

BIOPHILIA: A HEALING CONNECTION



BIOPHILIA

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BIOPHILIA: A HEALING CONNECTION

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By

Kelsey L. Jensen

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of
Master of Architecture



PRIMARY THESIS ADVISOR



THESIS COMMITTEE CHAIR

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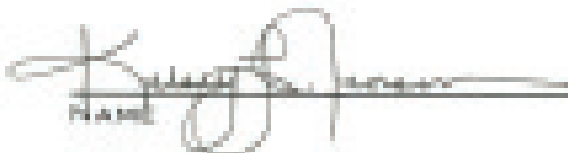
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CONTENTS

CONTENTS

SOI:

- 3 Abstract
- 5 Problem Statement
- 7 Statement of Intent

PROPOSAL:

- 11 Narrative
- 13 User/Client Description
- 15 Major Project Elements
- 18 Site Information
- 25 Project Emphasis
- 26 Plan for Proceeding
- 29 Previous Studio Experience

PROGRAM:

- 33 Theoretical Premise Research
- 47 Typological Case Study Research
- 69 Historical Context Research
- 77 Goals for the Thesis Project
- 79 Site Analysis: Qualitative
- 83 Site Analysis: Quantitative
- 97 Programmatic Requirements
- 99 Bibliography
- 105 Personal Identification

DESIGN:

- 103 Process
- 117 Final Program
- 119 Design Solution
- 133 Final Models
- 137 Presentation Boards

“We will never achieve an ethical architecture that is beautiful and sustainable until nature is integral and at the core and at the substance and being of the architecture, not added on. Buildings must shelter and inspire.”

-Steve Kieran, architect

(Kellert 2005)

SOI:

Abstract

Problem Statement

Typology

Theoretical Premise

Project Justification

ABSTRACT.

A BSTRACT

Throughout recent years more people have been inhabiting cities which creates growth of the built environment and a greater disconnect between humans and nature. It becomes a matter of finding solutions to settle this disengagement and bring change to the built environment to aid human beings. It is through a fusion of investigation and contemplation on the beliefs of the affects of biophilia that a research facility focusing on health care emerges as the typology. The project will be located on an area of wooded land on the east border of Minnesota, .5 miles from the St. Croix River and the Wisconsin border. Although the site generates a feeling of seclusion, it is easily accessible from a state highway road. Through mixed method research this thesis project will utilize aspects of biophilia which in turn could be utilized further by human beings and the built environment.

KEY WORDS: biophilia, neuroscience, health care research facility

STATEMENT.

PROBLEM STATEMENT

In what manner can the built environment respond to biophilia and the link to neuroscience research in architecture?

TYPOLOGY:

Given the research behind biophilia and the positive effects relative to rate of health recovery the typology of this project would deal with a type of smaller health care facility that would become an oasis for transitional care patients seeking relief and rejuvenation.

THEORETICAL PREMISE/UNIFYING IDEA:

The built environment must look to ways that biophilia could help enhance its state of being.

CLAIM:

Biophilia is innate in every human being. Throughout modern history, as more and more people move and live in cities, we have lost touch with this connection. Through recent research in neuroscience it has been shown that benefits can be acquired by utilizing design techniques that can help restore human balance in the environment.

STATEMENT OF INTENT

PREMISE:

Biophilia is one's connection to nature and is entrenched in every human being. It is this sense of connection to nature which creates a need to rediscover how to capture the benefits through design.

By investigating the relationship between biophilia and certain design strategies, a better correlation can be established and utilized.

The built environment changes as time moves forward, not always for the better. With the knowledge and incorporation of biophilia, the built environment could see change that benefits both nature and human beings.

JUSTIFICATION:

If biophilia could be realized through the built environment, people could take advantage of perceived benefits such as faster recovery times of an illness.

“Nature is a good teacher. I am a child of hers...Any building...should be an elemental, sympathetic feature of the ground, complementary to its nature-environment, belonging by kinship to the terrain.”

-Frank Lloyd Wright

(Kellert, 2005)

PROPOSAL:



Narrative

User/Client Description

Major Project Elements

Site Information

Project Emphasis

Plan for Proceeding

Previous Studio Experience

NARRATIVE.

NARRATIVE

Human beings have an interconnection with nature imbedded in them. This is known as biophilia. More than two-thirds of the American population currently resides in cities. This situation creates a disconnect to nature. Recent research has proven that people heal faster if given a view that incorporates some feature of nature.

The use of nature to help in the healing process is not something new, as it can be traced back to the Ancient Greeks. The Greeks would travel far out of the city to structures designated for healing. We have since lost touch with the use of nature to help heal the human body. We need to relinquish that under-used strategy. The quality and character of the contemporary built environment has increasingly isolated people from the beneficial experience of natural systems and processes (Kellert 2005).

People cannot get away from nature, from people wanting to spend the summer at the lake to people taking vacations in the winter to someplace where they can go skiing or someplace warm on the beach. A lot of people would rather be out golfing than stuck in the office. So why is it people love nature and the outdoors and seem to satisfy that need as much as they can? There are even channels on TV that are devoted to the outdoors. People cannot seem to get enough of mother nature. So why does this disconnect remain between nature and the built environment?

What are the best and most useful ways to capture the essence of what biophilia can offer human beings? How can we bring nature more into the built environment? How can architecture and research bring to the built environment the nature we yearn for?

COMMUNITY

The general public could come to the facility to learn about techniques they could incorporate into their own lives and benefit from.

PATIENTS

Different kinds of patients would be able to come to the facility to recuperate from their specific ailments that would be affecting them. These patients could come by referral from the Mayo Clinic or surrounding area hospitals.

RESEARCHERS

Researchers would come to conduct numerous tests on patients that could come from the Mayo Clinic and other parts of the region or country.

DOCTORS

As the patients would need to be monitored, doctors and nurses would need to be on staff at the facility as well.

The Academy of Neuroscience for Architecture (ANFA) is an organization that links neuroscience research to the built environment by combining the fields of science and architecture. Formed in June of 2003 in San Diego, CA, ANFA is growing and continues to develop.

In conjunction with the ANFA, the Mayo Clinic of Rochester, MN would benefit in utilizing this facility as a branch of the Mayo Clinic's extensive research facilities. The Mayo Clinic would be able to conduct research at the facility as would other approved researchers. The facility would be a place for researchers to conduct short-term studies in a setting that allows them to be more in tune with nature. Other studies might including analyzing the effects of winter on people and how architecture can adapt to help with the issue of few day-lit hours.

Basically, any research that conducts testing on human beings and their connection to nature to improve the quality of life and design techniques could take advantage of this facility. Those findings would then be able to help architects and researchers to come up with solutions and designs to incorporate into the built environment so human beings could reconnect with nature and reap the benefits mother earth has to offer.

The facility would be kept to a minimum size with researchers, patients, doctors, and the public coming and going. The researchers and patients would be in the facility around the clock until the study was complete, but the public coming into the facility to learn would only access the building during the day hours. Parking would be made available but kept to a minimum and away from the direct view of the facility. There might also be a drop-off for patients and others who might need close access when arriving.

PATIENT LIVING

Incoming patients will need a place to reside while they are cared for and tested during their stay at the research facility. Careful consideration will be given to these spaces to ensure proper testing can occur. These spaces along with multiple others will need to be flexible so that researchers can investigate different options. Along with a better connection to nature, patients will enjoy other amenities to make them more at ease.

RESEARCHER/DOCTOR LIVING

As the facility will be bringing in both researchers and doctors for longer stays, they will need a place to reside while at the facility. These apartments will have a number of amenities in order to make researchers and doctors feel at home.

RESEARCH LAB

Researchers will need a lab space to conduct tests and research different medical data.

MEDICAL CLINIC AREA

Since patients will be suffering from a variety of ailments, there will be a need for a full-service medical area where patients can be cared for.

LARGE CONFERENCE ROOM

This space will serve more than one purpose. Not only will the space act as a conference room for researchers to gather and discuss data, but the space will be utilized by the public when they come to learn about the latest findings.

COMPUTER LABS

There will be a computer lab for patients to access and also a separate lab for the researchers.

OFFICES

There will be a need for researchers to have an office to work and study.

FACILITIES MANAGEMENT

- There will need to be necessary areas for facilities and maintenance to store equipment.
- Offices for these employees will also need to be provided.

RECEPTION/RECORDS

- Near the entry of the facility a reception area will be located to guide and direct people to where they need to go, to check in patients, and to handle all paperwork.

COMMUNITY SPACES

- Throughout the facility there will be spaces that invite people to gather. These spaces will also be taken outdoors to areas with a covered overhang and gazebos.

FOOD SERVICE

- With occupants around the clock, a full service kitchen with accompaniment of a cafeteria will need to be provided.

Other **Major Project Elements** that would
be incorporated into the design:

- Circulation
- Public Restrooms
- Maintenance Facilities
- Mechanical Space
- Minimal Parking
- Interior and Exterior “Gardens”
- Labyrinth

MACRO: REGIONAL

Minnesota is located in the Upper Midwest and shares a boarder with four other states including: Iowa, North Dakota, South Dakota, and Wisconsin. Along with the bordering

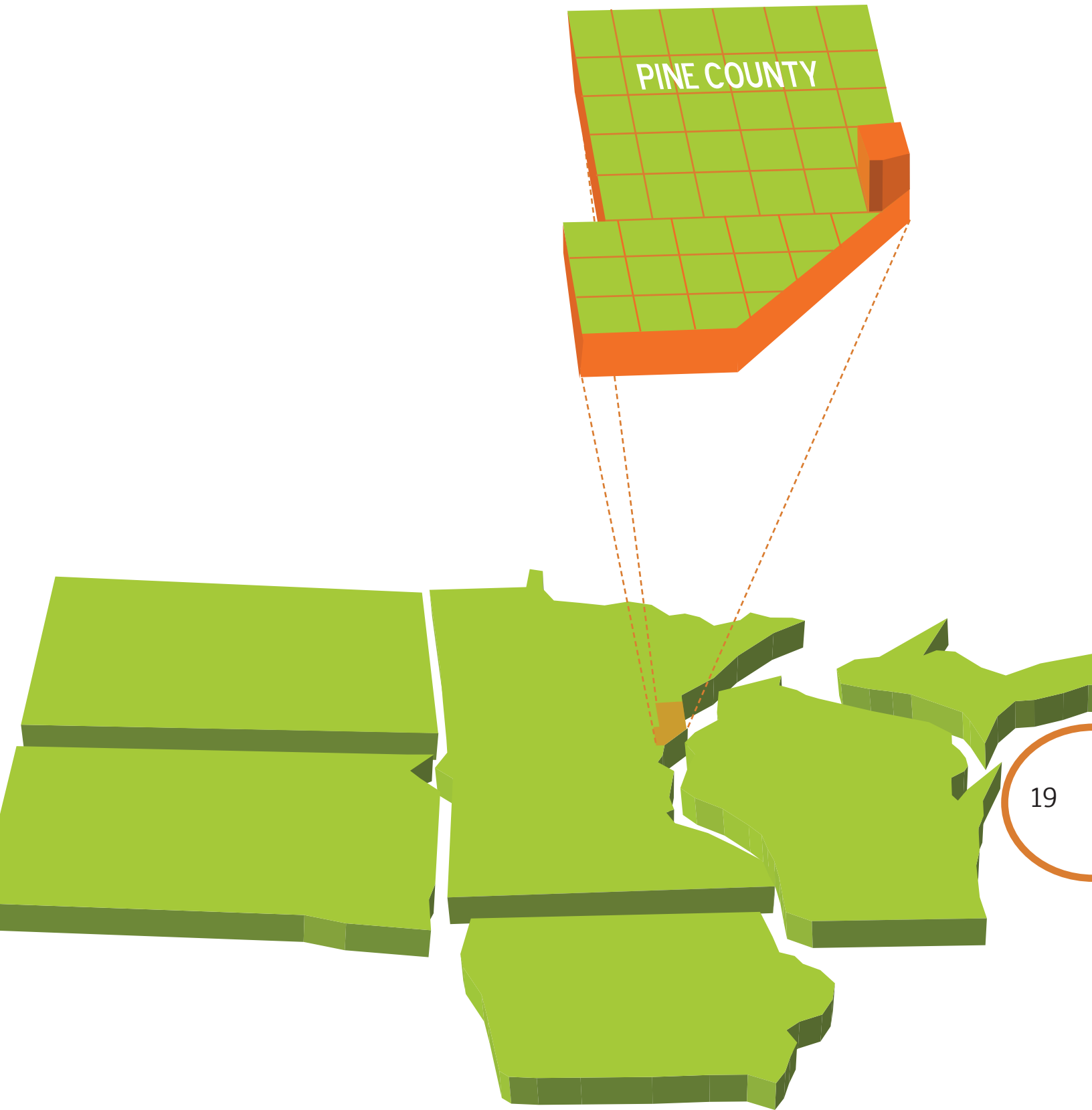
four states, Minnesota is also adjacent to the country of Canada.

Minnesota is known for its thousands of lakes and even sits along side one of the five Great Lakes, Lake Superior. The state is also known for its farming and four different weather seasons. Minnesota temperatures throughout the year can range from the 100 degree mark all the way down into the negative degrees. In fact the warmest temperature on record was 114 degrees Fahrenheit in Moorhead, MN, and the coldest temperature was recorded at -60 degrees Fahrenheit near the town of Tower, MN (Department of Natural Resources, 2008).

MACRO: TOWNSHIP

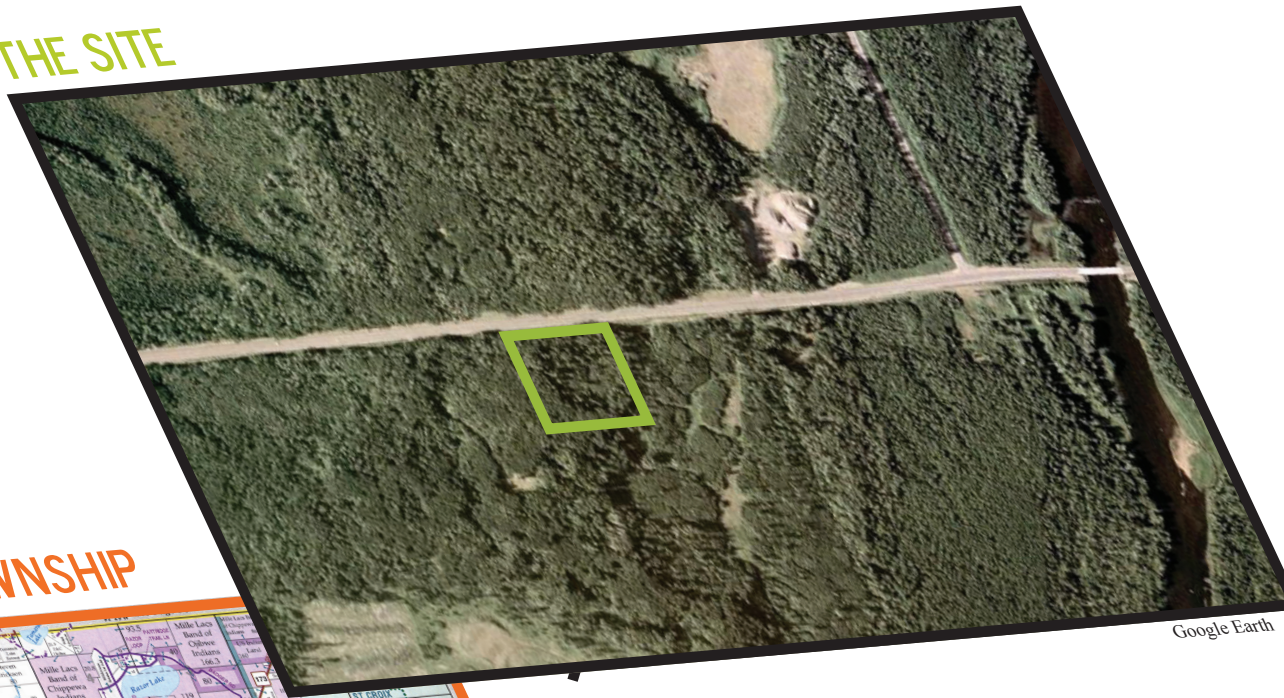
Pine County is located in the east central part of Minnesota. The county has a population of 28,116 people (Pine County Court House, 2010). Pine County lies between two highly populated areas, the Twin Cities and Duluth. The county encompasses numerous small towns but yet can still enjoy the amenities offered in a big city in less than an hour drive away.

SITE INFORMATION



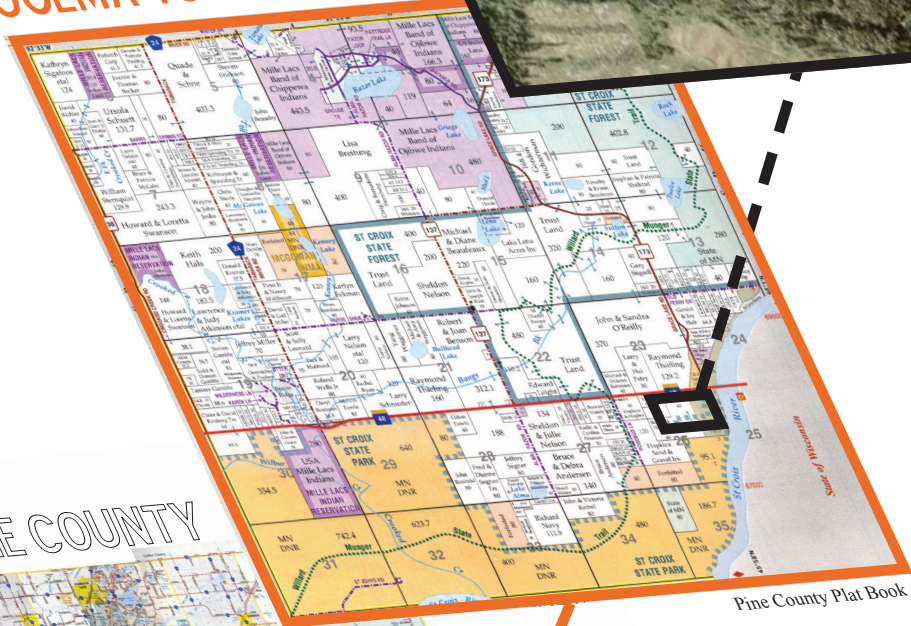
SITE.

THE SITE



Google Earth

OGEMA TOWNSHIP



Pine County Plat Book

PINE COUNTY



Pine County Plat Book

MICRO: SITE

The exact site is located N46° W92°27' and is on the west side of Ogema Township directly south of State Highway 48 and about half a mile west of the St. Croix River (Google Earth, 2010). The site finds itself just on top of the ridge line that a little farther east starts to drop dramatically toward the river basin. The St. Croix River is a natural boundary and to the east side lies the state of Wisconsin. The site is surrounded by wooded acreage that is parcelled out to multiple different owners. The only dramatic change to the land surrounding the site would be the gravel pit that was dug to the south and west. Normally no effects can be seen or heard from Hopkins Sand and Gravel Inc.

The site itself surrounds you with natural beauty including nine different species of deciduous trees and two types of conifer trees. Along with the native vegetation many types of creature scurry about the site. The tranquil feel of the site immediately gives that sense of peacefulness and escape from the fast-paced world we find ourselves in today.

SITE IMPORTANCE:

The site was chosen based on multiple aspects that were necessary components to aid in this project. First, the site came to mind because of the access I have to it as I am the owner of the property. Right now I have just under 40 acres but I hope to acquire the rest soon. The site currently functions as hunting land with minimal development. A gravel road, wide enough for one vehicle, serves as the only entrance and exit, and an area located near the northeast corner of the site has been cleared of trees. A movable fish house that has been converted into a “deer shack” and an outhouse are the only items on the site. The person that owns the small corner to complete the 40 acres did have electricity to his “hunting shack” brought in but it does not run anywhere else on the site.



Another reason for the site selection was the location in relation to a major state highway that travels to Wisconsin right from Interstate 35 that connects the Twin Cities to Duluth. The project needed the remoteness but also proximity to a major road for easy access.

The site is also between two major populated areas of the Twin Cities and the Port City of Duluth. Along with the major cities there are numerous smaller communities around the area that have hospitals that would take advantage of such a facility.

Finally, this site experiences all four seasons throughout the year. This was important because it would give researchers the ability to study biophilia throughout all four seasons.



EMPHASIS.

PROJECT EMPHASIS

The underlying goal of this project is to gain insight into the effects of biophilia on different people and how information might be utilized toward design solutions for the built environment.

Emphasis will be put on the design needs of researchers and how to incorporate design techniques that will utilize nature to its fullest potential to not only benefit human kind but the environment as well. The project will also host a flexible design that will allow researchers to incorporate new techniques for study.

Finally, the project will play an integral part in community education and awareness. Not only will findings be published but the public will have the opportunity to come and visit the facility and learn about biophilia and ways they themselves can benefit from different design elements.

SOI Due	September 16, 2010
Proposal Due	October 7, 2010
Program Due	December 10, 2010
First Day of Spring Semester	January 11, 2011
Midterm Reviews Begin	March 7, 2011
CD of Project Drawings	April 18, 2011
Physical Exhibits Due	April 25, 2011
Thesis Reviews Begin	April 28, 2011

Proceeding forward with this thesis will include utilizing a design methodology that assimilates a mixed method qualitative/quantitative analysis approach. Research will focus on aspects regarding the project's unifying idea, typology, historic context, site analysis, and programmatic requirements. Throughout the research phase, periodical checks will be preformed to make certain all information leads back to the unifying idea.

Quantitative and qualitative data will be sought to aid the project. Quantitative data including scientific and statistical information along with qualitative data immersing from experience with the site and archival searches will be completed. By a process of collection, research, summary, and interpretation, data will be recorded and presented either by method of graphs or written word.

Documentation of the design process will be completed carefully and abundantly including, at a minimum: sketches, physical mock up models, drawings, photographs, and digital models. All process material will be kept and given the opportunity to inform the overall design. Those pieces that impacted the project the most will find their way on to the project boards and certainly the project book document.



<http://ala.ndsu.edu/people/>

EXPERIENCE

STUDIO EXPERIENCE

2007
SECOND
YEAR
FALL

Tea House
Rowing Club Boat House
Biohaus

Fargo, ND
Minneapolis, MN
Rocky Mtn. Park, CO Darryl Booker

2008
SPRING
SECOND
YEAR

Casting Studio
Community Development

[Volume Exploration]
Fargo, ND Mike Christenson

2008
THIRD
YEAR
FALL

1950's Baseball Ballpark
Moorhead Public Library

"Agincourt, IO"
Moorhead, MN Ronald Ramsay

2009
SPRING
THIRD
YEAR

Performing Art Center
Boutique Hotel
Class Trip

Austin, TX
Upham, NM
Chicago, IL David Crutchfield

2009
FOURTH
YEAR
FALL

High Rise
LHB Competition
KKE Competition

San Francisco, CA
Fargo, ND
Fargo, ND Don Faulkner

2010
SPRING
FOURTH
YEAR

Urban Design
School Competition
Slum Dwelling

Dominican Republic
Tanzania, Africa
Dominican Republic
Darryl Booker
Paul Gleye
Frank Kratky

2010
FIFTH
YEAR
FALL

Historic Building Restoration

Fargo, ND Steve Martens

“We shape our buildings and afterwards our buildings shape us.”

-Winston Churchill, 1943

PROGRAM:

Theoretical Premise Research

Site Analysis: Qualitative

Typological Case Study Research

Site Analysis: Quantitative

Historical Context Research

Programmatic Requirements

Goals for the Thesis

RESEARCH

THEORETICAL PREMISE

THE BUILT ENVIRONMENT MUST LOOK TO WAYS THAT BIOPHILIA COULD HELP ENHANCE ITS STATE OF BEING.

BIOPHILIA:

When researching for the theoretical premise, listed above, the focus started on biophilia and what was meant by the term and its purpose in human being life. Biophilia has always been around but not so well defined as when Edward O. Wilson first coined the term biophilia in 1984. Wilson, a Harvard biologist, argued in his book, *Biophilia*, that human beings have an innate connection with nature. A colleague of Wilson's, Stephen R. Kellert, would later define biophilia in his book, *Building for Life*, as "a complex of weak genetic tendencies to value nature that are instrumental in human physician, material, emotional, intellectual, and moral well-being. Because biophilia is rooted in human biology and evolution, it represents an argument for conserving nature based on long-term self-interest" (Island Press, 2005).

Biophilia is an element that takes various sciences to explain. From biology and anthropology to psychology and neuroscience there is a wide variety of hard and natural sciences to understand the relationship of humans and biophilia.

Biophilia not only contains physical benefits for human beings but economical ones as well. If biophilia could be incorporated into the built environment and people were able to possess a more holistic well-being, reduction in trips to the doctor could be made. This potentially could reduce medical costs or insurance.

The amount of perceived benefits from biophilia keeps adding up. The advancement of biophilia is important and there are three ways in which we can boost efforts. First, a greater amount

- of research needs to be compiled on
- biophilia and its affects. Only minimal
- studies have been completed and only
- began to scratch the surface of what
- possibilities biophilia holds. Effort
- also needs to be put forth toward
- educating people on biophilia but also
- the potential benefits one can gain from
- integration of biophilic design into the
- built environment. For this thesis project,
- education is one of the focal points in
- the design. The general public will be
- able to visit the facility and learn from
- the research being conducted. Finally,
- there needs to be incentives to encourage
- implementation of these ideas and
- notions.

NEUROSCIENCE:

Neuroscience is important to this thesis project research as it is critical to understand the science behind the relationship. Human beings respond to biophilia for different reasons and it is necessary to correlate these occurrences to their source in the brain. By learning how biophilia exactly affects a person, many professions would be better equipped to cater to humans in a more positive way. There have been research studies conducted but not nearly enough to pinpoint the exact reasons behind why nature helps humans heal faster or why nature can reduce stress. Society has always known there to be healthy effects of nature on the human body, mind, and spirit, but we are just beginning to uncover the possible reasons and how to utilize these findings for the betterment of human well-being.

A couple of examples of research studies on people's connection to nature include the study by Roger Ulrich in 1984 when he found patients recovering from gallbladder surgery had a quicker healing period if patients had a view out into nature rather than a view to a brick facade. Another study showed that prisoners visited the healthcare facility 25% less when their cell had a view of farmland rather than the prison's interior stagnant courtyard (The Wisdom of Biophilia, 2006).

These studies along with very few others have been conducted that reveal positive benefits of humans' interaction with nature. So why is there not more being done?

In 2003 an organization formed to collaborate and work toward finding and explaining the capacity of biophilia and healing spaces. The Academy of Neuroscience for Architecture is located in San Diego, California. The non-profit organization consists of neuroscientist, researchers, and architects. The organization has been providing opportunities for professionals to come together to learn more about biophilia but also other research that stands to benefit society. Recently Dr. Eve A. Edelstein and colleagues of the ANFA have been using state-of-the-art technology known as the High Definition EEG. This machine allows scientists to track brain activity while a person is on a virtual walking tour of a building. Scientists want to understand the impact of way finding and the relationship natural visual cues have on the brain. Edelstien and others are also researching to what degree natural light affects human being's health.

Neuroscience is one important aspect in the development and implementation of biophilia. Healthcare facilities will want hard evidence that proves biophilia to be a catalyst in the healing power of nature.

HEALING SPACES:

Learning about biophilia and neuroscience directs focus upon what it is really meant by healing spaces. What is a healing space, and how can designers help to create such spaces for those needing healthcare and those who want to take preventative action on health and well-being?

While attending a National American Institute of Architecture Students Convention I was able to sit-in on a lecture from Esther M. Sternberg, M.D. Her numerous credentials have given her the opportunity to write a variety of articles, publish two books, and be host to a PBS series entitled, *The Science of Healing*. Sternberg's two books include, *The Balance Within* and *Healing Spaces*. From her lecture, documentary, and book there are a variety of components that can help distinguish a healing space. Sternberg first began to understand the power of a healing space when she herself started to experience pain from rheumatoid arthritis. She had recently lost her mother as well, so the stress added to her already hindering pain. During Sternberg's suffering she was given the opportunity to spend some time in Crete, the largest of the Greek Islands. Here she started to notice the pain was subsiding and she began to wonder the reasoning behind it.

Sternberg returned to the United States and began researching the effects that natural images had on the brain. When people encounter an image they like, or find peaceful and calming, the activity in the portion of the brain that neurotransmitters or endorphins are stored get released upon feeling this sensation. This release of neurotransmitters in turn can reduce stress and create a more resilient fighting immune system.

The formation of healing spaces dates back to the Ancient Greeks. Epidaurus, Greece is where the ruins of the Temple of Asclepion lay. This is where Hippocrates, a Greek physician known as the Father of Modern Medicine, developed many of his healing techniques or what he called “diets” (Sternberg, 2009). The Temple of Asclepion was located in a remote area set strategically into the hillside. Patients approaching the temple would only see the surrounding landscape until reaching the end of the path where the temple revealed itself from the serene terrain. Patients would be in awe of what they saw and that was believed to have a major impact of the treatment of the patient. Another treatment technique began when the patient was walking up the path to the temple. The patient was asked to leave their dirty diseased self and only bring in their clean soul to the temple. This instilled belief from the beginning. It is belief that aids in the process of healing and the Ancient Greeks were aware of this.

Even though we now know of the Placebo Effect it can still have a positive impact on the healing process. It is not necessarily bad for a person to believe a treatment is helping them improve their well-being even if the treatment is actually doing nothing as long as positive results can be incurred by the patient.

There are other techniques that can aid in the creation of a healing space. According to Sternberg, natural light, gardens, and fractals all can create a form of healing space.

Natural light is an important aspect in a healing space. From the book, *A Pattern Language*, there are two reasons why people must have naturally lit spaces. The first reason is concluded by asking people what they think of natural light in a building. By analyzing their word choices there is a correlation that people respond to windows in a room more positively than windowless rooms. The second is the growing evidence that suggest humans need daylight since daylight plays a vital role in a human being's circadian rhythm (A Pattern Language, p.526). Without natural light the circadian rhythm can be thrown off track and create problems to the overall well-being of a person.

Another component to a healing space is through gardens. Throughout history gardens have been a place of relaxation. Numerous types of gardens are able to offer that sense of peace and tranquility. From Zen gardens to gardens with water features, gardens create a place where meditation can be facilitated. Through meditation one can rejuvenate the mind, body, and spirit.

By the use of fractal patterns a calming sensation can be captured to create a healing space (Sternberg Lecture, 2009). Fractals are the organizational systems of nature, based on geometry and mathematics (Huelat, 2006). Organic architecture was a term first used by Frank Lloyd Wright who incorporated natural forms into his designs. Fractals can be another way to connect people back with nature.

OPTIMAL HEALING ENVIRONMENTS:

A healing space does not always have to be a specific location. From a healing space stems the optimal healing environment. This is where Sternberg relates physical fitness into the creation of a healing space. People need to encompass all aspects of well-being to create their own optimal healing environment and exercise is a component to the equation. The physical activity does not need to necessarily be strenuous but rather allows one to get the body moving. According to the American College of Medicine, exercise is

- medicine (Sternberg, 2009). There are
- therapeutic effects of exercising. Even
- thirty minutes of walking can relinquish
- the body both mentally and physically.
-
- Another characteristic for an optimal
- healing environment is through different
- types of therapy. Music can be used
- as a type of therapy. Music serves
- as a stress buffer and can have a
- profound impact on emotions.
-
- It is not always what is in or around
- the space that makes it a healing
- environment but rather sometimes it is
- about what is taking place in that space
- and how a person relates to it.

EVIDENCE-BASED DESIGN:

Evidence-based design can play an integral part in the advancement of biophilia. Evidence-based design is the process of basing decisions about the built environment on credible research to achieve the best possible outcome (The Center for Health Design, 2008). Evidence based design or EBD seeks how design can affect a diverse range of one's well-being.

EBD relates to this thesis project already through the nature of case studies developed. With the help of EBD the amount of knowledge that can be gathered from it better designs should be evolving.

THE PROCESS OF EBD

1. Define EBD goals and objectives
2. Find sources for relevant evidence
3. Critically interpret relevant evidence
4. Create and innovate EBD concepts
5. Develop a hypothesis
6. Collect baseline performance measures
7. Monitor implementation of design and construction
8. Measure post-occupancy performance result

(Clinic Design,2010)

PREMISE RESEARCH

Connecting to nature is a natural characteristic of the human race. Sometimes we need to look back to move forward. Since recorded history, human beings have had a connection to nature, and it is now more than ever, as most people live in cities, that we reconnect with nature. Steps have been taken through research and the formation of organizations to push forward with biophilia and prove to the world that it is something we should not ignore any longer. However, more still needs to be accomplished. This thesis project hopes to aid in the effort by creating a facility that can incorporate the aspects needed to study and learn from biophilia. Once the data is collected at the facility the next step is to educate others of the findings.

Neuroscience will play an important role in the ability to understand biophilia in scientific terms. Being able to prove the affects of biophilia and give society hard facts will increase the likelihood of the general public acting upon the results.

The general public and design professionals will need to be educated on the numerous types of techniques that can be applied to better one's well-being.

A major benefit of the facility to the researchers and doctors will be the availability of a wide variety of selection of the different studies they can choose to induce.

SUMMARY.

During the design process, steps will be taken to decipher the best approach, what to include, and how to implement these techniques in the best manner, all while using discretion for nature and the environment. Space design will stem from leading professionals in the field such as Esther Sternberg and her research into healing spaces. The research into natural light will play a key role in the layout of the design.

- People prefer a room with a view and history has shown day-lit spaces to be more powerful than we think.
- The design will incorporate various components into the design from large courtyards to smaller intimate meditation spaces. Elements such as water features can be integrated into spaces to create a calm relaxing space that can connect people to the outdoors while being indoors.

- As meditation is a focus when reaching a holistic well-being there should be a variety of meditation options provided. A labyrinth invites meditation while also providing a source of active movement.

- Physical fitness is an integral part of the holistic well-being and will not be ignored. Exercise can come in many forms and does not have to be thought of as a dreadful chore.

Reward does not come without risk. The design of this facility will need to be flexible, as research could conclude something incorporated into the design does not aid in the advancement of understanding biophilia. This will be the time when researchers and doctors will have to take a step back and figure out what changes need to be made.

Research data will not appear overnight and patients will need to be monitored for an extended period of time. This calls for the facility to be most accommodating as patients, researchers, and doctors alike may stay at the facility for more than one day.

The research that has been conducted up until now has made a valiant effort to inform people of the potential reward of biophilia. It is now time to push forward and look to new methods of research that can shove biophilia over that tipping point so human kind can embrace what nature has to offer us.

“It is difficult for people to go through experiences like this, and I wanted to create a building that would be calming and accommodating, and one that would be a fitting tribute to Maggie.”

-Frank Gehry, architect

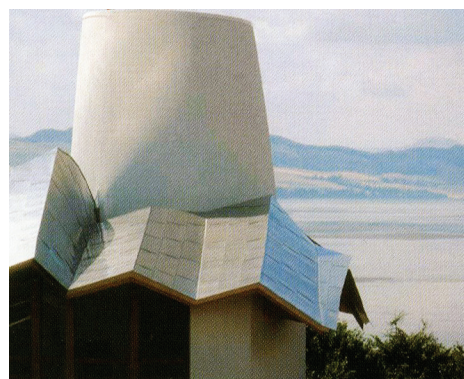
(maggiescenres.org. 2010)



(Phaidon Press Limited, 2004)



(Phaidon Press Limited, 2004)



(Phaidon Press Limited, 2004)

This small therapy centre for cancer patients was the first building completed by Frank Gehry in Britain. One of Gehry's smallest commissions, the centre is built in the landscape and plays off the surrounding hills of the Dundee terrain. The building is situated to command stunning views of the Tay Estuary and overlooks North Fife.

Frank Gehry signature designs conform around curving facades and undulating rooftops. With this design Gehry started the process of design by arranging the rooms in a layout most suitable for the centre then designed the outer shell. The timber roof structure is finished in stainless-steel shingles that have a soft matt finish. The inspirations for the folds in the roof line came from folds of a dutch hat which Gerhy had seen in a Vermeer painting. Gehry was also inspired by simple Highland dwellings known as Brochs. This is how the cylindrical form of the white tower came about which elegantly anchors the whole composition.

GEHRY PARTNERS

Maggie's Cancer Caring Centre,
Ninewells Hospital
Dundee, Scotland, UK

2,529 sq/ft
\$2million
Year: 2003

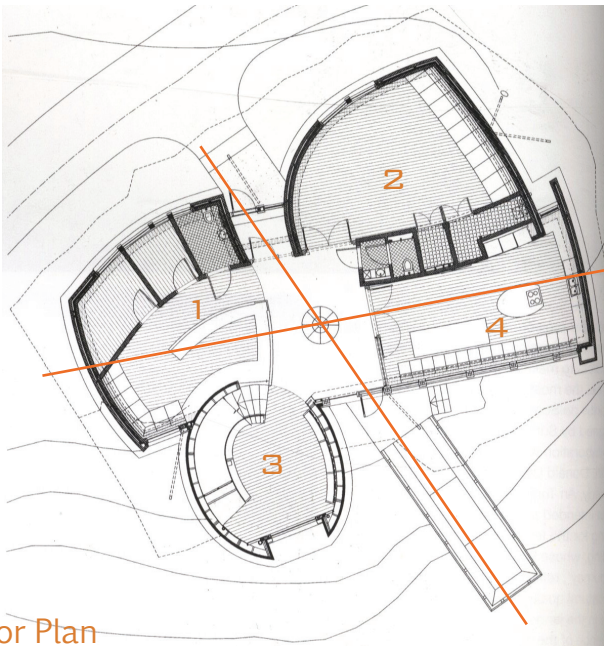
MAGGIE'S CANCER CARING
CENTRE DUNDEE IS LOCATED
IN FRONT OF WARD 32 AT
NINEWELLS NATIONAL HEALTH
SERVICE HOSPITAL.

STUDY ONE.

Excluding the cylindrical tower, which hosts a library and a small sitting area on the second floor, the building is all on one level. The design also has a kitchen with an open floor plan and dining area, a large sitting space, and smaller spaces for patients to have one-on-one sessions.

Looking at the floor plan there are distinct zones of the design that can be divided by an off-center axis. By drawing the axis the building shares similar amounts of square footage in zones 1 and 3, and zones 2 and 4.

From the entrance there is a direct path out onto the stilted walkway that overlooks the valley. This space allows visitors to surround themselves in the natural beauty. Another path through the building is created between the kitchen and dining area to the one-on-one area. A final notable path lies between the library space and the common area. These distinct paths give simple direction and order to the design.



- 1 Break-Out Spaces
- 2 Common Area
- 3 Library
- 4 Kitchen/Dining

Floor Plan
(Phaidon Press Limited, 2004)



Structural Roof Frame
(Phaidon Press Limited, 2004)

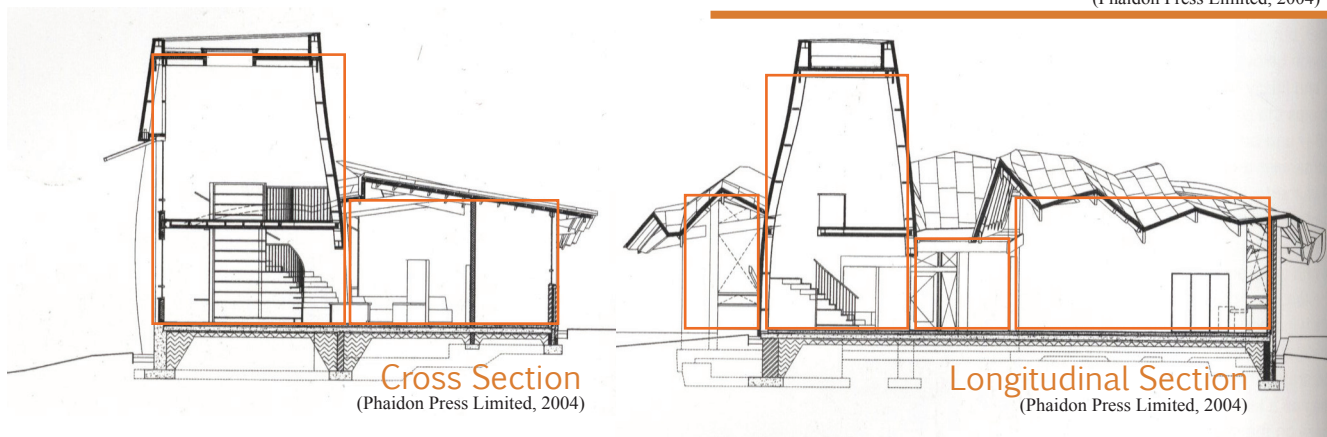
The sections reveal the organization of ceiling heights in the design. The more open spaces also incorporate a higher ceiling height than those spaces created for an intimate feel or for circulation.

Natural light is an important factor in this design. The building is given views of all the natural surroundings. The natural light is also able to penetrate into the structure and creates warm sunlit areas throughout.

The environmental surroundings are a contributing factor in the centre's success. Along with the breathtaking views, the centre also incorporated a garden including a labyrinth designed by Arabella Lenox-Boyd. The design uses a dramatic stepped earthwork that acts as an amphitheater setting overlooking the 33 metre diameter labyrinth. The labyrinth is utilized for contemplation while walking the curved path.



(Phaidon Press Limited, 2004)



Cross Section

(Phaidon Press Limited, 2004)

Longitudinal Section

(Phaidon Press Limited, 2004)

STUDY ONE.



(Phaidon Press Limited, 2004)

50

“I think it’s an inviting building, I think people will want to come inside and spend time there, and I really hope that in some small way it might contribute to a sense of rejuvenated vigor for moving forward and living life.”

-Frank Gehry, architect

(maggiescenres.org. 2010)

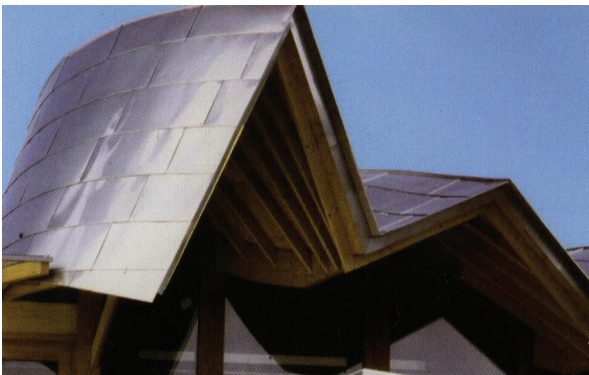
ANALYSIS:

The form of this building, with its undulating facades and roof structure, fits the landscape and culture. The building seems more like a cottage than an institution. The free-flowing forms let the building relate to its surroundings and not overpower the natural beauty. The cylindrical tower gives hierarchy to the structure but also anchors the whole design. The two distinct paths cutting through the building allow for an easy flow of circulation.

The views created with the glazing let the natural beauty enter into the interior spaces while the walkout gives visitors the ability to fully immerse themselves in the surroundings.

A labyrinth was created to give visitors the ability to take time to contemplate as they follow the circular paths. This form of therapy is something also found in another case study and will be a focus of further study.

The site gives this facility the distinction necessary for this to be a viable place of healing.



(Phaidon Press Limited, 2004)



(Phaidon Press Limited, 2004)



DIM, 2010

• DIM IS SITUATED IN THE
• WOODLANDS OF DUKE FOREST
• IN CLOSE PROXIMITY TO DUKE
• UNIVERSITY'S MEDICAL AND
• EDUCATIONAL FACILITIES.

STUDY TWO

INTEGRATIVE MEDICINE

This healthcare center is a healing environment where tradition and innovation unite to create a unique place of health and healing. This LEED certified building offers a place to go to experience an integrative medicine approach to medical care. This state-of-the-art healing facility is a place where technology and nature coexist.

The facility approaches healthcare with a holistic endeavour that focuses attention on the mind, body, and spirit. Visitors can spend anywhere from an hour to four days depending on the treatment they are seeking.

The balance between man-made features and nature is a reoccurring theme throughout the project that connects physical and mental well-being. The center is a place where the line is blurred between nature and the built environment.



DIM, 2010

DUDA/PAINE ARCHITECTS

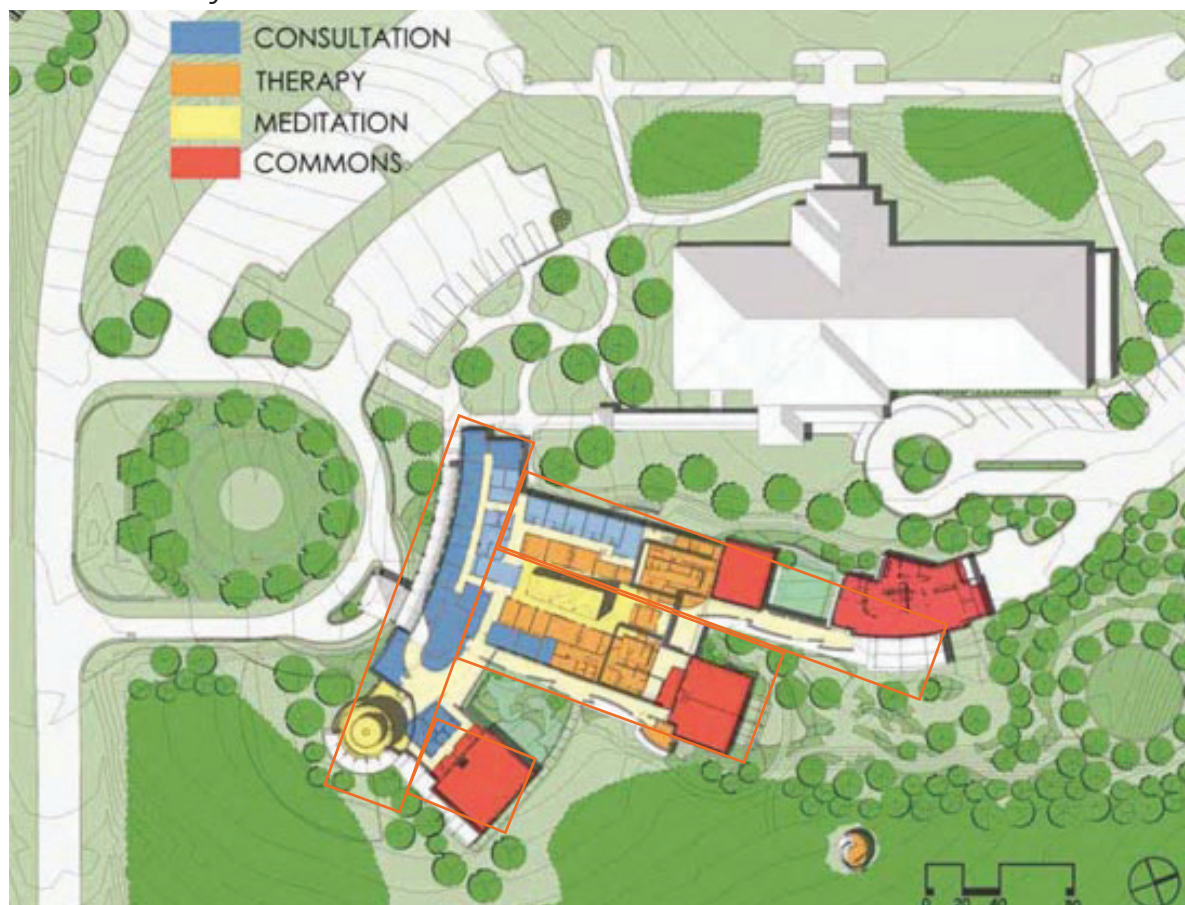
Duke Integrative Medicine (DIM),
Duke University
Durham, NC

27,000 sq/ft
\$25million
Year: 2010

STUDY TWO.

The layout of the facility is considered to be a metaphor to reflect the experience possible throughout the different layers of therapeutic programs. The facility is laid out to reveal different views and spaces as a visitor progresses through their own self-discovery journey. The main entrance gently curves which from this point the design radiates outward into different branches. The spaces reach out and blur the line between indoor and outdoor with glass walls.

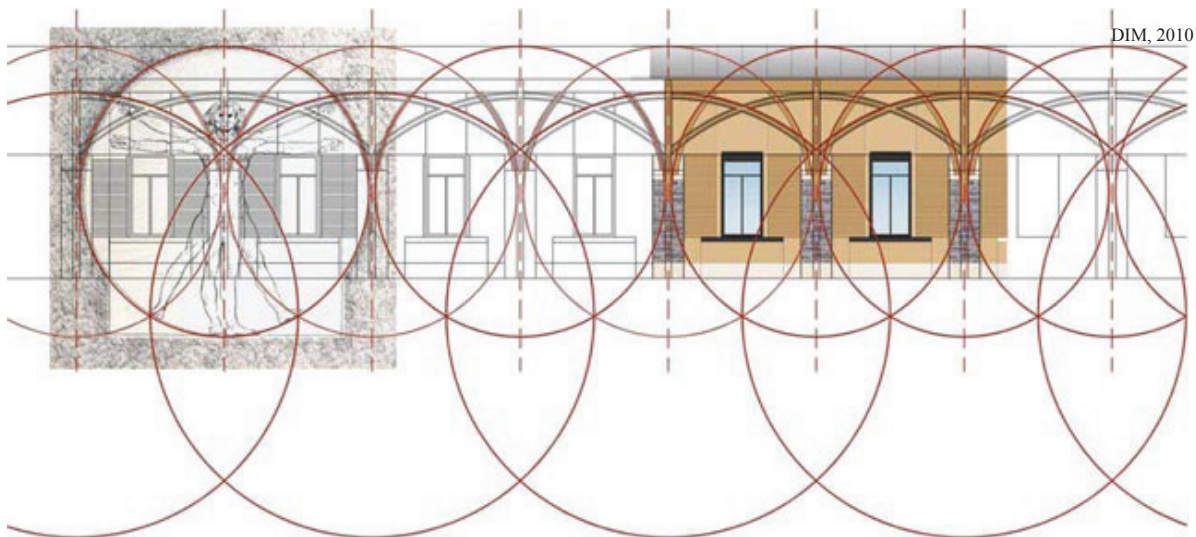
The most private and grandest space in the facility is known as the “anteroom” which is a covered garden courtyard. It is in this space that patients emerge, transformed, as all the treatment rooms are placed around this centrally located space. Here along with the entrance and sitting room is where the wooden arched truss system is encountered.



- The facility contains many unique spaces all of which were carefully and thoughtfully placed. Beginning with the main entrance’s wooden arched system which came from the human form and strikes relation to the golden ratio by overlapping circles that formed the segmented arcs. These arcs are again seen in the “anteroom” and sitting room.

Upon entry, visitors are greeted by the main waiting spaces which include a water wall that sitting benches directly face. Throughout the facility there are sitting and contemplation spaces both indoors and outside. A main focal point is the building's rounded library where relaxation, reflection, and reading occur. The library is full of resources to offer help and support to visitors.

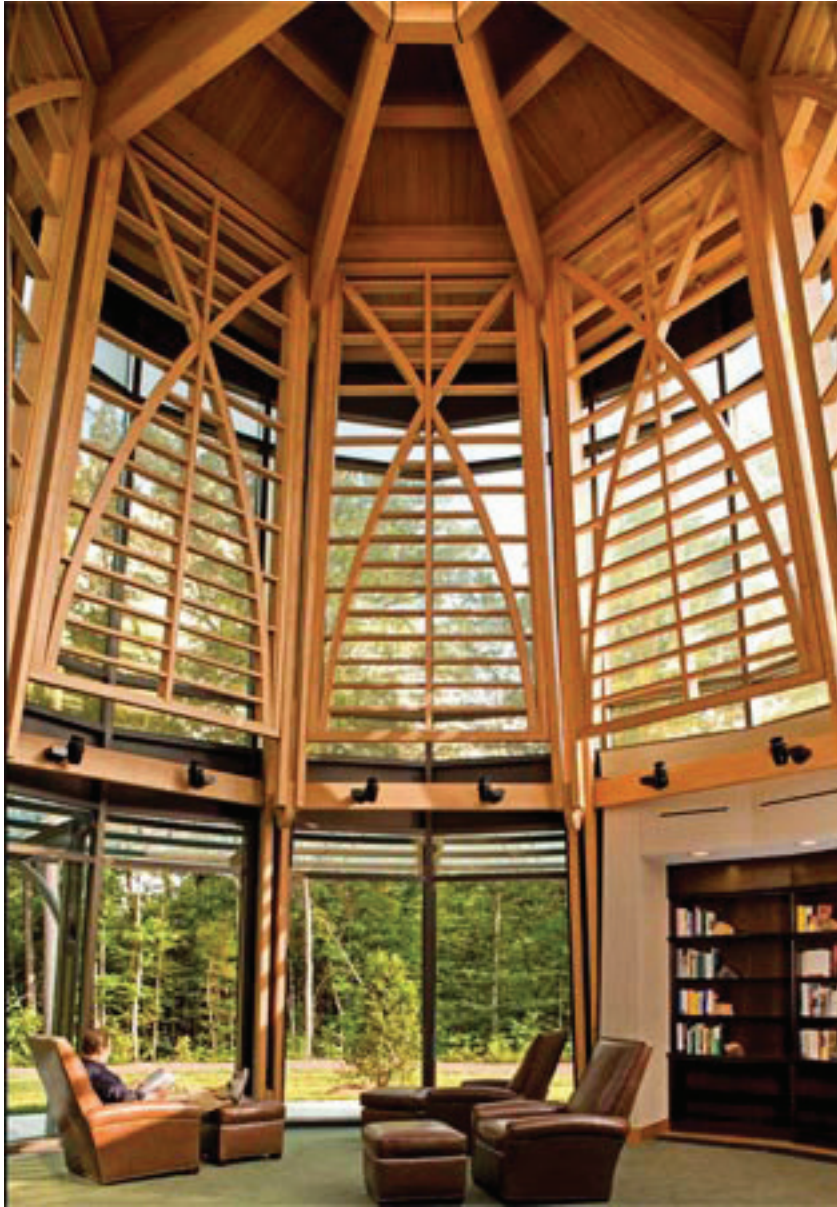
The facility is also equipped with consultation and treatment rooms that are designed to be a calming space by utilizing diffused lighting and Asian-style screening for privacy. There are three inviting and inspiring workshop rooms where a wide variety of presentations are given.



Other unique features to the facility are its full kitchen, dining area, and nutrition center where meal demonstrations are preformed and visitors can learn how to use nutritious ingredients to cook healthy meals.

The building is also equipped with a fitness center plus shower and changing rooms. Throughout the facility there are ornamental and functional herb gardens and interior and exterior gardens. There is also an outdoor labyrinth that is used for contemplation.

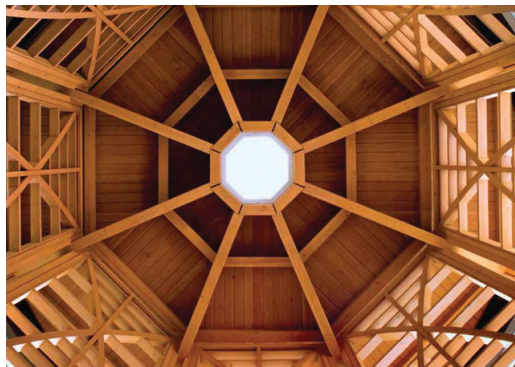
STUDY TWO.



DIM, 2010



DIM, 2010



DIM, 2010

ANALYSIS:

Tranquility is the reoccurring theme throughout this entire center. From the procession of the entrance to the sequenced path throughout the facility a visitor will travel, everything relates back to rejuvenation through calming and relaxing spaces.

The connection to nature is an important aspect in the design as well. The views created through an abundant use of glass allows nature to be brought indoors.

There are a number of sitting areas both inside and outside that allow for quiet meditation. The facility also incorporated a labyrinth as did the previous case study. Along with the labyrinth, the cylindrical tower was reoccurring in this facility as the first. Again the space was utilized for a library sitting space.

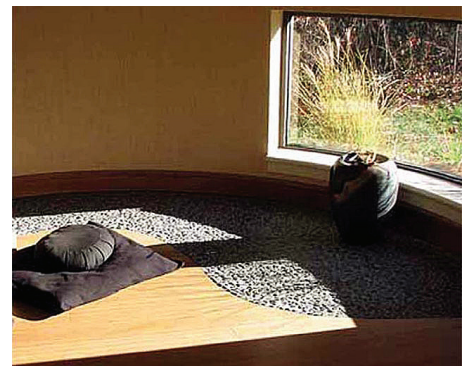
The form of the facility started at the entrance and radiated out from that point. Every space in the facility related to one another. This design also used a form of the golden ratio as means to create the wooden arched system found throughout the facility.



DIM, 2010



DIM, 2010



DIM, 2010

REHAB IS LOCATED ON
A 6-ACRE SITE WHICH IS
SURROUNDED BY LANDSCAPED
INTERIOR AND EXTERIOR
GARDENS AND COURTYARDS.



Architectural Record, 2005



Architectural Record, 2005



Architectural Record, 2005

STUDY THREE

REHAB CLINIC

The clinic for spinal cord and brain injuries appears more residential and natural-looking than a typical clinic. The facility provides 92 beds, where patients can stay up to 18 months, along with numerous other amenities. The goal was to connect patients both physically and visually to nature.

A main focal point when approaching the facility is its wood screens that wrap the exterior of the building. This screening not only provides shade but a degree of privacy as well. Upon entry through an open courtyard next to the facility's cafe, the identity of the structure is revealed when seeing the reception desk.

There are a variety of spaces on the two levels of the building with the more public spaces being located on the first floor and the patient rooms on the second floor. The main level includes the day hospital, intensive care, cafeteria, administrative offices, outpatient rooms, and a pool.

Outside the facility there is a 262-foot-long wheel-chair training course amongst the landscaped gardens surrounding the perimeter.



Architectural Record, 2005

HERZOG & DE MEURON

REHAB,
Center for Spinal Cord
and Brain Injuries
Basel, Switzerland

246,386sq/ft
\$110million
Year: 2002

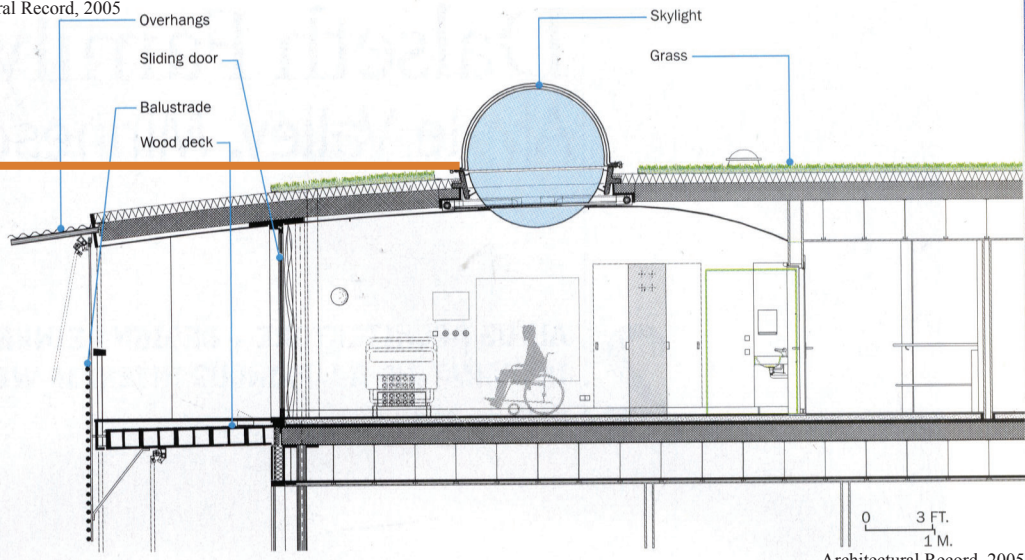


Architectural Record, 2005

STUDY THREE.



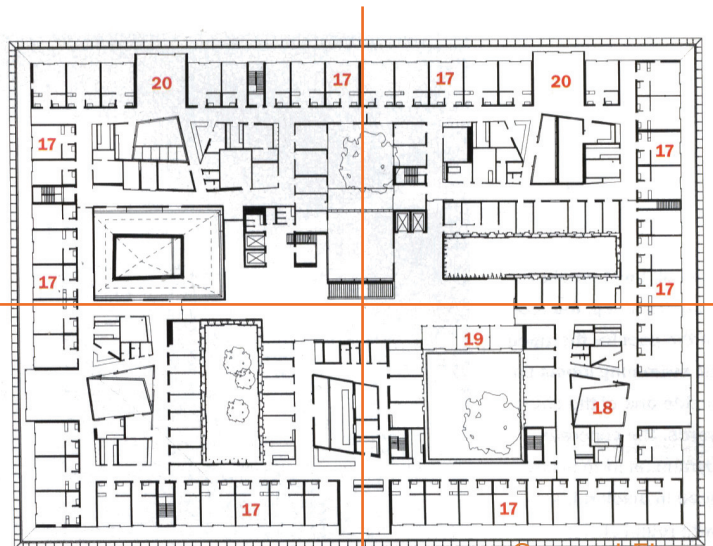
Architectural Record, 2005



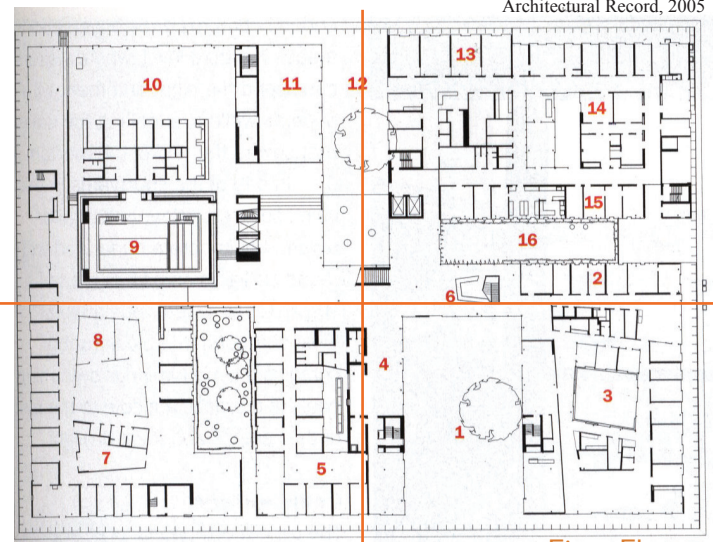
Architectural Record, 2005

The facility's layout was given a lot of thought as five courtyards were strategically placed throughout the design. These five courtyards each focus on different therapeutic activities and incorporate various planting or water features. Meditation is one use of the courtyards, but they also serve as a visual guide in orientating patients and visitors around the facility.

1. Entrance court
2. Outpatient rooms
3. Day hospital
4. Cafeteria
5. Administrative offices
6. Reception
7. Neuropsychology
8. Occupational and speech therapy
9. Therapy pool
10. Physiotherapy
11. Multipurpose space
12. French garden
13. Intensive care
14. Medical services
15. Diagnostics
16. Courtyard with pool
17. Patients' bedrooms
18. Services
19. Offices
20. Lounge/dining



Second Floor
Architectural Record, 2005



First Floor
Architectural Record, 2005

The second floor is filled with patients' bedrooms lining the perimeter. Lining the interior courtyards are office spaces and dining/lounge areas. Patient rooms not only look out toward the landscape but also include a walkout balcony that extends the whole second floor perimeter. Natural light was a focal point in this project as patient rooms were given floor to ceiling windows along with a skylight measuring 7 feet in diameter. The transparent plastic sphere along with the windows bring in enough natural light so artificial light is unnecessary during the day.

STUDY THREE.



Architectural Record, 2005



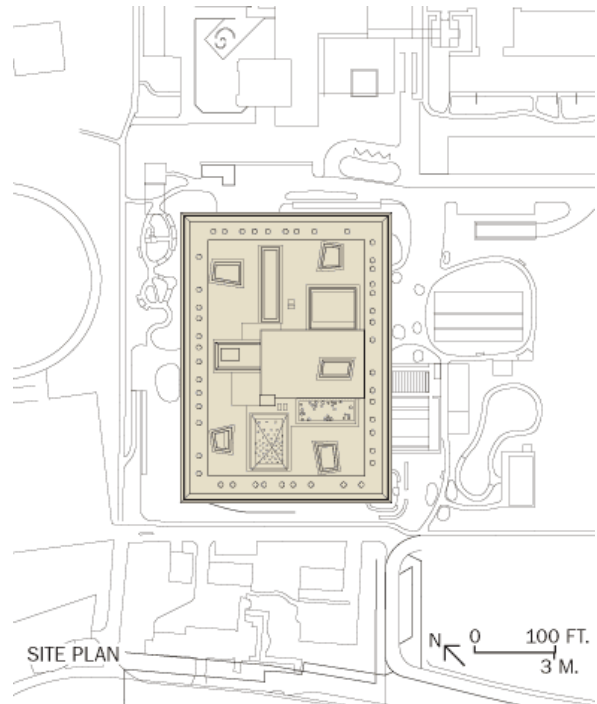
Architectural Record, 2005

ANALYSIS:

This facility focused its attention more on patient privacy but yet still allowing them adequate amounts of natural light and views. This facility also focused on creating a place that was not like a stereotypical clinic. The design was an attempt to deinstitutionalize a clinic setting. This was accomplished by nature and allowing it to come indoors and bring patients outdoors.

This facility compared to the other case studies was the most rectilinear in its form. With the addition of the wooden screens and addition of interior courtyards the rigid feel of the building disappears and is softened by the natural surrounding beauty.

Although this is a larger-scale facility, an intimate setting is still provided throughout the design. Outside there are landscaped gardens that provide space for meditation and paths that wind along the perimeter and are accessible for wheelchair users.



(Architectural Record Online, 2010)



Architectural Record, 2005



(Phaidon Press Limited, 2004)



Architectural Record, 2005

SUMMARY

CASE STUDY

There were four major elements gathered from the case studies investigated. The first notable feature in all the case studies was the great connection to nature by means of site selection, orientation on the site, and by the use of gardens and courtyards. The ability for people to embrace the view outside and be able to interact with nature is something that has been used by healthcare facilities in the past but then got lost in more recent times. These case studies show there is a need for people to connect with nature in order for health and well being to come full circle. The use of interior courtyards on the two larger case studies is a means to break up the large square footage and create places of meditation and retreat.

The case studies also gave insight as to form and circulation that healthcare facilities should focus on. Although the case studies covered a broad spectrum in terms of form, the pathway or circulation of the buildings related back to the movements of a patient and how they would proceed throughout the facility. The forms related to what was needed on the interior spaces as well as what was surrounding the site. This could be seen as to why Maggie's Centre is the most free-form shape as it has almost nothing but nature surrounding it. Duke's Integrative Medicine facility is still located in Duke Forest but is closer to the built environment. This could be why the overall design stems from a more open layout but is structured in a more rigid form than Maggie's Centre.



DIM, 2010

SUMMARY.

The center for cord and brain injuries is located on a site that is the closest to a built environment setting. Although the landscaping gives a feeling of seclusion this could be why the form is the most rigid. The designers opted to wrap the entire exterior facade with a wooden screen. The form was important but focus was kept on how to set up the spaces in a way that was functional yet gave patients places to sit and meditate.

Another feature that was seen throughout the case studies was the incorporation of different sized spaces throughout the facility where people could gather and mediate alone or in a group. The various size of the spaces differed depending on what type of meditation or contemplation would be taking place. Both in the Maggie's Centre study and the Duke study there was hierarchy given to this grand space where patients could go to relax, contemplate, and enjoy the views outside. Throughout the three different case studies there were smaller and more private spaces place inside and outside of the facility. The integration of both grand and private spaces is an important aspect in healthcare.



(Phaidon Press Limited, 2004)



Architectural Record, 2005

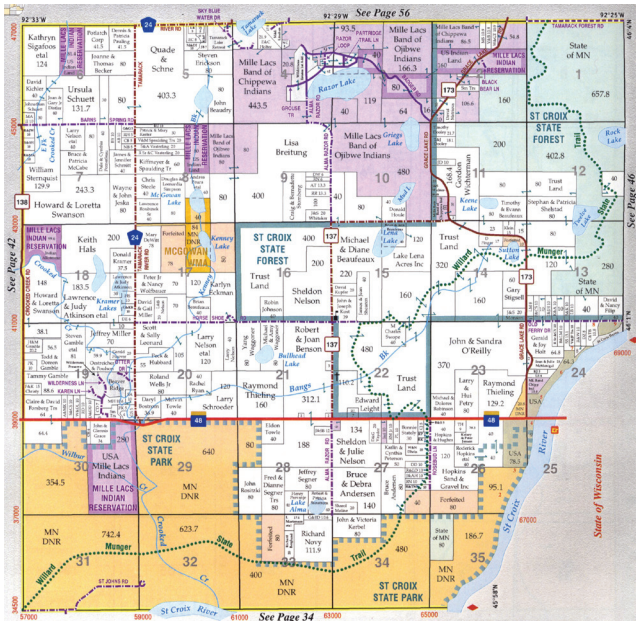
Finally, the incorporation of different forms of therapy and treatment are important. Two of the three studies included a labyrinth for patients to utilize by walking the circular path as a meditation and contemplation technique. This along with other innovative techniques will be looked into for this thesis project.

This thesis project will not be categorized under a typical typology rather a hybrid typology that stems from a form of clinic but will not be fully recognized as such. The other part of the hybrid typology would include a research facility portion that would be utilized by doctors and researchers while also educating the public of their findings. This fusion of clinic and research facility would focus its efforts around biophilia and the connection people have to nature and how it affects their mind, body, and overall well-being.

This facility would be around 25,000sq/ft to 35,000sq/ft in size. Attention would remain on exterior views and letting nature filter in. The layout and main circulation paths will be a focal point as it will have an important impact as to how patients will inhabit the space.

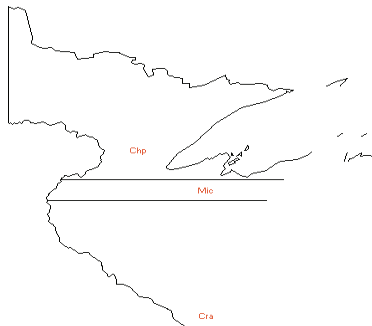


DIM, 2010

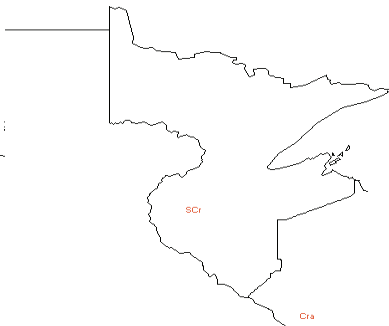


Pine County Plat Book, 2007

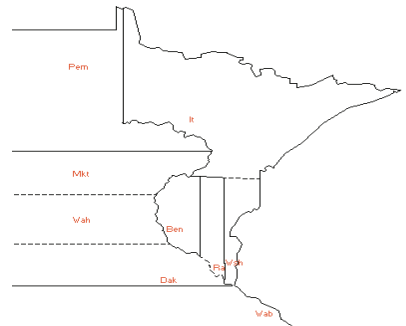
68



1820



1830



1840

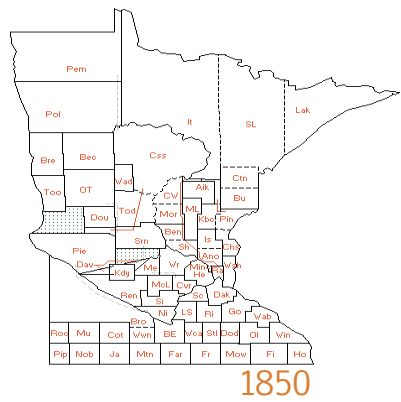
CONTEXT

HISTORICAL CONTEXT

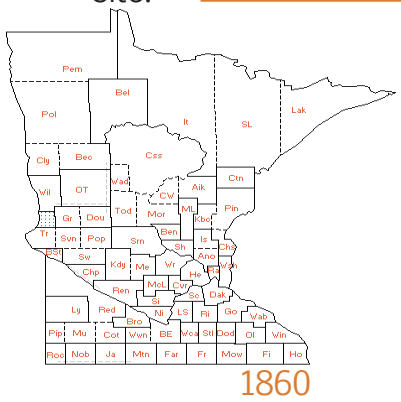
The context of this project relates itself to the surrounding communities including: Danbury, WI, Cloverdale, MN, and Hinckley, MN. The project resides in Minnesota but overlooks out into the Wisconsin countryside. The Minnesota/Wisconsin border is a natural boundary marked by the St. Croix River.

Minnesota was the 32nd state to enter the union on May 11, 1858. Pine County was formally organized in 1871 after breaking away from Chisago and Ramsey counties. The county received its name from the large amounts of White and Norway Pines. Logging became a way of life starting in the middle of the 1800's with access to the St. Croix River for shipping the logs down stream. With the amount of logging there were large amounts of debris left throughout the forest and with the unusually dry summer the chance of a fire was high. The Great Hinckley Fire captured the nation's attention on September 1, 1894. Hinckley along with the surrounding area was burnt to the ground and over 400 lives were lost. Many thought the area would never recover from the fire, but this was at the time when the railroad business was at its peak and aided in the revival of the area.

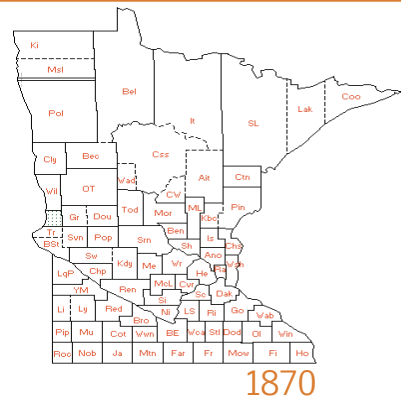
Pine County is home to two state parks and five state forests. The St. Croix State Forest and the St. Croix State Park are the closest to the project site. The St. Croix State Forest is directly north of the project site and the St. Croix State Park closely borders the west and south sides of the site.



1850



1860

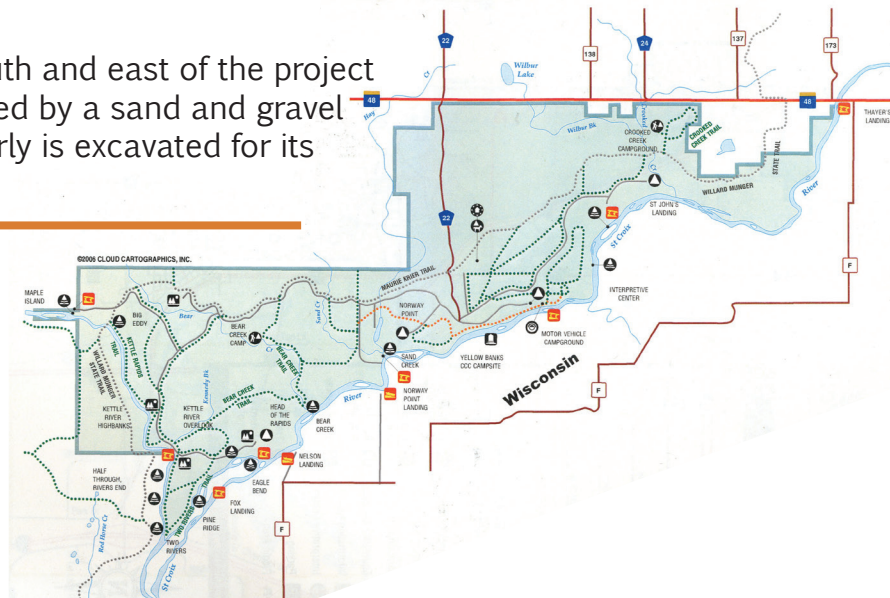


1870

The St. Croix State Park is host to two beautiful rivers, the St. Croix and the Kettle River. The State Park is over 34,000 acres and is filled with miles of trails for numerous activities including: hiking, horseback riding, bicycling, snowmobiling, and cross-country skiing. The park is equipped with lodging facilities and places to set up your own camp. The park has programs throughout the year at the visitor center to educate the community on wildlife and plant life. The St. Croix State Park is also listed as a National Historic Landmark.

- Pine County is filled with numerous Indian Reservations. The closest reservations to the project site are three miles north where the Mille Lacs Band of Chippewa Indians and Mille Lacs Band of Ojibwe Indians reside. The other closest reservation is the Mille Lacs Indian Reservation to the west four miles of the project site. The Mille Lacs Band of Ojibwe also owns The Grand Casino of Hinckley which is twenty-three miles west of the project site.

- The land directly south and east of the project site is presently owned by a sand and gravel company and regularly is excavated for its resources.



Pine County Plat Book

BIOPHILIA:

The term “biophilia” was coined by Edward O. Wilson in his book from 1984 entitled *Biophilia*. Wilson, a Harvard biologist, argued that human beings have an innate connection with nature. Stephen R. Kellert along with Wilson would later co-edit *The Biophilia Hypothesis* but Kellert also wrote *Building for Life* where he defines biophilia as “a complex of weak genetic tendencies to value nature that are instrumental in human physical, material, emotional, intellectual, and moral well-being. Because biophilia is rooted in human biology and evolution, it represents an argument for conserving nature based on long-term self-interest” (Island Press, 2005).

Attention and knowledge of biophilia has always been around but not so well-defined. Most demonstrated benefits of biophilia are based around human health and healing. Ancient Greeks would care for their sick in areas away from everything else and where beauty of the landscape would surround the sick. Chinese Taoists knew gardens provided benefits to health and healing. More recent research into the effects of biophilia came from Roger Ulrich, a professor of architecture and landscape architecture at Texas A&M University, who in 1984 showed evidence that patients recovering from gallbladder surgery had a quicker recovery period and required less medication if they were given a room with a view of trees and not a brick wall. Ulrich explained how nature appears to reduce pain through various mechanisms such as distraction and stress reduction.

Despite such evidence of these perceived benefits offered by biophilia, extensive research has not been conducted to conclude these findings along with possible other benefits.

CONTEXT.

PROSPECT:

(ABILITY TO SEE INTO THE DISTANCE)

Brightness in the field of view (windows, bright walls)
Ability to get to a distant point for a better view
Horizon/sky imager (sun, mountains, clouds)
Strategic viewing conditions
View corridors

REFUGE:

(SENSE OF ENCLOSURE)

Canopy effect (lowered ceilings, screening, branch like forms overhead)

WATER:

(INDOORS OR INSIDE VIEWS)

Glimmer or reflective surface (suggests clean water)
Moving water (also suggests clean, aerated water)
Symbolic forms of water

BIODIVERSITY:

-Varied vegetation indoors and out (large trees, plants, flowers)
Windows designed and placed to incorporate nature views
Outdoor natural areas with rich vegetation and animals

SENSORY VARIABILITY:

Changes and variability in environmental color, temperature, air movement, textures, and light over time and spaces
Natural rhythms and processes (natural ventilation and lighting)

BIOMIMICRY:

Designs derived from nature
Use of natural patterns, forms, and textures
Fractal characteristics (self-similarity at different levels of scale with random variation in key features rather than exact repetition)

SENSE OF PLAYFULNESS:

Incorporation of decor, natural materials, artifacts, objects, and spaces whose primary purpose is to delight, surprise, and amuse

ENTICEMENT:

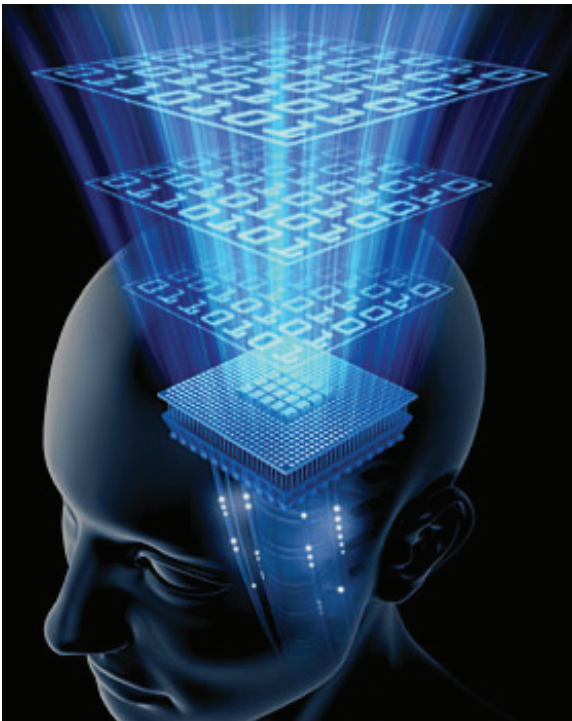
Discovered complexity
Information richness that encourages exploration
Curvilinear surfaces that gradually open information to view

NEUROSCIENCE:

Neuroscience is a branch of the life sciences that deals with the anatomy, physiology, biochemistry, or molecular biology of nerves and nervous tissue and especially with their relation and behavior and learning (Merriam-Webster, 2010).

Neuroscience research has many milestones throughout the years. Research of the brain dates well back to 4000B.C. From the days when Hippocrates and Plato first believed the brain was the seat of intelligence and mental process, to the middle of the 1500's when Giulio Cesare Aranzi coined the term hippocampus, to more recent times with Roger Ulrich's connection of nature to a faster healing time, there has been and will continue to be interest in research of the brain.

Although there have been studies into nature's affect on the human brain and body, more research is still needed to fully understand the magnitude of the numerous perceived benefits. In fact, according to Ulrich there have only been around thirty studies into this relationship (Environmental Building News, 2006). This number is nowhere near high enough to fully understand all the potential that may be.



Courtesy of adweek.com

The research into neuroscience will play an important role into this thesis project and will need to be looked into further to comprehend the capabilities through design.

As of 2003, an innovative organization formed combining the professions of architecture and neuroscience researchers and scientists. The Academy of Neuroscience for Architecture (ANFA) was formed in San Diego by the San Diego Chapter of the AIA. This coalition hopes to use their knowledge to help further both professions and understand more about the human response to the built environment.

Since the start of the academy there has been numerous meetings, lectures, workshops, and articles advancing the depth of insight into how the brain responds to architecture. Recently, former board member and respected colleague in the science field Esther M. Sternberg, M.D., hosted a series on PBS, “The Science of Healing.” This series stems from her book titled, *Healing Spaces*, where she reveals her research into the effects nature can have on the healing process. She gives insight on how scientific research can be translated and utilized in design. She also discusses the important role evidence-based design plays in medical facilities.

74

Evidence-based design and Esther M. Sternberg’s research will be an integral part of this thesis project.



LABYRINTHS:

Labyrinths are an ancient symbols that portray wholeness. The combination of a circle and spiral together create a meandering but meaningful path. The labyrinth is a metaphor of one's own journey in life traveling to the center and back out into the world with a greater understanding of one's self. The time spent walking the path is used as a meditation and sometimes as a prayer tool.

Mazes and labyrinths have been confused by some people. Sometimes when people hear the word labyrinth they think of a maze but this is not the case. A maze is more like a puzzle or something that is to be completed and figured out. A maze requires thought to figure a way out as many paths could lead you astray. A labyrinth on the other hand is a one-way path that leads one to the center of the path and back out again. A labyrinth involves a different type of thinking than a maze. It requires intuition and imagery.

There is not a right or wrong way to walk a labyrinth but there are some general guidelines one can follow. As one approaches the entrance of a labyrinth they should pause and reflect on the journey ahead. Focus should be placed on the task at hand and all other thoughts put to the side. Throughout the journey, walk purposefully and take in the process. Upon reaching the center one should stop and take several moments to reflect on the journey thus far. The journey is at one's own pace and should not be rushed. When the journey is complete take a moment to acknowledge the ending and embrace one's experience.



whit-lenge.co.uk



whit-lenge.co.uk

T HESIS PROJECT GOALS

FIVE.

To make this thesis the pinnacle in my architectural student career. Use all my current knowledge and skills to create a project that is a catalyst into my professional career.

SIX.

To research the connection of biophilia and optimal healing environments in depth through more case studies, readings, and interviews.

SEVEN.

To utilize the site in the least invasive way yet give users the most valuable experience from visiting the facility. This will be accomplished by paying close attention to details and incorporating only characteristics viable to the success of the project.



STARTING AT THE TOP PHOTO
AND GOING DOWN IS A TOUR
FROM THE MAIN STATE HIGHWAY
THROUGH THE SITE TO THE
CLEARING

QUALITATIVE

SITE ANALYSIS

As one approaches the site, caution must be taken to slow down since the entry approach is nestled in the surroundings. After opening the secured gate, one is able to take a vehicle on a class 5 gravel path up to a clearing in the woods. As of present day the entry is a shared entrance. I, along with another man who owns the final few acres of the full 40 acres, utilize this entrance. In the near future I hope to acquire the small southwest corner acres to once again unite the full 40 acres. The gravel path forks after the gate and travels south to the neighbor's "hunting shack" and east to an opening cleared by my father. The site has topography that undulates creating a ridge line near the east portion of the site. From the entrance, the site, with its natural grasses, dips down and back up to reach the clearing that is mostly flat.

There are nine different deciduous tree species on the site including: Green Ash, Northern Popple, Bass Wood, White Birch, White Oak, Red Oak, Box Elder, Hard Maple, and Sugar Maple. There are also three species of conifer trees including Black Hill Spruces, Norway Pine, and Balsam Fern.

As the site is situated on a hill top it receives various amounts of wind throughout the year. As I have visited the site on numerous occasions I have taken note that unless it is an unusually windy day the trees and foliage absorb a large amount of the wind, especially when the deciduous trees still hold their leaves.

BOTTOM PHOTOS:
VARIOUS TYPES OF
PLANT LIFE FOUND
ON THE SITE



SITE ANALYSIS.

The site is in a natural setting with minimal impact created. Distress is not present on the site as natural growth and death takes place year round. Year after year natural vegetation and animal life return to grow and live in and amongst the site.

Throughout the day the site is provided ample amounts of natural daylight that penetrates through the tree's canopies and onto the grasses of the site. Even when the deciduous trees carry branches of leaves the early morning sunrise is able to cascade its rays through the wood and brighten the site up in the mornings. In the winter months the sun is also able to be seen through the trees as it falls into the horizon. The intensity of the sun's rays beam off the white snow in the winter and cuts the air as the surroundings seem to become crisp and clear.

The four seasons make the site a different setting throughout the year. Many colors are present, like summer's bright green hue to the fall's radiant autumn overtones and winter's blankets of white. The site is the recipient of all these natural colors. Along with the changing colors throughout the year the temperature rises and falls as well. Temperatures can range from above 100 degrees Fahrenheit in the summer to below zero during the winter months.

BOTTOM LEFT:
LOOKING WEST AT
THE MN WELCOME
SIGN, SITE IS AT THE
TOP OF THE HILL ON
THE LEFT
BOTTOM RIGHT:
VIEW FROM THE SITE
DURING AUTUMN



The only current buildings on the site are a converted fish house to a “hunting shack” and an outhouse. Both facilities are easily removable. The neighbor to the southwest with the last few acres of the 40 also has brought in a moveable “hunting shack”. He however in the last few year has brought in electricity from the grid source. The site is mainly used only during deer hunting season and on occasional weekends for recreational purposes.

There are an abundance of wildlife that pass through and live on the site. Animals spotted on the site include: white tailed deer, black bears, wild turkeys, squirrels, numerous species of birds, chipmunks, and other native wildlife. During the more summer months there are also wood ticks and mosquitoes.

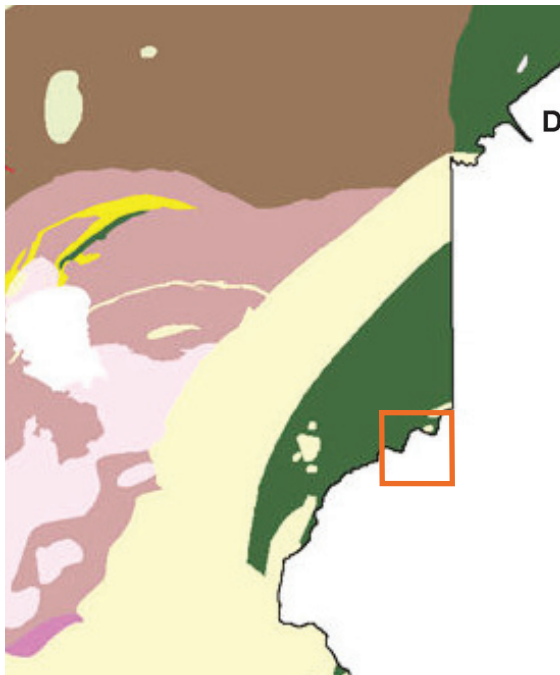
With there being a ridge present on the site, erosion of top soil may occur, but most recent years have shown this not to be of a concern. This ridge resides more on the neighbor’s property than mine as the site overlooks the ridge. During a hard downpour rain water will turn some of the ground into mud but nothing more than the usual for that type of situation

BOTTOM LEFT:
A BUCK RUB ON
A SMALL TREE
LOCATED ON THE
SITE
BOTTOM RIGHT:
VIEW OF THE
“HUNTING SHACK”





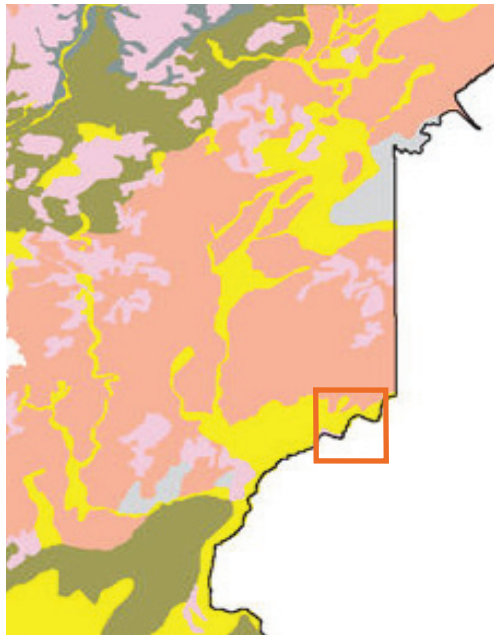




Dominant Rock Type

- Mudstone
- Limestone
- Sandstone
- Gabbro and basalt
- Quartzite
- Slate
- Iron formation
- Granite
- Schist
- Gneiss and schist

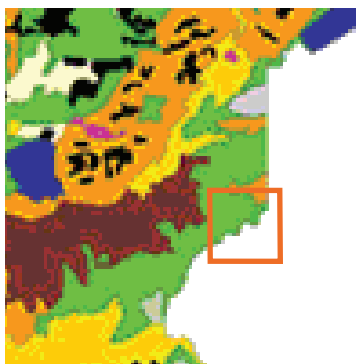
(Minnesota Geological Survey, 2006)



Dominant Soil Material

- Mine workings
- Peat
- Clay and silt
- Silt and sand
- Sand and gravel
- Silty glacial sediments
- Sandy glacial sediments
- Steep slope sediments

(Minnesota Geological Survey, 2006)



Soil Suborder Legend

- Aqualfs
- Udalfs
- Udolls
- Ustolls
- Aquolls
- Aquepts
- Udepts
- Aquents
- Orthents
- Psamment
- Orthods
- Hemists
- Aquerts
- Water

(Soils and Landscapes of Minnesota, 2001)

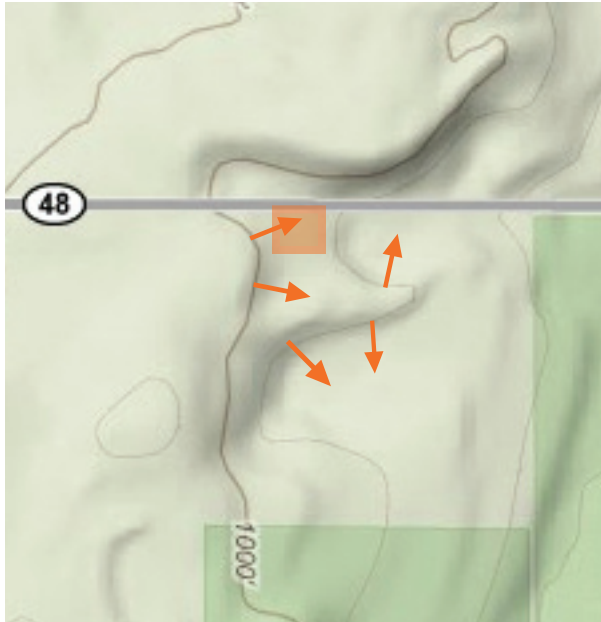
SOILS:

The dominant soil materials found on the site are sand and gravel. This composition is found all over the site and remains an ample combination for the plant life inhabiting the site. The parent material is known as the Superior Lobe Till (UMN Soil, 2010).

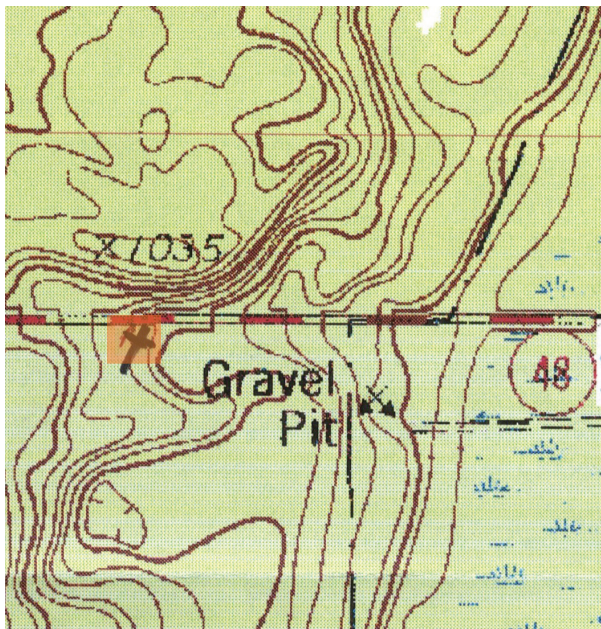
The land to the south of the site is owned by Hopkins Gravel Inc. They use their property to extract gravel from the land but are located far enough from the site where the company is undetectable.



SITE ANALYSIS.



Google Earth



Topo Depot Map

TOPOGRAPHY:

Where trees have already been cleared on the site would be part of the area used for the project design. Around 3/4 of an acre has been cleared. This area contains the most consistency in flat terrain which extends toward the south.

The east side of the site starts to dramatically slope toward the St. Croix River basin. On the actual site the greatest slope only reaches about 6% and the area cleared has at most a 3% slope in the southwest direction. It is from this east side, that at two spots on the site, one can look out toward Wisconsin and see the St. Croix River. The spot farthest north has the ability to view the St. Croix River all year long. The spot to the south can see the river only when the deciduous trees are leafless.

PLANT COVER:

Besides the deciduous and conifer trees there are also wild flowers growing such as Trilliums and also wild ferns.

- **AVERAGE SITE ELEVATION:** 1,000'
- **SITE AREA:** 34.9 Acres or 1,520,244 sq/ft
- **TOWNSHIP:** Ogema
- **LATITUDE:** N46°
- **LONGITUDE:** W92° 27'

UTILITIES:

On the site currently there are a limited amount of utilities. There is a source of electricity running underground back to the neighbors hunting shack. It would be simple to run the underground electricity up to the cleared site. Currently there is not a well dug for water or sewer on the site. Those two utilities would be a matter of digging a well that would need to go down 250 feet or more and implementing a gravity fed sewer system with a drain field.

PEDESTRIAN TRAFFIC:

As the site is not located near a city the pedestrian foot traffic is nonexistent. The most foot traffic the site sees is during deer hunting season, and even then traffic is minimal.

VEHICULAR TRAFFIC:

The site is situated off of State Highway 48. This is the main road that brings traffic off of Interstate 35 that comes from Duluth and the Twin Cities and travels over the Wisconsin border. State Highway 48 is a heavy traveled road that brings one to the entrance of the site. The site itself however, does not receive heavy amounts of vehicular traffic. Two vehicles mainly enter the site on occasional weekends and during deer season. The State Highway grants easy access to the site but the site itself remains secluded to outsiders. A large padlocked steel gate prevents trespassers from entering the site. There is only a small gravel road that travels through the site to a clearing. Along side of the State Highway the ditch is utilized as a ATV trail during summer and a snowmobile trail in the winter. This trail is not on the site as the state enforces a 200 foot setback off of the state highway.



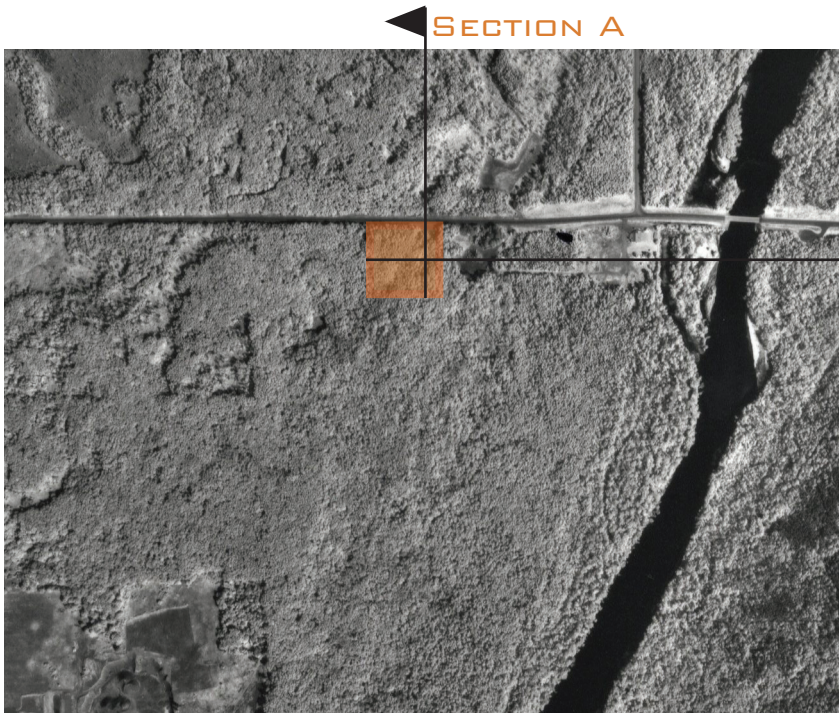
SITE ANALYSIS.



SECTION A



SECTION B



SECTION A

SECTION B

BOTTOM:
VIEW FROM
WISCONSIN
LOOKING WEST
BACK AT THE
RIDGELINE OF
THE SITE TO
THE LEFT OF
HWY 48



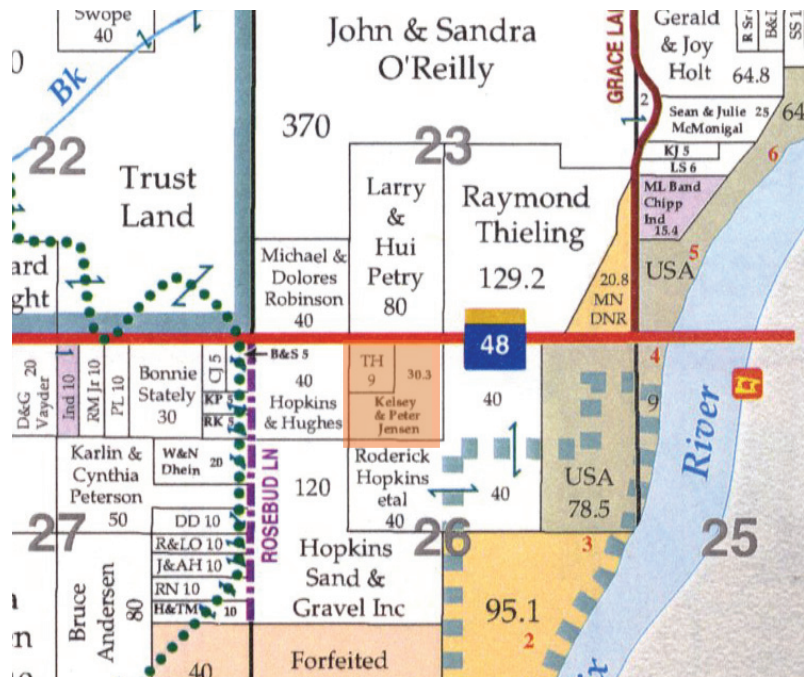
SITE CHARACTER: The site is used today for recreational purposes. The minimal impact the site has seen is in the placement of the gravel road and clearing of a number of trees on one portion of the site. Human impact has been limited because of the current use of the land for hunting. Not disturbing the area leaves the natural habitat for those plants and animals already there. Minimal impact on the site is crucial to the development of this thesis project as the basis around the facility feeds off the natural environment.

Although not accessible from the site, located just down the hillside flows the St. Croix River. About a half a mile away from the site there is public access onto the St. Croix River. The river flows gently under State Highway 48 bridge and continues on south. The St. Croix River is the natural boundary between Minnesota and Wisconsin.

BOTTOM LEFT:
VIEW EAST DOWN
TO THE ST. CROIX
RIVER FROM THE
ENTRANCE TO THE
SITE

BOTTOM MIDDLE:
VIEW ON STATE
HIGHWAY 48
BRIDGE LOOKING
NORTH

BOTTOM RIGHT:
VIEW FROM
THE PUBLIC
ACCESS LOOKING
NORTHWEST



Pine County Plat Book



SITE ANALYSIS.

JANUARY...FEBRUARY...MARCH

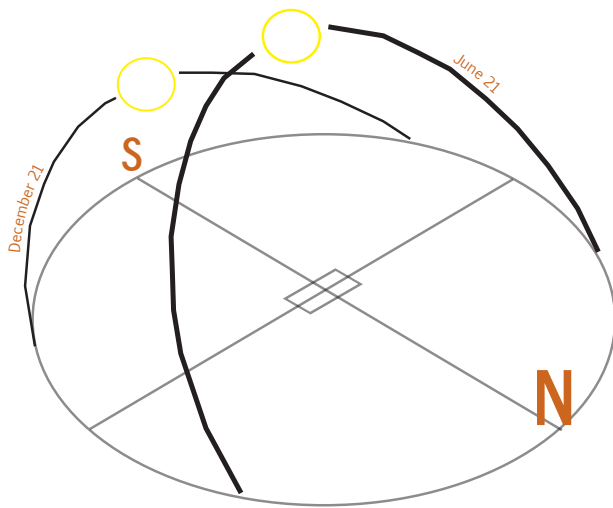


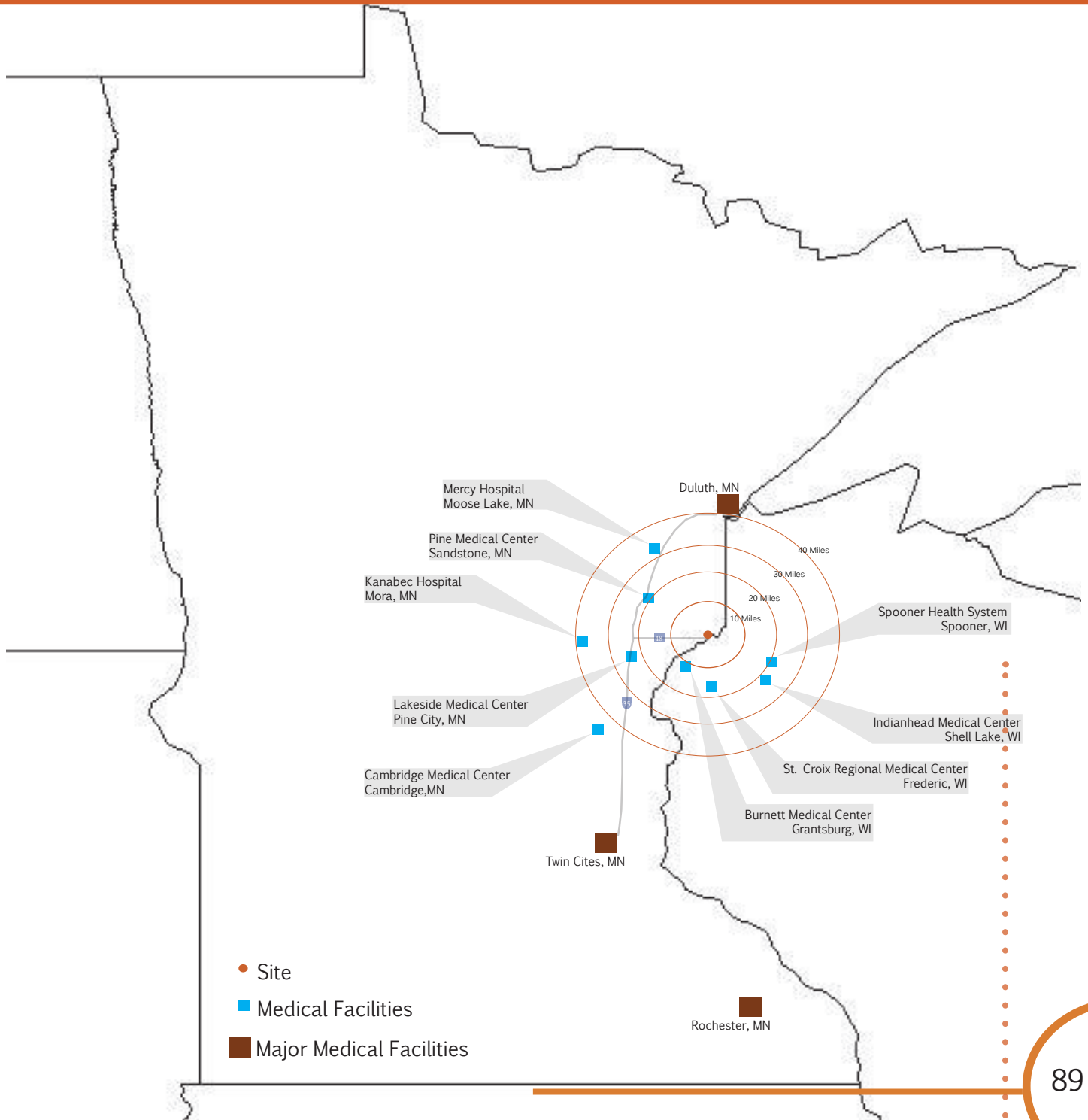
APRIL...MAY...JUNE



JULY...AUGUST...SEPTEMBER

OCTOBER...NOVEMBER...DECEMBER





MEDICAL FACILITIES NEAR THE SITE

SITE ANALYSIS.

SITE RECONNAISSANCES:

Views outward from the four property lines



Google Earth





SITE ANALYSIS.

Views outward from clearing on the site



Bing.com

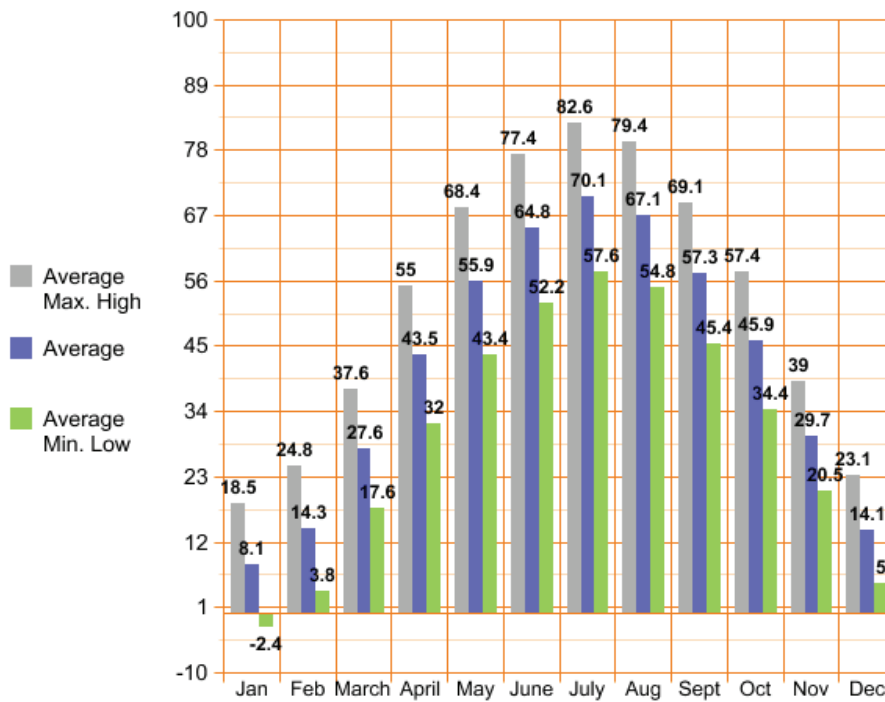




SITE ANALYSIS.

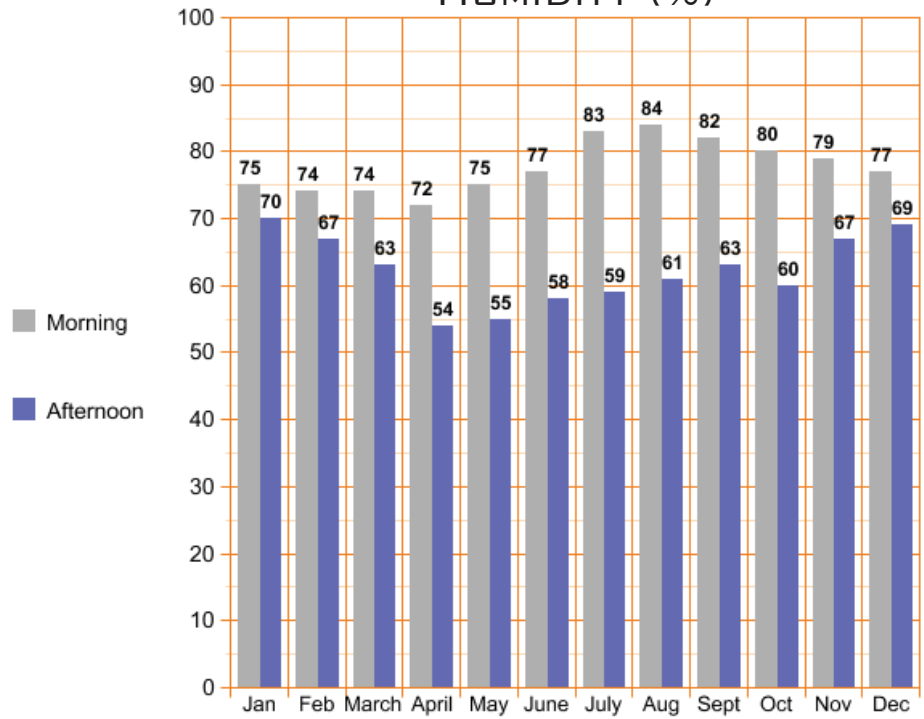
CLIMATE DATA:

AVERAGE TEMPERATURE (°F)



Data courtesy of Climate Data

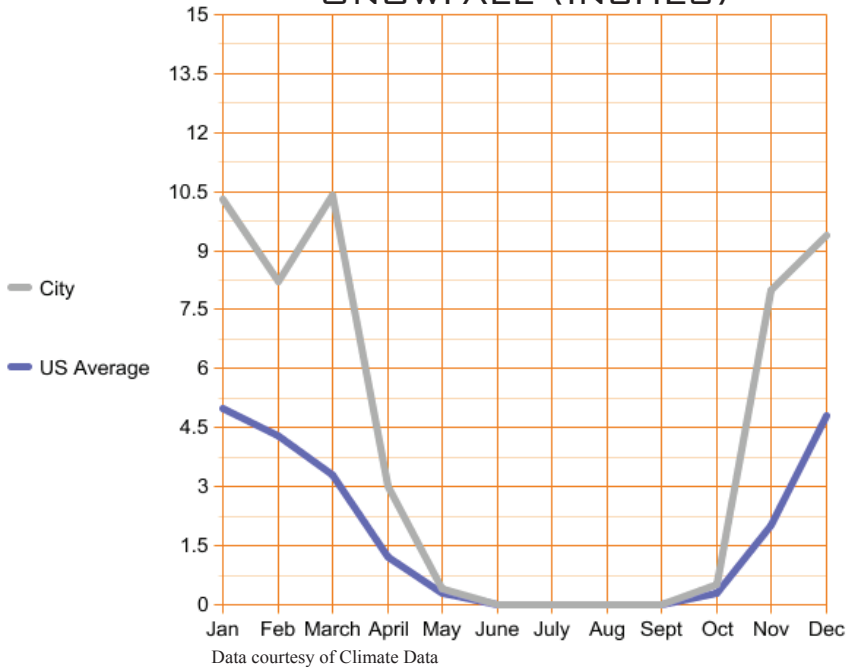
HUMIDITY (%)



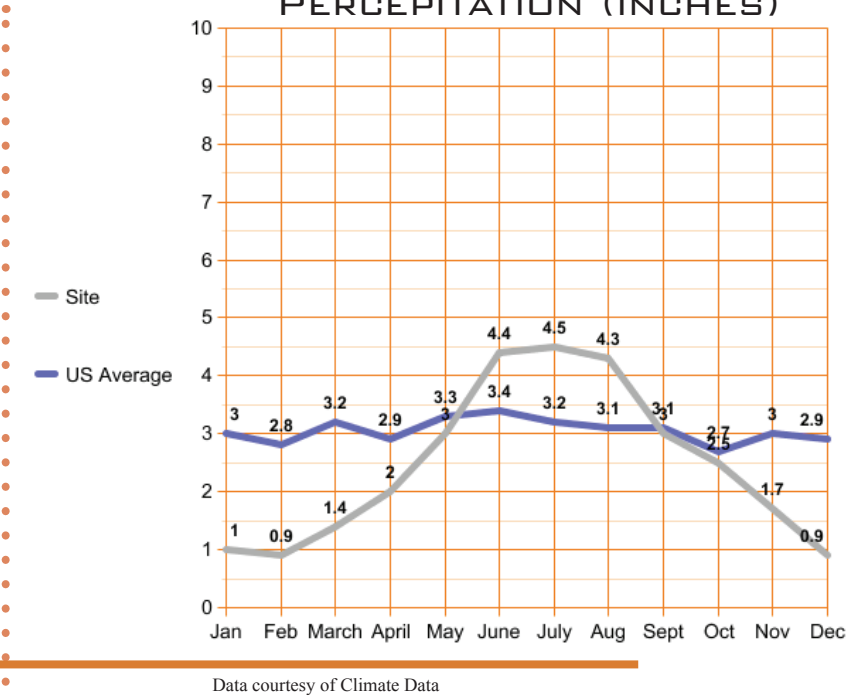
Data courtesy of Climate Data

SITE ANALYSIS.

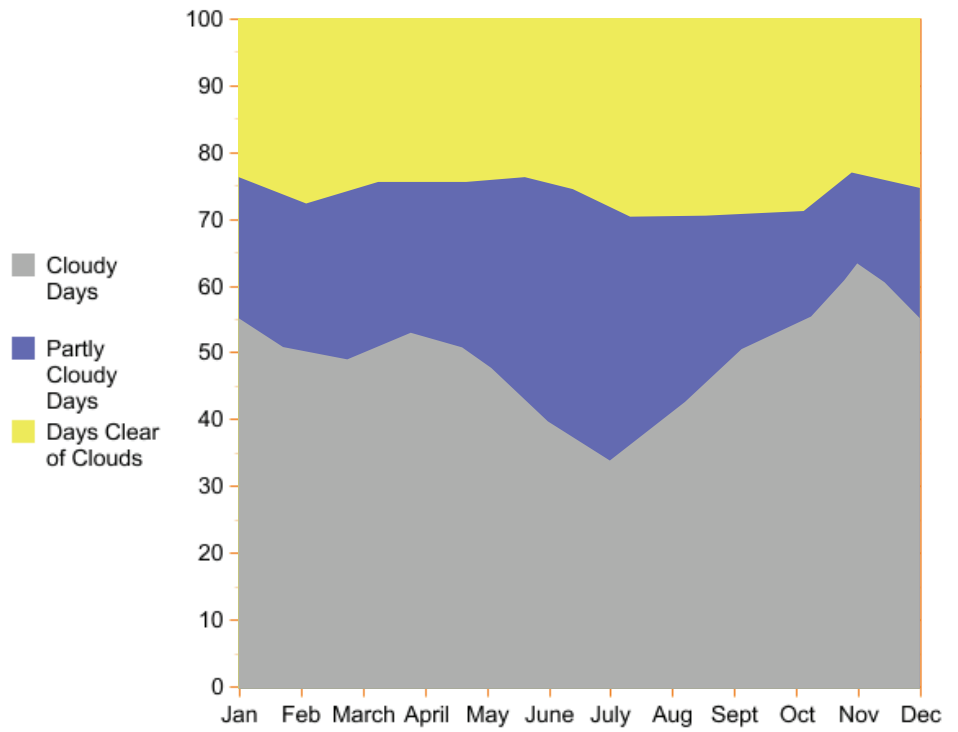
SNOWFALL (INCHES)



PERCEPITATION (INCHES)



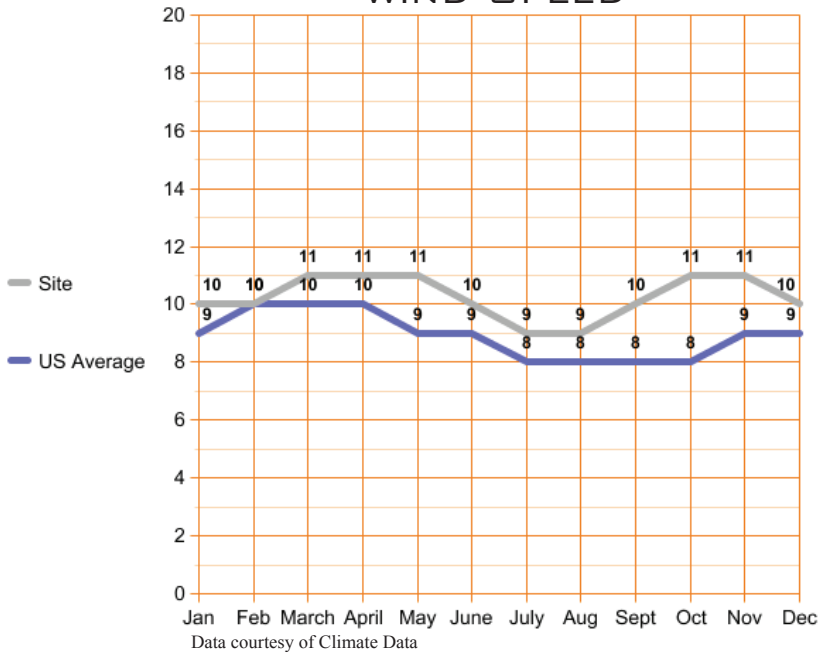
CLOUDY DAYS (%)



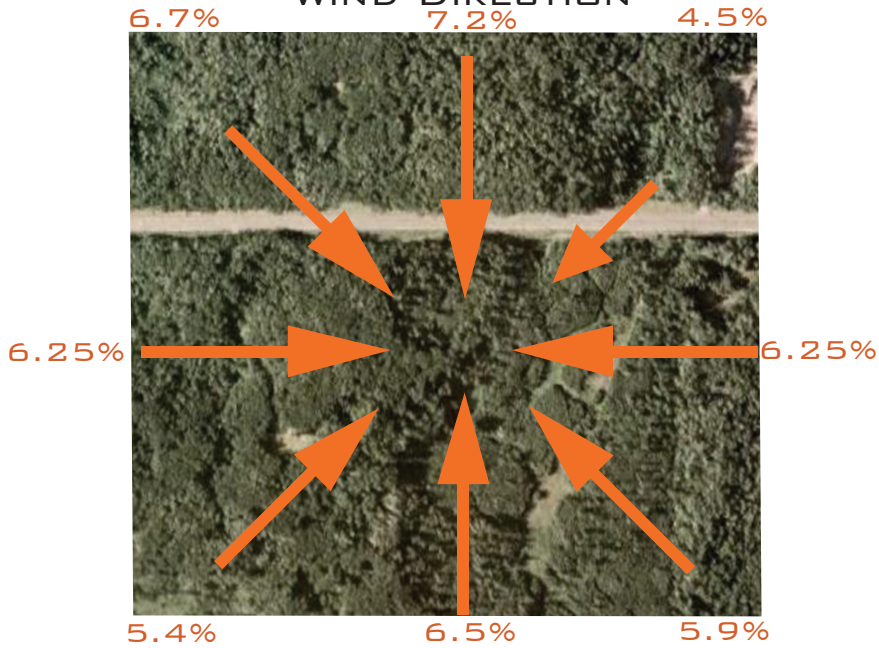
Data courtesy of Climate Data

SITE ANALYSIS.

WIND SPEED



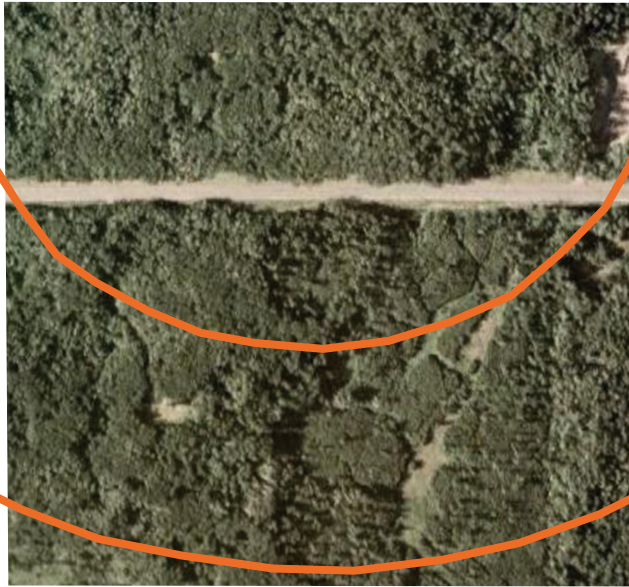
WIND DIRECTION



KJMR Wind Rose Data
Google Earth

SUN PATH

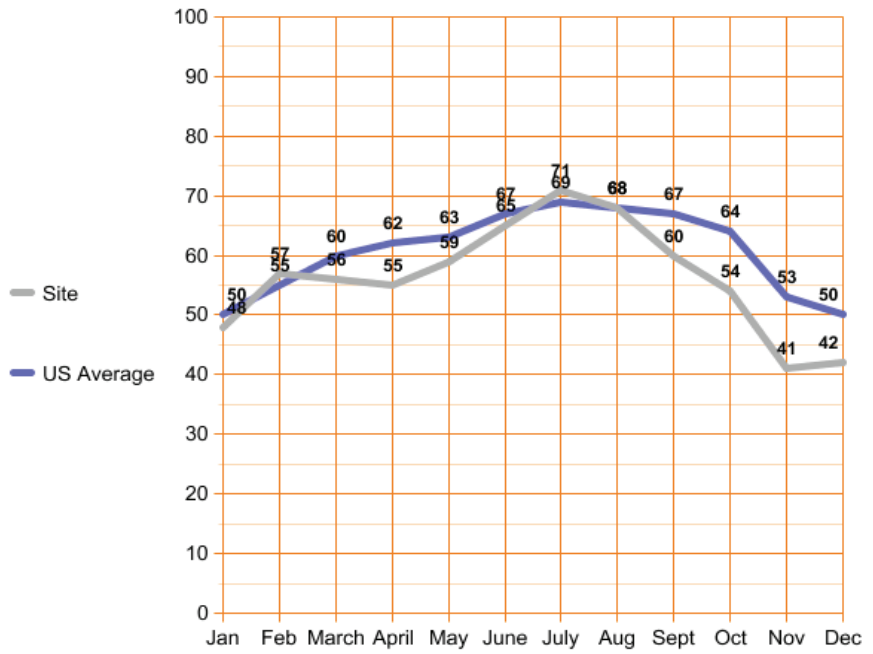
JUNE 21ST



DECEMBER 21ST

GAISMA Data
Google Earth

SUNSHINE



Data courtesy of Climate Data

The program will call for several designate spaces.
The requirements will result from six different
categories of spaces.

COMMONS MEDITATION
CONSULTATION SERVICE
LEARNING THERAPY

From these different categories numerous spaces
will be assigned.

REQUIREMENTS

PROGRAMMATIC REQUIREMENTS

Main Entrance/Lobby	400sq/FT
Reception	200sq.FT
Conference Room	700sq/FT
Cafe	300sq/FT
Restrooms	480sq/FT
Full Service Kitchen	1 000sq/FT
Dining Area	800sq/FT
Library	700sq/FT
Break out spaces	200sq/FT
Classroom/Workshop Space	600sq/FT
Computer Lab	300sq/FT
Offices	1,500sq/FT
Lab	400sq/FT
Gym/Basketball Court	6,000sq/FT
Workout Space	500sq/FT
Shower/Changing Room	200sq/FT
Courtyards	1,800sq/FT
Overhang Patio Seating	1,000sq/FT
Patient Living/Rooms	4,500sq/FT
Researcher & Doctor Living/Rooms	3,000sq/FT
Small Meditation Spaces	250sq/FT
Therapeutic Spaces	400sq/FT
Maintenance Room	200sq/FT
Mechanical	400sq/FT
Storage	600sq/FT

TOTAL BUILDING SQUARE FOOTAGE = 26,430sq/ft

Labyrinth	625sq/FT
Outdoor gardens	2,000sq/FT
Gazebo	700sq/FT
Minimal Parking	5,000sq/FT

TOTAL OUTDOOR SPACE = 8,325sq/ft



DESIGN:

Process

Final Program

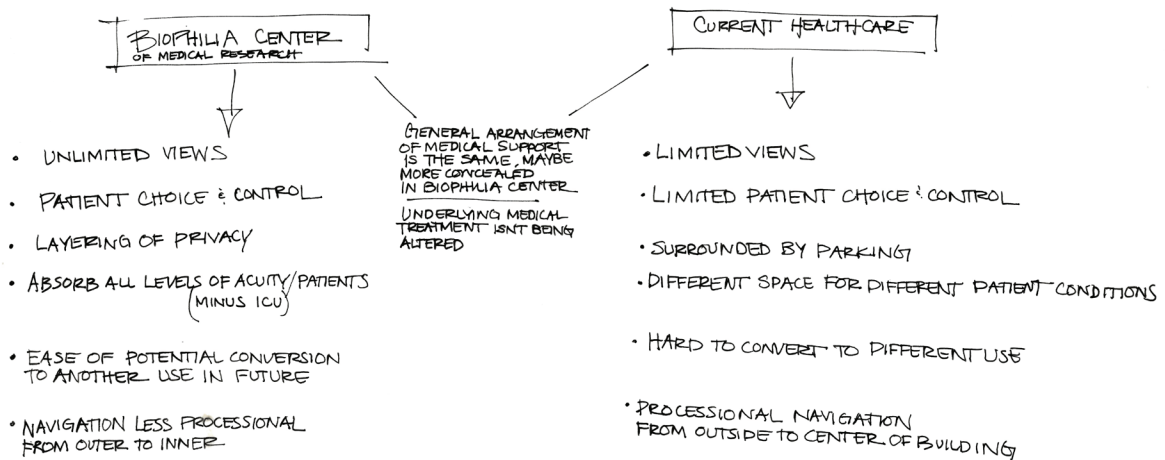
Design Solution

Final Models

Presentation Boards

PROCESS

Interviewed Robin Guenther in New York City over the Holiday break and we developed a list of items this project should set out to accomplish. We compared these items to a current healthcare facility.



ROBIN GUENTHER FAIA, LEED AP
PRINCIPAL AT PERKINS & WILL, NY

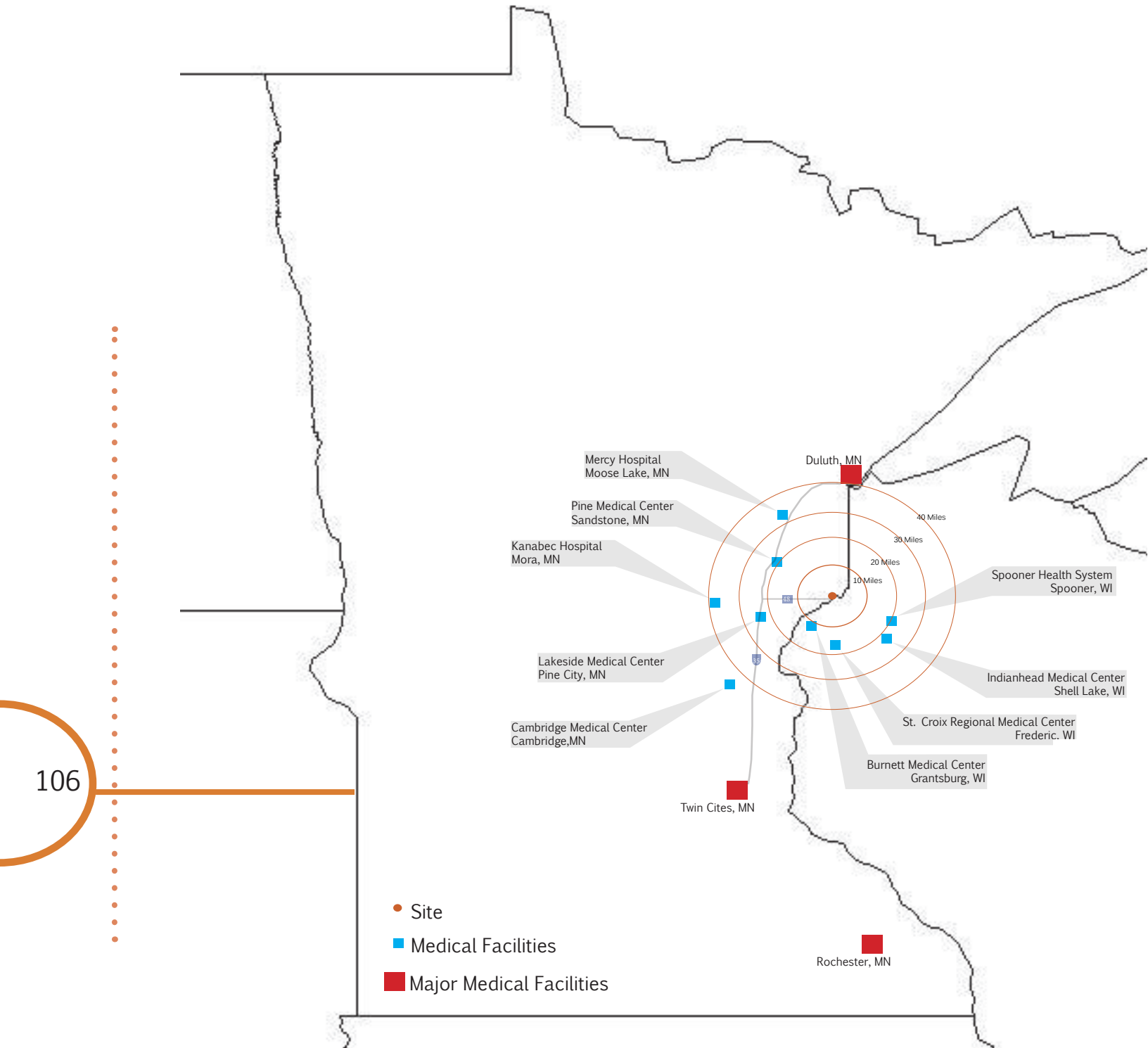


Voted #2 of the top 25 most influential people in healthcare design in 2010

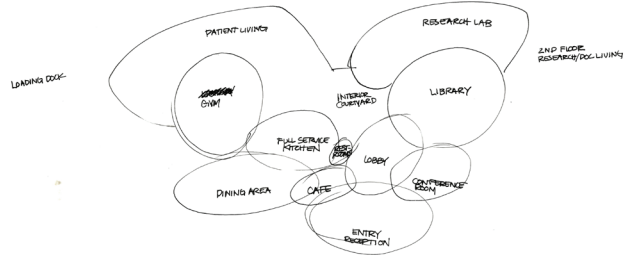
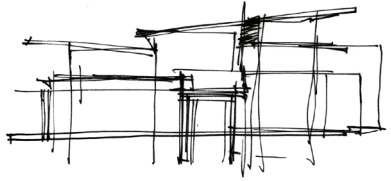
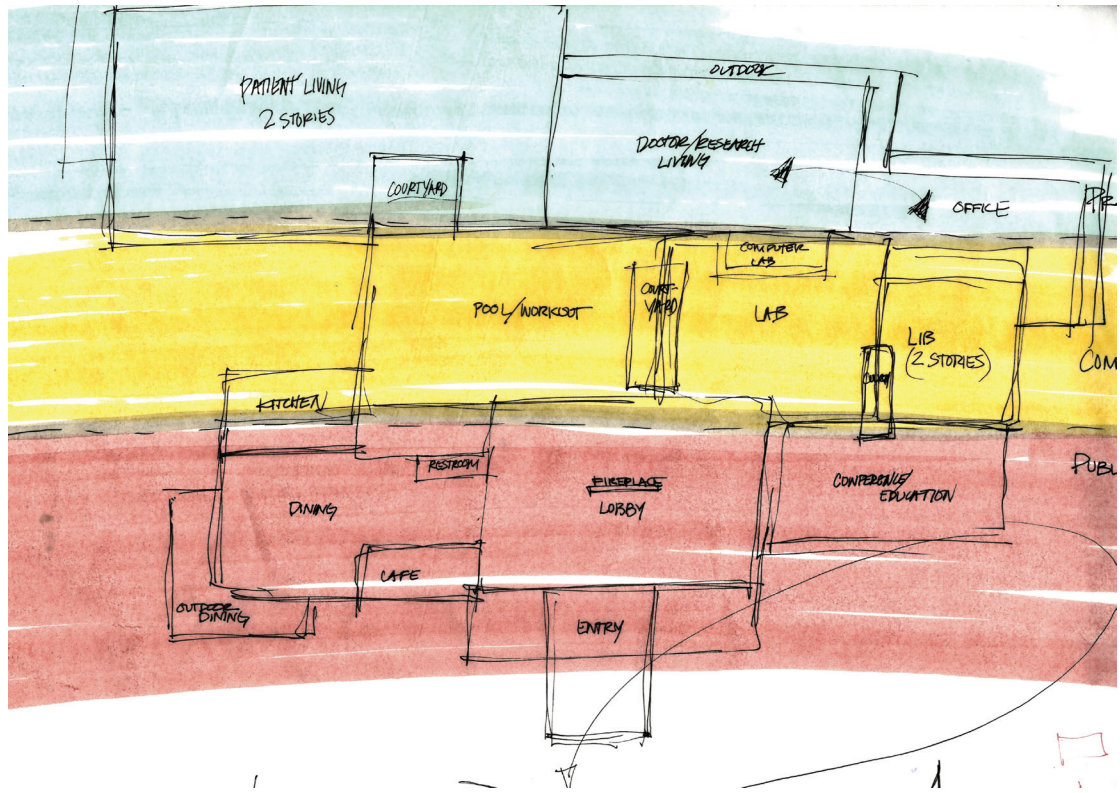
Principal author of the *Green Guide for Health Care*
Author of *Sustainable Healthcare Architecture*

Innovator for material selection in healthcare design

PROCESS.



PUBLIC COMMUNITY PRIVATE



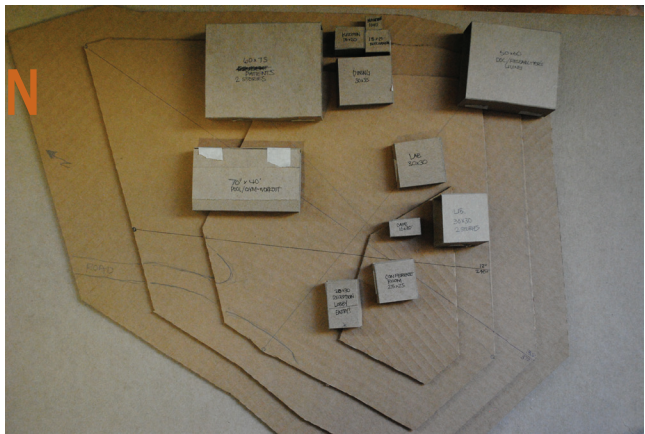
PROCESS.



Group One



Group Two



Group Three



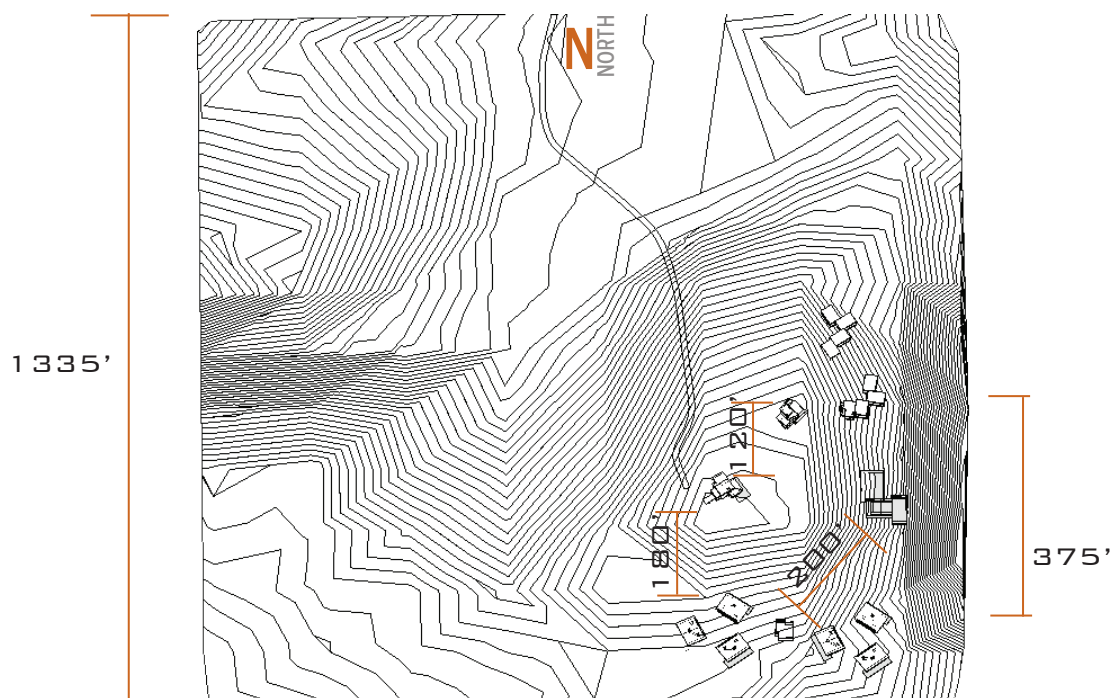
GREETING/CONFERENCE

PATIENT LIVING
DINING

POOL/WORKOUT

DOC./RESEARCH LIVING

STUDY/MEDITATION

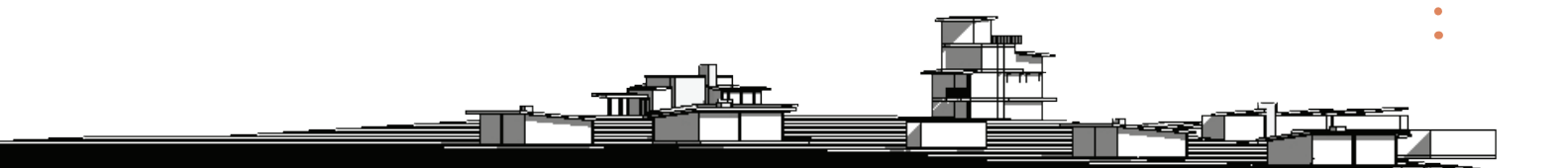


MATERIAL SELECTION

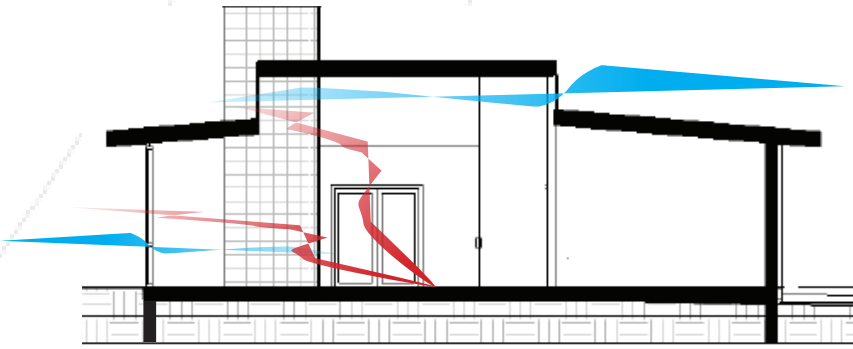
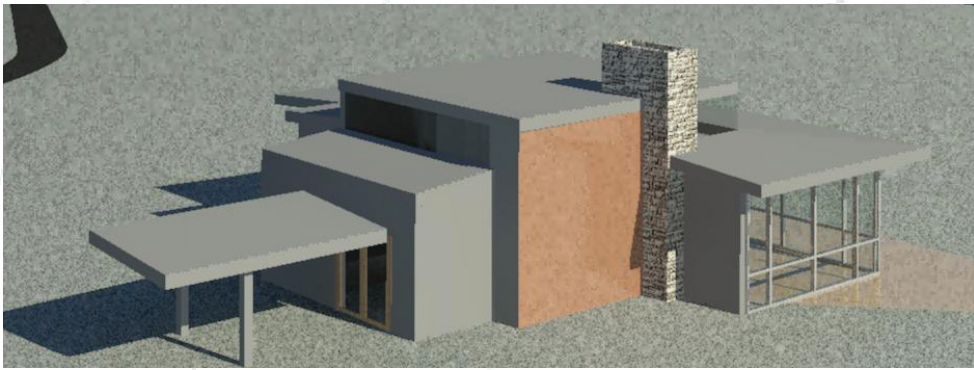
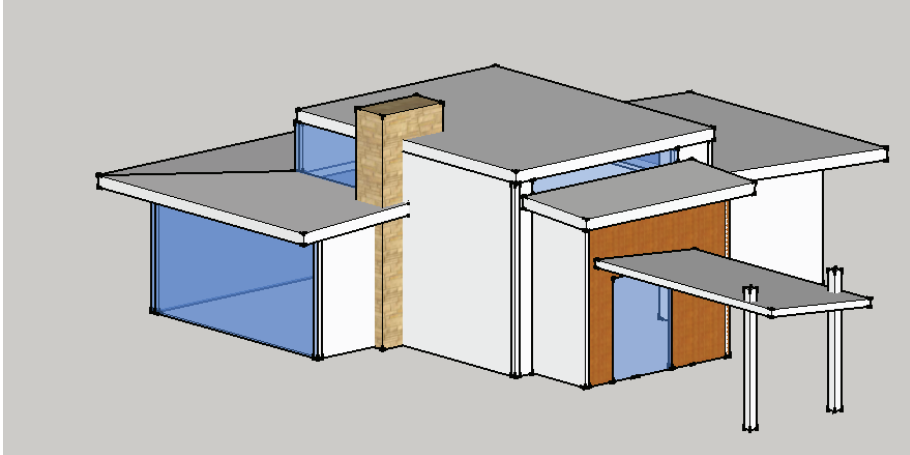
- WOOD
- SANDSTONE
- CONCRETE
- STEEL

ISOVIST

THE VOLUME OF SPACE VISIBLE FROM A GIVEN POINT IN SPACE, TOGETHER WITH A SPECIFICATION OF THE LOCATION OF THAT POINT.

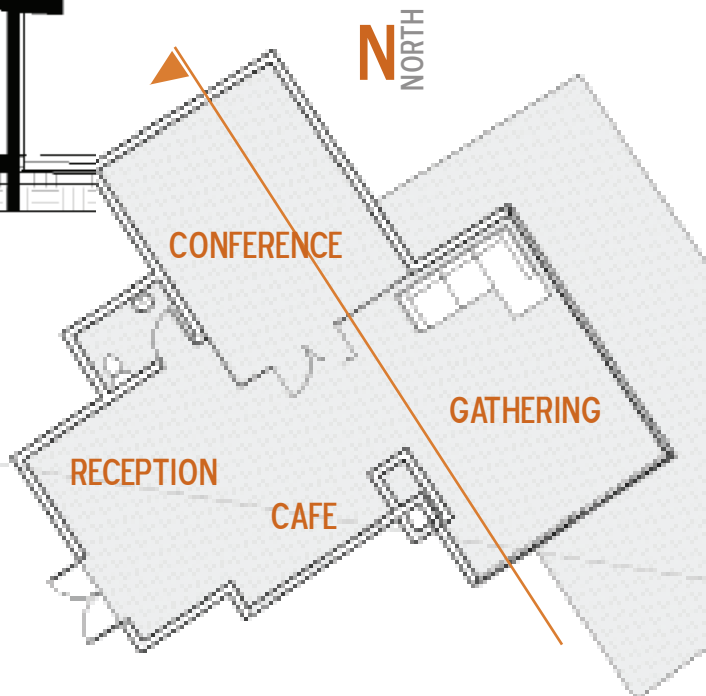


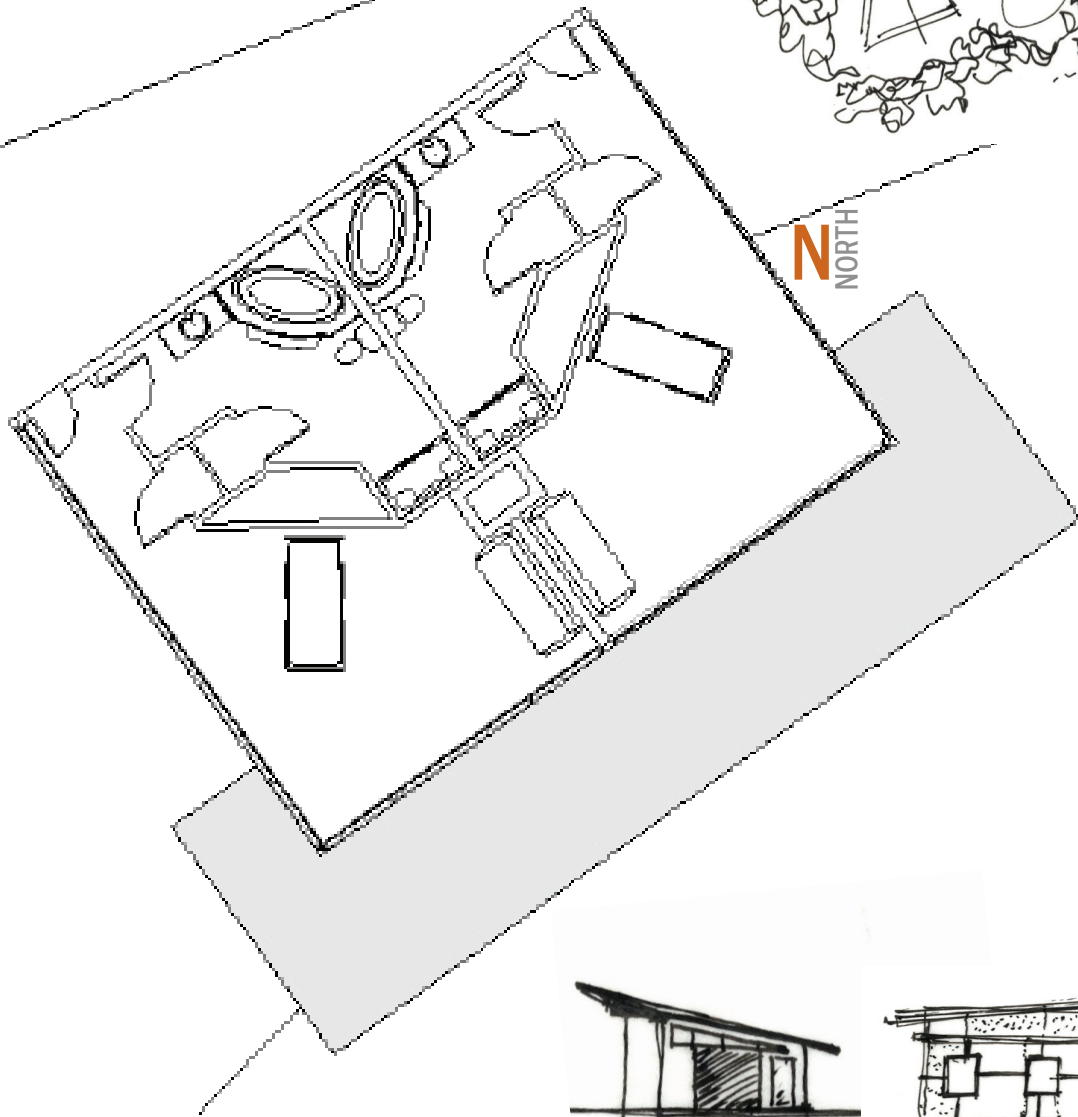
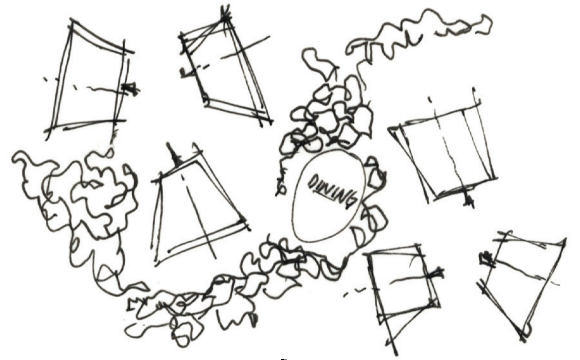
PROCESS.



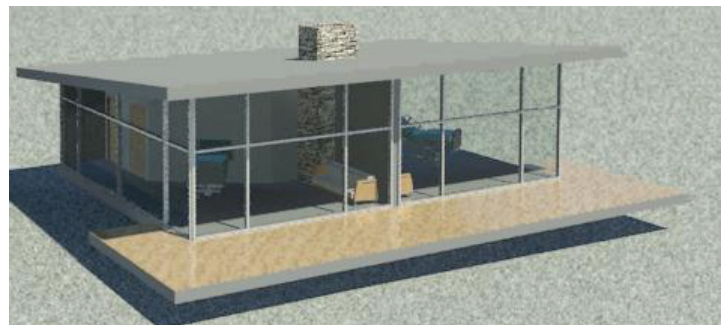
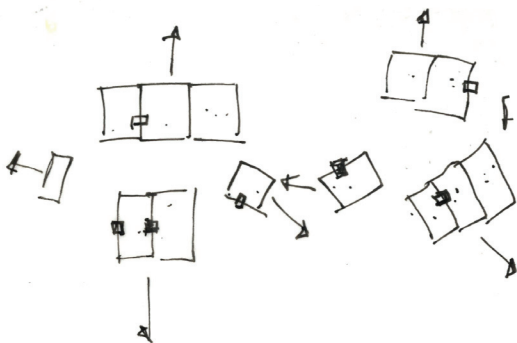
110

GREET/CONFERENCE

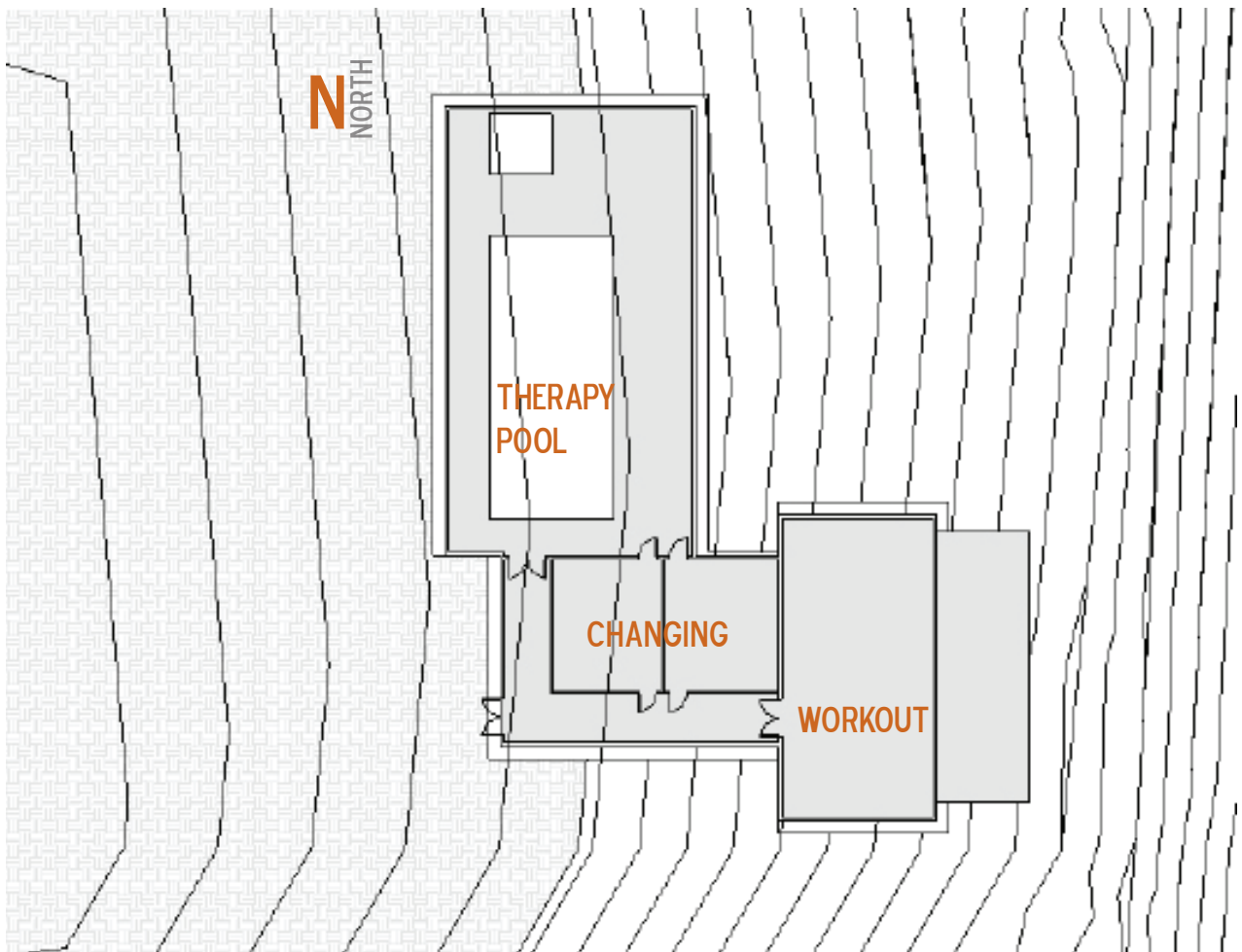
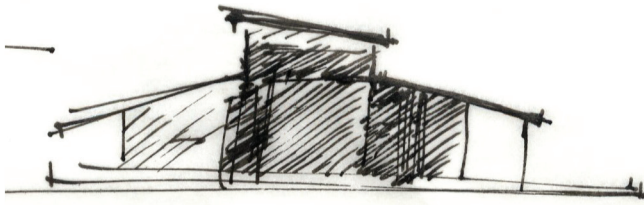




PATIENT LIVING

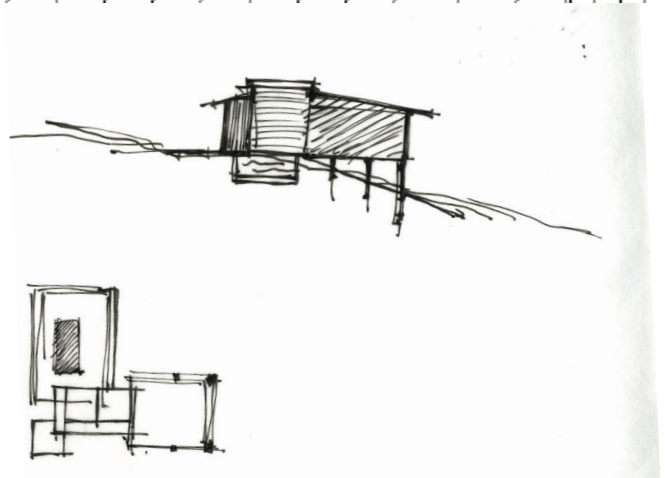


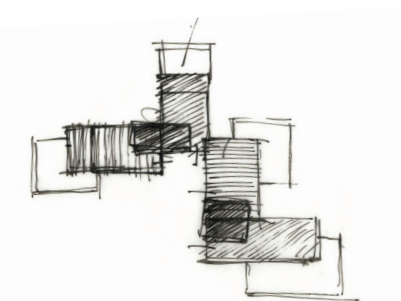
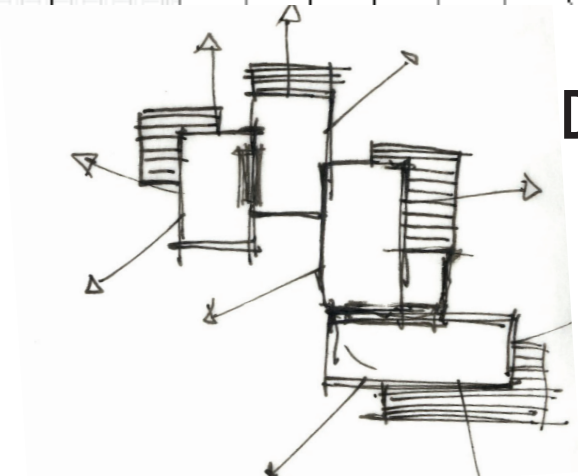
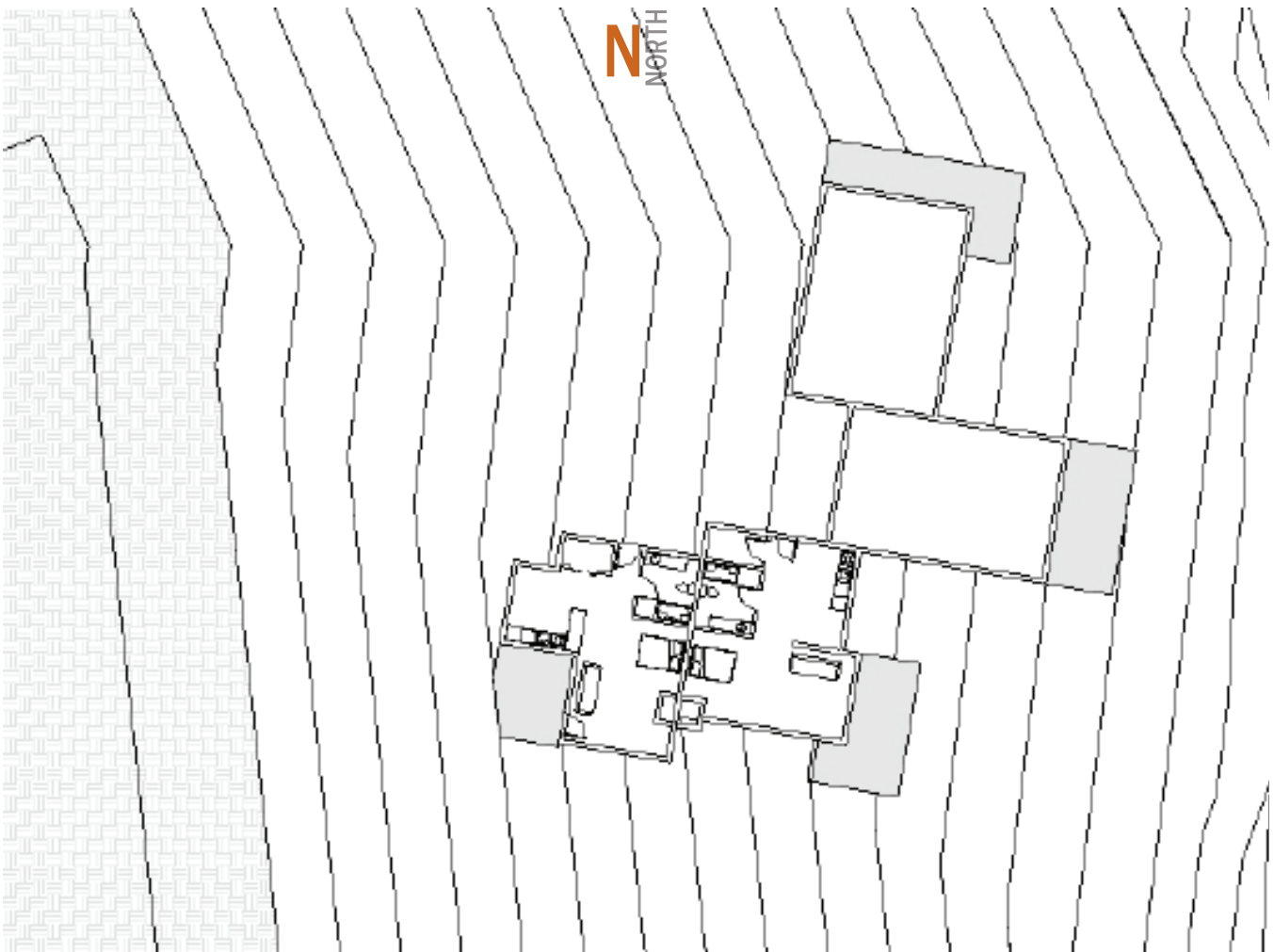
PROCESS.



112

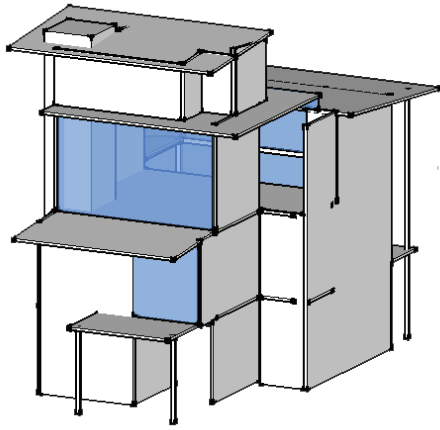
REHABILITATION





DOC./RESEARCHER LIVING

PROCESS.

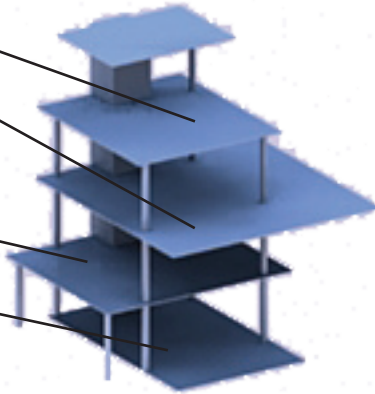


LOOK OUT

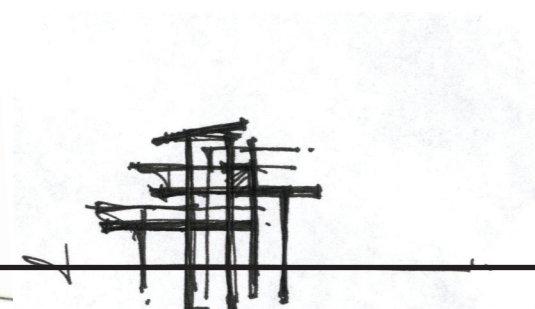
MEDITATION
(GROUP AND INDIVIDUAL)

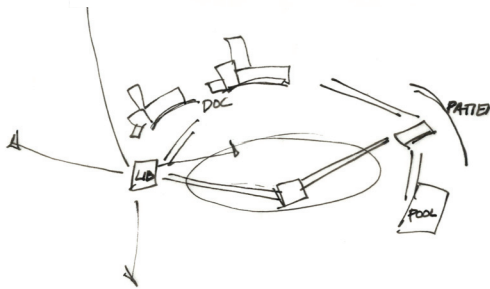
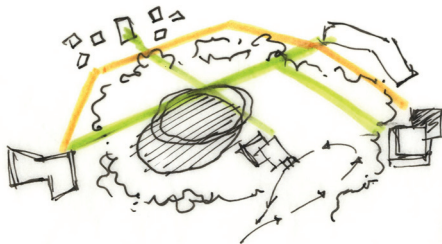
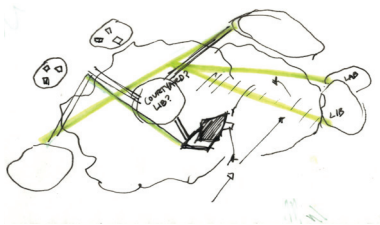
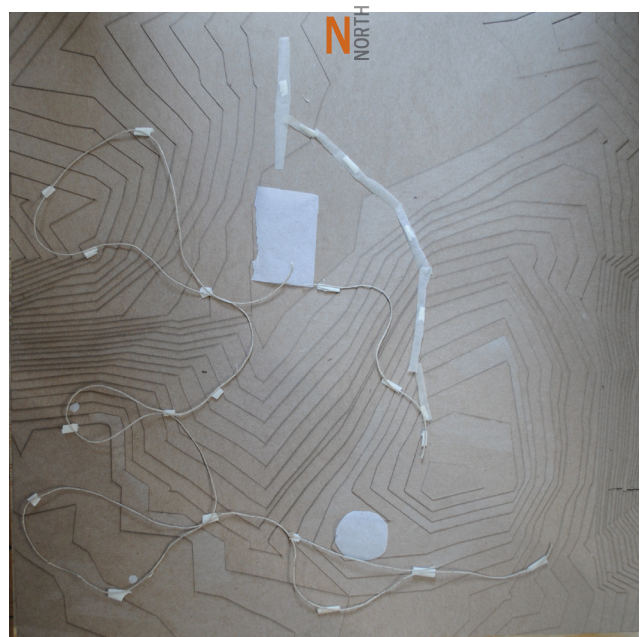
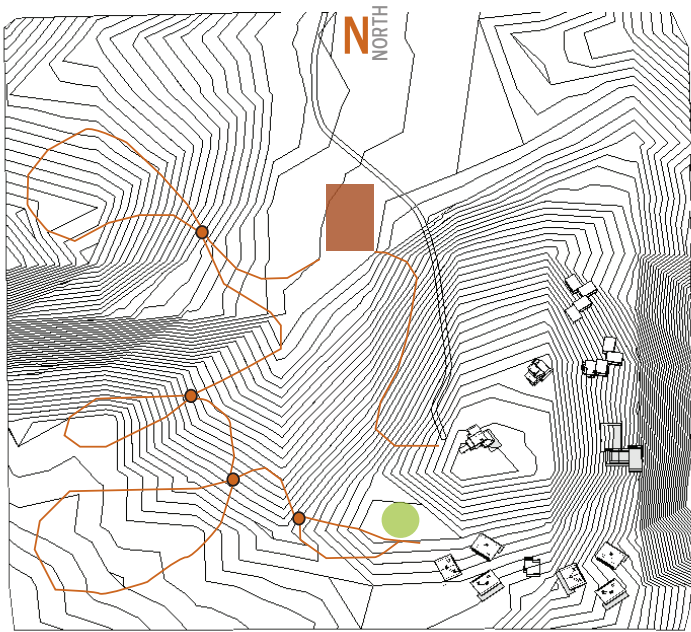
OFFICE SPACE

STUDIO SPACE



STUDY/MEDITATION





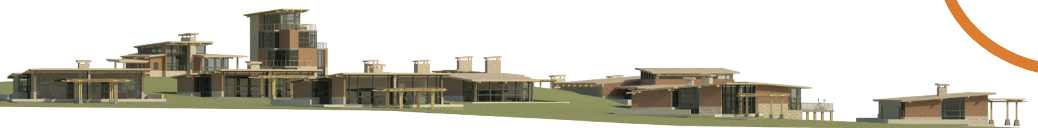
PATHWAYS THROUGH THE SITE

PROGRAM

FINAL PROGRAM

GATHER	Commons	414sq/ft
	Reception	108sq.ft
	Conference Room	340sq/ft
	Cafe	78sq/ft
	Restroom	50sq/ft
	Full Service Kitchen	1000sq/ft
	Mechanical	60sq/ft
	Outdoor Seating	800sq/ft
DINING/ NURSES STATION	Dining Area	600sq/ft
	Full Service Kitchen	338sq/ft
	Nursing Station	390sq/ft
	Mechanical	100sq/ft
	Outdoor Seating	500sq/ft
PATIENT LIVING (12 UNITS)	Living	360sq/ft
	Bathing	108sq/ft
	Kitchenette	66sq/ft
	Mechanical	50sq/ft
	Outdoor Patio	420sq/ft
DOCTOR/ RESEARCHER LIVING (8 UNITS)	Living	182sq/ft
	Dining	140sq/ft
	Bathing	84sq/ft
	Sleeping	100sq/ft
	Entry	56sq/ft
	Mechanical	50sq/ft
	Outdoor Patio	220sq/ft
REHABILITATION	Pool	2,800sq/ft
	Workout Space	966sq/ft
	Shower/Changing Room	700sq/ft
	Mechanical	80sq/ft
	Outdoor Patio	1500sq/ft
STUDY/ MEDITATION	Reception/Information	50sq/ft
	Patient Commons	486sq/ft
	Computer Cluster	50sq/ft
	Doctor/Research Studio	440sq/ft
	Meditation Space	182sq/ft
	Restroom	100sq/ft
	Mechanical	80sq/ft
	Outdoor Patio	340sq/ft
TOTAL BUILDING SQUARE FOOTAGE=		31,256sq/ft
Labyrinth	625sq/ft	
Outdoor gardens	2,000sq/ft	
Gazebos	500sq/ft	
Minimal Parking	4,200sq/ft	
TOTAL OUTDOOR SPACE =	7,325sq/ft	

TYOLOGY.



Recovery and Research Center is a small health care campus dedicated to helping non-critical patients from surrounding health care facilities recover from different surgeries while studying the effects biophilia has on recovery patients and their well-being. The Center hosts up to 12 patients and up to 8 doctors, researchers, and nurses for an extended stay. The general public is also welcome to come to the center and learn about what is being discovered and how biophilia can be incorporated more into their own lives.

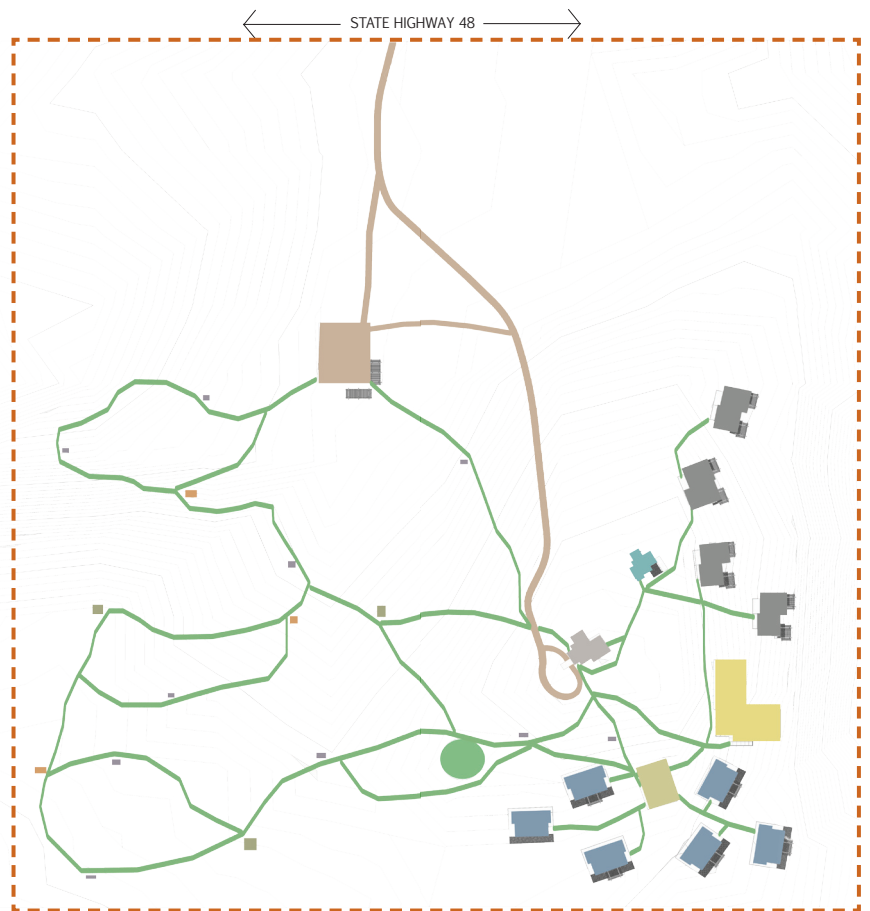


SOLUTION.



NORTH

-  GATHER (INFORMATION)
-  HEAL (PATIENT LIVING) 12 UNITS
-  DINING/NURSE'S STATION
-  ENCOURAGE (DOCTOR/RESEARCHER LIVING) 8 UNITS
-  REHABILITATION (WORKOUT FACILITY)
-  MEDIATE (STUDY/RESEARCH STUDIO)
-  WALKING PATHS
-  GRAVEL ROAD
-  LABYRINTH



120

Geothermal energy plays a key role to the campus as it distributes heat. The pipeline lies under the walking paths and travels counter-clockwise around the site finally ending back at the parking area.

GEOHERMAL ENERGY IS RUNNING THROUGHOUT THE SITE LOCATED UNDER DEVELOPED WALKING PATHS

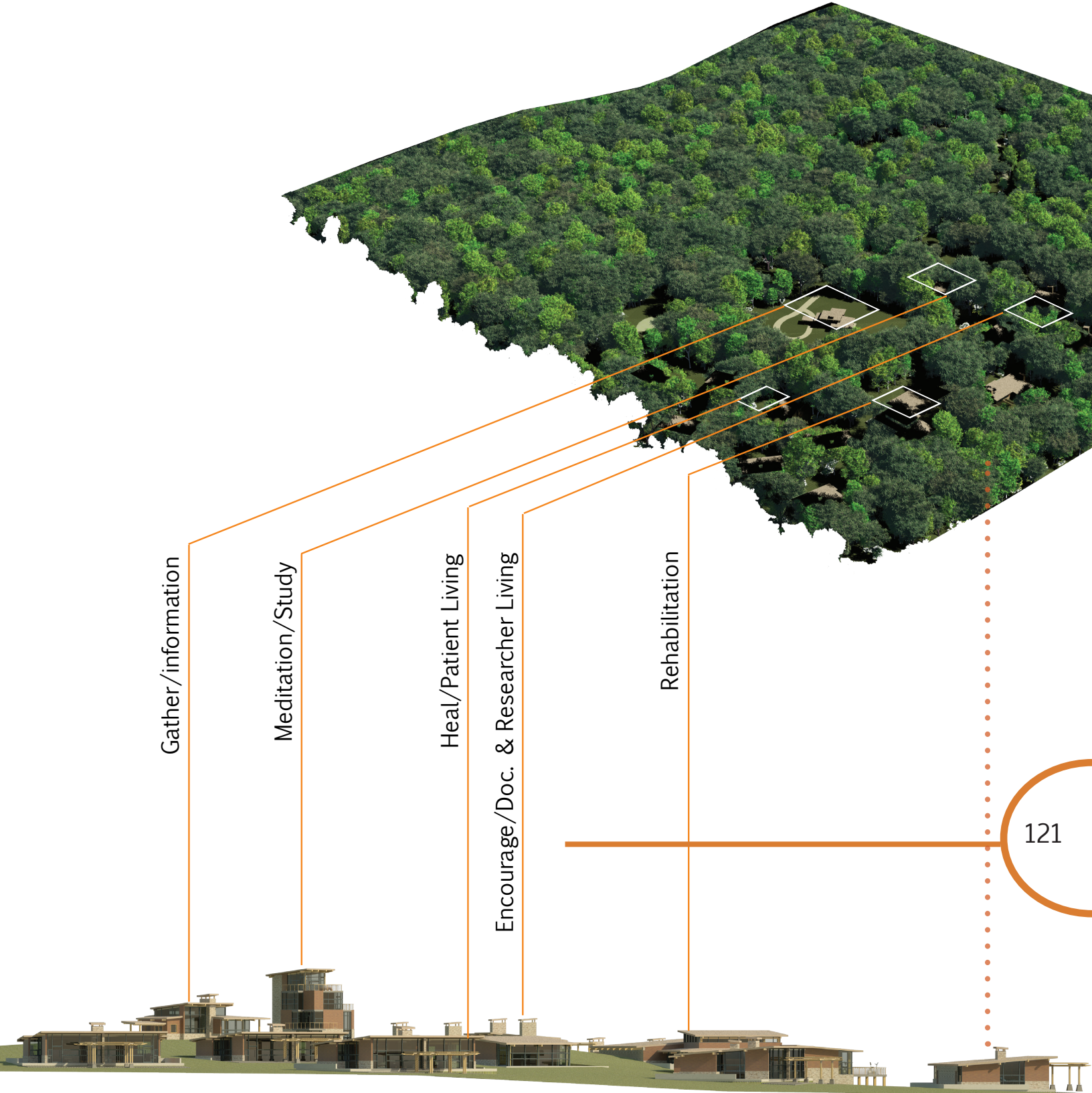
Gather/information

Meditation/Study

Heal/Patient Living

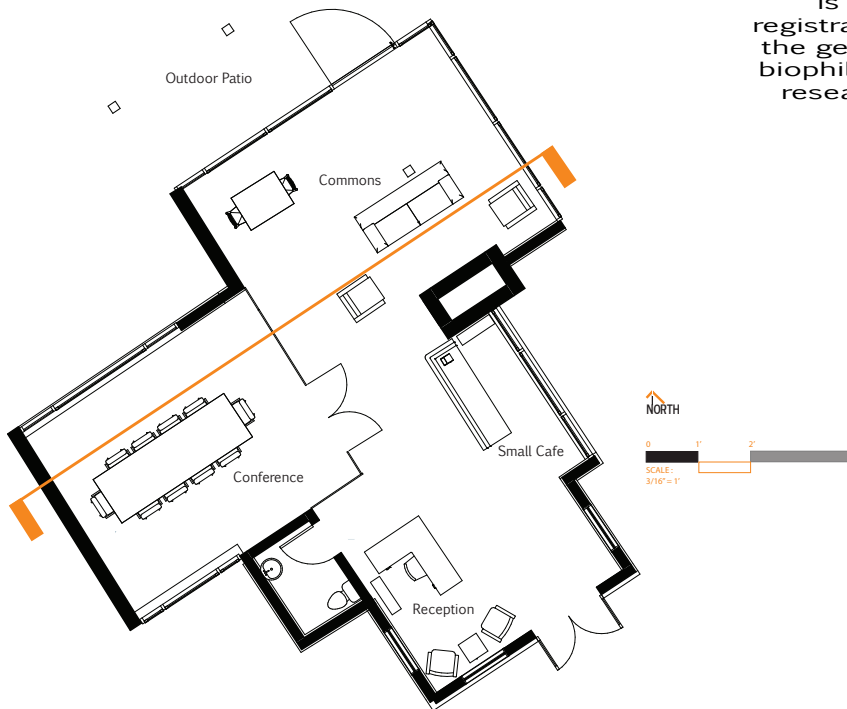
Encourage/Doc. & Researcher Living

Rehabilitation



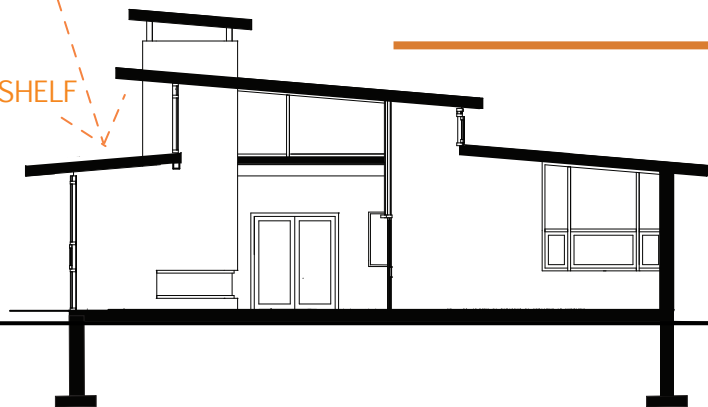
GATHER/INFORMATION

The first structure that greets people is the gather/information building. This space is utilized for patient registration and teaching the general public about biophilia and the current research that has been collected.





LIGHT SHELF

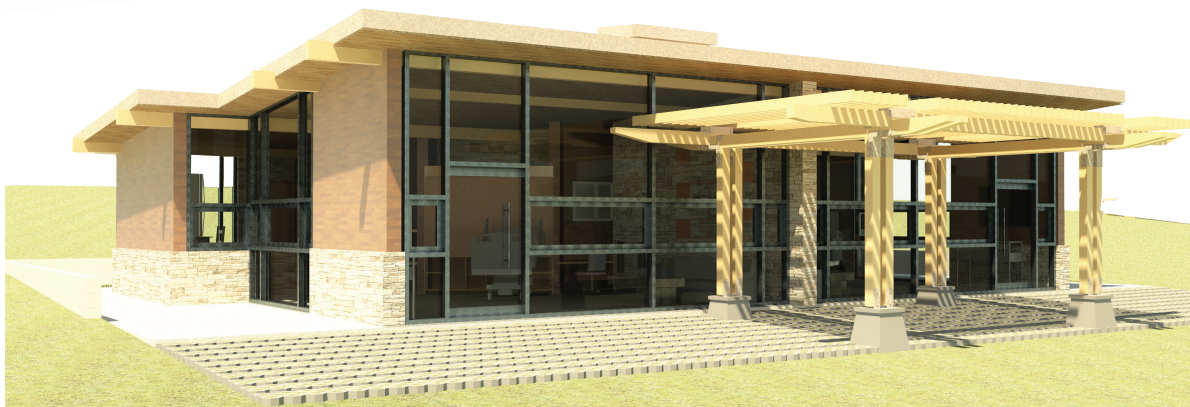
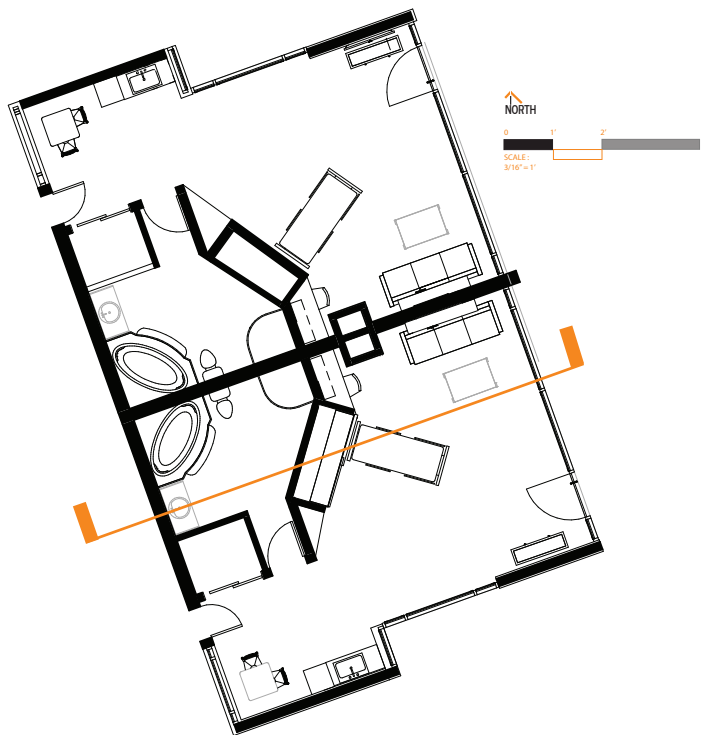
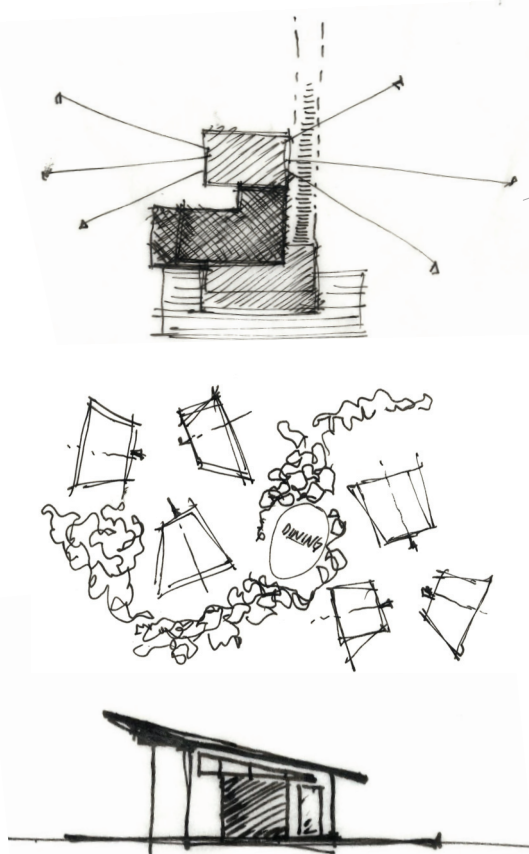


Daylighting is an important aspect to the design of the buildings around the campus. By creating a light shelf, light can penetrate farther into a building.

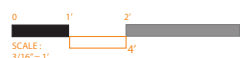
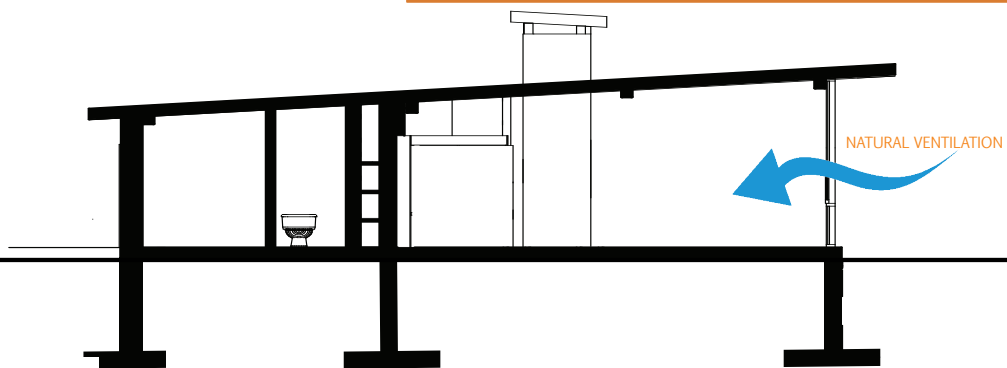
HEAL/PATIENT LIVING

The patient units are designed to relate closely to current medical facility standards with subtle enhancements. Increased views and more of a focus on hospitality for patients and their guests allows healing to occur. Placing the units in two smaller clusters creates layers of privacy as units do not directly face one another allowing for more patient control.

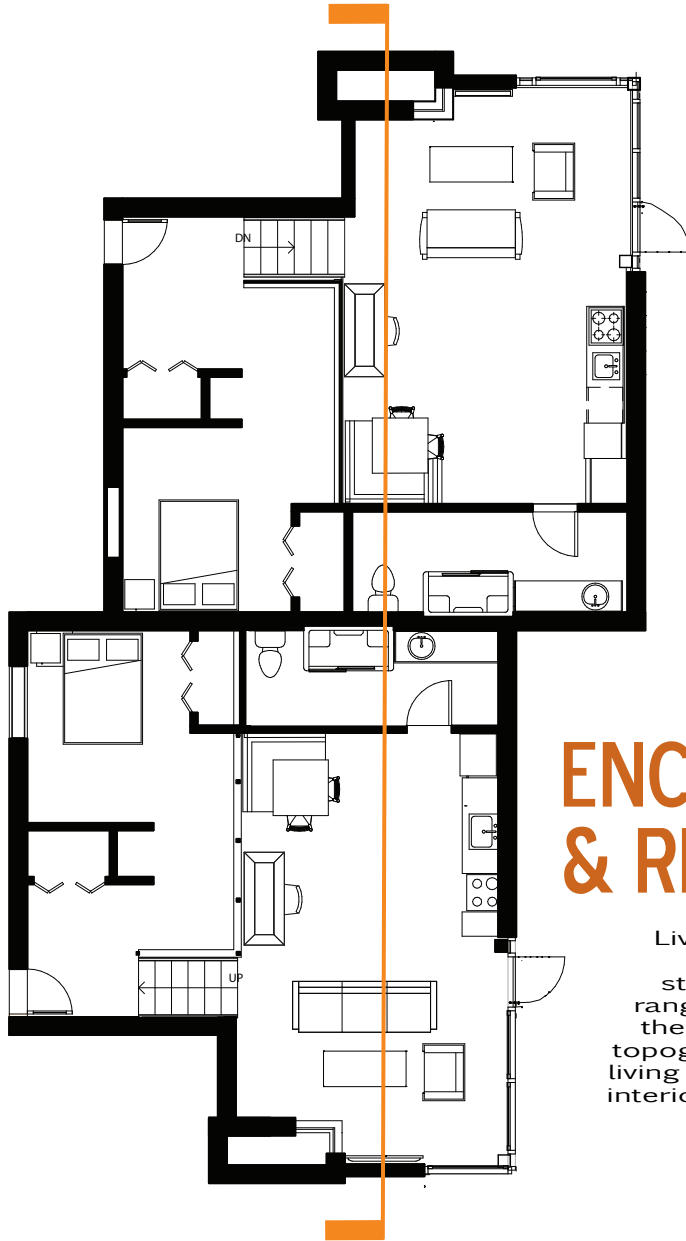
12 units total



Throughout the research center different systems are taken advantage of. The buildings are placed with the natural landscape in mind. Most buildings are located below the highest point on the site to protect from the north prevailing wind in the winter months and capture the natural airflow from the south in the warmer months.



SOLUTION.



NORTH

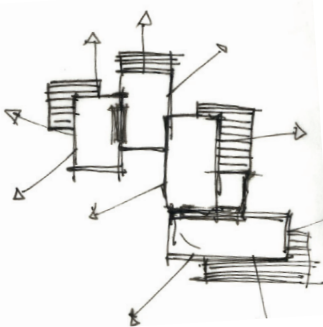
0 1' 2'
SCALE:
3/16" = 1'

ENCOURAGE/DOCTOR & RESEARCHER LIVING

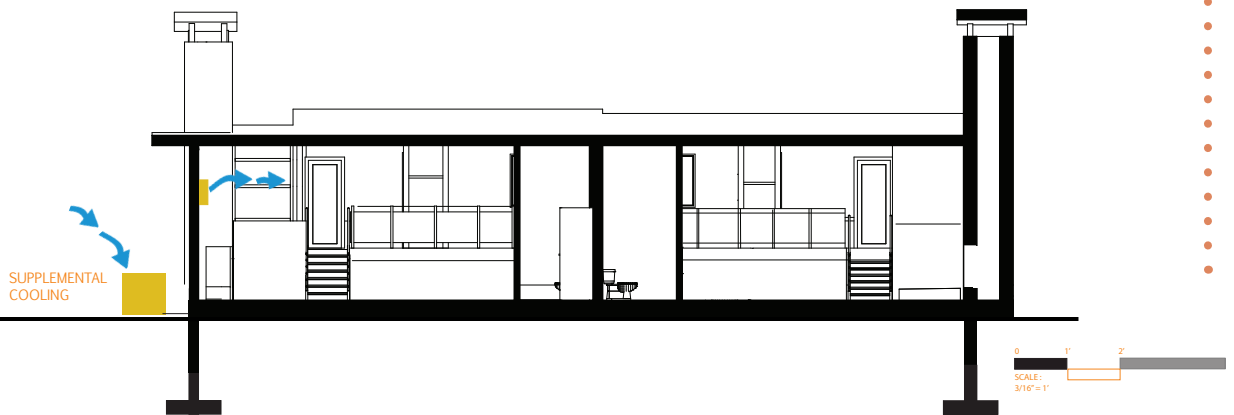
Living units are an essential component to the campus as doctors and researchers will be staying on site for an extended period of time ranging from a week to a month. Amenities for these units allow for comfort and privacy. The topography slopes at a greater rate around these living units and the design relates from that in the interior where the sleeping area is four feet above the kitchen and living spaces.

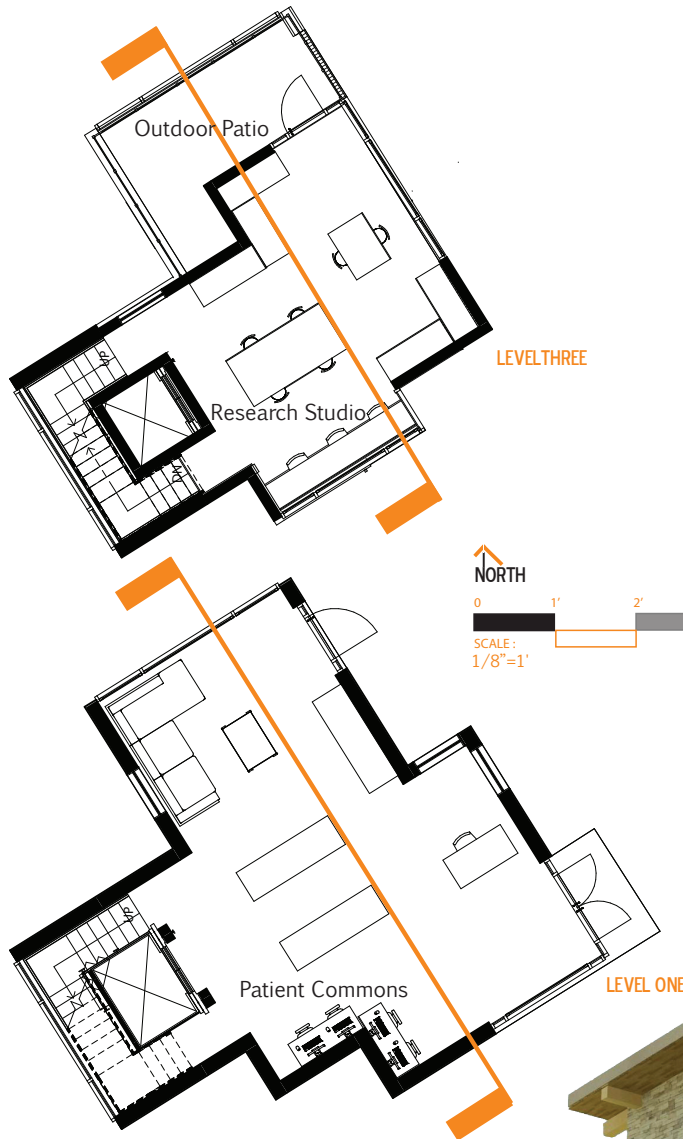
8 units total

126



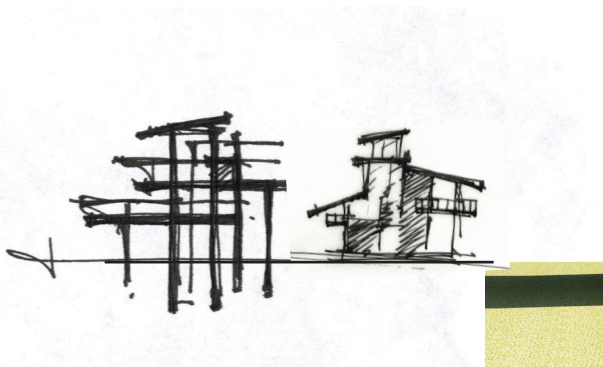
Although natural ventilation will be a main source of cooling another source of cooling will come from an air conditioning system.





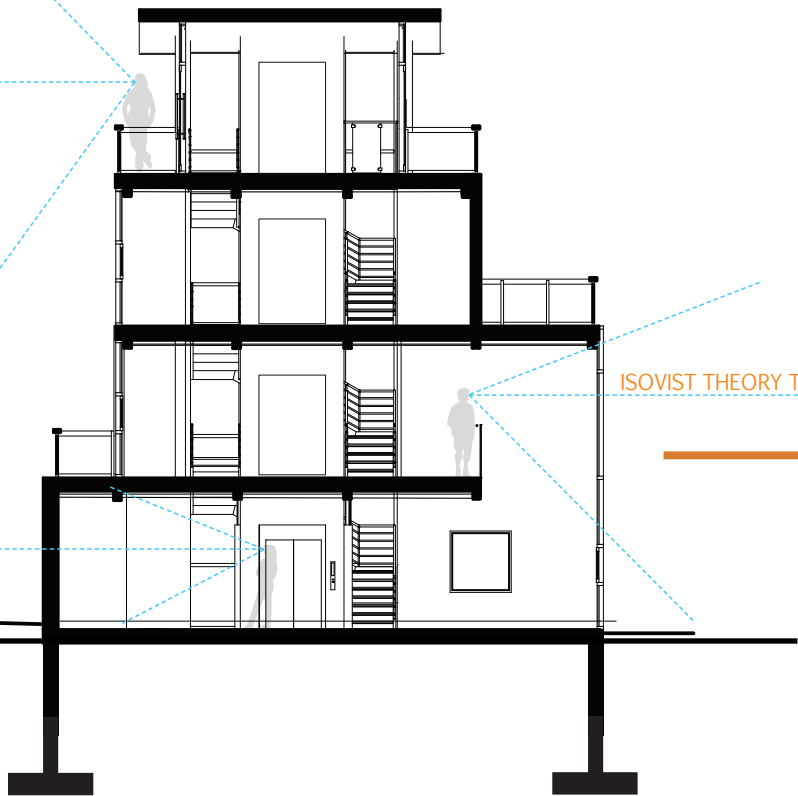
MEDITATION/STUDY

The meditation/study building was developed with the concept of merging a place where patients could go to use the internet, read a book, or enjoy the views from multiple vantage points, and researchers and doctors can study and collaborate. As the structure climbs upward more of the exterior is revealed to the interior.





The building also stemmed from the Isovist Theory on creating spaces where different amounts of area are visible to the eye.

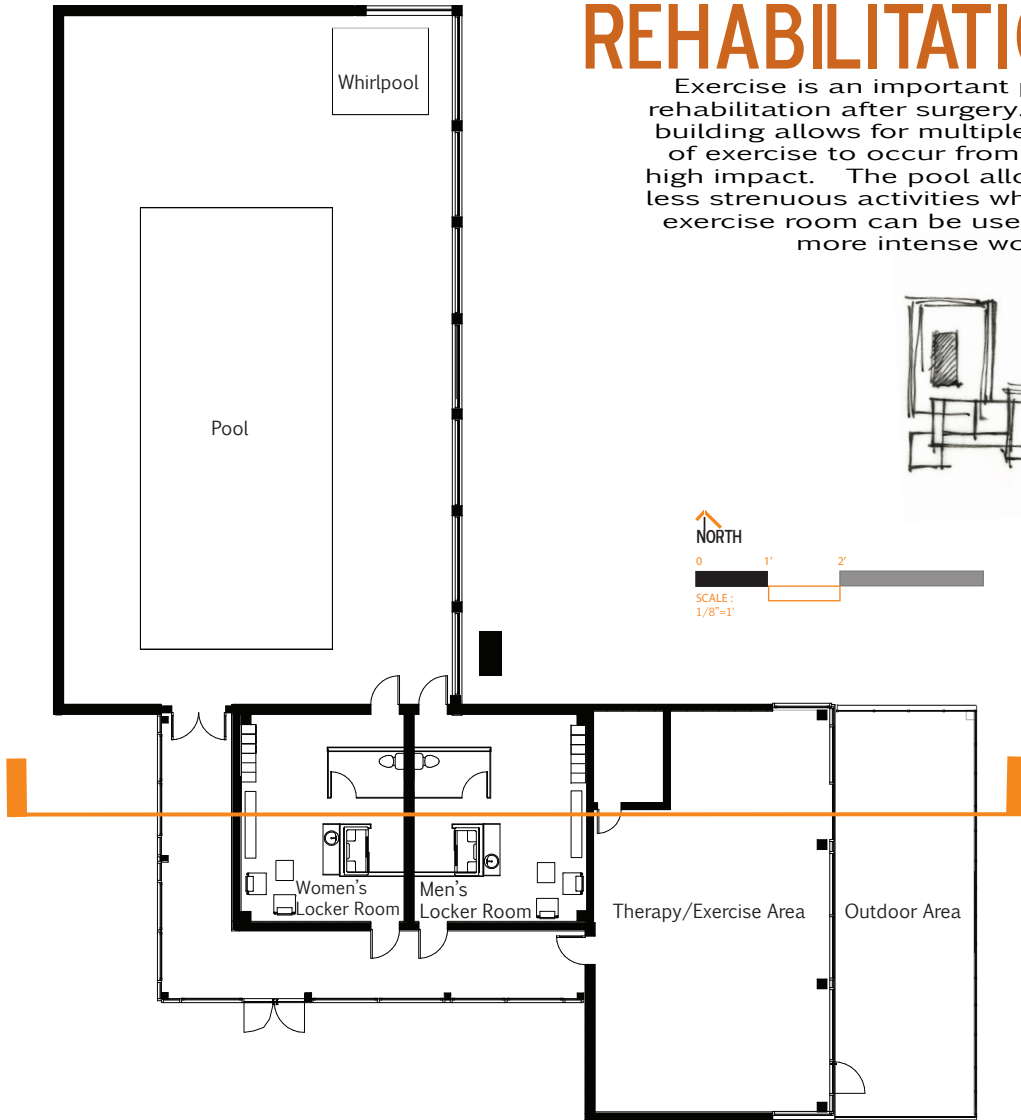


ISOVIST THEORY TESTING

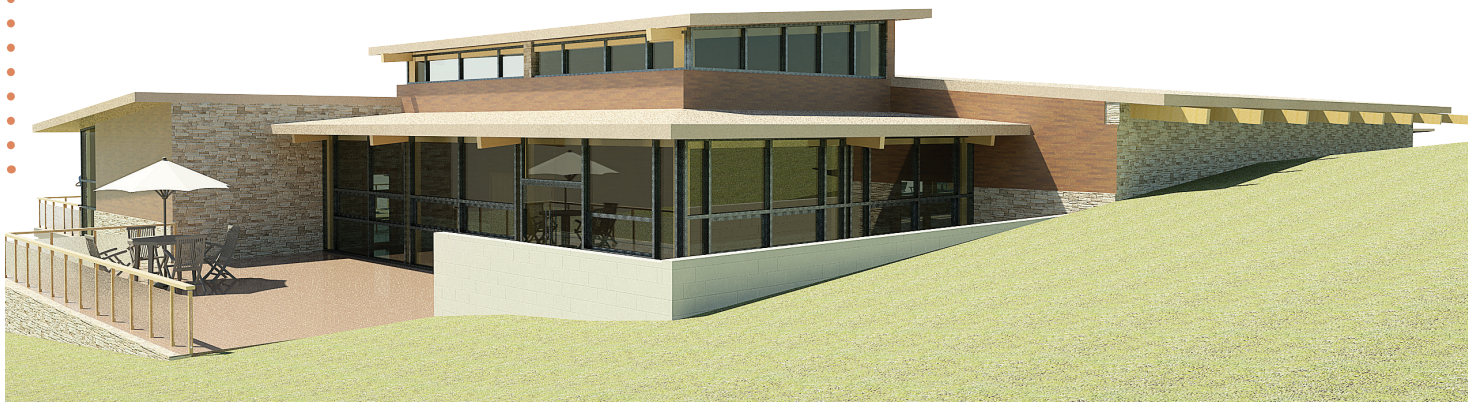
0 1' 2' 4'
SCALE:
1/8"=1'

REHABILITATION

Exercise is an important part to rehabilitation after surgery. This building allows for multiple types of exercise to occur from low to high impact. The pool allows for less strenuous activities while the exercise room can be used for a more intense workout.

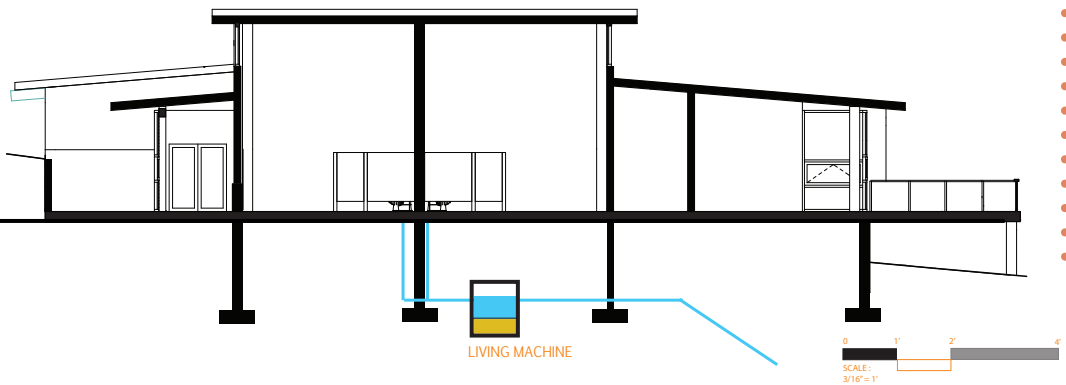


130





The campus uses a living machine approach to dispose wastewater. The system carries through the campus passing through treatment containers that lead to a garden area on site.



MODELS.

FINAL MODELS



MODELS.



134





PATIENT LIVING DETAILED SECTION
SCALE 1/8"=1'-0"

BOARDS

PRESENTATION BOARDS





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“NORTH DAKOTA STATE UNIVERSITY, AND THE ARCHITECTURE DEPARTMENT, HAVE GIVEN ME THE TOOLS I NEED TO BECOME A SUCCESSFUL PROFESSIONAL IN THE WORKING WORLD.”

-KELSEY L. JENSEN