



V I S T A
REHABILITATION
M a t t S m i t h

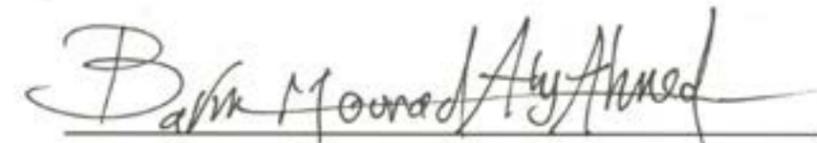
Vista Rehabilitation

A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
of North Dakota

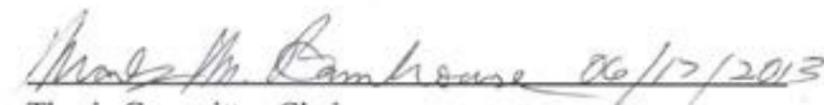
by

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In Partial Fulfilment of the Requirements
for the Degree of
Master of Architecture



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c o n t e n t s

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T H E S I S

a b s t r a c t

Vista Rehabilitation is a thesis project that explores the possibilities and affects that design, and its relation to nature, has on healing and the overall health of the inhabitants of a structure. In times of sickness and injury, time is spent with professionals in environments that are meant to repair our health in a timely, painless, sensible manner. These environments can be designed to promote a healthy mind and body through a strong connection between the built environment and its natural surroundings.

There are many factors that are involved in our body's biological recovery time, and many of these biological responses are induced through our emotions, which can be controlled in some degree by the spaces that surround us. The spaces we inhabit and their exposure to natural elements, such as sunlight and fresh air, contribute to a patient's recovery process. (Sternberg, 2009)

The typology chosen to explore this topic will be a Physical Rehab Center. The location chosen for this building will be Bemidji, Minnesota. Successful completion of this project will give a better understanding of what patients need in order to recover from physical injury or surgery in the most efficient, effective manner possible. Health care facilities are often times associated as being sterile, artificial environments. By designing spaces that are mentally stimulating, accomplished in part, through their connections with nature, a more holistic level of well-being can be maintained by the patients.

k e y w o r d s

Biology
Healing
Psychology
Transcendentalism
Stress
Well-Being
Rehabilitation
Nature



THE PROBLEM

s t a t e m e n t

How do built environments and their connection with nature affect our holistic level of well-being and in effect the healing/rehabilitating process?



THE STATEMENT

o f i n t e n t

S T A T E M E N T o f i n t e n t

Typology

A physical rehabilitation center specializing in orthopedic care and sports medicine.

Claim

The spaces we inhabit and their exposure to nature have direct effects on the human body—including comfort, mental stimulation, anxiety, and stress, which play a role in the human body's ability to heal and remain healthy.

The Actor: An individual, who is in need of rehabilitation due to injury or recent surgery, attempting to return to full health through their stay in an environment designed to restore health

The Action: Designing spaces that stimulate healing and allow for physical rehabilitation to take place

The Object: A patient's holistic well-being, and recovery process

Premises

Premise 1: The Actor:

An individual that is in a state of relaxation and overall happiness will recover or heal faster than an individual who is stressed or uncomfortable.

Premise 2: The Action:

We can design institutions that promote and enable a patient to recover and rehabilitate following an injury or surgery. The stress of a noisy, confusing hospital room might result in a patient not only feeling worried, sad, or helpless, but contribute to experiencing higher blood pressure, heart rate, and muscle tension. In addition, hormones released in response to the emotional stress could suppress the patient's immune system, causing their wounds to heal more slowly. (Kreitzer, 2012) Creating environments that reduce stress will, in effect, promote healing and stimulate the body's immune system.

Premise 3: The Object:

The holistic well-being of a patient can be volatile during times of recovery. Creating peaceful environments that give a sense of hope to the inhabitants can increase the quality of care and decrease the length of the rehabilitation process.

Theoretical Premise/Unifying Idea

Through architectural design, environments can be created that have a direct relationship with nature. A space can be created that instills a sense of hope in an individual requiring physical rehabilitation. Physical health is only one aspect of an individual's well-being. Through design and the use of natural elements, other parts of well-being such as mental, spiritual, and social, can be addressed.

Project Justification

Almost everyone at some point or another spends time in an institution while they are undergoing medical treatment or are in the process of recovering from that treatment. These environments should be designed in a way to promote that healing and ensure the patient's timely recovery. There are many dimensions of wellness and in order to be physically well, the mind also needs to be well. Exploring the idea that exposure to our natural environment plays a positive role in well-being can lead to the design of more effective healthcare facilities.



T H E
p r o p o s a l

T H E n a r r a t i v e

Throughout our lives we are forced to deal with illness and injury. The simple idea that nature has a positive effect on the holistic well-being of individuals is the focus of this project. This thesis explores the possibilities that the spaces in which we inhabit have on the healing and recovery process.

Nature has long been proven to have certain healing effects on individuals. Access to natural elements such as light, airflow, and views of nature can all have an effect on how we heal. Our body is constantly reacting to the spaces in which we inhabit. These spaces can have a direct effect on an individual's physiology and mental comfort. Stress levels and the mood of a patient may have the greatest effect on the healing process.

Physical rehabilitation is a process. There are many methods and systems being used to rehabilitate our body. In order for the body to heal, the mind and soul need to be in a good place. How can a rehabilitation center be designed to induce hope and optimism? A healthy, stress-free mind is not only less likely to become physically ill, but may also allow the body to return to full health faster.

Part of having a satisfying life is being able to do things that you enjoy. Typically people that live more active, healthy lifestyles can say that they are happier than those that don't. Recently our culture has shifted towards a more stressful life in which people are substituting time typically spent being active, with heavier workloads and stationary leisure activities (Eichelberger, 2008). People are exercising less and less and also eating more convenient processed foods, which may lead to physical or mental problems as they age. A Physical rehab center aims to bring people recently recovering from surgery or injury back to full health so that they can enjoy the things that make them happy.

As a full time student who has worked various full time jobs through school, I know how hard it is to maintain a healthy lifestyle. Having active outdoor hobbies are a way in which I can relieve stress and forget about everything that is going on in my life. I make it a priority in my life to have things that I enjoy doing. If I was to become physically injured and was unable to do these things I am sure that stress and depression may start to set in. For these reasons I feel that it is important to explore the possibilities of a rehabilitation center and the spaces within them to better heal the people that need the care provided.

The typology for this project will be a rehabilitation center. It will cater to an individual's recovery from physical injury or those in need of recovery following an operation. All care will be out outpatient care focusing on orthopedics and sports injury.

The site chosen to explore this topic will be Bemidji, Minnesota. This site is centrally located and has a strong connection with nature. It is close enough to major cities in the region but is also secluded enough to allow for isolation from the busy city life. The site will offer opportunities for the design to have a strong connection with nature and the natural elements such as air flow, natural light, and pleasant views of the surrounding environment.

Understanding the types of environments that are best suited to encourage the healing of an individual will enhance the quality of any healthcare facility. In this project nature will be the primary source being looked at, but there are many aspects to the spaces we inhabit that have effects on our well-being. The completion of this thesis project will produce an example of a rehabilitation center that utilizes nature and our perception of spaces to enhance the quality of healing and rehabilitation.

U S E R / C L I E N T
d e s c r i p t i o n

The rehabilitation center is focused on the patients and their wellness. Outpatient care that allows for patients to schedule appointments based on their busy schedule will be provided. Ideally the center will cater to less than 30 patients at any given time. This will allow for relationships to be built between staff and patients.

Staff at the facility will consist of a receptionist, nurses, physical therapists, physical therapist assistants, athletic trainers, and occupational therapists. In addition to physical therapists, nurses and a managerial team will also be on staff.

A small number of patients will be assigned to each team to ensure that the patients are given the quality of care that they deserve. Physical therapists will work overlapping shifts to cover busy times during the day but will also be available for appointments during early and late hours of the day

The center will assist in the recovery for patients dealing with muscular, skeletal, circulatory, and respiratory system disabilities. The aim is for patients to gain or improve health, physical movement, or to adapt to permanent physical disability. The rehab center will work with primary care providers and other healthcare providers to ensure the highest quality of care.

M A J O R
P R O J E C T
e l e m e n t s

Therapy Exercise Area
Aquatic Therapy
Sauna
Massage Therapy Room
Accupuncture Room
Consultation Rooms
Waiting Area
Physical Therapists Offices
Occupational Therapist Office
Managerial Offices
Community Lounge/Cafe
Reception
Healing Gardens
Outdoor Porch
Changing Rooms
Restrooms
Mechanical Room
Utility Room
Storage

S I T E I N F O R M A T I O N

figure 1.1



Region

The site is located in Beltrami County, Minnesota. Northern Minnesota is filled with beautiful views of nature and also opportunities to engage and interact with the environment. Filled with lakes and a variety of trees and vegetation, this site will allow for a strong connection with nature and the outdoors.

City

Bemidji, Minnesota is the proposed city for this project. The city is developed around the shores of Lake Bemidji and Lake Irving. The population is 13,431 in the city limits but has a lot of development in the surrounding areas outside of city limits (Census, 2010). Bemidji is also surrounded by several Native American tribes giving the city a strong connection to Native American cultures and practices.



figure 1.2

Site

The Physical Rehabilitation Center will be located on the southern shore of Lake Bemidji. The site is a heavily wooded area and will have strong views to the shores of Lake Bemidji. The site is also near a system of trails that run around the Western and Southern shores of Lake Bemidji. The site is on the borderline between commercial and residential districts of development. It is centrally located in Bemidji making it easy for patients to schedule quick appointments during their busy schedules.



figure 1.3

Growing up in Bemidji, Minnesota this site is familiar to me. Currently the site is near an area of town that is going through a lot of commercial development. With the construction of an event center there have been an abundance of hotels and restaurants being developed along the Southern shoreline of Lake Bemidji. This shore line that my site is located on is one of the last remaining undeveloped areas of the lake. I think that it is important to maintain these green spaces along the shoreline and my design will aim to have little impact on the shoreline. My site is not on the direct shoreline because there is a system of trails that run alongside the lake. This site will have a strong connection to the outdoors and year round activities associated with the outdoors.

Micro Site



figure 1.4

P R O J E C T e m p h a s i s

The emphasis of this project will be relating nature and our bodies' responses to stimuli as we experience the environments that we inhabit; more specifically how these responses affect an individual as they heal from injury or surgery. I will explore proven methods that relate healing to nature and incorporate them in the design of a physical rehabilitation center. Focus will be first and foremost on the patients and their well-being. The design goals for this project is to create a relaxed, stress free environment with direct connections to natural elements such as sunlight, airflow, views of nature, and an ability to engage directly with the natural environment.

Research Direction

The main focus on research will look at how our environment can yield biological responses in our body and how these responses have an effect on a humans healing process. How can both direct and indirect connections with nature affect our mood and sense of well-being? The human body is immensely complex and each component of our body is interrelated. I will conduct research regarding studies of how our body heals and how both architecture and our natural environment can lend a hand in this process.

The typology chosen for this project is a physical rehabilitation center. Case studies will be conducted to see what a successful rehab center needs and why some rehab centers may have a higher rate of success than others. Nature and our connection to it is a main focus of my research, so a number of my case studies will look at how the architecture works with its natural environment. Programmatic Requirements will also be explored concurrently with the case studies. Knowing what a rehab center needs in order to succeed is crucial to the successfulness of any design.

Historically, healing centers and ideologies have been around for as long as people have. How have rehabilitation centers and healing centers changed over time? Using nature as a tool for healing is not a new idea. Looking at which designs have utilized a connection to natural elements and how these designs have had an effect on the well-being of its' patients, I will be able to let history influence my design.

The site chosen for this project is Bemidji, Minnesota. I wanted to choose a site that had distinct seasons. I will explore how an individuals mood responds to these changes that occur with the seasons, and how these responses affect our body as it heals. Bemidji has a strong connection to the outdoors, and the specific site chosen has a variety of aspects that we commonly associate with nature, such as trees, waterfront, wildlife, and a variety of grasses. Research will be conducted as to how these elements can be interacted with by the patients, and how these interactions may affect healing.

Design Methodology

My research will be conducted using the Concurrent Transformative Strategy. The Theoretical Premise/Unifying idea will act as a starting point for my research and will stem out from there. Ideas and theories will be backed with scientific research through electronic journals, books, articles and any other sources that may be helpful in defining a solution. Case studies and visits to physical rehab centers will be conducted in regards to understanding programmatic requirements.

Documentation Process

Throughout the process of this thesis project all pertinent information will be compiled in an online folder and also in a physical book. As the thesis book continues to evolve through the process, any useful information and work will be accessible through the thesis book. This will include any research and process that is explored throughout the duration of the project.

T H E S C H E D U L E

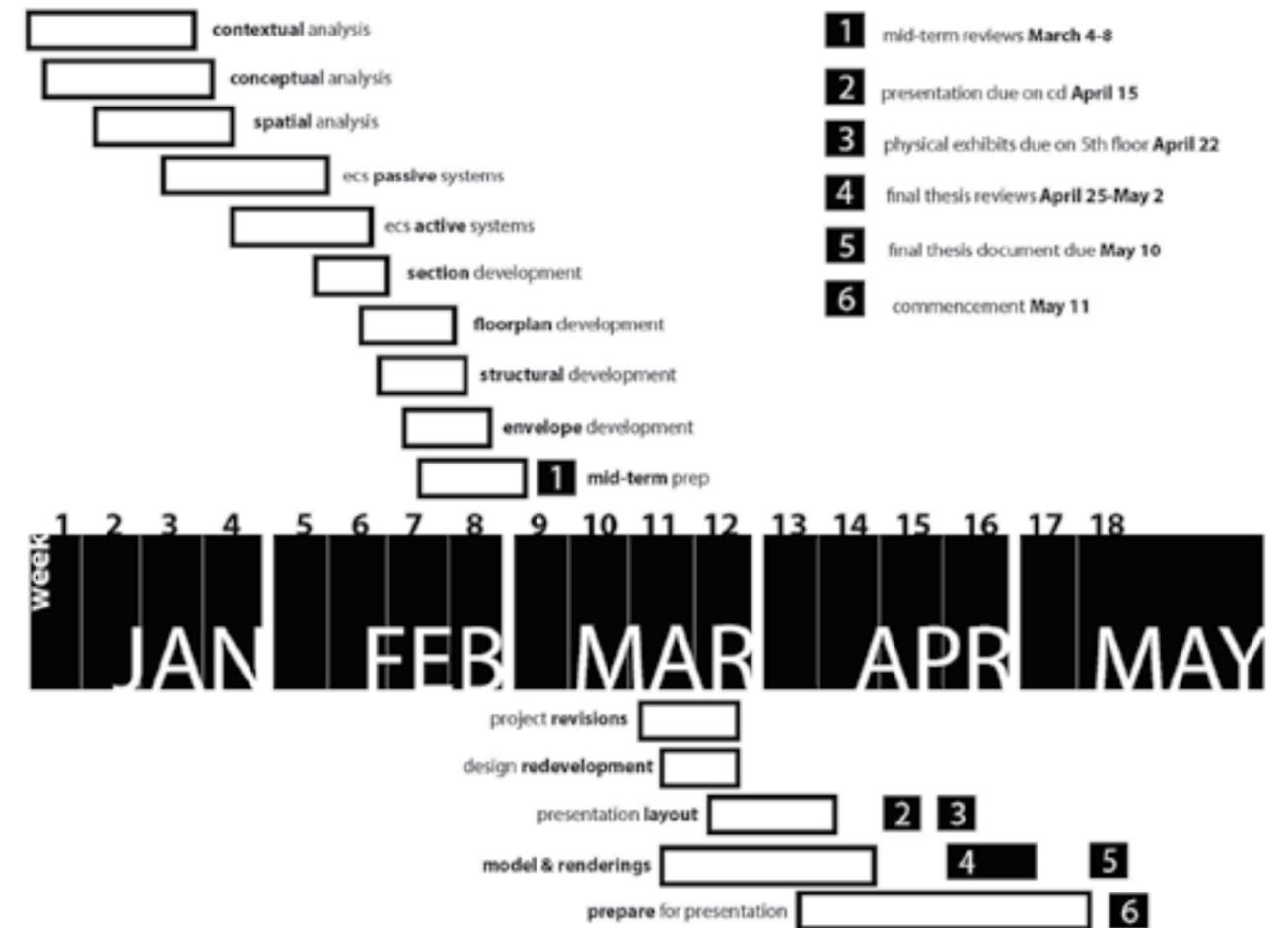


figure 2.1

P R E V I O U S S T U D I O E X P E R I E N C E

Studio 2009-2010

Fall - Heather Fischer
Tea House
Boat House

Spring - Joan Vordenbruggen
Montessori School
Bird House
Cripple Creek Dwelling

Studio 2010-2011

Fall - Cindy Urness
Wellness Center
Food Co-op
Ice Sculpture

Spring - Mike Christensen
Sixth Street House

Studio 2011-2012

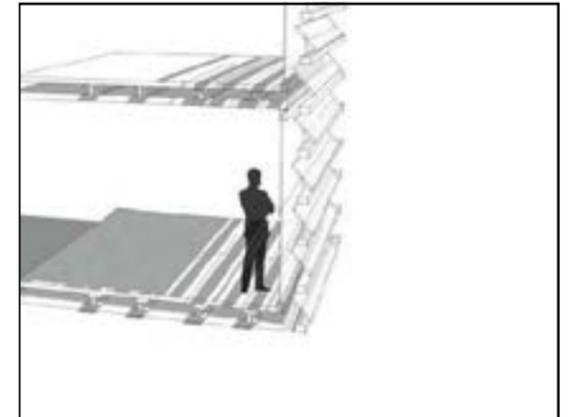
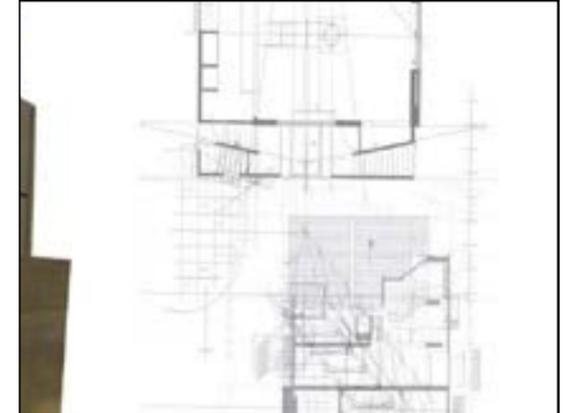
Fall - Frank Kratky
San Francisco High Rise
DLR/KKE Re-Use Competition

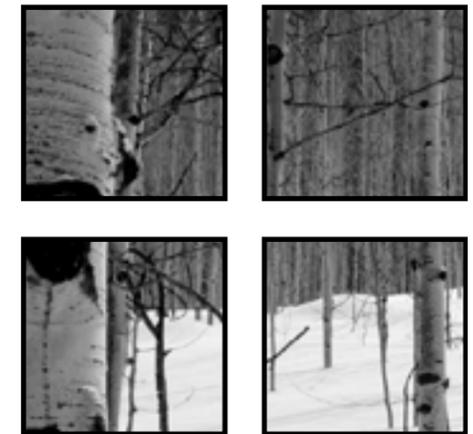
Spring - Ron Ramsey
Agincourt Urban Design Project

Studio 2012-2013

Fall - Regin Schwan
Grand Forks Museum Addition
Bonfire Venue Competition

Spring - Joan Vordenbruggen
Thesis: Rehab Center





THE PROGRAM
d o c u m e n t

Theoretical Premise

Through architectural design, environments can be created that have a direct relationship with nature by combining both of these entities a space can be created that instills a sense of hope in an individual requiring physical rehabilitation. Physical health is only one aspect of an individual's well-being. Through design and a connection to natural elements, other aspects of well-being such as mental, spiritual, and social, can be addressed.

Research

This thesis explores the influences that architecture, and its relationship to nature, have on the human body's ability to heal and remain healthy. The site of a building is an important factor as to how we relate to and experience a building. Our surrounding environments play a key role in our moods and behavior. Therefore it is important to take into consideration the relationships that our built environments have with the natural environment, and how these relationships can be used to instill a sense of happiness that is conducive to healing.

Many healthcare facilities are designed in a way that fosters quantity rather than quality. Long corridors, repetitive patient rooms, and cramped waiting rooms create an environment that feels gloomy, or dead. When visiting a facility designed to heal, an individual should walk inside and feel a sense of life. By harnessing nature and allowing the outside to flow indoors, spaces can be created that are enjoyable and stress free. A patient should be able to explore the facility, which creates a sense of community, and the design should suggest this. Large open spaces that connect different aspects of the program, and also exposed stairways and circulation paths allow connections to be made by all inhabitants of the structure, and can also promote an active lifestyle. Design can influence the process of obtaining wellness. Rather than moving between waiting rooms and patient rooms, which can create stress and anxiety, a more holistic approach can be implemented towards the journey to healing.

Our physical environment can be broken down into three dimensions: architectural features, interior spaces, and ambient features. (Dijkstra, 2006) These categories create the stimuli that we are exposed to, and have a direct impact on our relationship with space. Architectural features consist of the permanent structures and their layout. Interior spaces include the less permanent fixtures within a building, like furniture and artwork. Ambient features include lighting, odors, sounds, and climate.

There are many environmental variables that can be associated to healing. This thesis will explore elements such as views, natural light, airflow, and natural sounds. Communal green spaces and healing gardens will also be looked at to create a direct connection to nature. These variables will be used to establish not only a more natural and peaceful sense of place, which is inductive to healing, but also create an experience. Experiences are what we look back on and relate to. Familiar scents and views bring back memories which can instill a sense of calmness and peace, creating a healthy mind and body. Our present experiences are a product of our past experiences and we can relate the old with the new. We draw from our past to help us understand our current situations.

According to Christopher Day, "To be healing, a place must be harmonious. This means bringing change as an organic development so that new buildings seem not imposed aliens but inevitably belong where they are, responsive to their surroundings. Healing also involves invisible responsibilities like minimizing off-site pollution. But places – and buildings – must be more than that: they must be nourishing to the human being." (Day, 2004)

Neuroesthetics is a relationship of art and mental responses. When we experience art, or architecture, we are affected by the aesthetics on many different levels. These experiences can affect human behavior and therefore can have a direct relationship in the healing process. Spaces and art are subjective, therefore we all are influenced differently when we hear music, walk through a space, or view art.

Memories and personal preferences direct our feelings and experiences. (Hagendoorn, 2011) How then can these physical aesthetic experiences help to repair an injured mind or body? Knowing that the visual and physical objects we come into contact with everyday play a role in how we feel and act, we can use design to create spaces that ease the soul and excite the spirit.

In Frumpkins journal, *Healthy Places: exploring the evidence*, he states, "Some places are romantic, and some places are depressing. There are places that are confusing, places that are peaceful, places that are frightening, and places that are safe. We like some places better than others. Place matters." (Frumpkin, 2003)

The term ecopsychology refers to the connection humans have with the natural environment on both an emotional and physical level. Nature has long been associated with health. Studies have shown that a connection to nature decreases healing time in post-operative patients, can improve quality of school work by students, contributes to less nurse visits by prisoners, and in general reduce stress and improve performance. (Frumpkin, 2003) There are many ways to create a connection between our built environment and nature, both direct and indirect. Direct methods may involve coming in direct contact with nature. This can be accomplished through healing gardens and outdoor spaces by allowing the user to interact directly with nature. Bringing nature inside through the placement of plants is not a new idea, but is often overlooked as a way to instill a sense of tranquility to the observer.

Healing gardens have long been used in history to aid in the healing journey. Restorative gardens have been used by sick and healthy alike all the way back to the Middle Ages. According to the book, *Restorative Gardens: the healing landscape*, "For the sick of body or troubled in spirit, the garden relaxes and soothes and thereby encourages the body and the mind to restore themselves." (Gerlach-Spriggs, Kaufman & Warner, 1998)

Dr. Howard Rusk emphasizes that there are many elements involved in the restoration of health. He founded the Howard A. Rusk Institute of Rehabilitation Medicine, a part of the New York University Medical Center. The site for this center is amongst many high-rise buildings set in an urban environment. There are four separate gardens incorporated into the design: a glass garden for patients and horticultural therapy, a children's outdoor play area, and two walking gardens open to patients, staff, families, and the public. The gardens allow patients to escape from the medical setting into a garden setting that is relaxing, refreshing, and recreational. (Gerlach-Spriggs, Kaufman & Warner, 1998)

As part of the centers horticultural therapy program, patients are given a plant and challenged to care for it. Workshops are put on by staff teaching patients and visitors how they can use horticultural therapy in their lives, and the benefits that go along with it.

There is also a kitchen garden which houses more exotic plants like cacti, bananas, and pineapple. According to the views of the institute, the more exotic and exciting the plants are, the more interest they will bring about through the patients. The glass garden is also filled with birds and even butterflies. These patients cannot help but to be surrounded by nature and all of the positive qualities that come with it.

Modern medicine has created a healing society that focuses on eliminating the symptoms that come with sickness and injury rather than a more holistic approach which includes spiritual, social, and environmental wellness. But even today gardens can be found in cancer treatment facilities, nursing homes, mental institutions, hospices for the dying, and rehabilitation centers. The therapeutic benefits that can be obtained through healing gardens deal with health on a higher level. Healing gardens not only promote healing and wellness to the patient, but also family members and the individuals providing the care.

A healing garden refers to an enclosed space, a maintained environment that is thoughtfully designed to treat the patient on a spiritual level, just as a prescription drug is engineered to heal on a biological level. This brings up the point, why can't other spaces be 'healing' spaces? Why can't we have healing corridors, and healing entry ways? How can we take traits from these healing gardens and create spaces architecturally that are designed to have similar effects on a patient's holistic well-being?

Natural light, air quality, and pleasant views can all be described as indirect connections we experience with nature when inside a building. Having access to sounds and smells and also being exposed to the rhythms of time, distinguishing day and night, can give us that contact with the outside environment. (Esther, 2009) Watching the seasons change and experiencing these transitions can create excitement and joy to the observer. These indirect connections with nature can primarily be accomplished through the use of windows. Operable windows allow sounds and scents to travel indoors. Windows also provide natural light to enter the building.

Natural light may be the most studied environmental attribute that affects our experiences in a building. Fluorescent bulbs may conserve energy, but at what cost? At 120 flashes per second they have been proven to cause hyperactivity, headaches, and eye strain. (Day, 2004) Diffused natural light can create a more soothing environment that better fosters healing. Noises, either from a nearby lake or trees rustling in the wind can also bring forth pleasant memories to a patient. Even urban noises such as traffic can drown out noisy medical equipment and the constant footsteps of nurses and practitioners, allowing the patient to momentarily forget their current situation and simply relax.

Interior spaces and ambient features also play a role in how we feel within a space. Color choices can be relaxing, with hues of blues and greens, or stimulating, with the use of reds and bright colors. (Esther, 2009) The use of carpet, although often times not used in health-care facilities due to the importance of sterile environments, can create a more homely feel, and even drown out the noises of constant footsteps. (Dijkstra, 2006)

Stress is an issue that everyone deals with. Stress and anxiety can be counterproductive to the healing process and can also be a factor in the initial illness. Certain spaces may be stressful for one individual but not for another. A relaxing, therapeutic space for a child may not be the same for an elderly individual. Research has shown however, that low-stress, comfortable design through the use of an attractive and visually stimulating environment can reduce stress levels of a patient. (Geimer, 2009) Another factor that has been studied correlating healthcare and stress levels is wait times. Patients experiencing longer wait times, and in poorly designed waiting areas, have reported higher levels of anxiety and ultimately stress. Stress not only contributes to heart disease and other illnesses, but it has a direct effect on the immune system. Stressed individuals have higher levels of the hormone cortisol. High levels of cortisol slow the healing process due to its impact on the delivery of immune cells to parts of the body in need of healing. (Esther, 2009)

Controlling stress levels can be obtained by living a healthy lifestyle. Some levels of stress are healthy and expected, but keeping stress within an acceptable range is a challenge everyone faces. Exercising is a proven method of controlling these levels. Moni Fleshner performed an experiment in which she injected rats with a disease and observed the time it took for them to recover from sickness. The rats were divided into groups and were put through different levels of physical exertion, ranging from non-existent to extreme. She found that the rats who were put through moderate levels of physical exertion healed more quickly than the other groups. She found that the rats in the moderate group produced higher levels of dopamine and serotonin, both of which help to keep stress levels low.

Hospitals are often times highly stressful environments. Rather than making patients feel at home, they often times promote stress and anxiety. Studies have shown that stress may be counterproductive to the healing process by intensifying pain, suppressing the immune system, and potentially causing additional health problems such as insomnia, depression, and even heart problems. Newer hospitals are attempting to solve this issue not simply by adding windows and plants, but by re-thinking the hospital's overall function and organization. Hospitals of the future may move away the intimidating fortresses filled with mazes of corridors and move towards a more open homey village surrounded by functions not typically found in a healthcare facility. These functions may include parks, art displays, wellness centers, hotels, movie theaters, spas, and other activities sources. (Ridley, 2007)

Architects for the new Rikshospitalet University Hospital in Oslo, Norway stated, "We feel that our solution lay more in the domain of town planning than architecture." Their design introduces a long glass roofed structure that resembles a curving street. Treatment areas are clustered around the sides surrounding central courtyards and gardens. Every room in the building has pleasant views of both nature and public spaces.

According to the Environmental Protection Agency, Americans spend up to 90 percent of their lives in indoor environments. These environments often times have poor air circulation causing pollutants to be up to five times more concentrated than outdoor air. Many factors contribute to poor air quality in indoor environments. Some of these factors include: poor outside air quality, location of air intakes, building materiality, furnishings, filtration and ventilation efficiency, and occupant influence. Many harmful chemical compounds are often times found in indoor air. Volatile organic compounds emitted by building materials, furnishings, and cleaning chemicals contribute to poor indoor air quality. Mold, mildew, carbon monoxide, nitrogen dioxide, and particulate matter from cars also affect air quality to a large extent (Frumpink & Coussens, 2007)

Indoor environments in a healthcare facility should take into consideration psychological and social aspects associated with the design. Patients have a need for personal spaces, supportive environments, access to external areas, and access to recreational areas. Boredom is often times associated with conventional hospital design, stemming from a lack of creativity and mental stimulation. Thermal comfort, ventilation, and lighting is often times not controlled by patients in their personal environment. All the users typically have control over is a television. This can diminish any sense of control that a patient may have within a healthcare facility.

Mental stimulation helps give a patient a sense of excitement. Unfortunately, this stimulation typically comes from medical equipment rather than nature in most hospital environments. Signals are used by caregivers to monitor patient's well-being, but these noises are amplified through hard surfaces, and lack of acoustic tile creating a loud, over-stimulating sensation to all inhabitants of the facility. These noises can cause lack of sleep, headaches, stress, and irritability to both patients and workers. (Frumpink & Coussens, 2007)

Addressing all of these problems proves to be challenging as the obvious solutions often times compromise effectiveness of direct medical care. Addressing psychological needs of patients through the design of a building is important, but overall costs may increase as these needs are addressed. However, cost-benefit facts such as shortened stay in hospital, and added value felt by patients as they are surrounded by a more pleasant atmosphere should be considered by designers and investors. Possibilities are endless when creating healthy and sustainable environments.

R E S E A R C H s u m m a r y

Research for my theoretical premise/unifying idea has provided me supportive evidence that nature can indeed influence an individual's healing process in a positive way. My research looked at how our surrounding environments can be molded to best suit the needs of a patient. Stress, anxiety, natural connections to nature, healing gardens, our bodies social and psychological needs, and the overall healing process were the main focuses to my research.

Stress and anxiety proved to have a strong influence on healing. Healthcare facilities have traditionally been depressing places, partly due to design, but also due to the pain and suffering that is sometimes felt within a hospital. It is not the goal of this thesis to change what goes on in a healing environment, but how these things are done. Environments that reduce stress and promote comfort are better healing environments, according to what my research has shown.

Design can influence stress levels through a variety of methods. Homely, relatable spaces make the users feel more at home and at ease. Eliminating confusing circulation patterns and anxiety causing waiting areas can also reduce stress. Interior spaces and ambient features also play a key role in the comfort level of the patient.

My research also shed a positive light on healing gardens. Healing gardens provide a variety of therapeutic benefits to the user. They provide a direct connection between an individual and nature. Being able to momentarily escape the confines of a healthcare facility and relax in an environment that is designed to do so allows for all users of a facility to enjoy the benefits that come from nature. Healing gardens are becoming more common in modern healthcare facilities. These gardens are being seen indoors, outdoors, and on rooftops.

Connections to nature are not exclusive to healing gardens and outdoor spaces. Naturalistic views to nature and natural air flow and sunlight also provide inhabitants with a connection to the outside world. Studies have shown that hospital rooms which have windows with pleasant views typically yielded shorter patient stay times than those without. (Day, 2004)

Interior qualities of a facility also play a key role in the overall mood of patients, families, and staff. Lively, open, homely environments are key qualities that patients wish to experience within a healthcare facility. Poor air quality and stress inducing spaces are not only counterproductive to the healing process, but may create new health implications for inhabitants of the facility. Proper ventilation and airflow can ensure that air quality remains at healthy standards.

Taking into account all of the issues and potential solutions from my research, I feel that it is possible to re-invent the rehabilitation process through design in order to be a process more focused on the patient and their broad spectrum of needs. A holistic approach to healing, addressing not only physical health, but social, spiritual, psychological, occupational, and intellectual health can be accomplished through a more comprehensive healing process.

Nature has been a means of healing for centuries, and it should not be overlooked even with modern advancement of medicine. Alternative healing practices have fewer side effects and often times leave the patient feeling higher levels of overall well-being. By designing a facility which has a marriage with its natural surroundings, physical rehabilitation patients will be surrounded by the healing powers and benefits that nature has been proven to provide.

P R O J E C T

g o a l s

Academic Goals

Provide a theoretical premise/unifying idea which is derived from a need for change in healthcare design

To complete a thorough design of my chosen typology

To add to the stock of knowledge regarding my theoretical premise/unifying idea

Create a document that future students or anyone interested in healthcare and or nature can use as a reference in their own research.

Provide thorough research to my subject providing extensive knowledge on the topic which leads to a complete and well designed final project

Professional Goals

Develop design skills and presentation skills that will help me in my potential future as a licensed architect

Identify what I enjoy working on in regards to a comprehensive project, which may direct my future career path

Complete a project that could stand alone in the professional environment as a thorough design development

Personal Goals

Graduate the architecture program at NDSU and find a career that I enjoy going to everyday

Settle down in an area that I love that allows me to enjoy the things that I love to do, and also provide new experiences and activities for me to discover

Never stop learning and not being afraid to try new things

Travel around the world and experience new cultures

Continue to live an active lifestyle and enjoy the benefits that nature has to offer

T Y P O L O G I C A L
r e s e a r c h

Project: Rehabilitation Center Groot Klimmendaal
Location: Arnhem, Netherlands
Architect: Koen Van Velsen
Size: 14,000 sqm
Constructed: January 2010

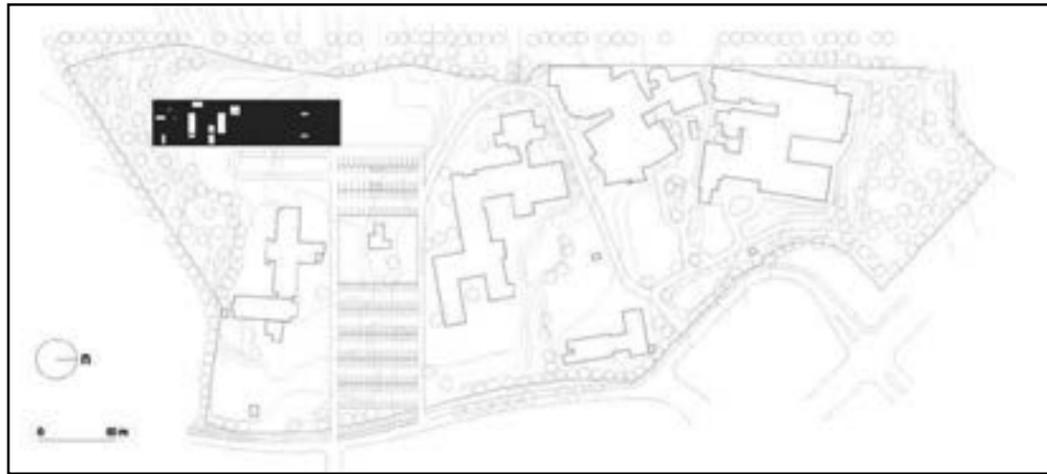


figure 3.1

SITE



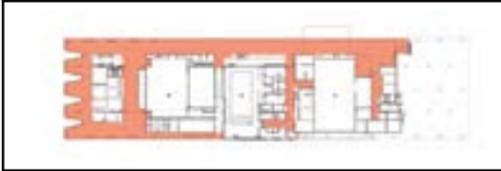
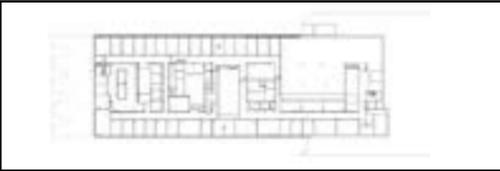
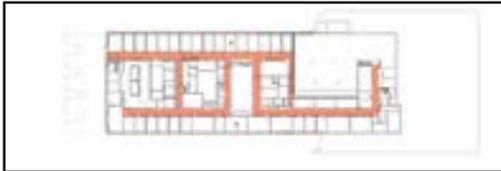
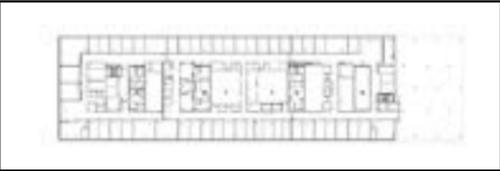
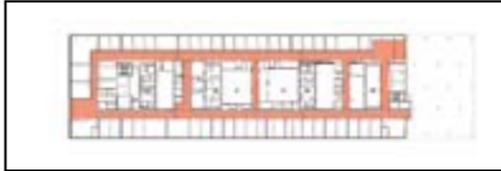
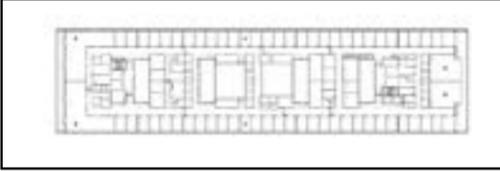
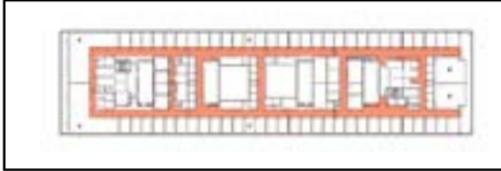
PLAN	CIRCULATION	LEVEL
		1
		2
		3
		4
		5

figure 3.2

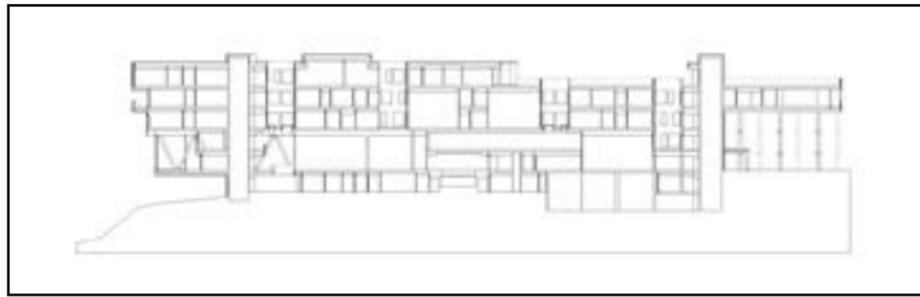
The Rehabilitation Centre Groot Klimmendaal is located in a dense wooded area in the eastern part of the Netherlands. The project itself aims to blend in with its surroundings to create a sense of peace and relaxation. The project is the first step towards a greater master plan which aims to evolve the site into a public park filled with one and two story buildings. Nature is a strong aspect to the master plan and the design attempts to bring the natural environment inside to the patients that occupy the rehabilitation center.

The building has a small footprint to the overall site, but the design still allows for 14,000 square meters of usable space. The program is set up so that the offices are on the ground level, clinical and recreational areas are located above, and on the roof there is a Ronald McDonald house. The program allows for much more than the typical rehabilitation center. Patients and their families have full access to sports facilities, fitness areas, a swimming pool, restaurant, and even a theatre. The clientele is not restricted to patients and their families; community organizations often use the spaces such as schools, theatre groups, and a variety of community clubs and committees. Due to the broad range of usages and inhabitants, the project is located in a central location in the community.

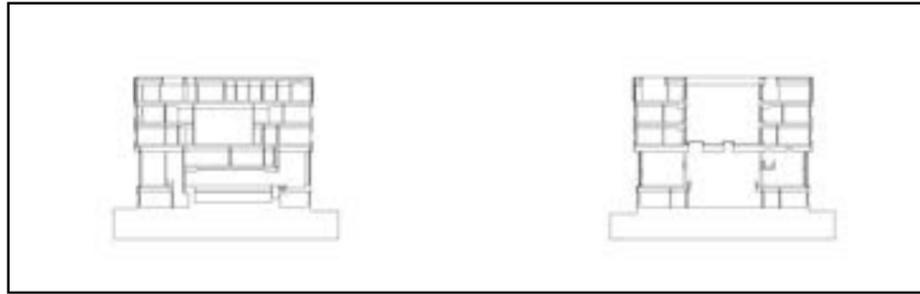
The process for this project included a strong collaboration between architects and clientele. The idea that a positive, physically stimulating environment is beneficial to the revalidation of its patients was a core concept in the design. A strong sense of community and environment help to create spaces that are both positive and rejuvenating. A long wooden staircase is a key component to the interior space and was designed to promote physical activity as inhabitants move from floor to floor. Both direct and indirect routes are used in the circulation of the building. This helps create both familiarity and also promotes mental stimulation as patients explore the different spaces.

The compact design allows for minimal energy consumption. Sustainable materials were chosen for walls, ceilings, and facades which would require little maintenance. The design also addresses sustainability on the social and economic level as the design allows for a vast variety of potential future uses of the building. Voids throughout the center allows for natural light to creep deep into the spaces. The long narrow design also allows for beautiful natural views to the forest in many areas of the building.

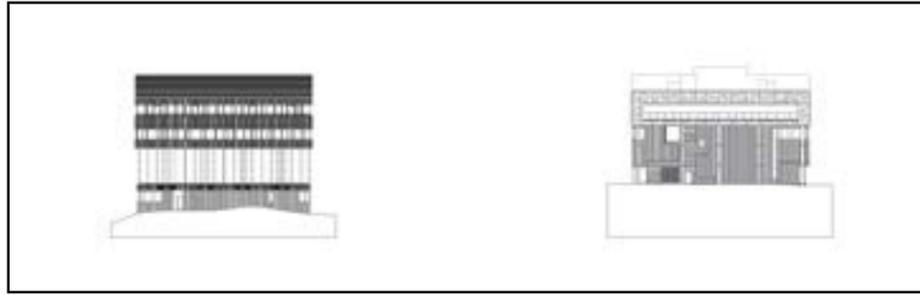
The premise for this design is that connections to nature and the natural environments are beneficial to the mood, and in return, the well-being of the patients. Healthy design invites its users to maintain a healthy, physically active lifestyle. The Groot Klimmendaal building does a superb job in addressing the design problem and creating a connection to nature.



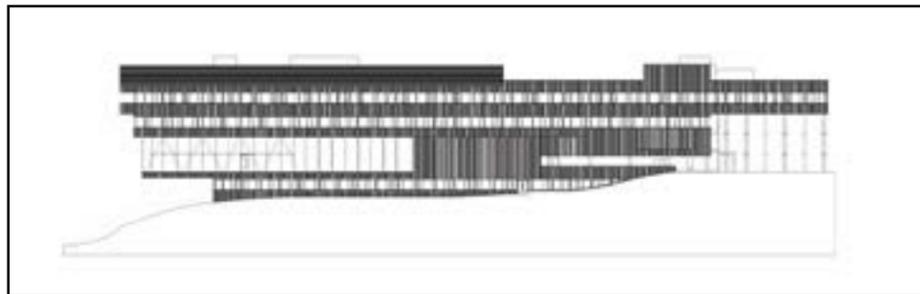
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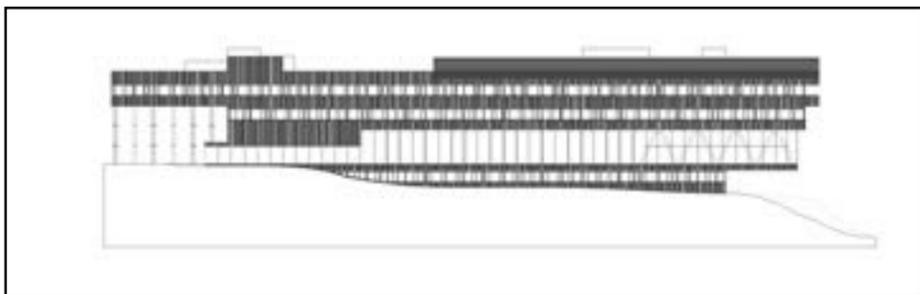
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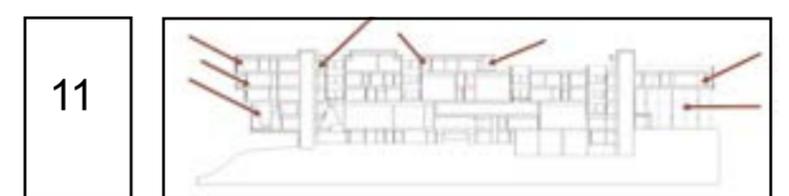
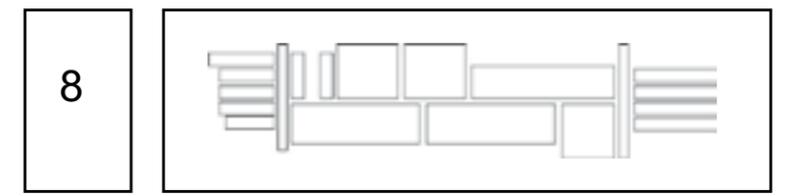
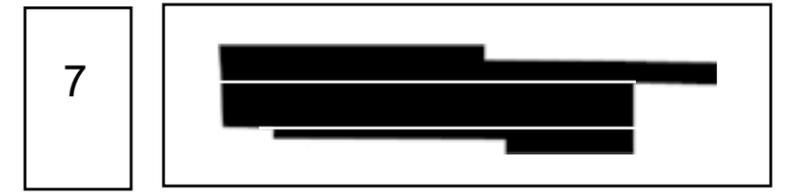
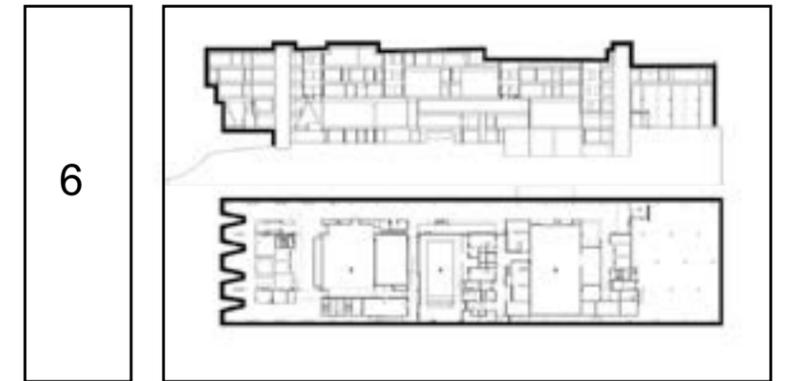
4



5

figure 3.3

- 1 North Section
- 2 East/West Section
- 3 East/West Elevation
- 4 South Elevation
- 5 North Elevation



- 6 Plan to Section
- 7 Massing
- 8 Geometry
- 9 Structure
- 10 Hierachy
- 11 Natural Light

Project: Beit Halochem Rehabilitation Center
Location: Beer Sheva, Israel
Architect: Kimmel-Eshkolot Architects
Size: 6,000 sqm
Constructed: February 2011



figure 3.4

SITE



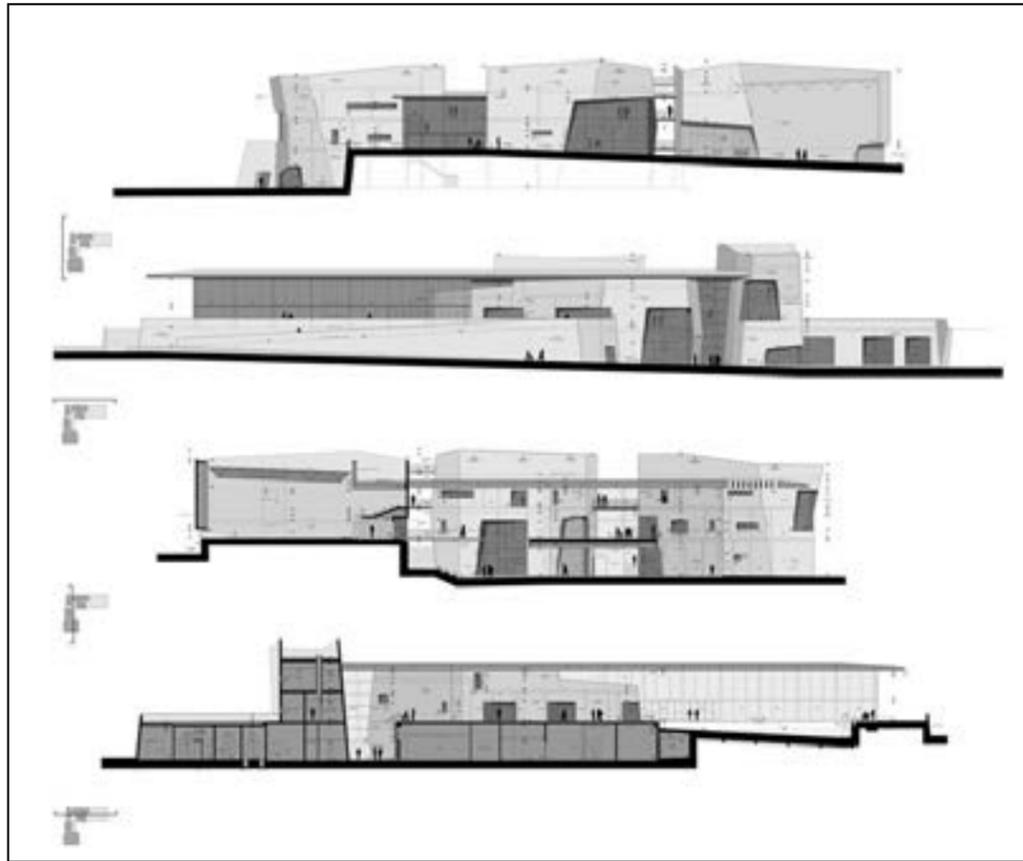
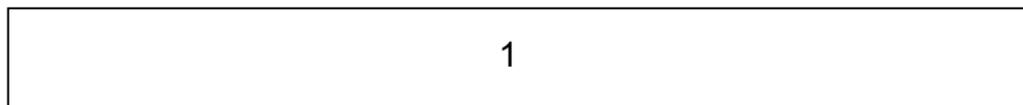
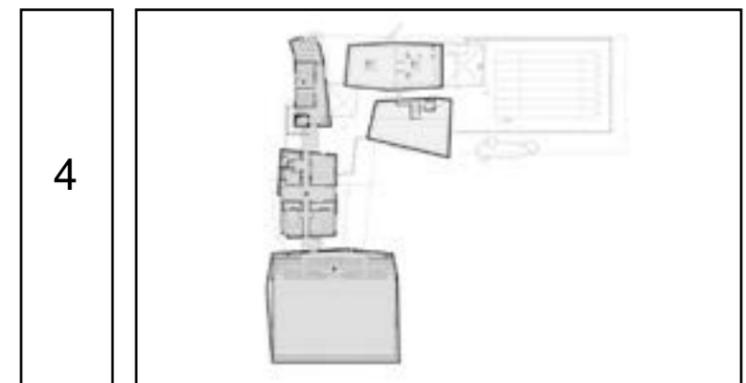


figure 3.5

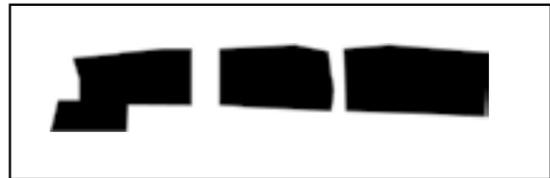


Located on the outskirts of Beer Sheva, Israel, Beit Halochem Rehabilitation Center harnesses inspiration from the desert landscape and the surrounding desolate environment which creates a structure that resembles rocklike formations. The thick structure creates quiet, relaxing personal spaces, while the corridors between these spaces serve as both circulation and community areas. Courtyard spaces are created resulting from long spanning 'bridges' which run between the various masses of the structure. The rehab center serves to restore full health to wounded veterans and create a home for their families. There is a strong sense of 'experience' as one navigates between the thick concrete walls and public spaces throughout the building.

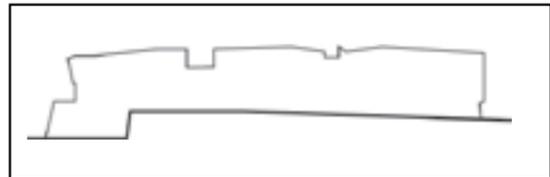
A strong sense of positive and negative through the use of voids allow light to reflect off the surfaces of the center and help diffuse an intense sunlight, creating a tranquil environment. The concrete materiality of the building allows for stored energy to be captured during the day and later released during the cooler nights.



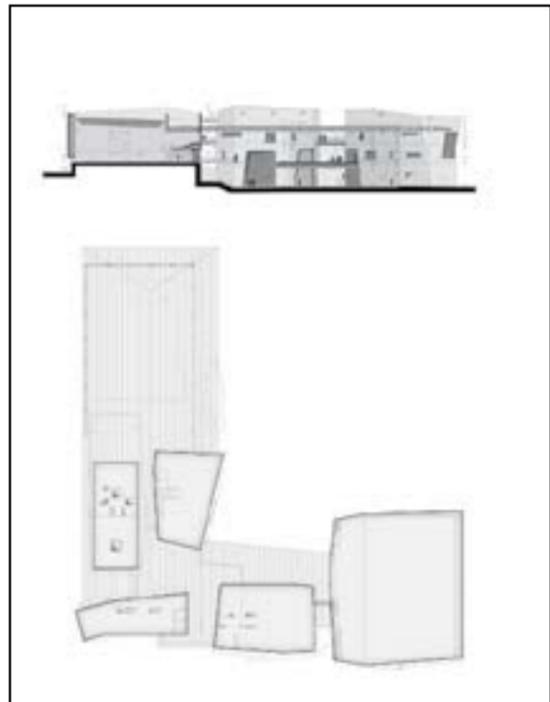
- 1 West Elevation/North Elevation
West Section/North Section
- 2 First Floor Plan
- 3 Second Floor Plan
- 4 Third Floor Plan



1



2



3

- 1 Massing
- 2 Hierarchy
- 3 Plan to Section
- 4 Natural Light
- 5 Structure
- 6 Circulation to Use
- 7 Geometry

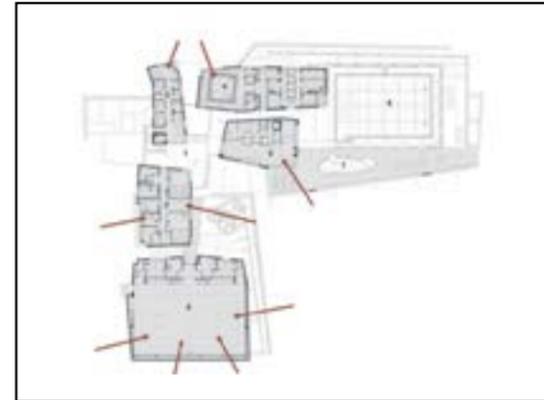
figure 3.6

The environment and design create strong outdoor public spaces allowing the veterans and their families to enjoy the outdoors, giving them a peaceful environment to relax. Due to the physical condition of many wounded veterans accessibility was a major design aspect for the center. With varying elevations throughout the interior and outdoor spaces, ramps are in place as well as wider circulation paths to allow comfortable living conditions for the patients.

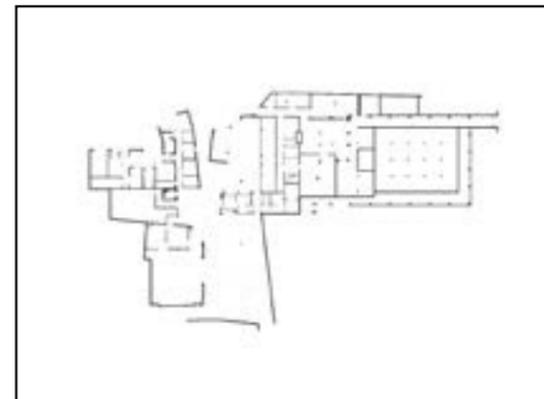
Community and family are two terms the architects kept in mind while designing this rehabilitation center. Not only does the program allow for families to remain with injured veterans, it allows for members within the community to experience and use the spaces within the center. Community rooms are used by different organizations and clubs within the community which brings all types of community members into the structure. A place of healing should not be restricted to patients and practitioners. Diversity creates a sense of comfort and normal to the patients. They do not feel isolated from the community with the presence of both familiar and new faces alike.

Architecturally, the design for Beit Halochem Rehabilitation Centre is both creative and functional. The negatives and voids are used in a way that allows circulation and natural elements such as sunlight to be drawn into the building. Strong views to the landscape can be obtained from nearly every space within the building. It is truly a place of healing, and the design allows it to be.

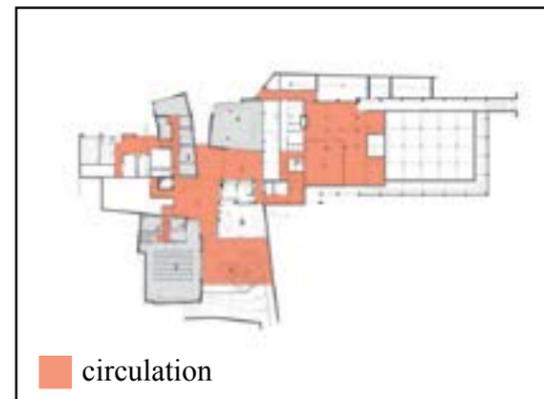
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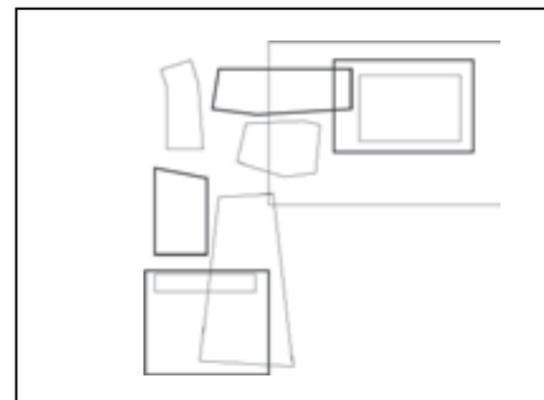
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6



7



Project: Copenhagen Healthcare Center
Location: Copenhagen, Denmark
Architect: NORD Architects
Size: 2500 sqm
Constructed: 2011



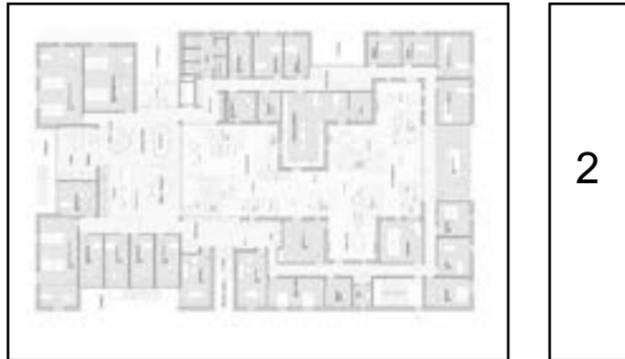
figure 3.7

SITE

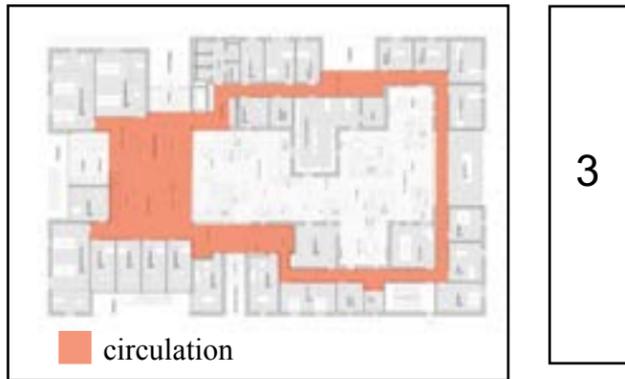




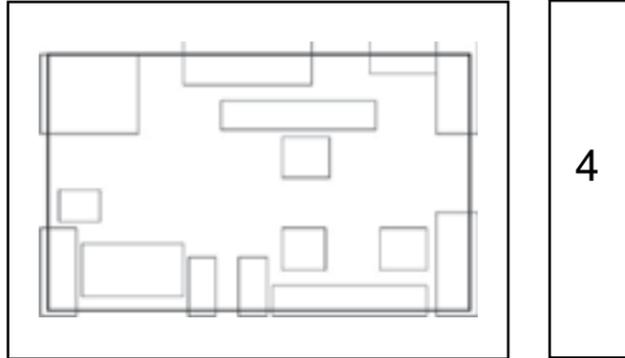
1



2



3



4

figure 3.8

- 1 First Floor Plan
- 2 Second Floor Plan
- 3 Circulation to Use
- 4 Geometry

The Copenhagen Healthcare Center is located in Copenhagen, Denmark. The typology is cancer treatment and education. Nord Architects philosophy for this project was that architecture can be a healing influence through the use of a human scale within the spaces and the integration of a homey atmosphere. Their goal for the design of this project was not to create a place where you go only when you become sick, but a place where you come to heal, obtain knowledge, and have fun.

Nord Architects have an impressive history when it comes to reinventing institutionalized buildings. They create institutional buildings that are not the typical brick boxes that we seem to have become accustomed to. The form of the building resembles a series of small houses. The shapes resemble homes that we may all be familiar with, like monopoly houses or general houses we may have watched in cartoons when we were younger. This form allows the building to become a landmark in the community, but without losing the comfortable human scale for the patients.

The intent behind the experience for the patient was to provide them with the most comfortable, relaxing stay possible. As a newly diagnosed cancer patient attempts to take on the identity as a cancer patient, the outlook may look overwhelming and bleak. There are no large reception areas or secretaries running around, instead there are many volunteers consisting of individuals who have all dealt with cancer on some level and may know what the patient is going through.

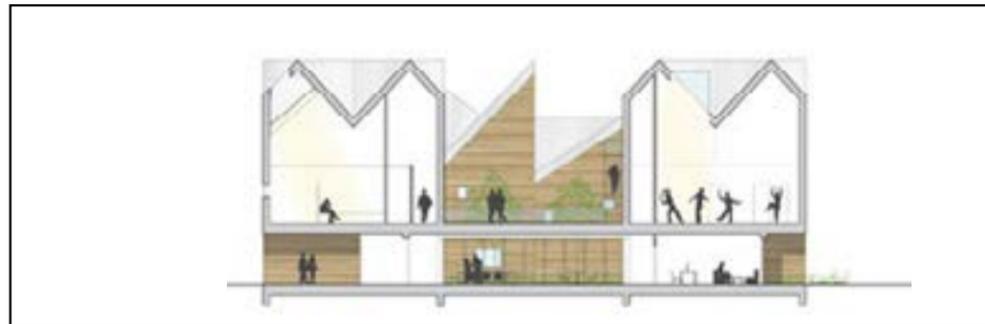
The healthcare center has a large inner courtyard space which provides scheduled activities and also a place to relax and meditate. At this day in age many young people are being diagnosed with cancer. It is important for them to know that healing is not exclusively about rest. The inner courtyard provides spaces for physical activity, while the building itself offers activities such as rock climbing and strength training.

As previously mentioned, the Copenhagen Healthcare Center is not exclusive to cancer patients. Preventative knowledge through the guidance of a healthy lifestyle programs are integrated into the program. Knowing how to prepare healthy meals, and learning methods to remain positive when you or a loved one is going through cancer are taught at the center.

The architecture for this project does a great deal in providing a homely relaxing environment that is beneficial to the healing process. The center has attempted to reinvent the healthcare system not only through design but overall experience. From the moment you walk in the doors to the moment you leave, a new method of healing is implemented. No longer do you wait in crowded waiting rooms and travel down long white corridors but instead you are immersed in a community that promotes life and excitement.



1



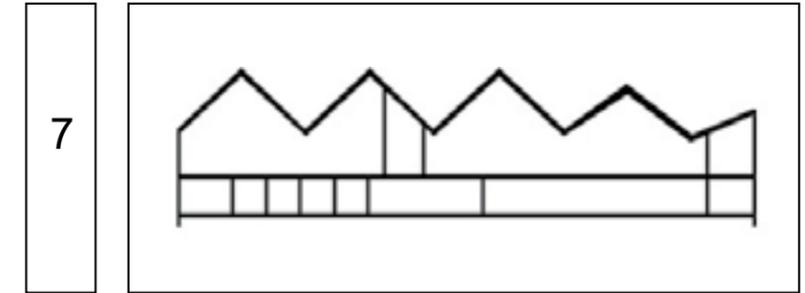
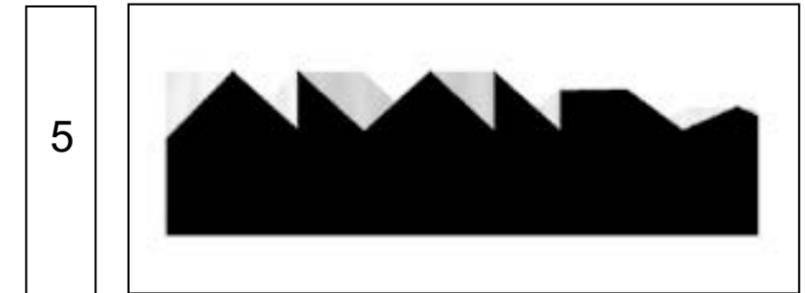
2



3

figure 3.9

- 1 North Section
- 2 South Section
- 3 West Section
- 4 Natural Light
- 5 Massing
- 6 Hierarchy
- 7 Structure



C A S E S T U D Y

s u m m a r y

When searching for case studies I attempted to find projects that were of my chosen typology, and also projects that had a clear connection to nature and the surrounding environment. Each project that I looked at was different, but they all gave me good insight as to programmatic requirements, healing processes, and ways in which to create connections to the natural environment. The case studies that I found not only gave insight to my theoretical premises but strongly supported them.

One of the strongest elements that each project had in common was their views regarding traditional institutional design, and how these institutional buildings could be better designed in order to foster a more appealing environment towards healing. No longer does a healthcare facility need to be a brick box with sterile, dead feeling spaces inside. These case studies have shown me that colorful, exciting, homely environments can replace these institutional structures that have become the norm.

The patients should feel at ease when they walk into a healing center, not anxious and sick. This was accomplished in Groot Klimmendaal through the use of large windows which provided views to nature and natural light. Views of nature are important to this thesis project, but views to other spaces inside the building are also important. Large, open spaces provide a sense of community to the inhabitants, and may make the patient more likely to explore other parts of the building, promoting a healthy lifestyle and creating an experience. One of the most influential aspects I took away from these case studies was that it is not just architecture and nature that should be looked at, but also the sequence of events and how these events are experienced as one goes through the healing process. A more holistic approach is typically necessary, and each individual has different needs and preferences. All three case studies had different spatial arrangements, but the one that stuck out the most to me was Groot Klimmendaal's pinwheel arrangement, consisting of a central space with other functional spaces branching off from there. This allows for users to interact with each other and the and also eliminates uncomfortable enclosed waiting spaces and long corridors. Being able to see destinations rather than travel down corridors that are seemingly mazes gives the user a much more comfortable sense of place.

Each case study I researched took inspirations from the site for the design of the building. They allowed the structure to blend in with the site which created harmonious relationships between built and natural environment. The case studies proved how powerful nature can be in regards to the healing process. Each project reacted to the site differently, but they all harnessed nature in some way and brought those elements into the experience of the patient. Indoor and outdoor gardens provide spaces for activity and leisure. Newer healthcare facilities are finally starting to see the importance of nature in the healing process, and healing gardens becoming more common this day in age.

Typically a rehabilitation center is a space which caters to the patient and the practitioners. These cases studies provided spaces for families and members of the community. Being able to bring your family and friends along can make the patient more relaxed and help create a homely feeling. Spaces available for community events and classes allow for patients to feel like they are not shunned from their community. These spaces may include classes on preventative care, or health in general. A healing center should not only focus on healing, but on health and preventative care. Copenhagen Healthcare Center is open to the public. Their central garden is a public space which is used by patients and community members alike. Their program has a secondary focus on educating the public on cancer and how to cope with a diagnosis or family member undergoing treatment. This allows for a variety of interactions with a variety of people within the center.

These case studies provided a variety of insights regarding the successful design of a rehabilitation center. Site selection, connections with the natural environment, spatial organizations, programs, and overall experience are all important aspects of the healing process.

History of Healthcare

Hospitals and healthcare facilities play a familiar role in our lives. We often times are born within the walls of a hospital and many of us spend our final moments in a similar setting. Our experiences vary from pain, joy, sadness, anxiety, and even happiness while we inhabit a healthcare facility. The history of healthcare involves both cultural and social aspects. Constant changing definitions of health and sickness, ecology of disease, religion, sense of personal responsibility of wellness, and modern science all play a role in the timeline of healthcare.

Evidence of healthcare can be linked as far back as recorded history can provide. In these ancient times medicine and healing were linked to religious views. The earliest recorded medical practices can be traced back to ancient Egyptian temples. These temples were dedicated to the healing god Asclepius. Temples were often located in forested areas near springs or water sources. Water was believed to have cleansing properties and the mountains and wooden areas were believed to house the souls of good spirits. (Guenter B. Rise, M.D., Ph.D. 1999) Asclepieion temples were carefully designed to provide spaces that were conducive to healing. A connection between healing and worship provided a holistic approach to healing.



Temple of Asclepius, Villa Borghese Gardens, Rome

figure4.1

Around 430 BC an Asclepieion temple was constructed in the Greek city of Epidaurus. Sick people traveled long distances to be healed within the walls of this temple. With Christianity beliefs in the Roman Empire new practices and beliefs associated with healthcare came to be. The First Council of Nicaea in 325 A.D. established the construction of hospitals in every town or city which had a cathedral. These hospitals contained primary physician's (archiatroi), nurses (hypourgoi), and orderlies (hyperetai). These hospitals laid the ground work for the advancement of modern medicine. Doctors and physicians were recording their diagnosis's and studies in manuscripts which would be shared with other physicians and future generations. Specialized centers for specific diseases such as leprosy were being established, as well as systematic treatment processes designed to treat patients on holistic levels of wellness. (Guenter B. Rise, M.D., Ph.D. 1999)

Medieval Europe followed a similar healthcare system as the Roman Empire. Hospitals were in the form of religious communities with primary care provided by nuns and monks. Many of these healing establishments were connected to monasteries. They provided care for the sick but also catered for refugees, the poor, and pilgrims. The endowments for these hospitals were typically farms which provided food for patients and guests. As Christian views evolved into a more secular one, medical practices slowly changed during the sixteenth and seventeenth centuries. By the eighteenth century modern hospitals served primarily medical needs. Hospitals were staffed with nurses, physicians, and surgeons rather than monks and healers.

The age of Enlightenment, which began in the 18th century, shed a new light on hospitals and their design. Highly ornamented facades for institutional buildings slowly changed into dull, repetitive structures that we often associate with hospitals. As cities became more densely populated, the hospitals needed to be designed to house larger quantities of patients. With migration and overpopulation, poor hygiene and sickness became more common and in turn filled the hospitals to their capacity. Hospitals became places where you would only dare venture upon last resort. Wealthy individuals would not dare enter a hospital, but instead would have a private physician visit them at home. During the late 19th century the idea of infection and diseases became the precursor for the sterile white environments that many modern hospitals still resemble today. In order to create these sterile environments, environments needed to become minimal and simplistic.

By the mid 20th century modern medicine was advancing so quickly that previous hospitals were becoming obsolete. During this time large hospitals were designed as to support the changing programmatic requirements of modern medicine facilities. Much criticism has sprouted from these ‘super hospitals’ as they were often designed quickly with low standards. Older hospitals did not have the space required to house newer equipment that came through medical advancement; due to this many facilities underwent multiple additions creating irregularly shaped buildings with confusing circulation patterns. (Guenter B. Rise, M.D., Ph.D. 1999)

In the late 20th century hospital designed shifted towards an emphasis on human comfort. New hospitals were constructed which focused on the patient by shedding the white, sterile environments and introducing a more homely comfortable feeling for the patient. A transition from large hospitals to smaller clinics and specialized hospitals began appearing in cities and rural communities alike. Healthcare is always changing, and with medical advancement and changing standards of well-being, our hospitals and healthcare facilities will continue to evolve to suit our society’s current needs.

History of Physical Rehabilitation

Physical Rehabilitation as a means of healing has been around as far back as prehistoric times. Physical methods of healing have included heat, cold, massage, water, light, exercise, and electricity. The first recorded accounts of physical healing techniques are traced back to Hippocrates as far back as 400 B.C. However it was not recognized as official medicine until 1947 when it became known as Physical Medicine and Rehabilitation.

Empirical trials emerged during World War I in an attempt to rehabilitate injured and disabled soldiers. Therapeutic methods were developed in order to restore a high quality of life to injured war veterans involving heat, exercise, electrical stimulation, diathermy, heliotherapy, and massage. Physical exercise and regimes were being explored to restore coordination and performance. These new methods were being introduced in specialized Army Hospitals.

In the 1920’s physical therapy and psychiatry had begun to gain acceptance in the medical community and organizations were being formed including the American Medical Association Council on Physical Therapy and also the American Society of Physical Therapy Physicians. (Bradley, 2003) In 1926 formal educational standards were put into place for Physiatry. Dr. John Stanley Coulter became the first accredited academic physician in the physical medicine field. He soon became known as a leader in the field as he developed educational standards in the field over the next two decades.

By the onset of World War II society started to understand the importance of physical treatment and rehabilitation due to the high number of disabled veterans returning home from service. During this same time period thousands of individuals were being affected by the poliomyelitis epidemic. President Franklin D. Roosevelt, one of the most popular public figures of his time, returned to the public eye only after being treated at a physical therapy center in Georgia to treat his polio condition. Demand for physicians trained in comprehensive rehabilitation increased as patients demanded physical, mental, emotional, social, and vocational healing.



figure 4.2

Treatment center for children affected by Polio

By the mid twentieth century physical medicine, rehabilitation medicine, and electromyography had formed a more cohesive union. Electromyography (EMG) became a vastly important tool in modern medicine, making it possible to pinpoint problems in the neuromuscular system, making it possible to locate and evaluate sensory and muscular components in an individual's nervous system. (Bradley, 2003)

In 1994 there were a total of 4642 Board Certified Psychiatrists. The average age of these psychiatrists was 40 years of age and steadily dropping. The need for physical rehabilitation continues to increase and smaller clinics began to show up in nearly every community. The field continues to grow as modern medical advancement allows us to achieve higher quality of life throughout all stages of life. The field is challenged to provide high quality of care to ensure a high standard of life.

History of Bemidji, Minnesota

Before Bemidji officially became a town, a small band of Leech Lake Indians lived along the south shore of Lake Bemidji. Old photographs show the tribal band living in teepees and living off the land. They harvested wild rice annually and would also rely on buffalo hunts to provide themselves with food and hides.

The town of Bemidji was initially surveyed in 1874, and later became an officially recognized township on June 26, 1897. The name Bemidji was derived from the Ojibway phrase Lake Bemejigamaug, which is defined as the lake with water running across it. The Mississippi River runs through Lake Bemidji. This marriage of lake and river also create a connection between Lake Bemidji and Lake Irvine.

A majority of the initial homesteaders were of Scandinavian descent. They migrated east from the Dakota prairies after they heard of the beautiful lakes and forests. Homestead claims started appearing early near the south end of Lake Bemidji and a series of wagon trails led to nearby more developed townships. Carr Lake Township was one of these townships, which included a school, co-op, farmer's club, 4-h clubs, sports teams, and a family recreation center. (Amble, n.d.) The Carr Lake Township continued to support the newly established community of Bemidji as it quickly began to grow.

The first official road in the Bemidji Township was established in 1897 along the south shoreline of Lake Bemidji. This road ran along the south shore of Lake Bemidji along the eastern shore of Lake Irvine into the neighboring community of Carr Lake. Businesses began appearing at this same time. Before the turn of the 19th century a sawmill, hotel, blacksmith shop, bank, meat market, general store, and three publishing companies were established. By 1898 two railroads passed through Bemidji, creating even more commerce to the town, which had a current population of 2,000. (Amble, n.d.)

Transportation during these early settlement periods was done mainly by horseback. Merchants and loggers helped create the initial roads so they could travel easier between nearby villages. In 1896 a stage was incorporated which ran between Park Rapids and Bemidji. This ox-drawn wagon left Bemidji around 6:00 a.m. and would arrive back at 10:00 p.m. Steam powered paddleboats were commonly seen on the lake transporting loggers between lumbercamps and the village. Other paddle boats were simply used as recreational means transporting villagers to beaches and other local favorite destinations around the lake.



figure 4.3

Third Street Bemidji, MN, 1918

By 1910 Bemidji had five different railroad companies which shipped logs, lumber, freight, and passengers. Around this same time automobiles started to appear in the Bemidji area. This brought an increased demand for improved infrastructure. During the next decade the population steadily inclined and the local economy grew, primarily due to the local commerce and the lumber industry. (Rosemary, n.d.)

Hospitals and healthcare services have been part of Bemidji since the late nineteenth century. During that time period Bemidji officially consisted of a few stores, a small post office, and about six homes. The first hospital was established by the Benedictine sisters of the motherhouse in Duluth. They leased the second floor of a small store on Third Street, the first commercial street in Bemidji which is still popular today, and created a temporary hospital called St. Anthony's. It could only accommodate about 20 patients. This hospital later became known as the "Lumberjack Hospital," because the sisters would travel into the woods and sell hospital insurance tickets to local lumberjacks for one dollar in an attempt finance the hospital.

Since then a larger Lutheran Hospital was built in 1927 and the Bemidji Community Hospital was built in 1929, undergoing three additions throughout the next thirty years. In 1981 a new corporation was formed called the North Country Health Services. The subsidiary corporations included: North Country Hospital, North Country Nursing & Rehabilitation Center, and North Country Housing and North Country Health Services Foundation. Today this facility serves over 55,000 people and offers state of the art medical services. (Amble, n.d.)

"Through all the years of growth and change from the Lumberjack Hospital to a regional health care center, the corporation's mission has remained constant - to meet the needs and expectations of the people of north central Minnesota." (Kelly, n.d.)

S I T E A N A L Y S I S

n a r r a t i v e

The site of a project is crucial to the design. The design of a building should not merely focus on the inhabitants and programmatic requirements, but also the surrounding environment. This thesis project attempts to create a harmonious connection between the natural and built environments. In order to accomplish this, a complete understanding of all aspects of the site must be uncovered.

I explored many sites in order to find one that I felt had all the strong sense of nature that I was looking for. The site is amongst an area that is undergoing new development in an attempt to create a lively area on the south shores of Lake Bemidji. Although there are existing structures in close proximity to the site, I immediately felt secluded and protected from the fast paced urban environment upon arriving to my site. This site was chosen primarily due to the experience I had with the site. The following narrative documents my initial visit to the site.

My journey to the site began in downtown Bemidji, MN. It was a cool, windy day and it had been raining off and on all morning. As I drive along the lake front I can see my site from across the lake. It is dominated by a large patch of jack pine trees on the immediate edge of the commercial development of the city. I drive further until I reach a newly constructed road. The road was put into place with the construction of a new event center, and the hopeful development of properties to draw tourists and locals alike to this part of the town.

As I travel down this road, the concrete slowly turns to damp grass and green spaces. I already feel as if I am leaving the city and entering a more natural environment. The road I am on turns to gravel and this is where my site begins. I immediately feel protected by the site. I am surrounded by jack pine and birch trees on the south side of the site, providing a barrier between the site and a residential development. To the north of the site there are two small drainage ponds, and a small distance further is the shoreline of Lake Bemidji.

The density of the trees provides protection from noise pollution coming from nearby streets. You cannot even see through the trees they are so thick. Recent storms and high winds have caused many of the jack pine trees to snap about halfway up the trunk. The site tells a story written through natural events and changing seasons. A mixture of live and dead trees help define the history of the site. The tall grasses tell me that this site has not had much human experience.

Between my site and the shoreline there is a state park trail system which runs more than halfway around the lake. It begins at the State Park on the north shore and runs all the way to Bemidji State University on the west side of the lake. I see bikers ride past my site. They do not stop to experience the site, but I am sure that it, and the miles of similar terrain have had an effect on them. It has already had an effect on me.

The wind has picked up and I can faintly hear the waves crashing against the shoreline. The wind whistles between the trees and drowns out any worries or stress I may have had prior to experiencing the site. Thus far on my visit I have seen more animals than humans. A family of loons is swimming near the shore, smaller birds bounce between the trees, and signs of deer are still fresh in the soft gravel.

It is not hard to justify why I chose this site for my thesis. I immediately feel at ease, and peaceful as I inhabit the site. I am already envisioning my project on the site, which is acting as the main inspiration for the rehab center at this point. I see many possibilities in which to create a harmonious connection between the site and structure.

Views and Vistas

The natural views obtained while inhabiting this site are among the strongest features. The beautiful shoreline to the north and dense trees to the south cannot be ignored. Open grassy areas to the east and west fade away into forested areas. There is also public activity commonly present due to the state park trail system which runs along the shoreline, creating an active and exciting sense of place.

North

The northern border to the site contains grassy areas and two small runoff ponds. Further north lies the state park trail system and the shoreline of Lake Bemidji which is protected by a grove of small trees and shrubs. Views can be obtained all the way across the lake while standing in the center of the site.



While standing from a central location on the site and looking south you will see a dense patch of jack pine trees. They are dense enough that they block views of the residential development further south of the site. Storms and high winds have caused a lot of damage to the trees. There are many fallen trees and branches giving it unique character.



East & West

Looking east there is a small pond amongst an open field which eventually runs into a forested area. To the west of the site you can see a parking lot and the newly built Sanford Event Center.



Textures in Plan



figure 5.1

The site is a transition point between commercial and residential. The unforgiving, cold concrete fades to soft grasses and thick pine trees. A large parking lot to the east lies empty a majority of the time, unless an event is going on. Grasses and shrubs line the waters edge. The site is so rich in natural elements it almost feels out of place in its urban setting.

Material Textures



Material textures on the site include tranquil shades of yellows and greens, depending on the season. The reflection of the trees off of the water yield a greenish blue hue visible from the site. The pine trees shed their needles for the winter amongst the fallen branches and trees. The material objects of the site define a story of the seasons effects on the site.

Light Quality



Trees on the southern edge of the site diffuse direct sunlight into a more comfortable level. Morning sun is more intense than evening due to more exposure on the eastern side of the site. Trees along the shore also eliminate a majority of the glare coming off the lake.

Vegetation



Jack pine and trembling aspen trees are scattered throughout the site. A variety of marsh grasses and blue stem grass make up roughly 90% of the ground cover. With the vast variety of vegetation on the site the aspect of changing seasons is unavoidable to inhabitants of the site. Thick brush and trees block out the surrounding city, providing a place of solitude and tranquility.

Water



Lake Bemidji is a stones throw north of my site. The southern side of Lake Bemidji tends to be more recreational than the north, although this specific area tends to remain tranquil throughout the year. Two small ponds are also located directly on the site. They serve as water runoff for the site and also nearby parking lots.

Wildlife



During my site visit I encountered an abundance of wildlife. Loons were present near the shoreline and many smaller birds were bouncing between trees on the site. During Summer and Fall months geese can also be encountered near the site. Rabbits, and other small mammals are commonly present in the area. A small trout pond south of my site is located in a small part space providing oppurtunity for children to feed and watch the trout. Deer, eagles, hawks, snakes, and turtles are also present in the area, although they are not seen as often as other wildlife.

Human Characteristic



Although the site seems secluded, it is surrounded by a busy urban environment. During local events, like concerts and hockey games, the nearby event center becomes a hub of activity and human interactions. Directly on the site however, human interactions are limited to users of the state park trail system. The site itself has very few signs of direct human influence. A residential development to the south of the site is embedded a highly forested area.

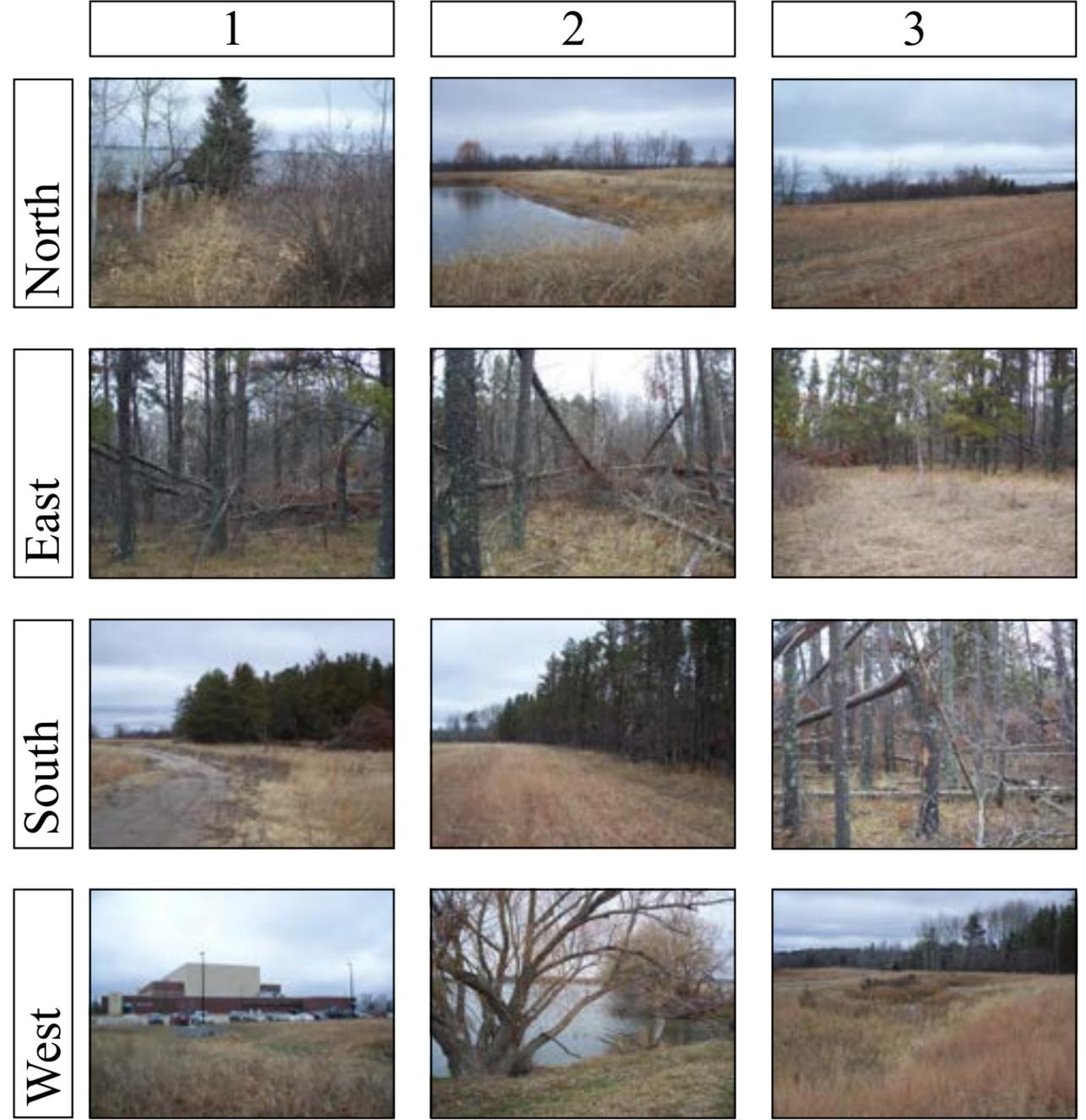
Distress



Distress to the site is apparent through dead trees and fallen logs. High winds coming off the lake create a shoreline that has become rigid through time. The fallen trees create a forested environment that has the qualities of time and varying weather conditions. High southern winds create large waves which over time have eroded the soils of the shore, exposing large rocks and interesting soil patterns.



figure 5.2



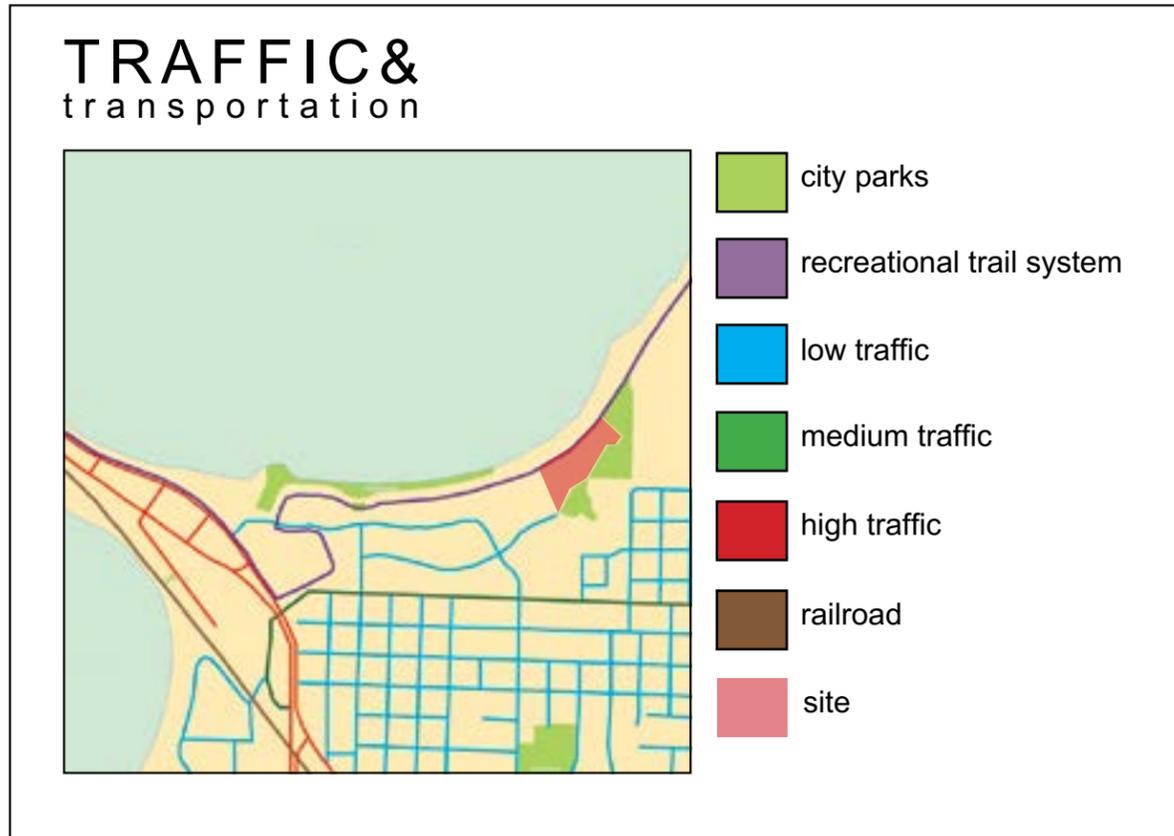


figure 6.1

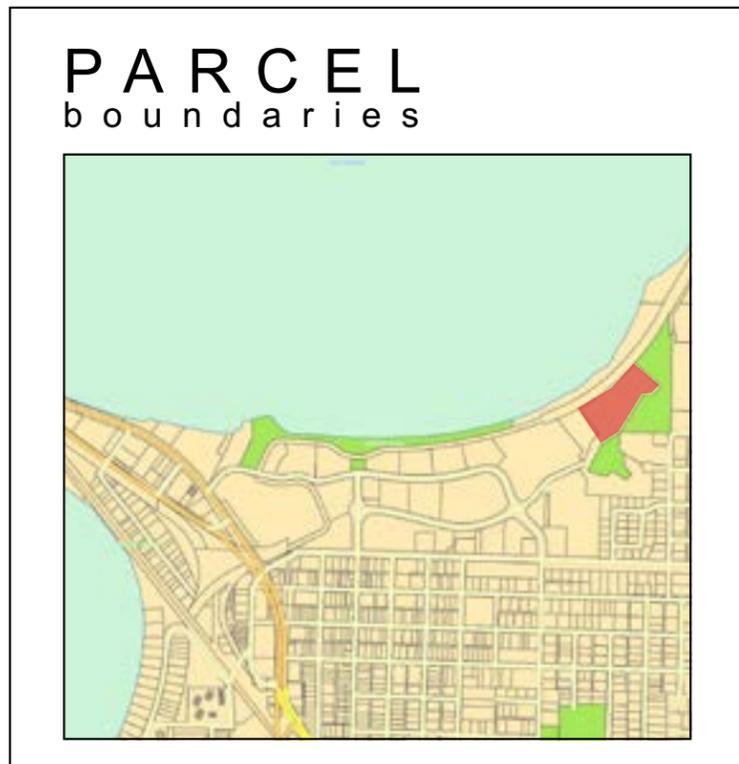


figure 6.2

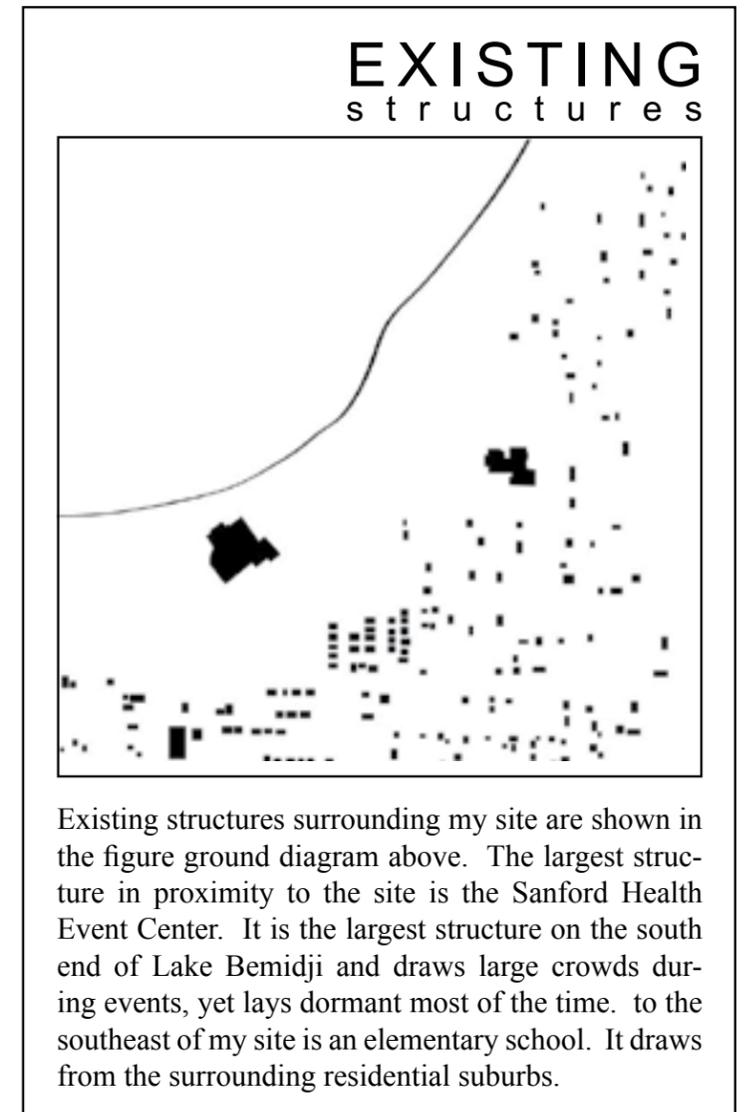


figure 6.3



Top soils to the site consist of coarse sands and gravel classified as brown and damp. Below the fine sands, seams and layers of slightly plastic sandy loam can be found. Pebbles and loamy sand with gravel is also mixed in below the top soil to varying depths. These soils are classified as browns and vary between moist and very moist. Soils become saturated at approximately 65 inches depth. Water table fluctuates depending on the season but remains relatively constant, only fluctuating a few inches annually.

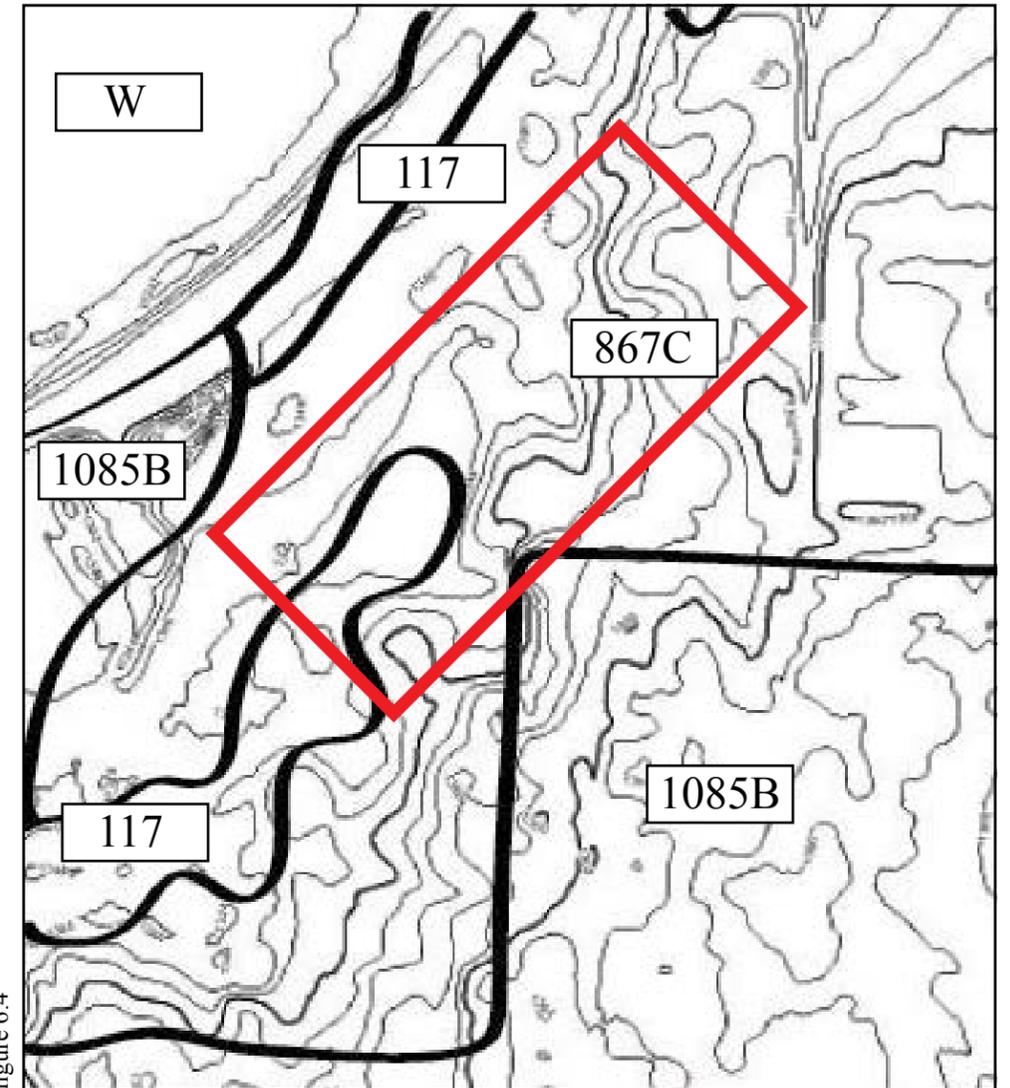


figure 6.4

- water W
- urban land graycalm complex 1085B
- graycalm menahga complex 867C
- cormant loamy fine sand 117
- site

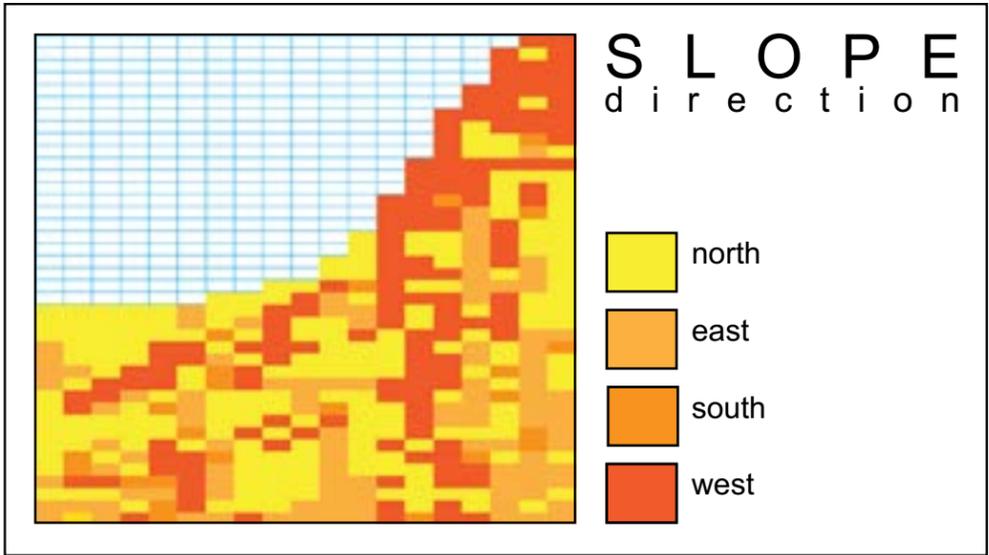
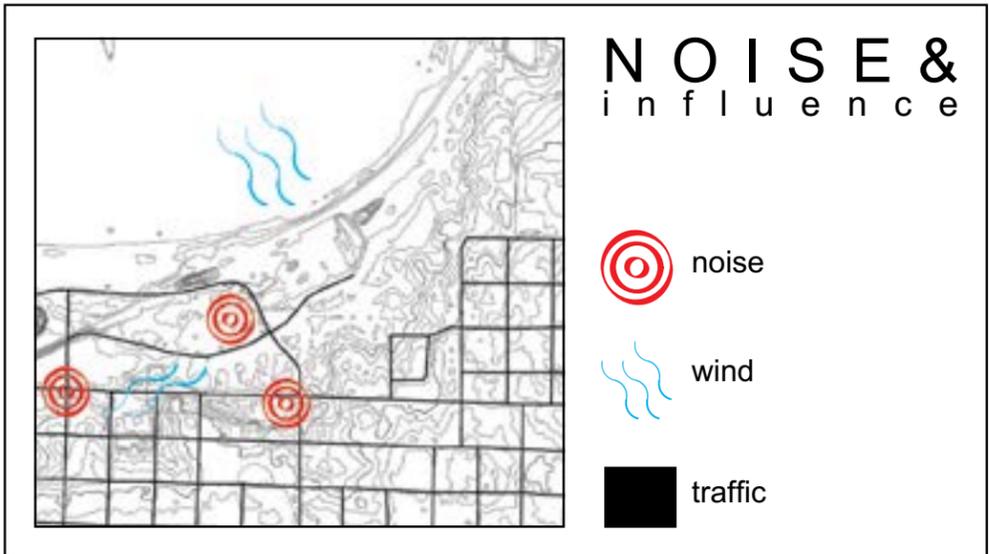
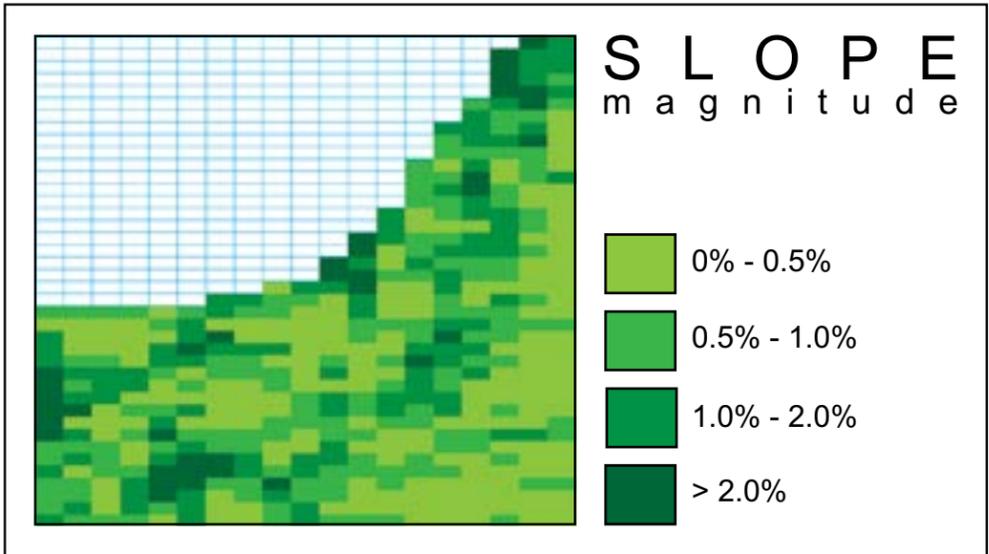
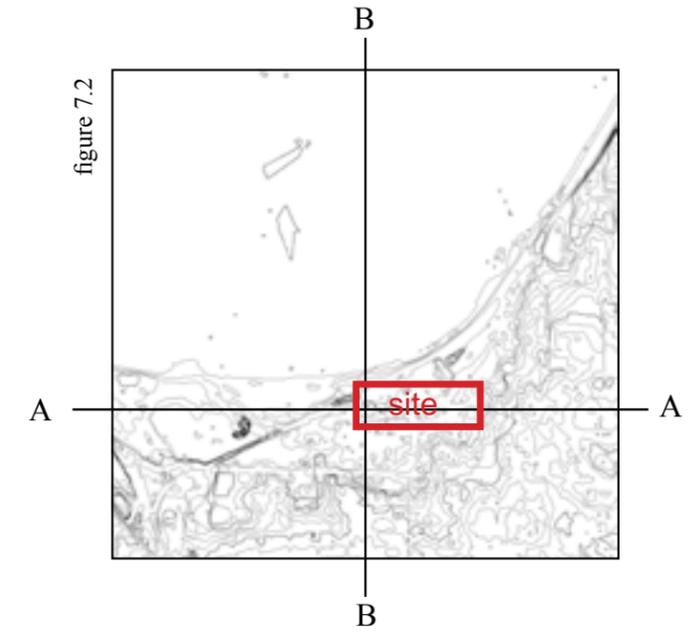


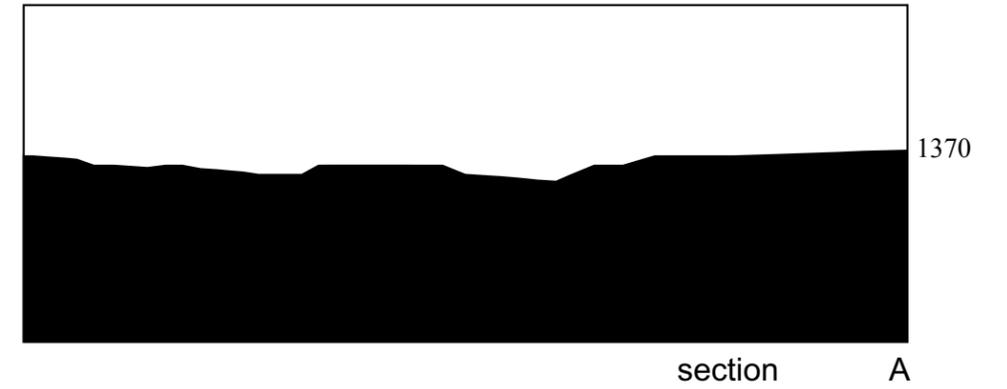
figure 7.1



SLOPES
analysis



1348



1324



CLIMATE

d a t a

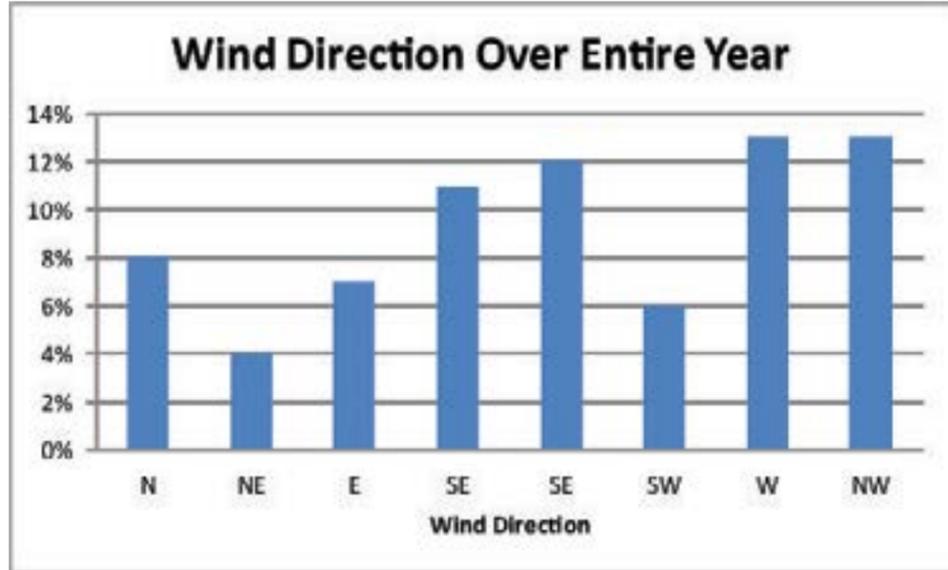
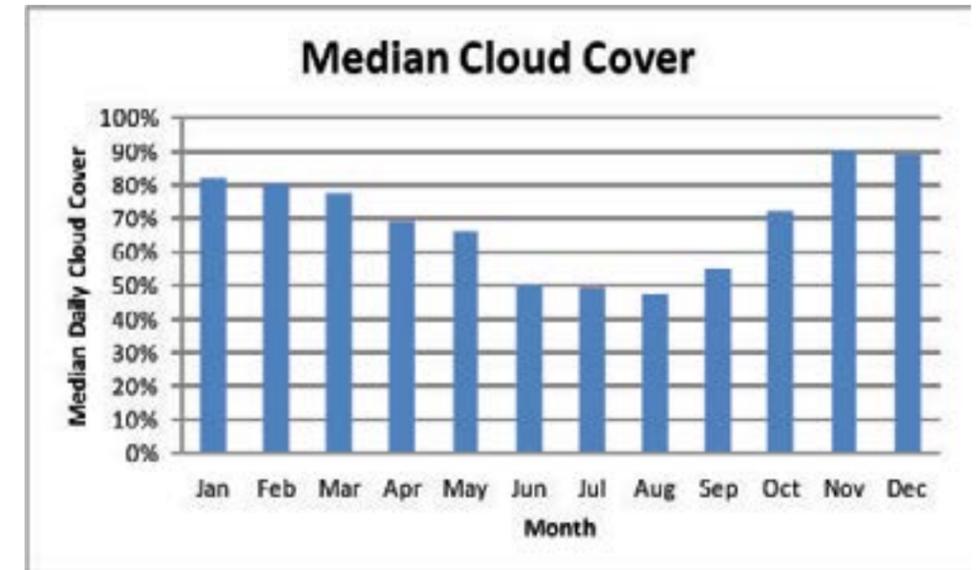
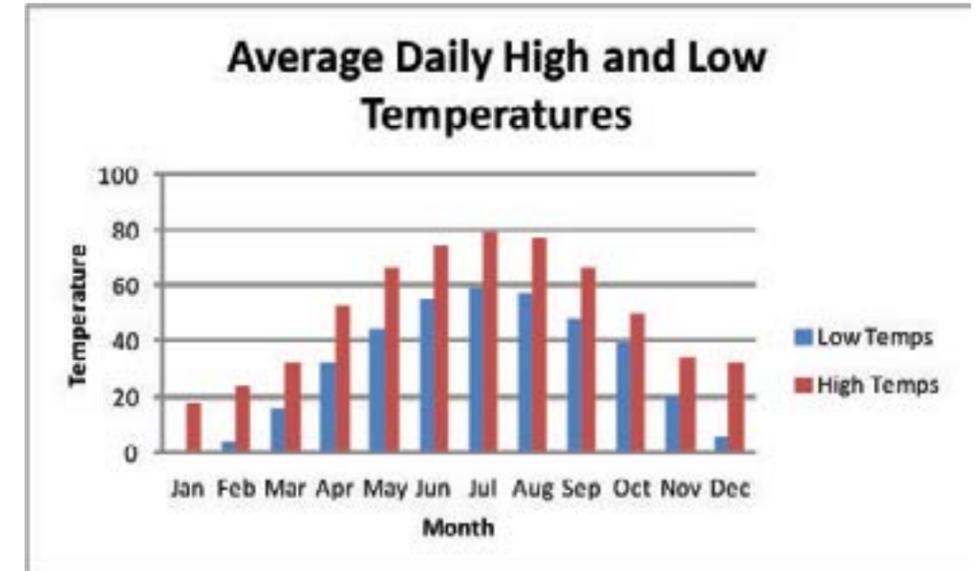
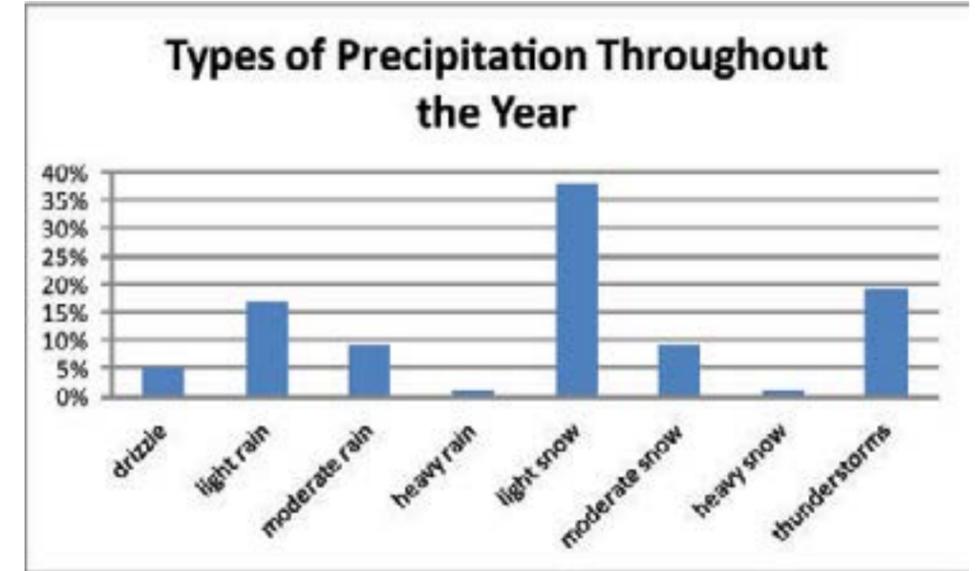
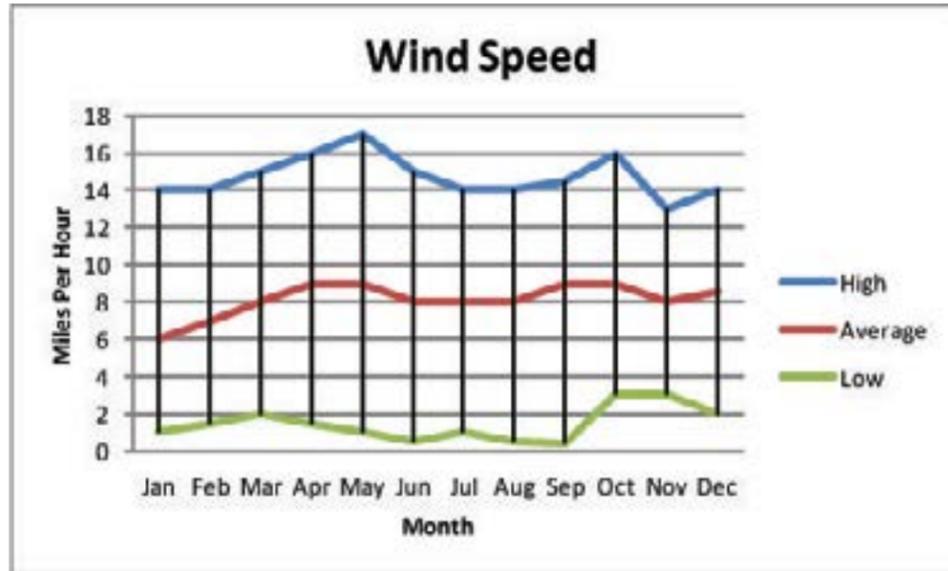


figure 8.1



SHADING

s t u d i e s

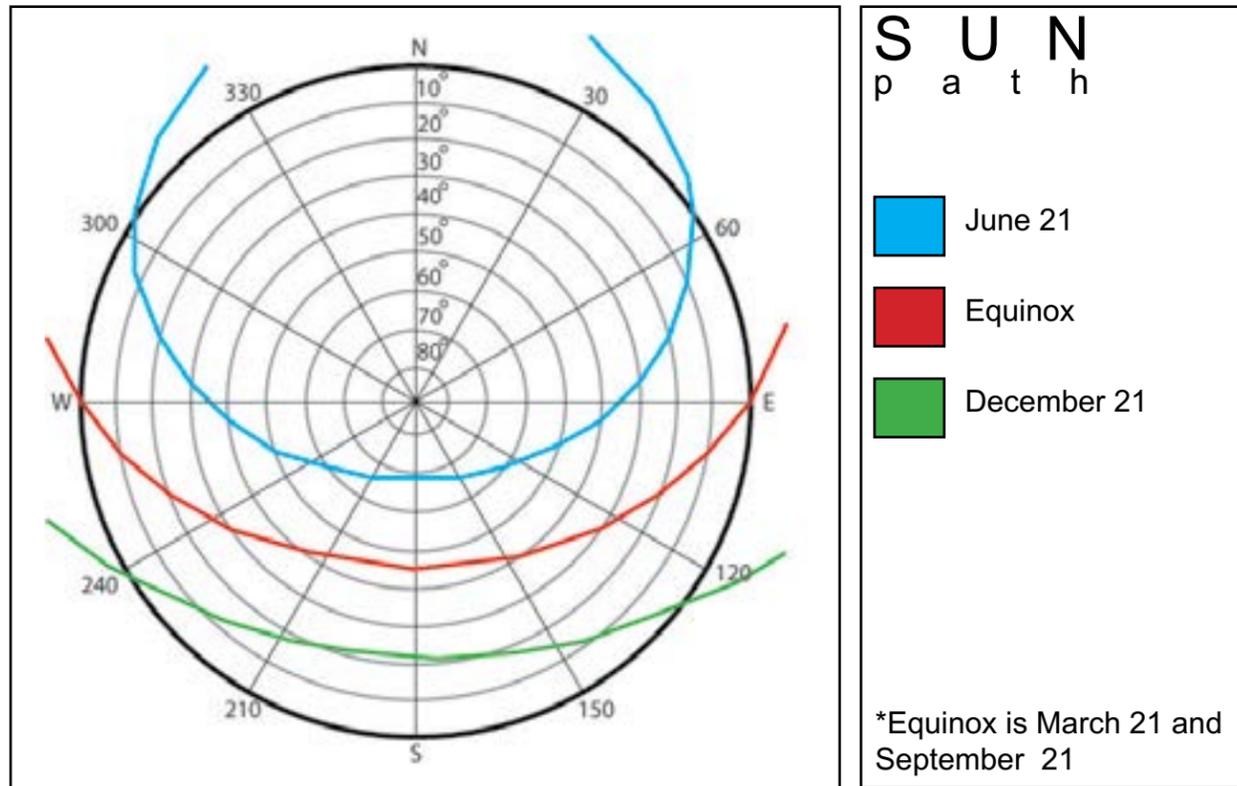
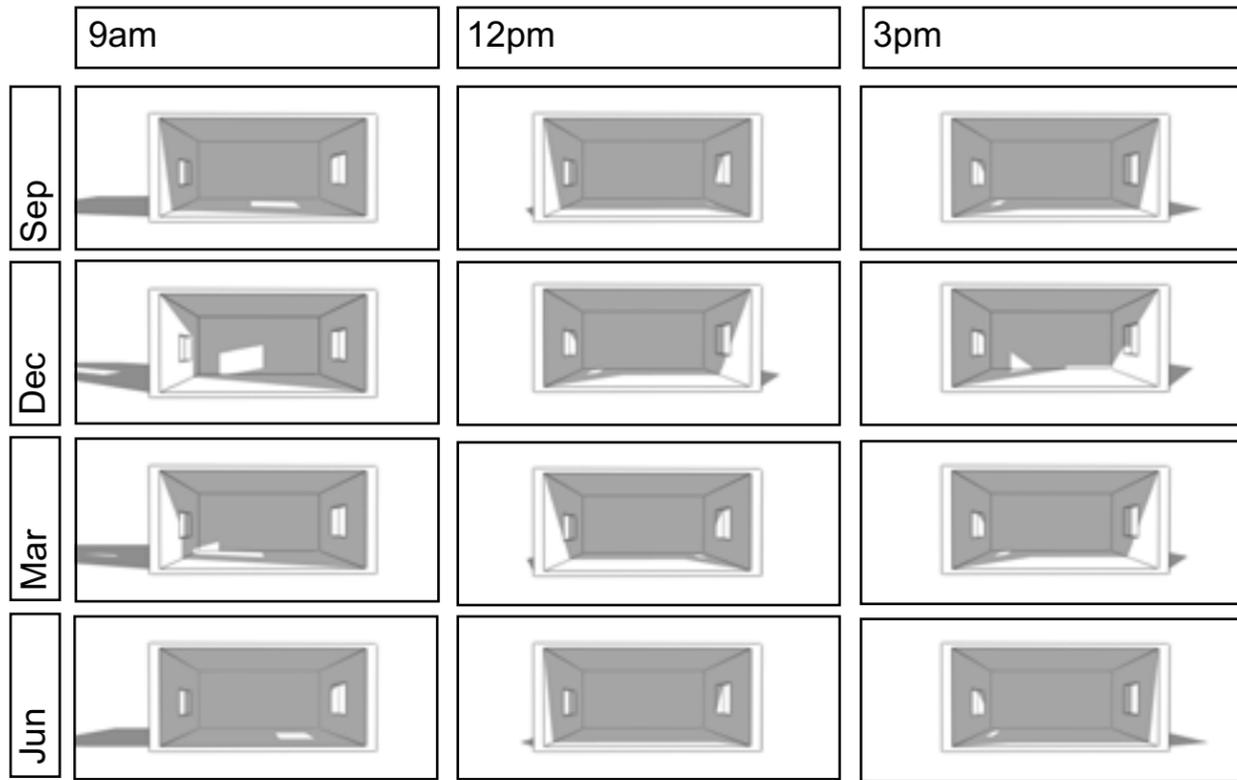


figure 1
1'6 sunlight

TOPOGRAPHY

m a p

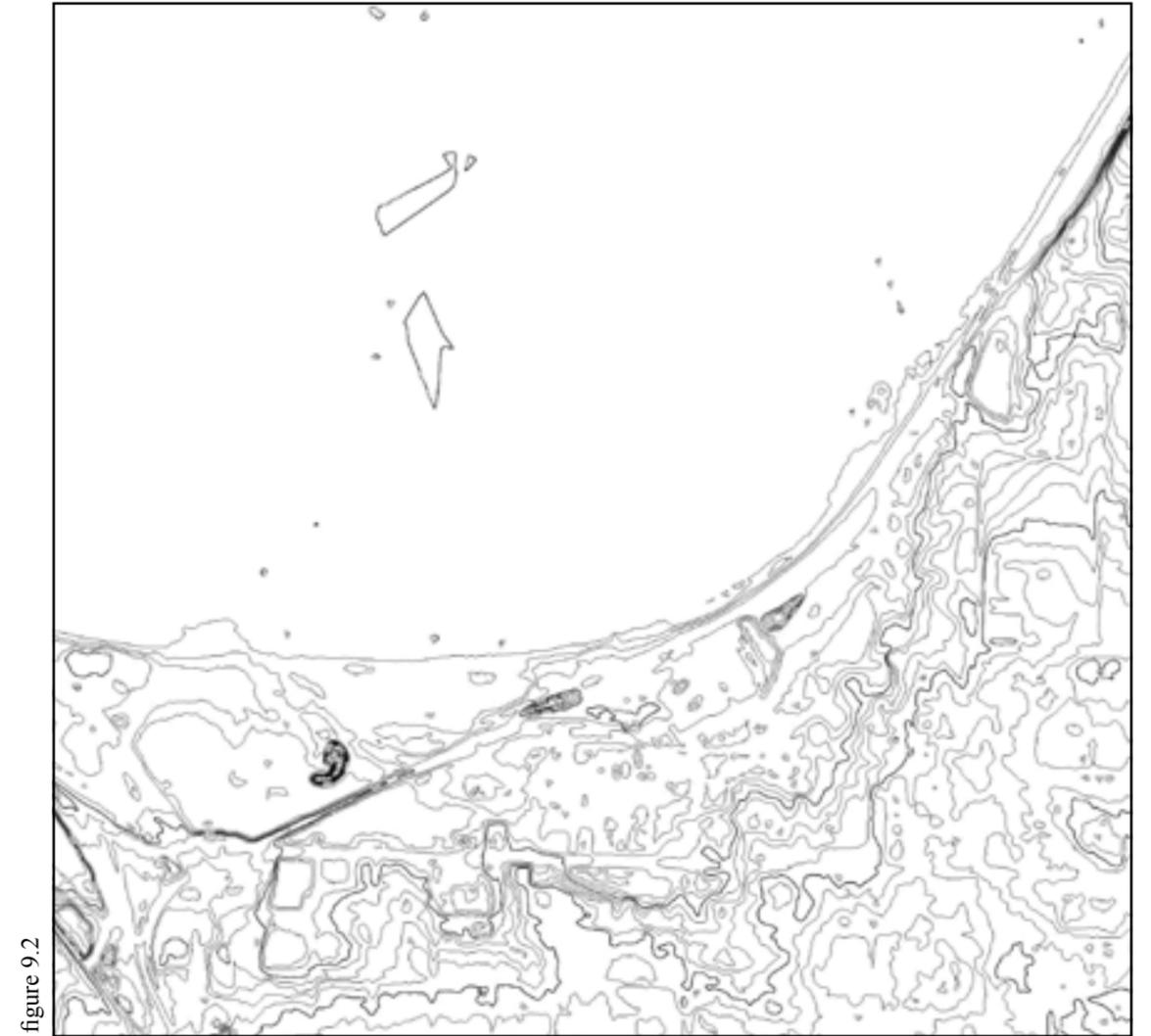


figure 9.2

SPATIAL classification

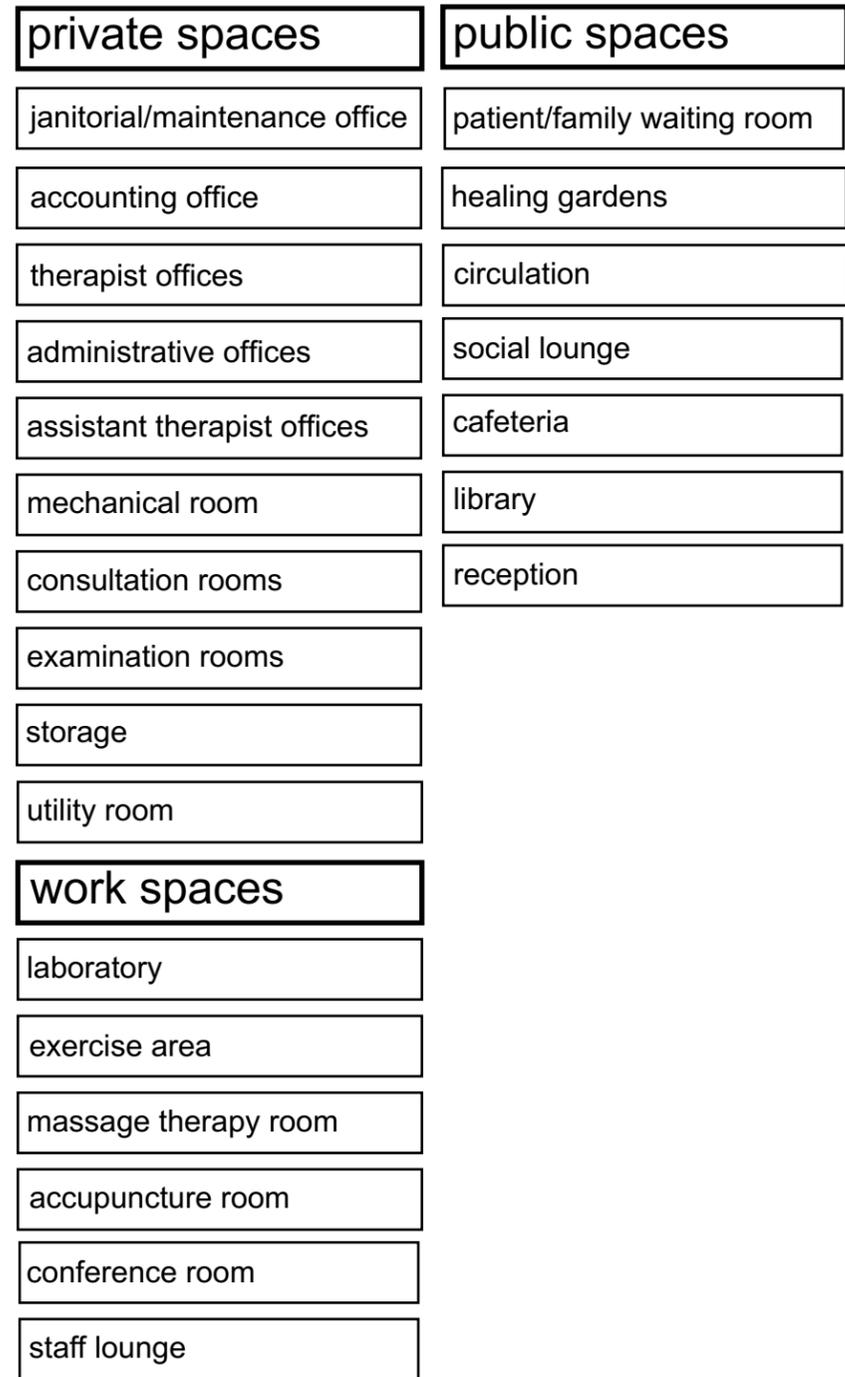


figure 10.1

INTERACTION

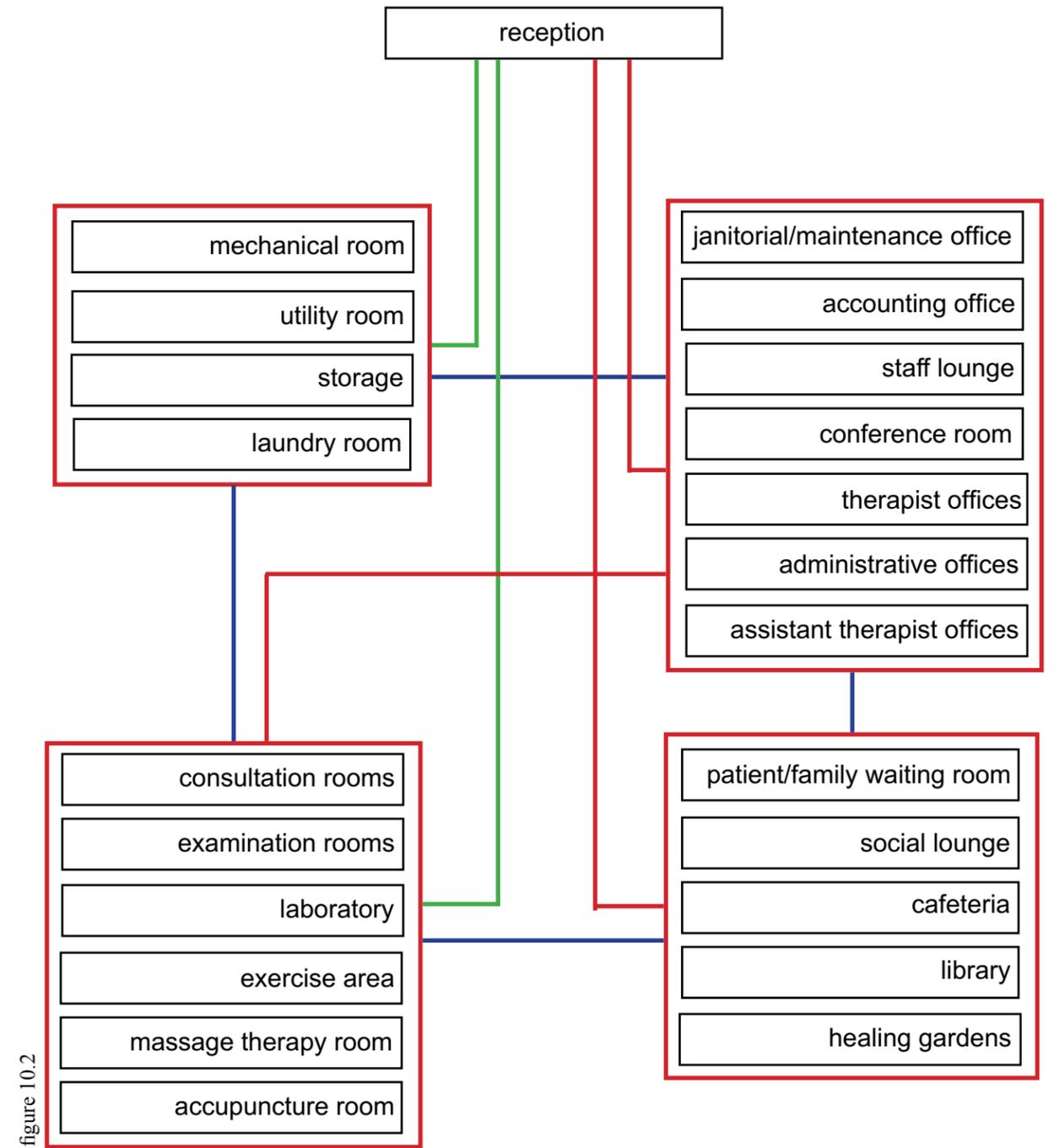
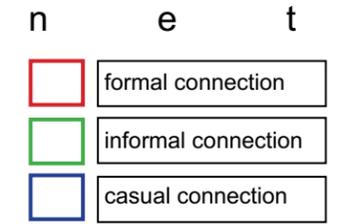
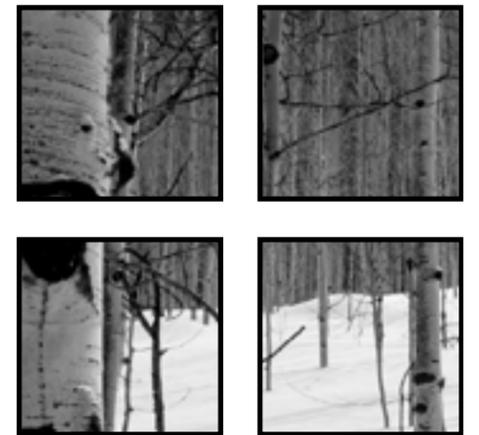


figure 10.2



F **I** **N** **A** **L**
d e s i g n



figure 11.1

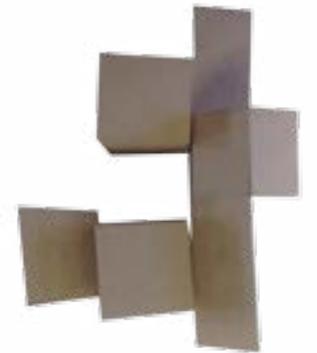
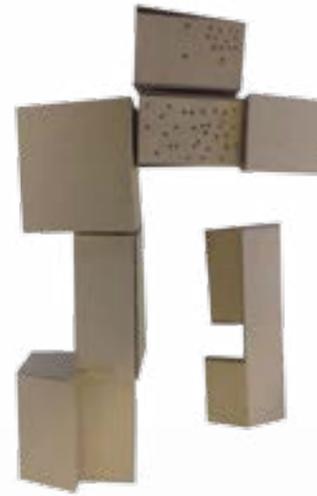
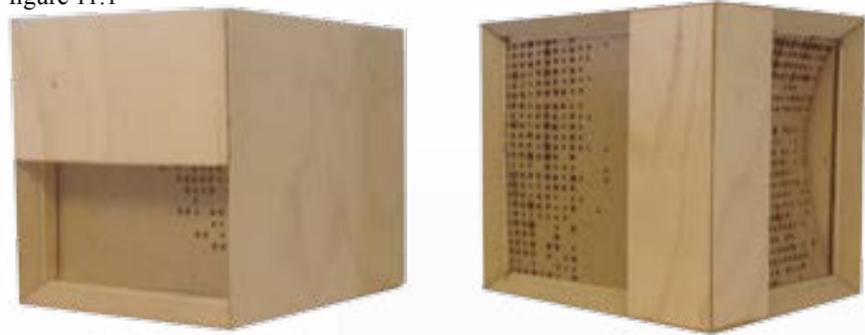


figure 11.2

figure 11.3

process drawings

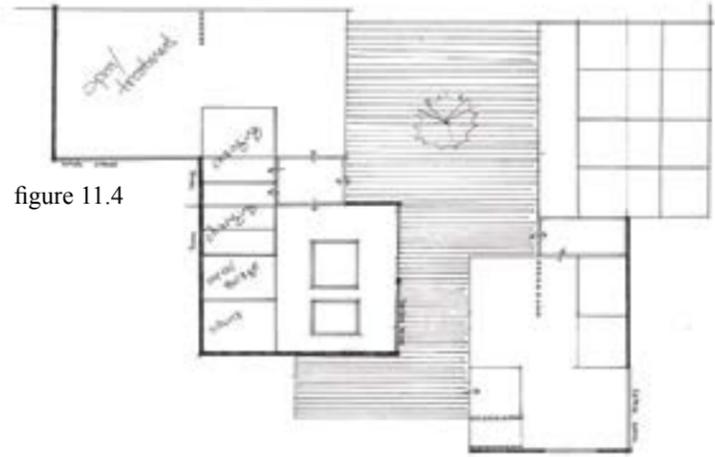


figure 11.4

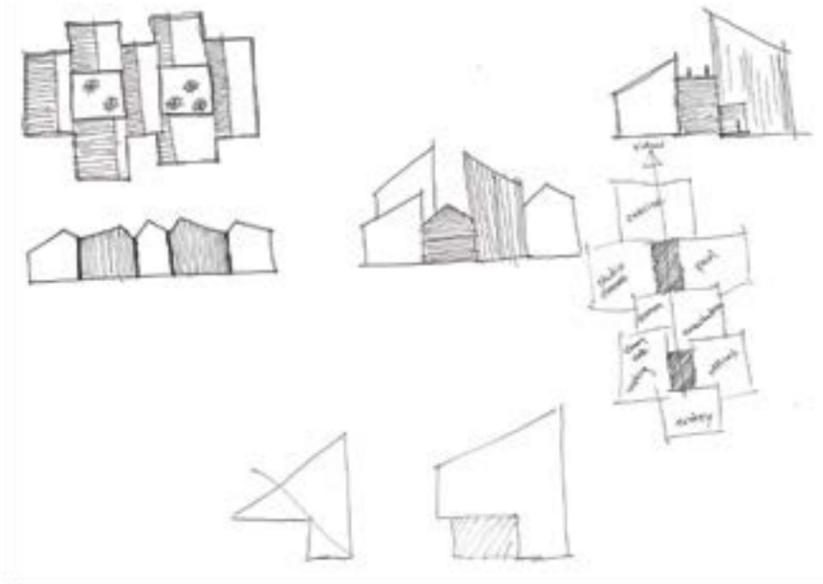


figure 11.5

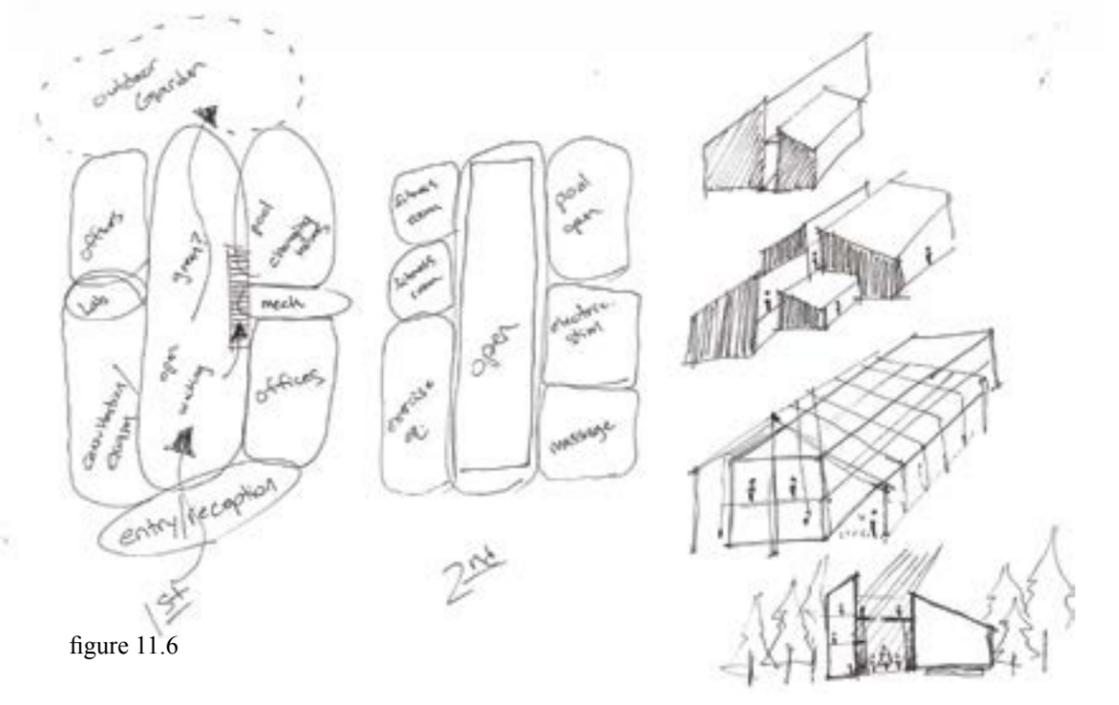
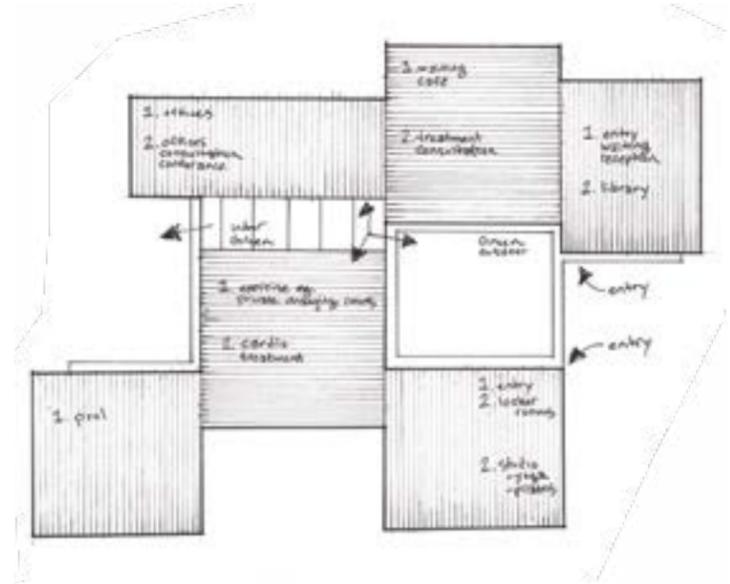


figure 11.6

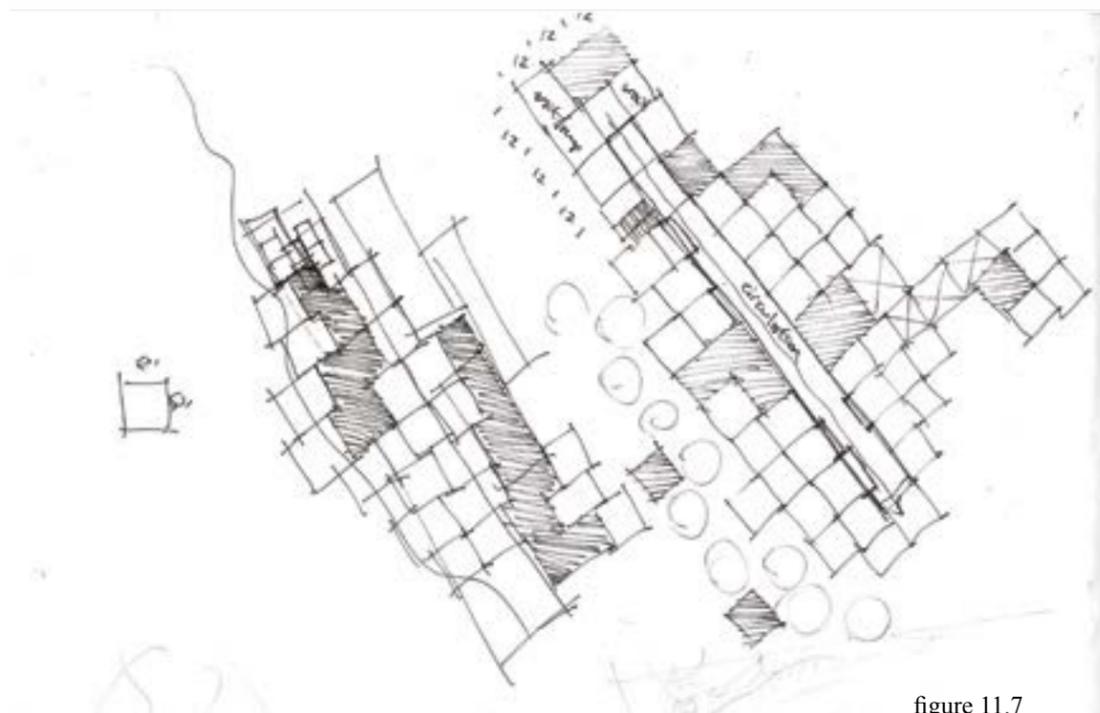


figure 11.7

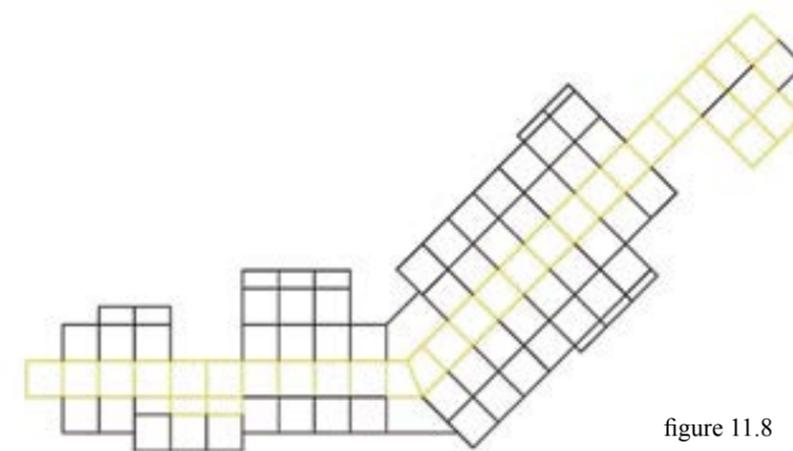
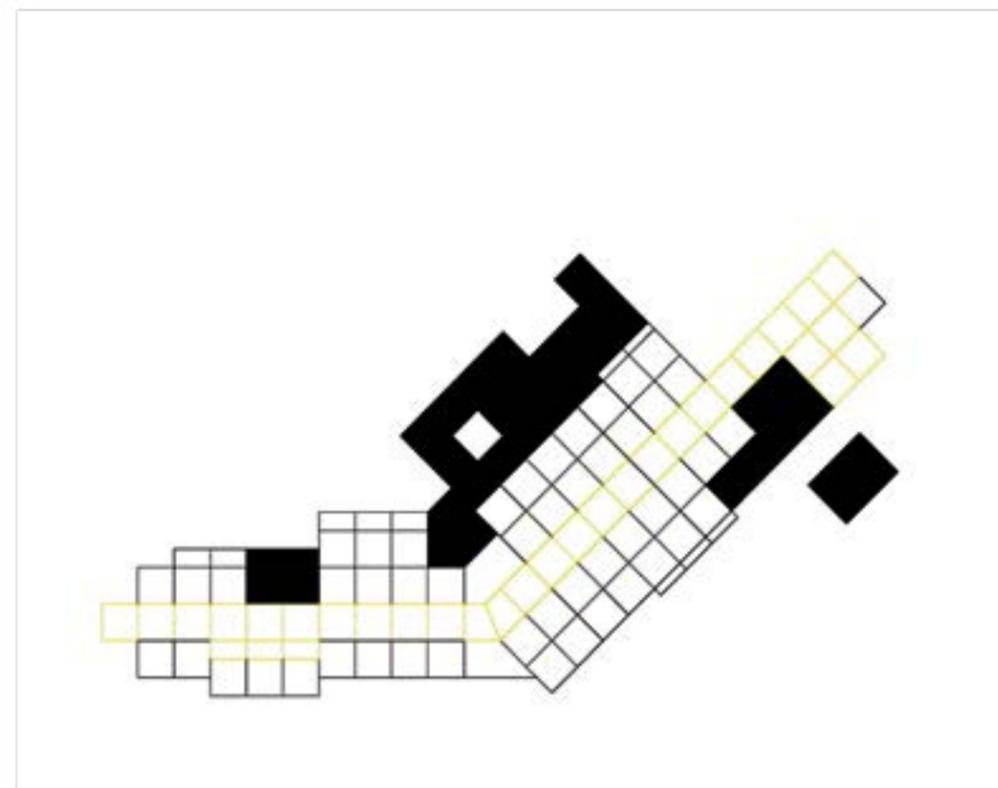


figure 11.8

MIDTERM

review



figure 12.1

entry perspective



figure 12.4

therapy room



figure 12.2

healing garden



figure 12.5

waiting room



figure 12.3

aquatic therapy



north birds eye



south birds eye



figure 13.1



ground level with site

figure 13.2

GROUND LEVEL

- 1 Entry
- 2 Reception
- 3 Indoor Garden
- 4 Library
- 5 Waiting Lounge
- 6 Private Waiting Lounge
- 7 Mixed-Use Deck
- 8 Office
- 9 Restroom
- 10 Office
- 11 Office
- 12 Staff Lounge
- 13 Massage Therapy
- 14 Therapy
- 15 Open Lounge/Cubbies
- 16 Changing Room 1
- 17 Changing Room 2
- 18 Changing Room 3
- 19 Changing Room 4
- 20 Pool Changing Room 1
- 21 Pool Changing Room 2
- 22 General Therapy Area
- 23 Outdoor Therapy Deck
- 24 Aquatic Therapy
- 25 Mechanical/Storage
- 26 Sauna
- 27 Storage
- 28 Green House
- 29 Interactive Garden
- 30 Storage
- 31 Private Outdoor Deck
- W Water Wall Fountain
- C Circulation

UPPER LEVEL

- 32 Nutritional Consultation
- 33 Flex Space
- 34 Therapy/Consultation
- 35 Outdoor Deck 1
- 36 Restroom
- 37 Office
- 38 Outdoor Deck 2
- 39 Open Lounge/Cubbies
- 40 Office
- 41 Office
- 42 Storage
- 43 Office
- 44 Administrative Office
- 45 General Therapy Equipment
- 46 Storage/Mechanical
- 47 Studio A
- 48 Studio B

BASEMENT

- 49 HVAC/Geothermal Equipment
- 50 Pool Systems
- 51 Storage



figure 13.3

North East Section



figure 13.4

natural ventilation

Operable windows allow for natural ventilation throughout the building. Cool breezes enter the building from the North and escape through clerestory windows that operate on a sensor system ensuring that the interior spaces remain comfortable. Large glass doors can also open the spaces up to the outdoors creating a transition to the deck spaces and also allowing the scents and sounds of the surrounding environment to enter the building.

Water Wall Fountain



Water Wall Fountains placed throughout the building provide ambient noises of water falling intended to create a relaxing environment. The water runs down a single pane of glass on both sides helping to define semi-private spaces while still allowing an individual see understand what is going on behind the wall.

As the water falls into the polished rock basin and into the water tank, it is brought back to the top of the feature through a simple water pump system. Water has long been associated with healing and relaxation, so by implementing simple fountain systems such as this patients and staff will inhabit a more stress free comfortable environment.

Solar Window Detail



South facing window panels are integrated with photovoltaic panels organized in a way that creates the negative image of a forested skyline. The solar panels provide energy to the building and as light passes through the window panel it creates an interesting shadow pattern that resembles the shadows that would be cast from a pine tree.

E-Glas Window

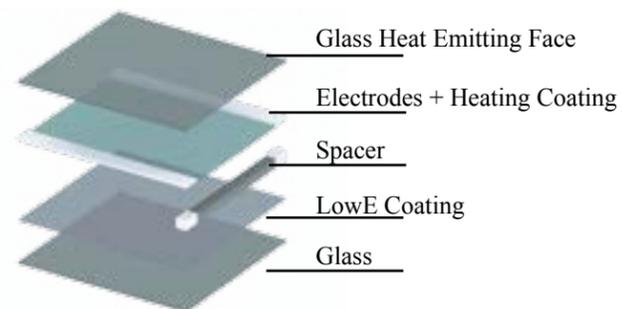


figure 13.5

E-Glas is an active glazing in which electrical power is converted to heat. When stimulated by electrodes the oxide coating on the inner face of the glass radiates heat towards the opposite face of the glass.

Using thermostats or snow-detector systems, the glass ensure that snow is melted as it falls onto the glass ensuring the glass remains clear of snow to prevent overwhelming snow loads and maintain natural lighting throughout the winter months.

Section through Circulation



figure 13.6

Insulated Concrete Forms

The concrete forms used in Vista Rehabilitation are created using polyrene panels which form the mold in which the reinforced concrete is created from. The panels act as excellent insulation and are easy to handle and install.

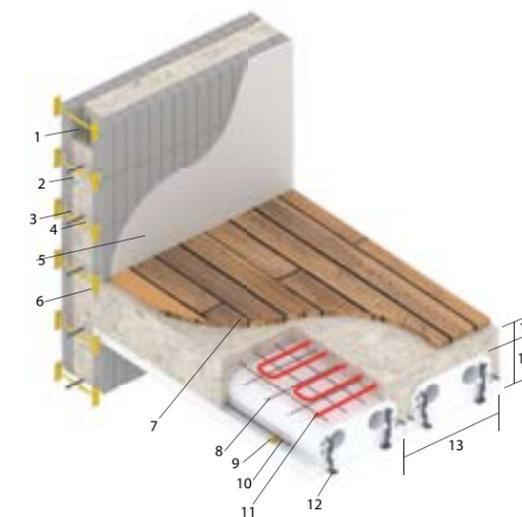
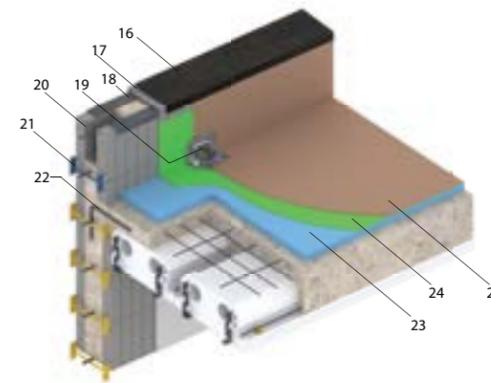


figure 13.7

- 1 Insulated EPS Panel (48"x 12" x 3")
- 2 Exterior Concrete Cladding
- 3 8" Yellow Tie Creating 6" Concrete Core
- 4 Rebar Reinforcement
- 5 Interior WALL Finish
- 6 6" Thick Reinforced Concrete Core
- 7 Wood Floor Finish
- 8 Slab Reinforcement Welded Wire Mesh
- 9 Rebar Chair
- 10 Concrete Rib Reinforcement
- 11 In-Floor Radiant Heating PEX Tubing
- 12 Steel Furring Strips for Ceiling Attachment
- 13 24" Wide Polystyrene Panel
- 14 Polystyrene Panel Thickness = 8"
- 15 Slab Thickness = 4"
- 16 Top Parapet Flashing - Fasten to Metal Track
- 17 Base Parapet Flashing - Fasten to Concrete
- 18 Metal Track
- 19 Drain
- 20 Wire Top Tie
- 21 6" Blue Tie Creating 4" Concrete Core
- 22 REbar Dowels From Wall to Slab
- 23 Additional Roof Insulation
- 24 Base Sheet Membrane
- 25 Cap Sheet Membrane - Covered in Paver



entry perspective

figure 13.8



east perspective

figure 13.9



south perspective

figure 13.10



figure 13.11

waiting lounge



figure 13.12

upper level therapy area



figure 13.13

outdoor therapy area



figure 13.14

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