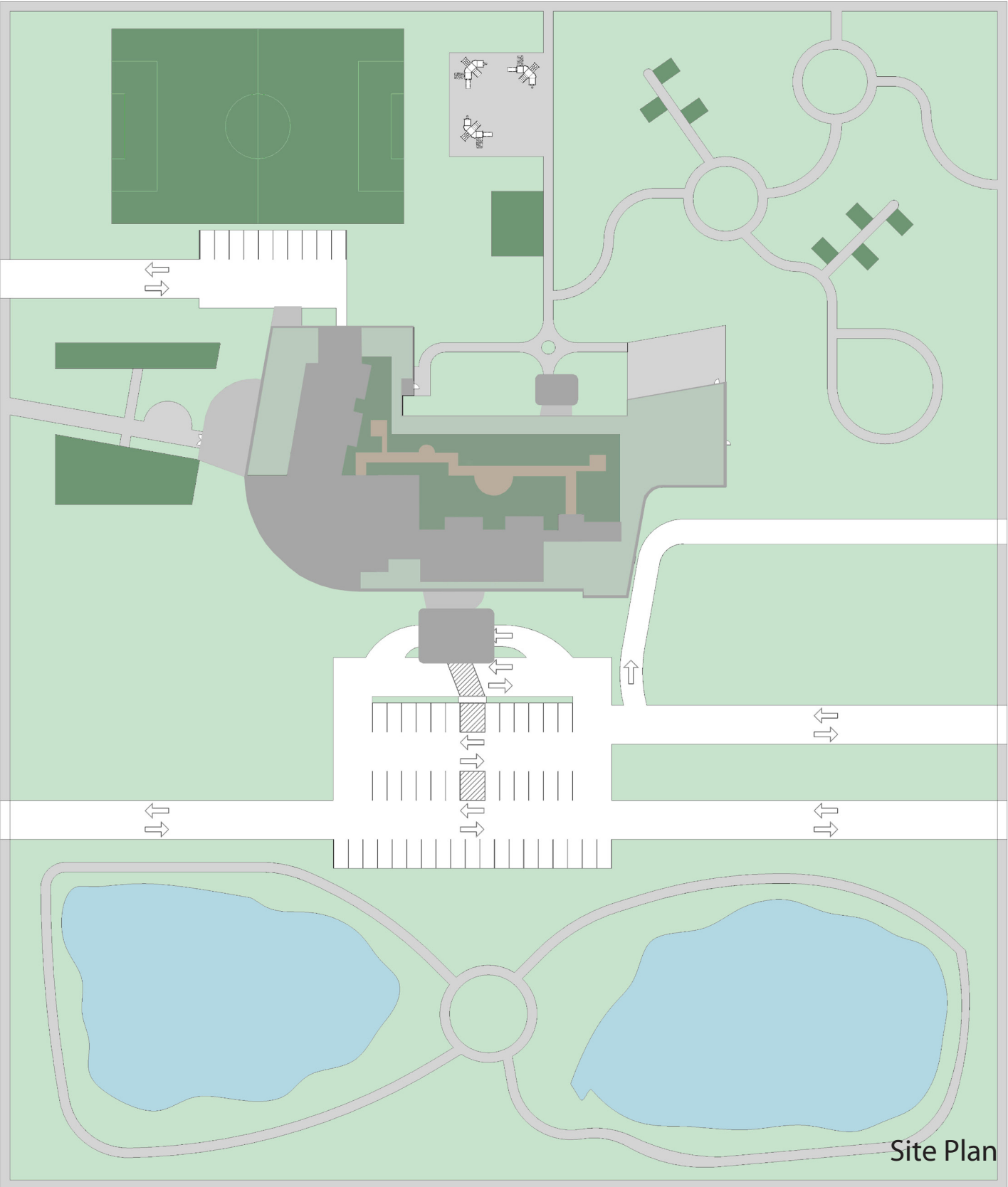


Second Floor Draft



Third Floor Draft

# PROJECT SOLUTION



Site Plan

# PROJECT SOLUTION



# PROJECT SOLUTION



# PROJECT SOLUTION



Top Left - South West Exterior

Bottom Left - Waiting Room

Top Right - Green Roof

# PROJECT SOLUTION



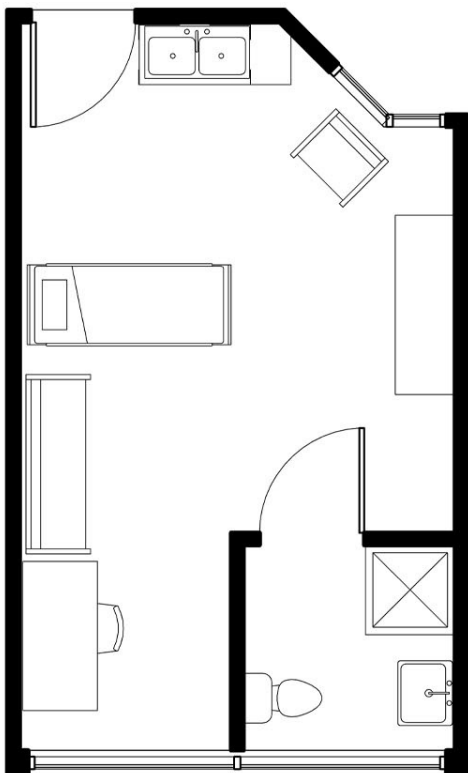
Top Left - Common Area

Top Right - Nurse's Station

Bottom Right - Patient Room



# PROJECT SOLUTION



# PERFORMANCE ANALYSIS

## **Response to the Site**

The site location in Fargo, North Dakota provides several advantages. The relativity to major roadways allow for ease of access, and the proximity to a nearby hospital allows for higher levels of care when necessary. Since residential communities are located near the site the inclusion of outdoor facilities for all ages help foster a community connection to the site. The reservoir pond has been moved to the south end of the site and also serves as a site feature with walking trails and rest areas.

## **Response to the Typological Research**

The typology researched for this project was hospitals. Observing what has been done in other projects that benefit occupants in the healing process and caring for their entire well-being was key for this project, as well as noting where improvements could be made. The various methods of research were beneficial in seeing what aspects of design are beneficial to creating spaces that are conducive to positive mental health and supporting the healing process.

## **Response to Goals and Project Emphasis**

The goal of this project was to create a healing environment through architectural design that focuses on the body as a whole in the healing process. These goals were achieved through several design choices: providing windows throughout the design with views of nature and allowing for natural light to enter wherever possible, including blue and green throughout the design for their connection to feelings of calm and healing, and designing the connection and location of spaces to be simplified and streamlined to reduce stress and anxiety in occupants.

# APPLICATION OF RESEARCH METHODS

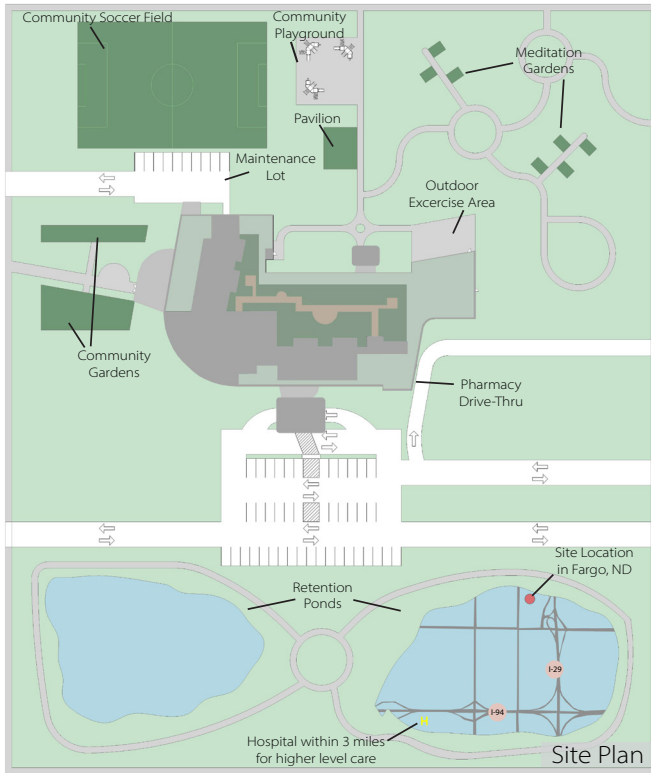
The usage of the various design strategies regarding color, materiality, relation of space, natural light, and vegetation were applied throughout the design solution as influenced by the research. The usage of these strategies allow for some aspects of each design strategy to be present in every space of the project in some capacity. The connection of spaces was one of the biggest factors in the design solution, with the usage of the on-stage off-stage model inspiring the clinic design, which provides a separation of work areas for staff providing a calmer experience for guests. The usage subtle colors and wood materials throughout the design provide passive benefits to occupants' mental health, and natural lighting is available in some capacity whenever possible. Vegetation was not included within the building to avoid any potential issues that could arise with guests, but windows throughout the design solution provide views to various softscapes, and there are multiple access points to outside gardens on site as well as a walkable green roof for patients receiving extended care. Overall these design strategies were crucial to providing a full body healing experience for guests of this healthcare facility project.



# Healthy Architecture

Keegan Hovel

Healthy Architecture looks at what architecture can do to improve the healing process through design. The strategies used include multi-scaled green spaces throughout the design, sensitive use of color and the warmth of materials, access to natural light, and the intuitive sizing and connection of spaces. This facility is unique in that it provides skilled nursing for patients that require extended care outside of what hospitals and long-term care facilities provide for mental health care and physical rehabilitation.



- Floorplan Key
- Healthcare Worker Area
  - Guest Area
  - Multi-use
  - Restroom
  - Vertical Circulation
  - Mechanical
  - Pharmacy
  - Physical Rehab





**PROJECT**

**INSTALLATION**



# THE APPENDIX







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# STUDIO EXPERIENCE

## **2nd Year**

### **2017 Fall**

Project – Tea House | Instructor – Cindy Urness

### **2018 Spring**

Project – Tiny House Town of Cripple Creek, CO | Instructor – Milton Yergens

Project – Studio Apartment | Instructor – Milton Yergens

## **3rd Year**

### **2018 Fall**

Project – Wood Project – Entomology Lab | Instructor – Mark Barnhouse

Project – Masonry Project – Industrial Design Firm | Instructor – Mark Barnhouse

### **2019 Spring**

Project – Art Museum | Instructor – Emily Guo

Project – Retirement Facility | Instructor – Emily Guo

## **4th Year**

### **2019 Fall**

Project – Marvin Windows Competition | Instructor – Mark Barnhouse

Project – Miami High Rise | Instructor – Mark Barnhouse

### **2020 Spring**

Project – Water Treatment Plant in Miami, FL | Instructor – Mark Barnhouse