Live Active

An Architectural Response to Rehabilitation

Written by Adam Pangrac

LIVE ACTIVE:
AN ARCHITECTURAL RESPONSE TO REHABILITATION

A Design Thesis Submitted to the
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By

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abstract

This thesis researches and examines the way we respond to our environment, both natural and built. According to Newtonian physics, for every action there is an equal or opposite reaction. Default stairs, walls, windows, doors, roofs, and floors have compromised our ability to interact with our surroundings. If the environment allows, enjoyment can be found in the midst of struggle. Process is as vital as product.

As a study of movement, motivation, balance, and blending; the following research is aimed toward architectural design. A dynamic shift in the way people interact with and perceive their surroundings to stay active. In Rapid City, SD a physical rehabilitation center will allow me to incorporate innovative architectural thinking. The facility is intended to allow the disabled to regain strength and endurance in a setting suited to their needs.

keywords

recover, rehabilitate, wellness, well-being, active, supportive design

problem statement

problem statement

How can architecture provide an experience that fosters wellbeing?

Statement of Intent

typology Physical Rehabilitation Clinic

claim Architecture is capable of helping the injured or disabled achieve a higher degree of wellness.

premises Architecture has a significant influence on the way people feel and act. Architectural elements, the material pallet, and spatial configuration are influential on what we do within a space.

A higher degree of wellness is something most everyone would like to achieve. The process is not often thought of as easy, but certain attributes improve its attainability.

The injured, disabled, or unfit are unable to perform everyday activities to the level of those around them.

theoretical premise/ unifying idea Design has a significant influence on one's ability to reach their full potential. Environment, both natural and built, promote an experience that is perceived as positive or negative. Careful analysis of wellness dimensions and other factors become pivotal in the way technologies are applied and spaces are created.

project justification On an individual level, it is important to sustain a healthy way of life. The injured, disabled, or unfit are at a disadvantage to those maintaining a high degree of wellness. Their self esteem may even be compromised in the community setting. By utilizing innovative new technologies, a rehabilitation center is capable of improving the lives of the physically handicapped.

the Proposal

Narrative

Following one's passion is a must if he/she want to live a happy and joyful life. Doing what brings enjoyment can increase motivation, self-esteem, and overall personal strength. Unfortunately for some, doing what they love is not so easy.

When someone has a physical disability, it can inhibit their activity level. Inactivity can also lead to disability. Diabetes is a prime example of this. Professional quarterback Jay Cutler has type one diabetes and is only able to perform as well as he does because he constantly exercises. Despite having to take shots, his activity level helps his body regulate insulin (U.S. Department of Health and Human Services, 2009).

In 2006, womens' professional wakeboarder Dallas Friday broke her left femur in seven places while competing in the final event of the Wakeboard World Cup Series. After surgery she developed severe breathing problems and had to be on a respirator for a week. She went from the top of her sport to completely disabled and unable to breathe properly. A few years later she came back to win the 2009 Queen of Wake title. In an interview she stated, "My biggest hurdle to recovery has to be my expectations. It's difficult when your body doesn't respond how or when you'd like it to." With the help of physical trainers and the necessary equipment, Dallas was able to get back on top of her game (Anderson, 2009).

For professional athletes like Dallas Friday and Jay Cutler, dedication and hard work has allowed them to reach their full potential. Looking beyond the physical demands of professional athletes, means for rehabilitation are in demand by many others in today's society.

Once suffering a severe setback, it can be even more difficult to reestablish what has been lost. This can cause a loss of self esteem or depression. Even if they they have a strong desire to recover, their needs often exceed what is available (Health and Human Services, 2009).

Innovation has caused a cultural shift. Decisions are often made for the sake of convenience as we strive to make things easier on ourselves. The current generation operates differently than those of the past. Exhausting work schedules and new forms of entertainment have robbed time once spent playing sports or participating in other communal activities. These changes have unknowingly effected health levels (Health and Human Services, 2009).

Individuals who do not exercise regularly are at a significant disadvantage to those who are in constant training. Being out of shape can make participating in athletics very difficult. Because they aren't as conditioned as other members of the community, they may even choose not to partake. Socially this can be seen as a serious issue. Even with a strong desire to play soccer, go on a hiking trip, or ride bike around town, self image can restrict the unfit from doing what they are passionate about.

By utilizing architecture and technology, we can seek to restore individuals to optimal health, functioning, and well-being. The first step to a solution is to provide an avenue for recovery. Architecture can help the injured, disabled, or unfit reclaim their well-being.

User/Client Description

Most traditional wellness facilities are open to the public, but they unintentionally exclude the disabled. Instead they attract elite athletes and make the disabled or unfit feel unwelcome. The proposed rehabilitation center will not be open to the public. This might hinder the self-esteem of its intended clientele, the disabled, Users are to be proscribed by a healthcare professional.

Owner

The Rapid City Regional Hospital is home to numerous healthcare services. The Rehabilitation Institute is an extension of that programing. The Rehabilitation Institute is accredited by the CARF (Commission on Accreditation of Rehabilitation Facilities) and The Joint Commission. It offers care to individuals suffering from illness, injury, and various other disabilities. Therapists treat over 300 patients per month, and their average length of stay is around 13 days (Regional Health, 2009).

This project would operate in conjunction with the Rehabilitation Institute as a branch of the regional hospital. By providing a better suited environment, these facilities will help patients reclaim their well-being. Patients may be transferred from the institute or directly from the hospital.

Patients

The most important users of the physical rehabilitation center will be those seeking recovery. After suffering a setback, these individuals have the desire to regain their well-being. The goal of the design will be to enhance the process of their rehabilitation and allow them to better function with other members of the community.

It is important to note that socially, patients may be suffering from a depleted self image. They may have low confidence. Special consideration must be taken so that the design is sensitive to current state.

Physical Therapists/Trainers

The design would have to provide the necessary space for physical therapists to administer treatment. Massage, hydrotherapy, and other specialty treatment spaces must be accounted for.

Trainers would be present throughout the facility as they instruct each patient individually. Both therapists and trainers would need staff offices and shared break spaces

Amount

The majority of users will be located in activity spaces. These specialized spaces will be both indoors and outdoors. Based on the amount of patients treated at the Rehabilitation Institute, the facility would need to accommodate approximately 50 patients and 25 staff (Regional Health, 2009).

Peak Usage

Peak usage for the building would be in the early morning and later afternoon. People like to be active early because it is a time otherwise spent sleeping. People tend to strive for efficiency in what they do. The late afternoon is a good time for activity because it is when the body is at it's physical peak. The design is to respond to this time frame.

Parking

Depending on their degree of disability, users will arrive at the facility by various means. Individual parking spaces will not be in high demand as a vast majority of patients will be unable to drive.

Drop off points and temporary parking become vital for patients that are dropped off by family, friends, or shuttle.

Physical Restrictions

This is a vital piece of the design as the majority of users will be disabled in one way or another. ADA Code will be followed closely as spaces are crafted.

All spaces must be wheelchair accessible and an efficient elevator system will be incorporated as part of the program.

Major Project Elements

The goal of this design will be to focus on process. Rehabilitation can be very difficult. By making space interactive and unique, the goal is to minimize the struggle. In discrete ways, architecture should motivate patients and keep them on track with their goals.

Entry and Sense of Vision

As patients enter the facility, it is certain that many will feel uneasy. They have already been burdened by some sort of struggle or loss. Their goal is to achieve a greater sense of physical wellbeing. It is important to be sensitive to their past while showing them a vision. That vision should not intimidate, but rather inspire.

The Entry will seek to harmonize natural and built environments. The transition should not be an abrupt shift from outdoors to indoors, but rather a subtle progression. This is intended to reassure users that what may go on inside has a direct relation with what goes on outdoors. In any struggle, a clear vision of the product can help inspire and motivate.

Recreational Spaces

There will be multiple recreational spaces throughout the design. These areas are intended to bring users together and build confidence in a community setting. Patients will much more willingly engage in activity with other patients if they have had similar struggles. These will likely be the largest spaces throughout the facility. They will allow for an extension into the landscape. The architecture of these spaces will seek to blend inside and out. A pool, basketball/ volleyball court, bike /running path, and game area have potential in becoming pieces of this space.

Training

Training spaces will vary in privacy. Some will be shared while others will be private. Training can be done individually or in small groups. Along with patients, physical trainers and therapists will be utilizing the space. Lifting weights and other patient-specific exercises will be done within this space.

Therapy

In order to maximize the benefits of exercise, therapeutic space is to be incorporated in design. Massage tables and a pool for hydrotherapy are elements of these spaces.

Personal Storage

Instead of having standard locker rooms, this space should be something different. It has the potential for dynamic interaction. Instead of having over 100 swinging locker doors, the system can easily be redeveloped. Sliding panel doors allow for a mixture of solid and void as they are left open or closed. Subtle functional changes allow for personalization.

Administrative

It is necessary to include offices for therapists and trainers to administer their work. Meeting rooms and break spaces for the staff will also be included.

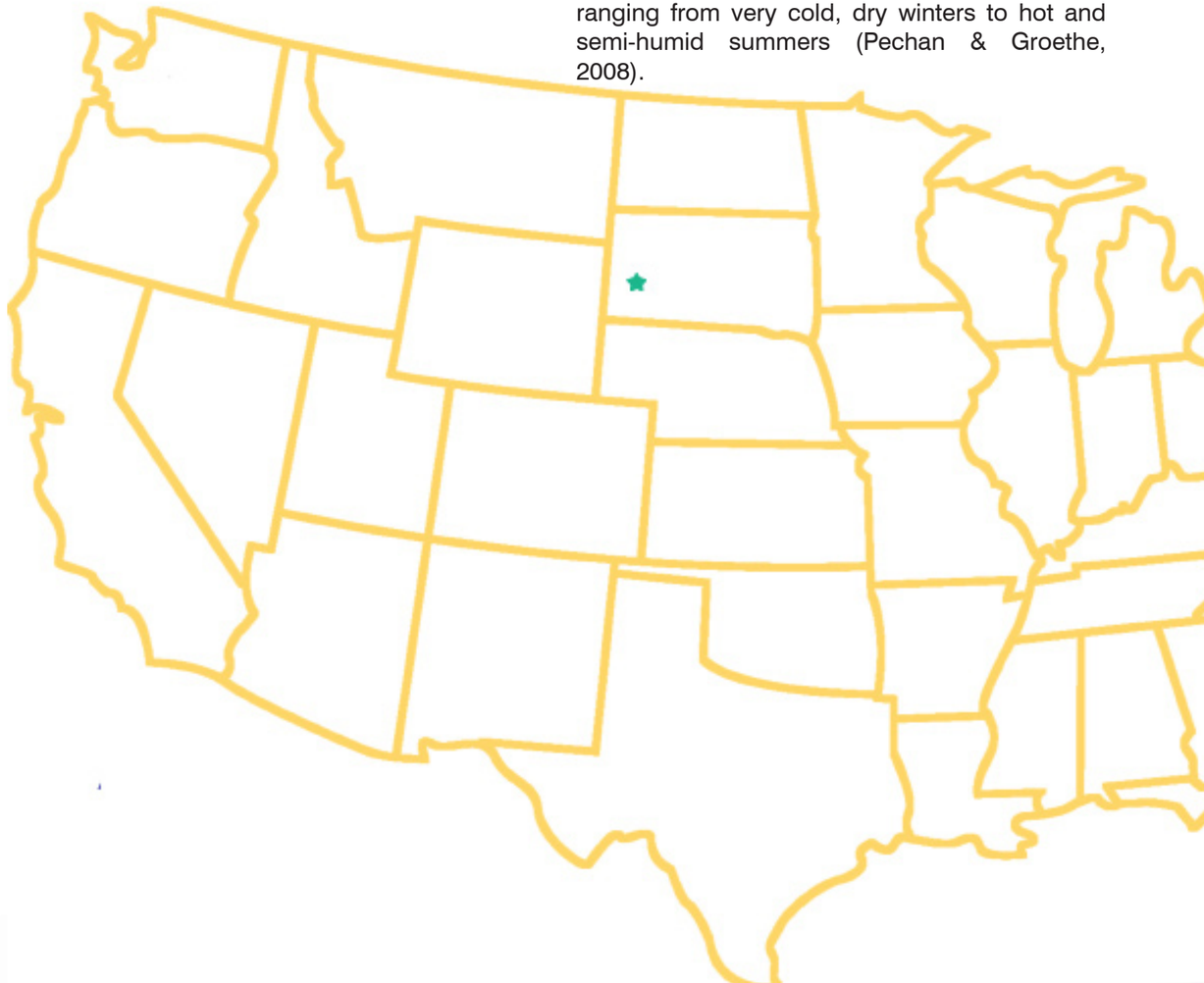
Site Information

The rugged Rocky Mountains run north and south throughout the western part of the United States. Just to the east of the Rockies are the Great Plains. These vast, relatively flat prairies extend east across the central U.S. The site is located between the mountains and plains on the eastern edge of the Black Hills (Pechan & Groethe, 2008).

Region

South Dakota is part of the Midwest. The state is bisected by the Missouri River. It is known for its varying terrain as the landscape transitions from having rolling hills and trees in the west to flat grassland in the east (Pechan & Groethe, 2008).

The temperate region has four distinct seasons, ranging from very cold, dry winters to hot and semi-humid summers (Pechan & Groethe, 2008).



City

Rapid City, South Dakota, has a population of 67,107 and it is seeing much development in the midst of our current economic state. The city enjoys a thriving economy based on farmers who have been raising beans, wheat, and alfalfa since the turn of the last century (Pechan & Groethe, 2008).

There is a dynamic blend of parks and recreational facilities to be found throughout Rapid City. There are six public golf courses, thirteen miles of bike trail, two ski resorts in the Black Hills, four hundred miles of nature trails, fourteen mountain lakes, and three hundred miles of streams/rivers. Tourists also come to town to visit Mount Rushmore (The City of Rapid City, 2007).

Site

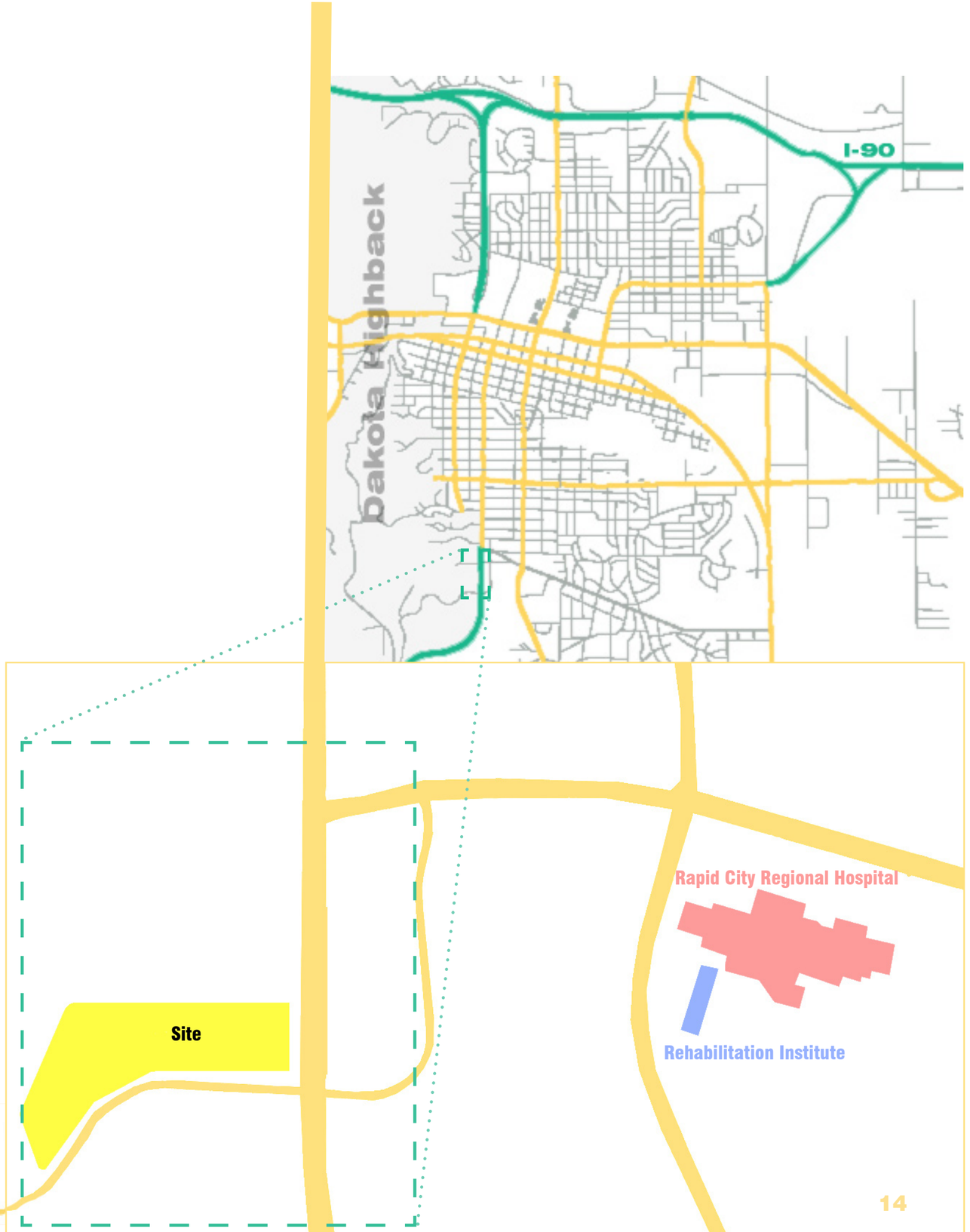
The location for the site is just to the east of the Dakota Hogback. The Dakota Hogback is a mountain range the cuts through the middle of Rapid City. The site is unique because it offers varying topography with excellent views of the city (Pechan & Groethe, 2008).

The physical features on site include exposed rock, trees, slopes, and tall grass. It is not overly developed so this natural richness remains intact. Still, it is easily accessible by exiting off of Mt. Rushmore Road.

The site maintains proximity to the Rapid City Regional hospital and rehabilitation institute. This is vital in maintaining relations with the administrator.

Importance of Site

With one of the leading healthcare providers in the region, Rapid City already attracts those in need of what a physical rehabilitation center has to provide. Also, varying topography allows for a creative blend of natural and built environments, an ideal canvas for architectural innovation. Finally, with so many parks and recreational activities in the area, it becomes even more important to help the disabled freely engage in community activities (Pechan & Groethe, 2008).



Project Emphasis

The primary focus of this project is to inspire physical well-being through architecture. The research will be primarily focused on finding new and innovative ways of thinking about space. By studying environmental implications on an individual's well-being, positive design decisions result in space better suited to needs.

The project must be very sensitive to concerns within the community. By finding convenient processes for recovery, the design will seek to ease each patient's individualized struggle to reach a higher level of physical wellness. By helping the disabled assimilate back into the community, social, economic, and environmental benefits can be seen. Community activities mean a higher amount of revenue can be generated by the city. Social interaction is the product of more activities. As individuals engage in activities with each other, not only can physical wellbeing be attained, but communal strength can also be developed.

Stainability in the development of this facility is another primary focus. Architecture should not only seek to inspire; it should also help preserve. Great architecture helps individuals as well as the environment.

A Plan for Proceesing

Research Direction

A vision has already been planted in my mind of what the project might be like, but it is important to allow that vision to change as research reveals opportunity. Research will help me truly understand what a rehabilitation center is. The theoretical premise/unifying idea will help clarify my goal throughout the process. I will focus on developing a greater understanding of the building typology as I seek to learn more about the site. Much research will be spent examining disabilities to ensure programmatic requirements are met.

Design Methodology

My research will be conducted using the quantitative/qualitative mixed method approach. The two types of data will be continually cross referenced, analyzed, and integrated throughout the research process. The statement of intent will act as a starting point for initial research. It is important to continually go back to the theoretical premise/ unifying idea so that time is not lost on tangent searches.

Documentation

Special attention must be paid to what I am doing throughout the process. This means that many drawings and pictures will be taken. Every week I plan on making a quick flier (summary page) that shares current thoughts and significant imagery. By having all the fliers at the final review, it will allow reviewers a fun way of looking at what I have done.

Studio Experience

Second Year

Fall 2007 - Mike Christenson
- Tea House - Fargo, ND
- Rowing Club - Minneapolis, MN
- Ordinary Site - Fargo, ND

Spring 2008 - Malini Srivastava
- Community Courtyard - Fargo, ND
- Dance Studio - Fargo, ND

Third Year

Fall 2008 - Steve Martins
- Wildlife Research Center - Buffalo River State Park, MN
- Guild Hall - Grey Eagle, MN

Spring 2009 - David Crutchfield
- Performing Arts Center - Austin, TX
- Spaceport America Hotel - Las Cruces, NM

Fourth Year

Fall 2009 - Darryl Booker
- High Rise/Vertical Community - San Francisco, CA
- KKE Acoustic Instrument

Spring 2010 - Frank Kratky, Darryl Booker, Paul Gleye
- Viable Community - Santo Domingo
- Public School - Africa
- Santo Domingo Housing - Santo Domingo

Fifth Year

Fall 2010 - Cindy Urness
- MXC Activity Center - Urbank, MN

Theoretical Premise/Unifying Idea

Research

Basic Theory

This thesis examines the relationship between architecture and activity. I am concerned not only with what we do in a space, but also why. How we respond to our surroundings, both natural and built, is very complex. Exhausting variables make this study intricate and difficult to examine. Still, careful examination can lead to a more informed design that emulates positive influences on patients, staff, and visitors.

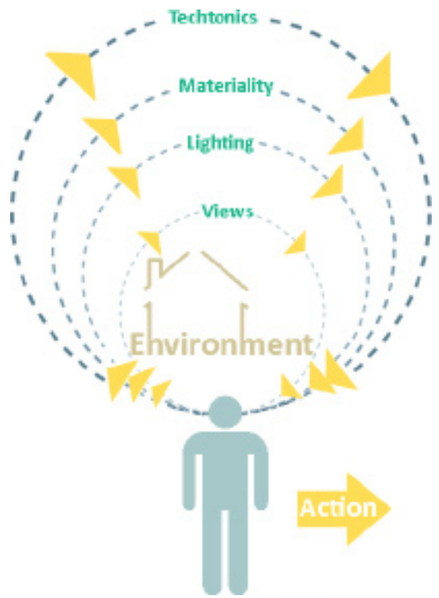
The true spirit of this thesis lies in behavioral analysis and design application. As an illustration, let's examine why I am currently drinking a cup of coffee. Consider the following:

1. It is late and I desire to stay awake.
2. The temperature is 10 degrees outside.
3. I don't enjoy the taste of coffee.

These observations suggested that I may be utilizing the beverage to stay awake or warm myself. Positive aspects of the experience have contributed to my decision to drink the coffee, despite the fact that I don't appreciate the taste. I realize that this is very generalized, but it helps set the framework for the following research.

Infinite variables influence my overall perceived experiential quality associated with drinking a cup of coffee. The key word here is experience. If my overall experience is positive, it is very likely that I will eventually have another cup of coffee. Architecture may be capable of functioning in a similar fashion.

By paying careful attention to how individuals respond to light, space, materials, views, tectonics, and other architectural factors, an architect can do more than create functional space. They can arouse interest and encourage engagement in activities outlined in the program. This is specifically beneficial idea if activities in the program aren't universally seen as enjoyable. Application could be used to enhance or accelerate processes often thought of as distasteful.



Sincere Care

Wellness centers, gyms, and hospitals each carry a their own function and aesthetic. To think of them as universally the same would be fraudulent. Still, all of them share something similar in spirit. These facilities attend to the whole human being. Physical healing, behavioral medicine, social healing, community development, and education are a few included areas. Also, all have staff that observe or assist users as they seek improvement. Besides staff, the environment plays a pivotal role in the process of rehabilitation. By helping others to help themselves, these facilities are capable of improving society.

Healthcare and wellness facilities have been traditionally designed separately around function. The goal was to provide efficient space. Design focused on making doors wide enough to fit beds or fitting as many people as possible in a given space. The result was a facility that was functionally efficient, but psychologically bleak and boring. Roger Ulrich describes such a facility as "hard." These buildings lack appeal and provide little to no intrigue to occupants. It is also suggested that these designs can actually increase stress and restrict users from reaching their full potential (Ulrich, 1991).

In the past, the idea was that patients went to hospitals, recovered, and left. Likewise, someone would go to a gym, complete their workout, and leave. Over the past few decades there has been a drastic shift in the programming of these facilities. The evolution has been fueled by an increased understanding of what wellness truly is. Emilie Sommerhoff speaks of it as "a shift from a place to exercise, to something more. Now it's wellness in the sense of mind, body, and spirit" (Sommerhoff, 2003).

As healthcare and wellness facilities pushed for "something more," a holistic building typology began to appear. Programs began to include message rooms, community spaces, and spas. Physical wellness was no longer isolated from other aspects of well-being. The idea is that a common relationship is shared amongst various aspects of wellness.

There is no absolute listing of common wellness divisions. Each listing seems to be slightly different, but commonalities can be found. Physical, emotional, and spiritual wellness seem to be the most common divisions. According to Julie Chobdee, there are seven dimensions to wellness; physical, intellectual, occupational, environmental, spiritual, emotional, and social. She suggests that there is a close relationship amongst these dimensions. Balancing them is the key to success (Chobdee, 2009).

According to Carol Davis, "there is a real and fundamental need for a shift in health care away from the business emphasis and back to sincere, professional helping and healing" (Davis, 2009).Unfortunately, economic needs have compromised the spirit of healing and rehabilitation. The desire to help those in need is a fundamental in nature. Still, in our current economic situation, functionality is once again appealing.

Hospitals are beginning to see wellness facilities as a marketing opportunity as they scramble to get more patients. It is important to turn a profit, but this must not become primary. Instead the focus should be in the spirit of rehabilitation. By committing to helping at the highest degree, the result is an increased chance of success. Architecture has the capability of allowing for a pleasant, efficient environment that reduces cost and improves care. It is the ethical responsibility of those practicing healthcare to sincerely care about those they are helping. Likewise, it is the responsibility of the architect to care about how patients, staff, and visitors experience design (Davis, 2009).

Supportive Design

In 1984, Roger Ulrich noticed that postsurgical patients in rooms with outdoor views tended to recover more quickly than those without. This provoked his interest and he soon reported his observations in *Science*. At this point he became a pioneer in understanding the relationship between environment and healing. Ulrich believes that "design isn't just an aesthetic luxury in health care; it's a core, health-related area" (Bilchik, 2002, p. 12).
Ulrich developed the theory of supportive design. The premise of this theory is that wellness can be promoted by designing healthcare facilities to foster stress. He sees stress as pivotal to people's responses to their surroundings, both voluntarily and involuntarily. Ulrich believes that therefore:

- Health facilities should not raise obstacles to coping with stress, contain features that are in themselves stressors, and thereby add to the total burden of illness.
- Healthcare environments should be designed to facilitate access or exposure to physical features and social situations that have stress reducing influences.
- Target groups should include patients, visitors, and healthcare staff.

(Ulrich, 1991, p.99)

Biophilia Hypothesis

Supportive design is also referred to as evidence-based, evidence-informed, or research-based design. Regardless of what term is used, observation is focused on how people respond to environmental space, stimuli, and variability. The biophilia hypothesis is an underlying premise that suggests that there is an instinctive bond between human beings and other living systems. Breaking down this concept even further, philias are the attractions and positive feelings that people have toward certain habitats, activities, and objects in their natural surroundings. It revolves around human dependence on nature in that it extends far past material needs and includes human craving for aesthetic, intellectual, cognitive, and spiritual satisfaction (Kellert, 1993).

Ulrich attributes three components to his concept of supportive design. They include a sense of control with respect to physical-social surroundings, access to social support, and access to positive distractions in physical surroundings. He suggests that these three components are likely to promote wellness by helping patients deal with stress. A sense of control can be as simple as allowing a patient choose their own music, granting access to operable windows, or supplementing control over room temperature. Social support pertains to contact with family and friends who are helpful, caring, and/or supportive. Positive distractions generally pertain to aesthetic stimuli with just the right amount of activity (Ulrich, 1991).

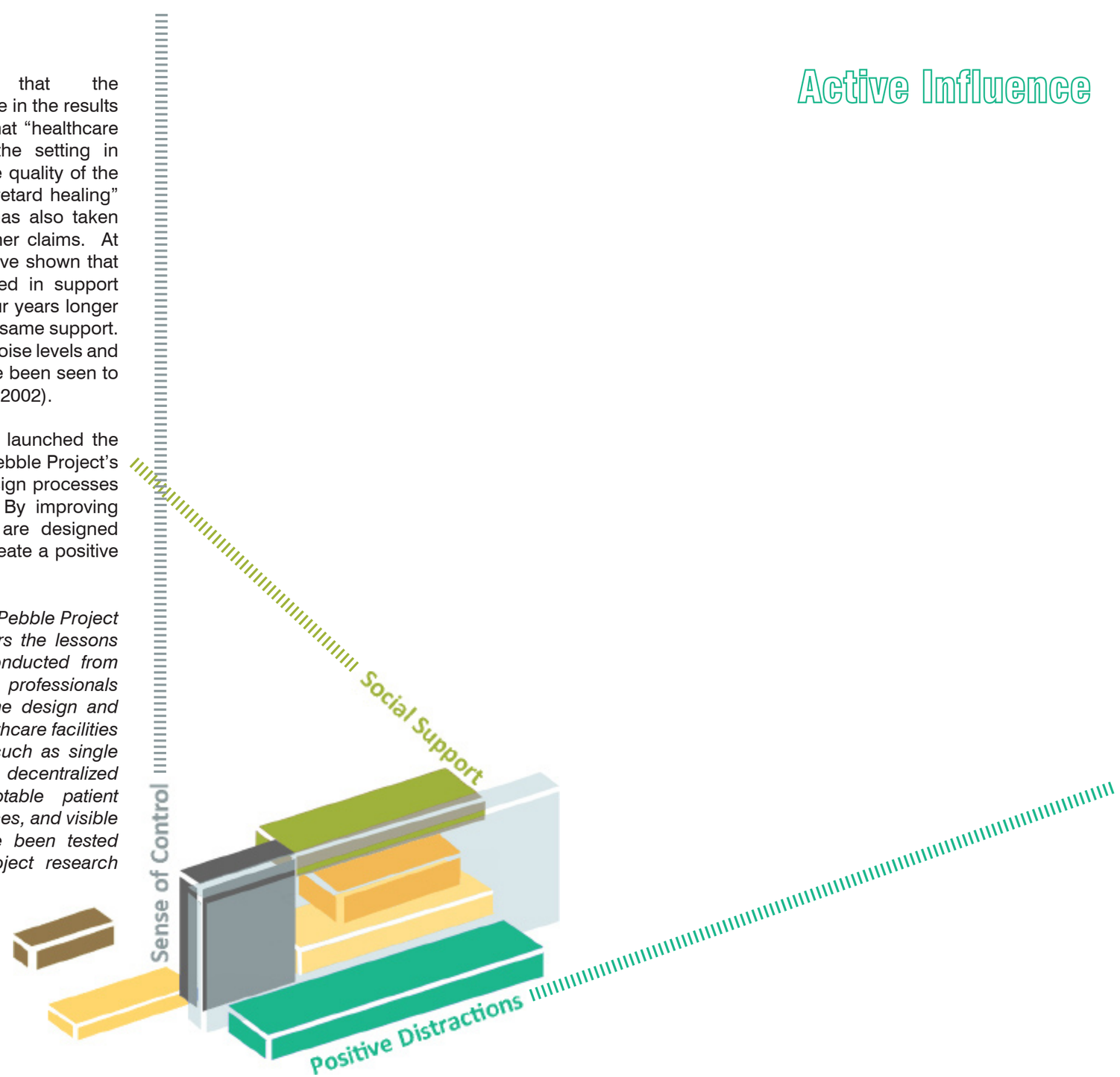
Application

The application of gardens is an example of how healthcare facilities can supplement supportive design. The importance of therapeutic features, like gardens, has been ignored as new medical technologies and functional platforms hoard a facility's program. Ulrich had done numerous studies to evaluate the effects of viewing nature on health outcomes. One such study involved patients recovering from gall bladder surgery. Groups of patients were assigned to two similar rooms. The only difference between rooms was in their window views. One window offered views of a small grove of trees, while the other looked at a brick wall. Patients were categorized based on age, weight, tobacco use, and previous medical history so that these factors would be less likely to influence results. Results suggested that those viewing the grove of trees required fewer injections of pain releasers. They also had fewer negative comments from nurses and an overall shorter postsurgical hospital stay (Ulrich, 1999).

Jain Malkin also believes that the environment plays a pivotal role in the results of healthcare. She believes that “healthcare cannot be separated from the setting in which it is delivered,” and “the quality of the environment can enhance or retard healing” (Bilchik, 2002, p. 12). She has also taken note of evidence supporting her claims. At Stanford University, studies have shown that breast cancer patients involved in support groups lived approximately four years longer than those who did not get the same support. In similar studies, heightened noise levels and interrupted sleep patterns have been seen to reduce recovery rates (Bilchik, 2002).

The Center for Health Design launched the Pebble Project in 2000. The Pebble Project’s goal is to understand how design processes affect behavior and culture. By improving the way healthcare facilities are designed and operated, they hope to create a positive environmental impact.

What’s most notable about the Pebble Project is that over a span of 10 years the lessons learned and the research conducted from this extraordinary group of professionals has dramatically influenced the design and outcomes of thousands of healthcare facilities around the world. Concepts such as single patient rooms, distributed or decentralized nurses’ stations, acuity-adaptable patient rooms, sound-absorbing surfaces, and visible hand washing locations have been tested and validated by Pebble Project research (Goodman, 2010, para. 10).



Active Influence

In 2002, The National Survey on Recreation and the Environment reported that 97.6 percent of Americans took part in outdoor recreation (NSRE, 2002). These numbers are impressive, and compared to earlier studies, more people are engaging in recreation. A physical setback becomes more detrimental with this lifestyle. (Diedrich, 2002)

It is typical that people take pride in what they do. The activities we choose to participate in can represent who we are or even what we believe in. Generally, society views activity as positive. Someone is likely to receive a college scholarship if he or she is involved in extracurricular activities. Being active seems to suggest someone is healthy and well rounded.

What makes something difficult can also make it worthwhile. Working out and staying in shape is not easy for most. Therefore, if someone has reached a high degree of physical wellness, they can be proud of what they have achieved. Physical wellness corresponds with psychological wellbeing.

Healing or attaining wellness is often thought of as positive, but one must not overlook that it can be trying and demand great discipline. Stress and anxiety are by-products of struggle. Specifically, physical therapy often requires one to withstand a high degree of agony. Given this challenge, it is increasingly important that wellness facilities foster recreation and relaxation (Gallup, 1999). This supports Roger Ulrich’s ideas of supportive design: that architecture should foster a sense of control, social support, and positive distractions to ease difficult processes (Ulrich, 1991).

Someone is less likely to struggle with depression or lack motivation if he/she is capable of activities that bring them joy. The ideal model pushes toward living for tomorrow’s satisfaction rather than instant gratification.

Designing Different

There is almost always more than one way of doing something. Because something has been done one way in the past does not mean there are not alternative venues.

Architecture plays a significant role in the process of rehabilitation by providing an environment suited to individual needs. Rehabilitation is not an easy process, but it is amazing how much easier completing a task can seem under ideal environmental conditions or circumstances.

Environment does not equally foster various types of activity. Reading is difficult at the mall and having a conversation is difficult at a library. When designing healthcare facilities, it is all about creating the right formula (Gallup, 1999). The formula should be suited to the needs of the facility but also allow a certain degree of flexibility.

At the Springfield Hospital Healthplex, designers strategically placed a space below the floor to allow for adaptation. It is designed to allow for future duct work and cabling systems as rooms change function. This is to allow these spaces access to future environmental requirements (Gallup, 1999).

Indoor running tracks have always been laid out in an oval while outdoor paths offer far more variability to its users. It might be behooving to integrate positive aspects of various track types. Hybrid solutions introduce something new and allow for a dynamic response. Similarly, there has always been a debate over the benefits of running on a treadmill vs. running outdoors. Varying preferences suggest the implementation of both systems as a solution.

Waiting rooms and lobby spaces are often overlooked in the design of healthcare facilities. Because these spaces are said to produce no income, they are often designed as an afterthought. These spaces have a direct implication on the overall experience of the building. They can be a pleasant settings for those suffering from pain and anxiety. Proper design can be therapeutic to those suffering from pain or anxiety (Gallup, 1999).

Taking Ulrich's ideas of healing gardens to the next level, the natural environment is capable of becoming intertwined with the built environment. Green roofs, vegetative walls, and other natural elements can be utilized. These tools can be used to blend interior and exterior space and make the building more sustainable. "The wellness center design should take every opportunity to bring nature indoors. Using natural light, natural materials, and producing, through skilled design, a rhythm that encourages and uplifts people" (Gallup, 1999, p.152)

Summary

Much of the success or failure attributed to an environment can be traced to its perceived experiential quality (PEQ). The PEQ refers to one's overall impression as he or she is influenced by it. The PEQ influences an individual's engagement in the programming associated with given setting. Simply put, environment influences activity. Therefore, the design of a rehabilitation clinic should strive for sincere care, reduce stress, and be innovative so that it communicates a positive PEQ.

Sincere Care

Functionality is important, but in order for a rehabilitation clinic to be successful, it must express concern for it users. Design should not be solely based on function; a more holistic approach is needed. Expressing sincere care in design can be accomplished by understanding the needs of patients, visitors, and staff.

When considering patient needs, it is important to take a holistic approach. Varying dimensions of wellness call for a variety of spaces. The facility is to focus on physical rehabilitation, but this does not mean exercise, training, and activity space make up the entire program. Those areas are important, but other considerations include a spa, educational space, massage room, nutrition bar, and other therapeutic spaces.

It is important to also provide convenience and comfort to staff and visitors. A staff lounge, parking area, reception space, and conference room are examples of how convenience can be provided to users. It is important that these are not merely designed around function, but instill joy in those who use them. Happy visitors and employees will ensure the facilities productivity and economic success.

Reduce Stress

Stress is pivotal to how people respond to their surroundings, both voluntarily and involuntarily. Roger Ulrich's theory of supportive design outlines the importance of designing a healthcare facility to reduce stress. Stress can be minimized by providing a sense of control with respect to physical-social surroundings, access to social support, and access to positive distractions in physical surroundings.

Drawing from the Biophilia hypothesis, therapeutic gardens are an example of supportive design. Evidence has shown that there is a bond between humans and nature. We are attracted to nature as we accumulate positive feelings from it. Therefore, the application of nature to design can result in a decreased level of stress.

Innovation

Innovation is important in the design of a rehabilitation clinic. New systems and methodologies are likely to intrigue users and keep them motivated. Because something has been done one way in the past does not mean there are not other (better) options.

Flexibility of space can give architecture the ability to adapt. Dynamic walls and access to utilities allow for change. By carefully analyzing multiple ways of doing something, positive characteristics can formulate a unique concept. For example, running tracks and outdoor trails might be integrated.

Sustainability has always been subject to innovation. It is the role of the architect to develop new strategies or apply existing strategies in new fashion. As the rehabilitation center includes therapeutic features, avenues for sustainability become apparent. Pools can act in thermal massing, and healing gardens are capable of producing food. Passive heating, cooling, and ventilation is applicable to the synthesis of natural and built environments.

Typological Research

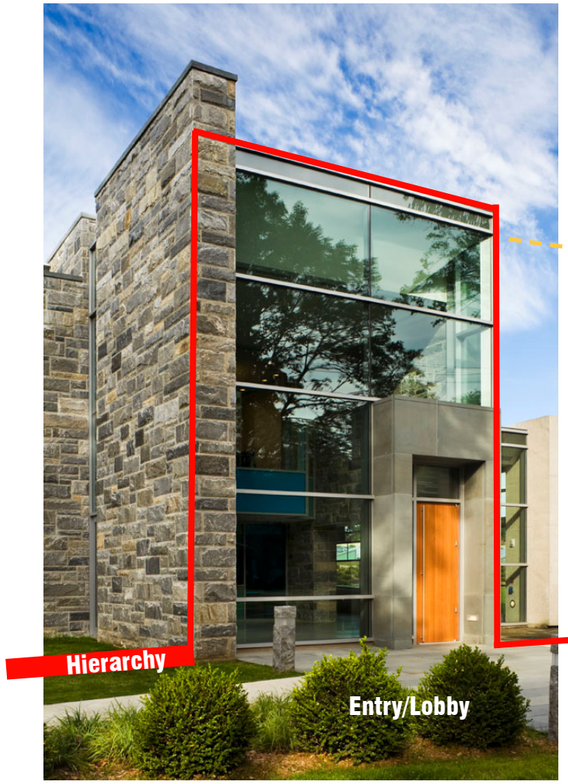
Center For Wellness

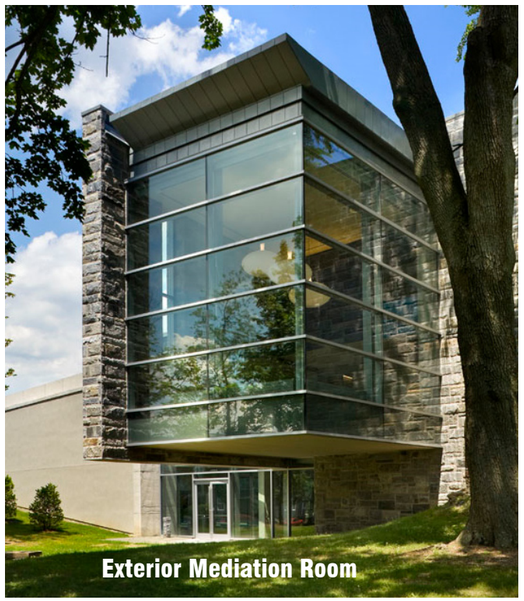
ikon.5 architects
New Rochelle, NY
2008

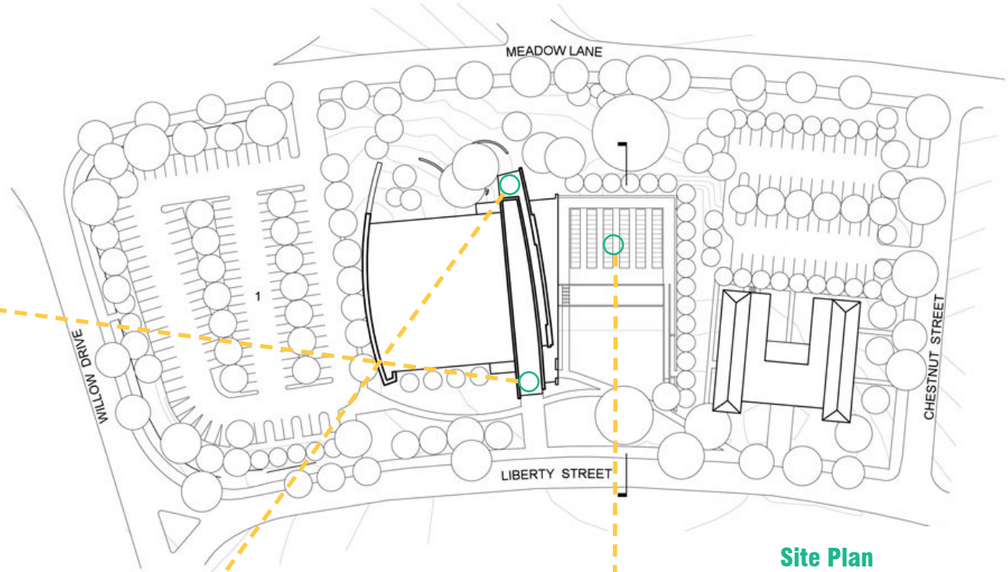
The Center for Wellness at the College of New Rochelle was inspired by the paradisiacal garden. The design of the 55,000 square foot facility focuses on wellness of body, mind and spirit. Poetic depictions of the garden of Eden were influential on the meditative and spiritual quality of the space. The design is seen as a oasis in that it is removed from the metropolitan landscape that surrounds it because of how it pleasantly combines natural and built environments. (McHugh, 2008).

The facility has achieved a LEED Silver rating and is innovative in how it integrates both the natural and built environments. The program is designed to represent natural landforms. The gym (2,000 seats) is much like a rock outcropping, the indoor swimming pool (200 seats) takes its form from a grotto (small cave), and the multi-floor lobby is similar to a crevasse cut into the landscape. The design also includes a fitness/aerobic space, meditation room, offices, and classrooms. The total facility is 55,000 square feet (McHugh, 2008).

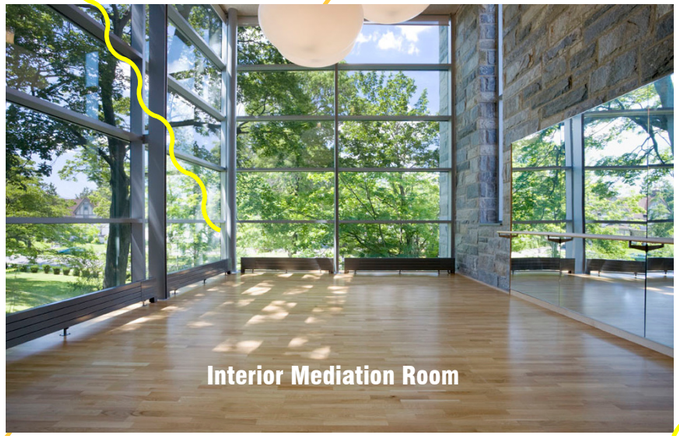
The facility is made up of three distinct forms. The concourse at the center divides the facility while creating the wellness and swimming/garden wings. These wings are asymmetrical, but balance is achieved with their relation to the concourse. The hierarchy of the concourse signifies entry and allows circulation.



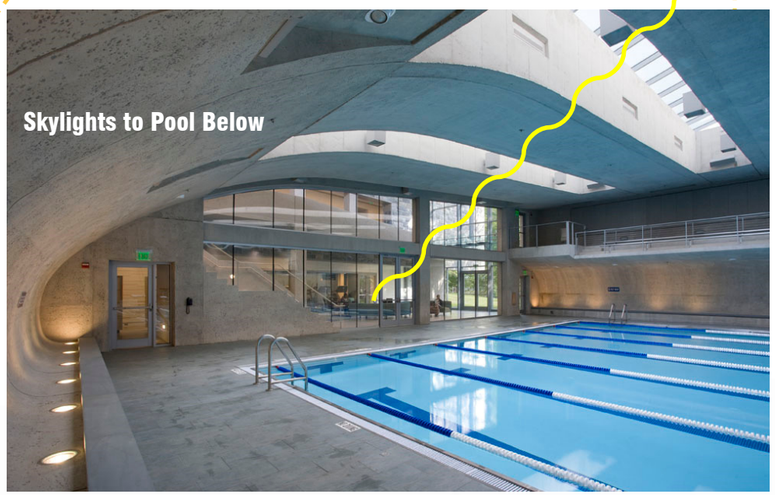




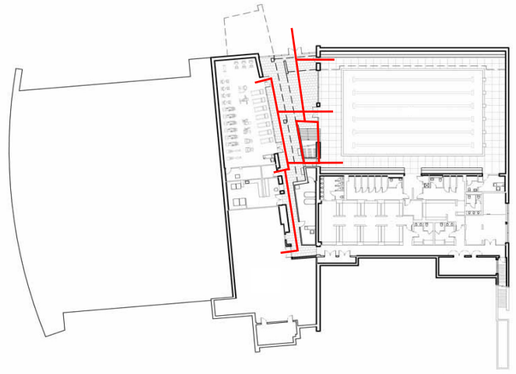
Site Plan



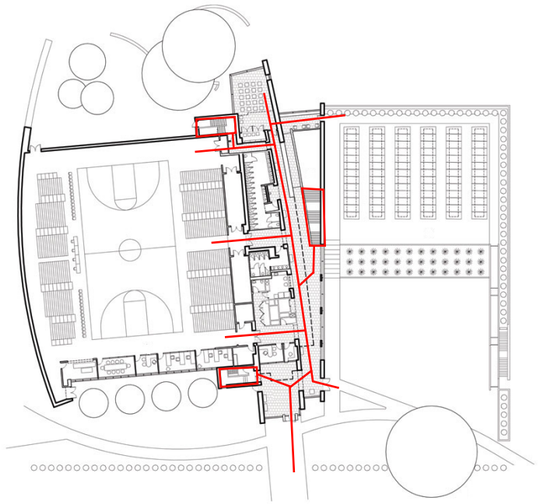
Natural Lighting



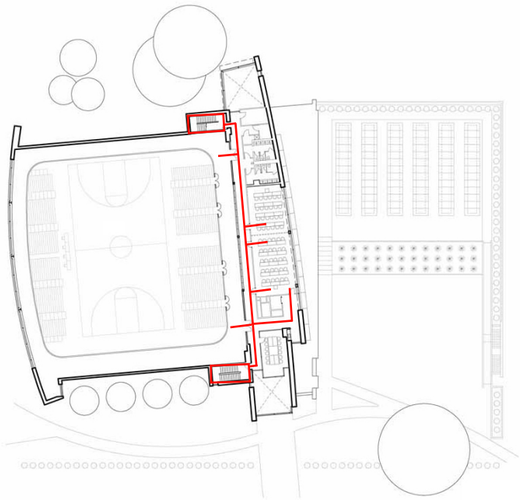
Photos: Paul Mauss



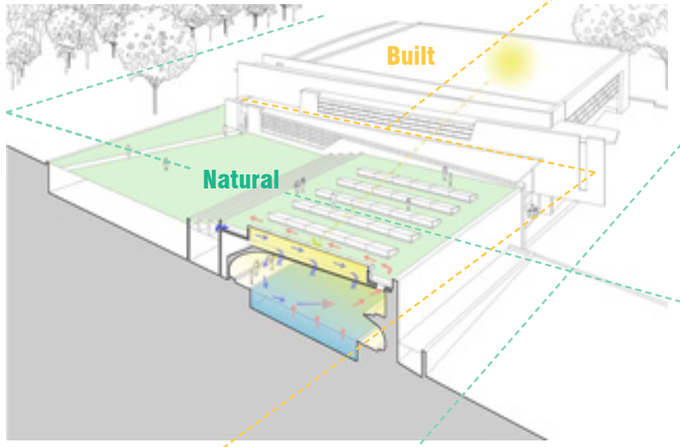
Lower Level Plan

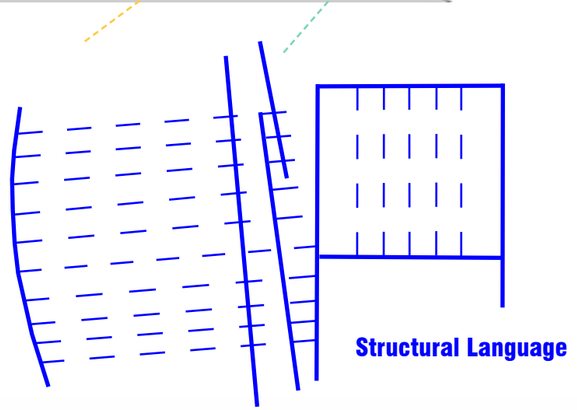


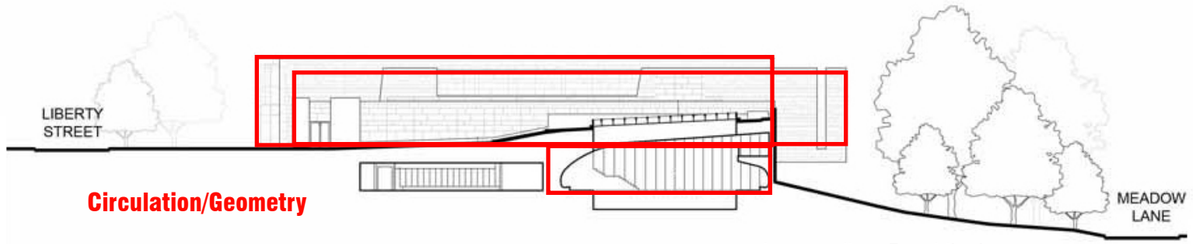
1st Floor Plan



2nd Floor Plan







Images: ikon.5 architects

About 40 % of the building is below grade to allow an outdoor meditative garden. By utilizing a double slab vaulting concrete structure and retaining wall, the granite walls of the gymnasium extend from the site much like a rock outcropping. One portion of that outcropping cantilevers over the sloping site like a rock ledge suspending the dynamic meditation room over a grove of trees. This preserves their mature root structure below (McHugh, 2008).

Skylights set above in the concrete cavern-like swimming area allow natural day lighting to penetrate to the pool waters below and reduce artificial lighting and energy consumption. The building's windows are carved out of the stone walls, like fissures in stone surfaces. The colored glass acts as shading to the gymnasium and classrooms (McHugh, 2008).

This facility follows Roger Ulrich's guidelines for supportive design. Specifically, the therapeutic garden follows his ideas. They grant control, allow supportive interaction, and create a positive distraction.

The design of the Center for Wellness at New Rochelle helps to support the concepts outlined in the theoretical premise/unifying idea. The environment directly influences the composition of space. It provides an outlet for our instinctive bond toward nature and has a significantly positive influence on our perceived experiential quality.

Bronson Methodist Hospital

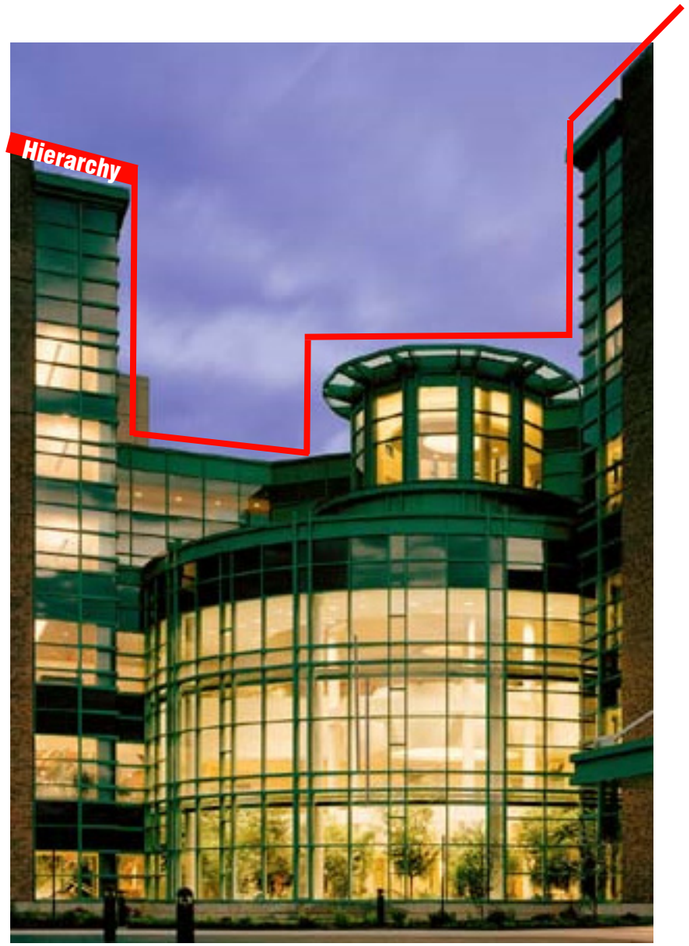
Shepley Bulfinch Richardson and Abbott
Kalamazoo, MI
2000

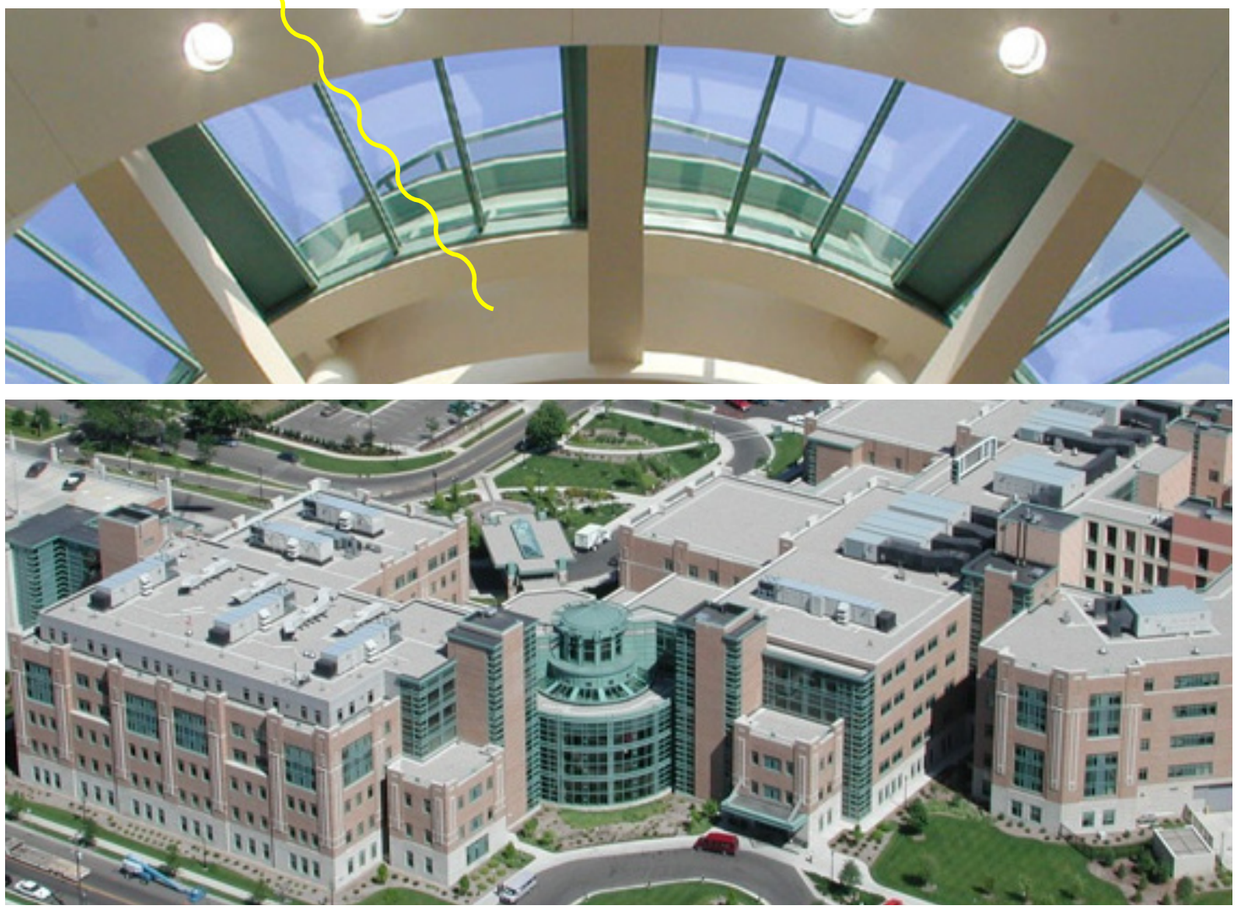
The Bronson Methodist Hospital is a 750,000 square foot building that facilitates many healthcare services. Level one is emergency care, diagnostic imaging, orthopedic beds, and an ICU; level two is surgery services; level three is women's and children's care; and level four handles oncology and cardiology (Bronson, 2009).

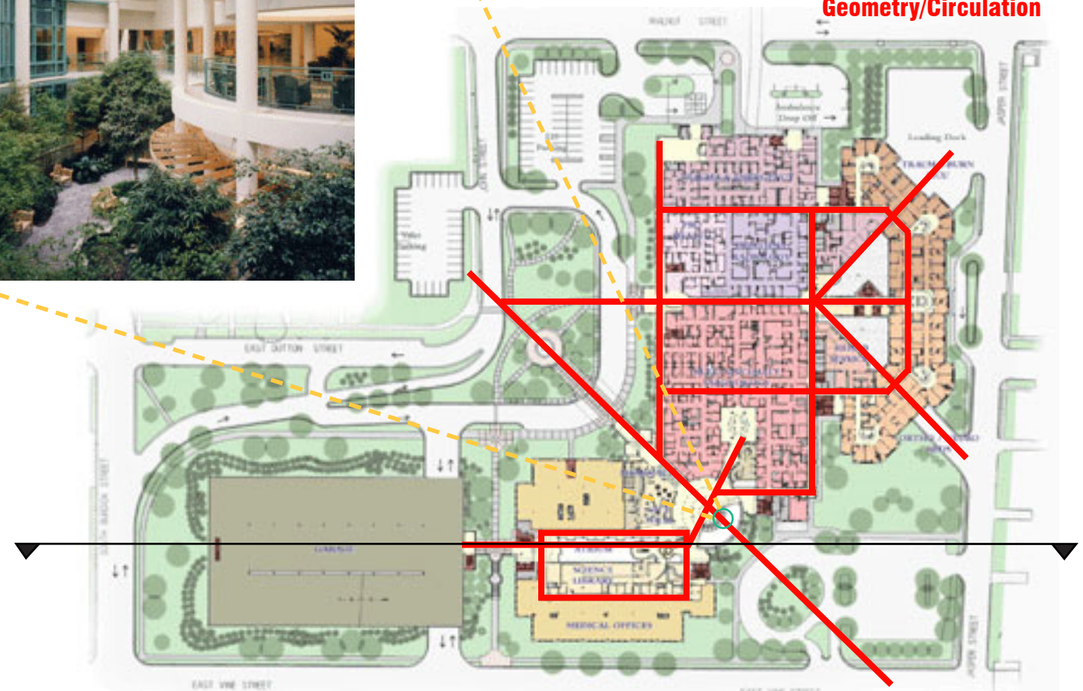
The design is viewed by many as a model of evidence-based or supportive design. As one of the first Pebble Projects, it has won multiple awards. Evidence-based design strategies include:

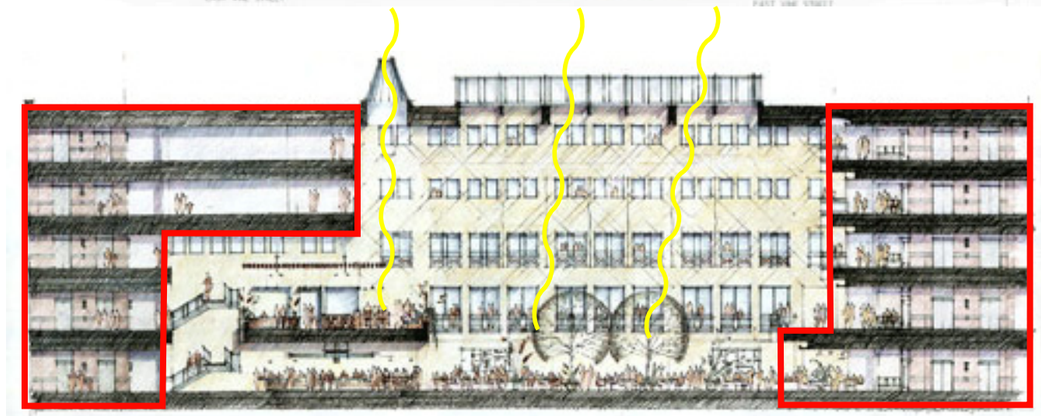
1. Natural lighting, landscape views, and indoor garden courtyards designed to reduce patient stress.
2. Open, welcoming reception spaces, and waiting areas that include Internet stations, family kitchenettes, and specially designed furniture.
3. Specialty glazing, high-performance acoustic ceilings, and specific floor selections (carpet/rubber) enhance sound reduction.
4. Clear spatial connections that utilize colors and directional cues rather than signs.
5. Neonatal Intensive Care Unit with all-private rooms for injured or ill newborns (only found in a few facilities across the country. (Bronson, 2009)

Bronson Hospital is devoted to its staff as they see their involvement as crucial to success. They participate in focus groups to discuss potential improvements to room layout, wardrobe, and communication processes. These Pebble Project strategies have been successful and as a result, Bronson's turnover rate is less than half the national average (Bronson, 2009).










Atrium (also shown in section)


Walls Acting as Cues

A primary distinguishing factor between the Bronson Hospital and New Rochelle Center for Wellness is how it fits into the landscape. The Bronson Hospital seems to be set on top of the landscape (additive) while the New Rochelle facility is carved into the topography (subtractive). The subtractive approach seems far more successful in the interest of blending natural and built environments.

Due to scale and programming requirements, the Bronson Hospital seems very bulky. Except for the central garden atrium, the majority of the design is rectangular. The use of a cylinder for the atrium make it stand out in form.

The facility allows a great deal of natural lighting through the use of large curtain walls. These are showcased in the central garden atrium. There are also numerous skylights throughout the design. Task lighting is used for much of the other interior lighting.

The structure is composed of a steel frame system with poured concrete decking. The building materials used are brick, designer stone, concrete, metal, and glass (Bronson, 2009).

The building is designed to facilitate convenient parking and circulation. Each level is devoted to a particular specialty so patients and visitors can park on the level that provides their service (Baker, 2010). The influence of the Pebble Project on the Bronson Methodist Hospital can be seen throughout the design. It shares similar characteristics with the New Rochelle Center for Wellness in that they seek to creatively blend natural and built environments. Both share an asymmetrical balance, but the hierarchy is inverted. The hospital's primary entry lies at a low point in the facade instead of using height to signify entry. Due to the scale of the Bronson facility, the circulation is far more complex but well designed. For flow/simplification, each floor carries its own piece of the program with looped pathways (Baker, 2010).

Football Training Center

Chartier-Corvbasson
France
2009

Located on the banks of the River Selle, this football (soccer) training facility creates a unique relationship with its surrounding. By taking a modernist approach, it suggests the domestication of nature (Saieh, 2010).

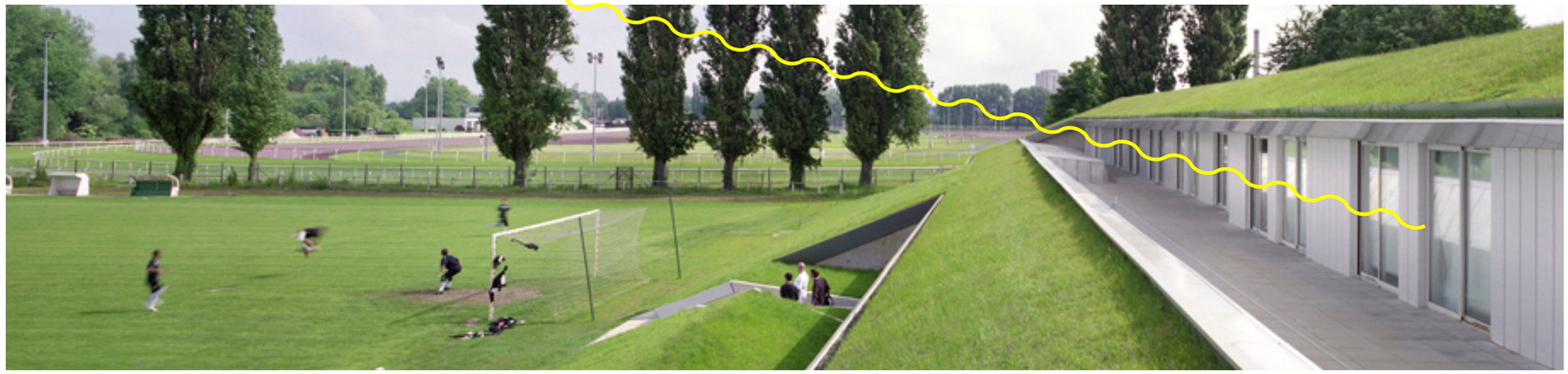
The building's program is divided between the facility's two floors. The lower level has dressing rooms, a medical unit, activity halls, and other various services while the upper level contains offices, training rooms, and dorm-like living spaces (Saieh, 2010).

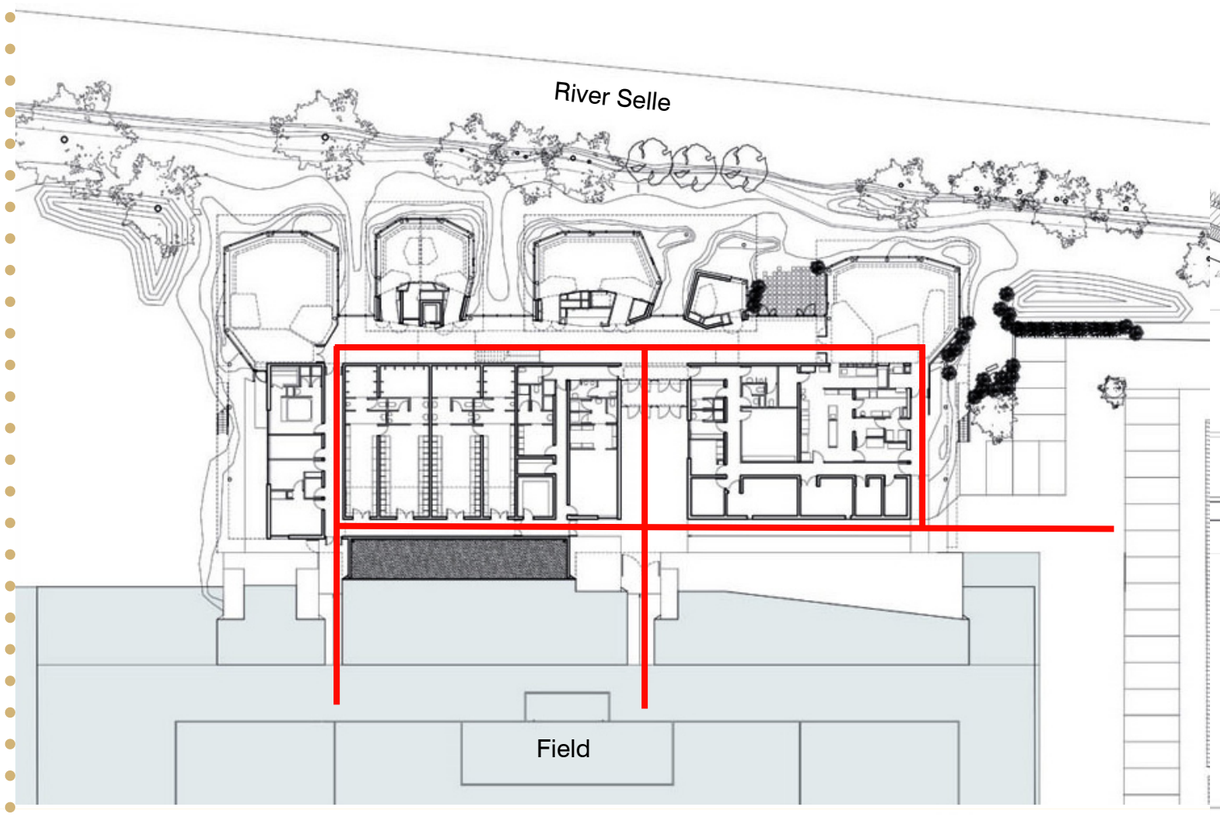
The size of the facility is roughly 20,500 square feet. The scale is suited to accommodate 45 players and facilitate their needs (Saieh, 2010).

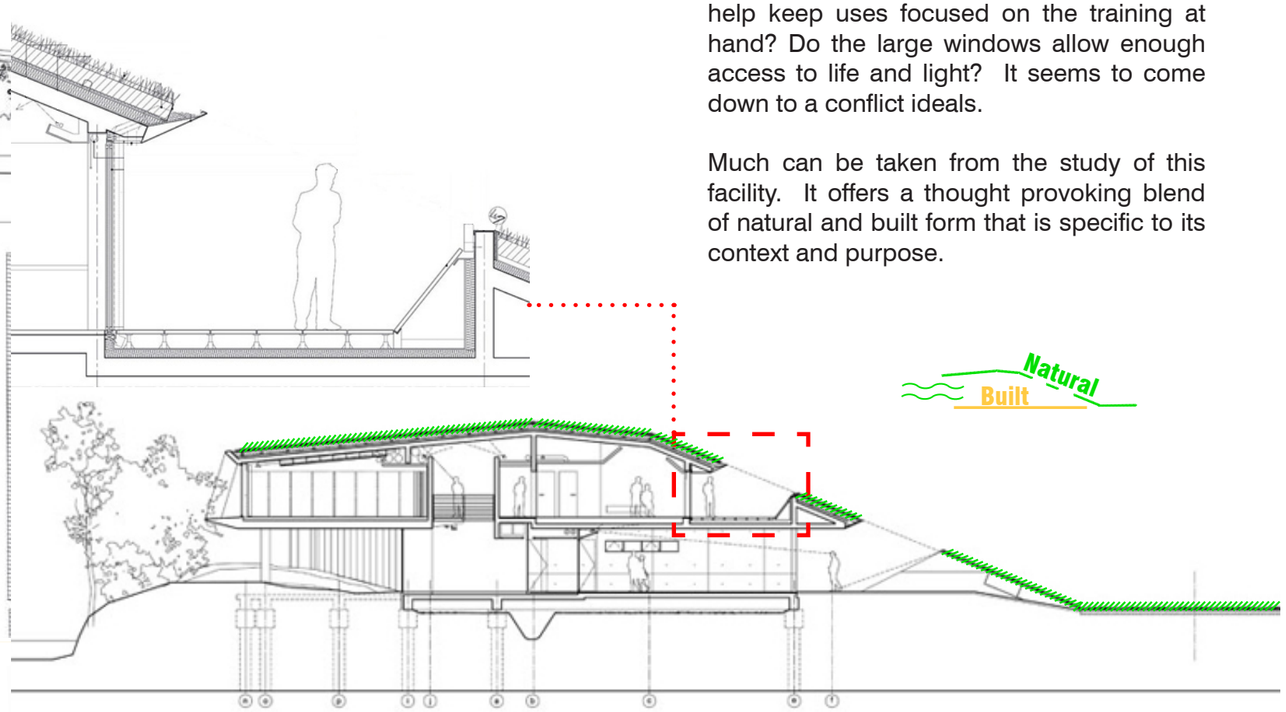
Chartier-Corvbasson utilizes concrete to give the facility a neutral tone. This works to bring out the site's natural environment, but it makes the interior cold and sterile. Indirect and natural lighting help warm interior spaces.

The facade facing the River Selle is designed to function much differently than the facade that extends into the field. The riverside elevation has inward looking features. Many large windows and curtain walls help ensure greenery is visible (Saieh, 2010).

The field facade blends the turf of the field with the building itself. A small knoll flows into a second floor overhang and the roof. This is the feature that makes the facility engaging to occupants. By introducing an element of nature in a new way, the facility engages its occupants and sparks intrigue.







Photos and Images; Philippe Ruault, Yves Marchand & Romain Meffre

The design of the training facility is much like the Center for Wellness at the College of New Rochelle in its design approach. Natural landforms are influential at New Rochelle. The Football Training Center seems to take inspiration from the crisp aesthetic of a clean soccer field as it carries the feature from ground to roof. As a result, an intermediate space is created between interior and exterior. That is where the building fully engages those utilizing the facility and its innovative nature is brought to attention.

By taking a common element and presenting it in an new way, how might it influence its occupants? Fundamentally the building may become more appealing and positively contribute to one's PEQ. Still, it is important to remember that there are many other factors that influence this.

The vegetation is highlighted by the neutral appeal of concrete. Sure the natural element has appeal, but how much might that be offset by the sterile/cold interior? Does minimalism help keep uses focused on the training at hand? Do the large windows allow enough access to life and light? It seems to come down to a conflict ideals.

Much can be taken from the study of this facility. It offers a thought provoking blend of natural and built form that is specific to its context and purpose.

Summary

The New Rochelle Wellness Center, Bronson Methodist Hospital, and Football Training Center were all designed by different people in different locations. They vary in their size, structure, and geometry. Still, each facility is similar in spirit. Despite their differences, they all aspire to provide a caring environment in the spirit of wellness. When designing a physical rehabilitation center, the examination of these facilities can be helpful. Lessons can be learned from examining each study individually and making comparisons.

New Rochelle Wellness Center

At 55,000 square feet, this midsize case study is an example of holistic design that provides something more than functionality. A mediation room, welcoming lobby, and rooftop garden seek to enhance wellness of spirit, body, and mind. Sincere care is inherent in how programmatic elements were inspired by natural landforms.

Bronson Methodist Hospital

As one of the first Pebble Projects, the Bronson Methodist Hospital is a model of supportive design. This large (170,000 s.f.) building's success can be attributed to many evidence-based design strategies that cater to the needs of patients, visitors, and staff. By contributing to circulation and helping patients reduce stress, the building's distinguishing central garden atrium is a key to success.

Football Training Center

The Football Training Center is much smaller than the preceding studies. The minimalistic design carries the grass from the soccer field up and over its concrete body. On the opposite side of the building there are many large curtain walls and windows that allow for views of greenery. The innovative design is designed to bring out the nature of its site and maintain the focus of its users. Therefore, its rural site and plain composition is void of negative distractions.

Before making comparisons it is important to note a few factors. These three studies are all different in their size. A difference in size introduces much more variability. Also, the Bronson Hospital is much older than the other two studies. It was conceived when supportive design was starting to demand attention. The other two projects were done in the last few years and represent a more developed concept.

Indirect and natural lighting is utilized in at least one part of each study. Not only do larger curtain walls allow for light, they also provide views. They also give users knowledge of where they are and what is going on outside so that stress can be reduced.

Balance seems to be preferred over symmetry among these studies, but entry conditions vary. Height is used to signify entry at New Rochelle. Formal change in the form of a cylinder used at Bronson. Finally, the training facility elects to use landscape elements to guide people in.

The designs of the training facility and wellness center are unique while Bronson introduces more repetition. This might be attributed to Bronson's large size and desire for simplification as it would benefit users. Repetition can be useful in creating commonalities, but overuse can become boring and dissuade interest. It is important to find balance in these attributes.

These three studies share a common attribute. They all emphasize the importance of nature to enhance space. They all foster our instinctive bond with nature as it has a significantly positive influence on our perceived experiential quality. This concept is used to reduce the stress of patients at the Bronson Methodist Hospital, aid in meditative processes at the New Rochelle Wellness Center, and act as positive reinforcement in training at the Football Training Center.

Historical Context

Before taking a look at the historical context of this thesis, it is necessary to understand it currently. The spirit of this project seeks to help society restore those in need to greater health or ability.

For Example, Roger Bryanton and his wife Cindy frequently visited their summer cottage in New Brunswick. Back in the year 2000, they were making the familiar drive to their second home. Just before reaching their destination, they hit a moose. Sadly, Roger suffered a spinal cord injury resulting in quadriplegia, paralysis of the body from the neck down.

Roger was transferred to Ottawa Hospital Rehabilitation Centre. After being outfitted with an electric wheelchair, he began to receive therapy five days a week. He spent time working on arm movement and learning how to do everyday activities in a new way. After a few months, his finger began to retain movement. He spent time in the weight room and at therapy sessions as professionals monitored his progress. In a year, he reestablished movement in his fingers and thumbs.

Care of staff, support from family, and a positive environmental influence helped him achieve a higher level of wellness. Today he is once again able to make the drive to New Brunswick with his wife (The Ottawa Hospital, 2008).

Rehabilitation - the physical restoration of a sick or disabled person by therapeutic measures. May also include reeducation in the activities of a normal life within the limitations of the person's physical disability.
The American Heritage® Stedman's Medical Dictionary

Origins of Physical Therapy

Origins of modern day physical therapy date back to 1813 when Per Henrik Ling founded the Royal Central Institute of Gymnastics in Sweden. Massage, manipulation, and exercise was used to help the disabled. Other countries soon began practicing physical therapy. The United States adopted similar techniques during the polio outbreak and World War I. As the practice was institutionalized, the term "Reconstruction Aide" was the title given to those practicing physical therapy in 1918 (Bradley, 2003).

During World War I, physical therapy was adopted as physicians began practicing what was then called "physiotherapy" to help soldiers."

Physiatry is a medical specialty that uses manipulation, massage, exercise, heat, water, or any other physical remedy to rehabilitate a patient. Despite being practiced since before recorded history, it became recognized as a medical specialty in 1946 (Bradley, 2003).

Education for physiatry, also known a physical medicine, began in 1926 at Northwestern University Medical School under to leadership of Dr. John Stanly Coulter. Working at the Mayo Clinic, Frank Krusen became another great contributor to physical medicine as he published the widely used textbook on the subject in 1941. Krusen later became known as the "father of physical medicine" (Bradley, 2003).

Through the middle to late 20th century, research and development sparked evolution in physiatry and physical therapy. Electromyography (EMG) was a profoundly important method for the evaluation of problems in the neuromuscular system. Since being introduced in the 1950's, it has helped boost the results of practitioners. This diagnostic tool made it possible to pinpoint and evaluate muscular/sensory pathology components of the nervous system (Bradley, 2003).

Kessler Rehabilitation

One of the first individual U.S rehabilitation institutes was founded in West Orange, NJ. Henry H. Kessler purchased a small brick building on a hillside just outside West Orange. The 16-bed facility opened January 3, 1949. Sixty years later, Kessler Institute for Rehabilitation is the single largest rehabilitation hospital in the nation (Kessler Institute, 2010).

A large part of Kessler's success can be attributed to his approach to rehabilitation. From the beginning in 1949, Kessler took a holistic approach to healing. He believed that in order to be successful, it was necessary to treat the whole individual instead of focusing solely on physical recovery. His desire was to facilitate physical, mental, social, vocational, and economic need so that full care is provided. Patient care, community education, personnel training, research, and international programming made up his five-fold mission (Kessler Institute, 2010).

History of Rapid City

In 1874, gold sparked an influx of people to western South Dakota. A group of unsuccessful miners founded Rapid City in 1876. They referred to their settlement as the "Gateway to the Black Hills." Rapid City got its name from Rapid Creek, a spring-fed stream that flows through it. Early economic activity was established by selling supplies to those in search of gold. It was this that contributed to the town's survival of the boom and bust of the late 1800s.

After the invention of the automobile in the early 1900s, tourism brought another influx of people to the Black Hills area. In 1927, Gutzon Borglum initiated work on Mount Rushmore. Located just south of Rapid City in Keystone, the monument became a destination to many travelers. Tourism kept the city afloat during the Great Depression. In the 1940s, Ellsworth Air Force Base was established. It was very beneficial to the city in that its economy could thrive off of military payroll.

Just prior to the 1950s, leaders of Rapid City envisioned a plan of growth. They began outlining plans for a civic center, parking, new schools, and paved roads. These plans were set into motion, and a building boom took place throughout the 1950s.

In 1972, heavy rains caused Rapid Creek to flood. More than 200 people were killed in the disaster and over 100 million dollars in property was destroyed. In an effort to rebuild what was lost, a second building boom began. The flood cleared space for further development. The area along the river became a public park. The Rushmore Plaza Civic Center and a Central High School took advantage of the space cleared by the flood (Rapid City: History, 2006).

Rapid City Regional Hospital

Prior to the early 1970s, two separate hospitals served Rapid City (Saint John's McNamara and Bennett-Clarkson). Doubting the feasibility of maintaining two hospitals, the decision was made to join efforts in 1973. Thus formed the Rapid City Regional Hospital, establishing itself in southern Rapid City. The Hospital sparked the development of many specialty facilities. Other facilities focused on surgery, pediatrics, neonatology, rehabilitation, radiology, and behavior management. Today, this area can be described as a campus of healthcare facilities (Regional Health, 2009).

Rapid City is a major medical care center for a five-state region. It has a strong background in rehabilitation. Rehabilitation has always been been a primary area of focus. Their Rehabilitation Institute is a tribute to that. This 51-bed comprehensive inpatient rehabilitation facility is becoming outdated. When it was constructed years ago, function was its primary concern. The facility is due for an upgrade to better suit the needs of its patients.

There were many Works Progress Administration projects done in Rapid City from 1935-1943, and nine still stand today. Skyline Drive/Dinosaur Park is one of those projects. Dinosaur Park is located at the end of Skyline Drive on a high point in the Hogback Range. The Road extends through Rapid City, offering breathtaking views of the city below (Miller, 1985).

The idea behind Dinosaur Park was planted by R.L. Bronson after he has seen a mechanical reproduction of a brontosaurus at the Chicago Century of Progress Exposition. Government approved his idea and initiated WPA project 960. It was agreed that sculptures of a triceratops, triconodon, brontosaurus, stegosaurus, and tyrannosaurus rex would be included in the project. Steel tubing shaped the framework of each creature and a steel mesh was used as the foundation for their concrete exterior (Miller, 1985).

Work was fully completed in 1938 after the park had been dedicated. Many people still visit Dinosaur Park, taking the scenic Skyline Drive to get there. It acts as a reminder of how important tourism was to the development of the city (Miller, 1985).

There are many buildings in Rapid City that have survived the test of time. The examination of these historic buildings is significant and communicates Rapid City's architectural expression through history. The 1886 Clower Building, 1907 Railroad Station, and 1915 Fire Department are three classics.

1886 Clower Building

Built in 1886, the Clower Building is one of the oldest buildings that still stands in Rapid City. It was built for the L. Morris Dry Goods Company and it included Franklin & Baer's wholesale liquor store. A new façade was placed on the building during the 1950s, but in 1993 it was carefully restored to its original condition. It has been described as commercial Italianate construction at its best (Lane, 2001).

1907 Railroad Station

The Chicago, Milwaukee, and St. Paul Railroad system came to Rapid City in 1907. The railroad depot was constructed the same year. This structure served as the gateway to Rapid City for those traveling by train. Today the facility is still utilized as a Mexican restaurant. It has been restored, but still articulates the form familiar to turn of the century design in Rapid City (Lane, 2001).

1915 Fire Department

The Rapid City Fire Department was built in 1915. The building's large brick façade is still appealing today. It was originally run by volunteers from the community, but eventually it became a professional organization. Garages with large doors housed fire trucks and equipment on the main floor, and there were quarters for firemen on the second floor. It was renovated in 1975; since then it has been used as a restaurant (Lane, 2001).

Conclusions

Physical therapy has been a vital form of healthcare since recorded history, and physiatry was an extension of that. Rehabilitation institutes came into existence during the late 1940s when physiatry was establishing itself as a profession. Kessler's Institute suggests that successful institutes arise with a holistic approach to their care. The current rehabilitation institute in Rapid City was designed when holistic wellness was compromised by the need to facilitate function. Therefore, Rapid City presents itself as the perfect setting to implement a new, more holistic physical rehabilitation clinic.

Project Goals

With any pursuit, it is important to outline goals. They function much like a compass as they point us in the right direction and guide decisions. The goals of this project can be outlined in three environments; academic, professional, and personal.

Academically, I hope to learn from this project. By designing every element, from program to section details, I plan to gain a better understanding of the roles and responsibilities of an architect. As a result, I would like to receive a legitimate grade in the studio and graduate with a Master's in Architecture. Also, my work will be kept on file at the NDSU Library so I feel it is important to leave behind something useful. When future students are conducting research and come across my work, I would like it to be clearly outlined in a professional manor.

After I get an internship and complete my IDP, my goal is to become a licensed architect and open my own firm. When I look back, I want to be proud of this project. As someone interested in becoming a licensed architect, it is in my best interest that this project help me obtain an internship. It is important that the results of the project communicate that I am a good designer dedicated to my craft. Of all my projects, I feel this should be the focus of my portfolio. Innovation is also important. When viewed by the professional world, I would like this project to be appreciated for its innovation. It is my hope that it will spark their desire to see it in built form.

My greatest personal goal in this endeavor is to be nominated for the Mackenzie Prize and win. I believe this would help me attain an internship and jump-start my career. On a much smaller scale, I would personally like to use this project to better understand who I am as a designer. I believe it will help me understand the type of architecture I would like to purse. I am currently interested in healthcare or recreational facility design. This project will either confirm my interest or point me in another direction.

I appreciate the opportunity that this thesis project provides. I have many goals that can be achieved through this project. Academically I hope to use it to graduate with my Master's. Professionally, my goal is to use this project to land an internship. Personally, I hope to win the Mackenzie Prize and achieve a greater understanding of who I am as a designer.

Site Analysis

Narrative

I remember traveling through South Dakota as a child. Its neutral tone and relatively flat terrain did very little to keep an eight-year-old entertained. About nine hours into our car ride, I was anxious to stop somewhere other than a gas station. After the third round of I Spy, my dad finally said we were going to make a stop and stay overnight.

Suddenly the landscape lost its dull, dismal nature and I was looking at what seemed like a mountain. We took a winding road up the “mountain” and the car came to a stop. My overly rested energetic legs carried me at full speed up a set of stairs to where I found myself face to face with dinosaurs. I was overwhelmed with excitement as I ran up to them, wishing they were real. I climbed up on a stegosaurus and looked out over the urban landscape. At the time I had no comprehension of where I was or what I was doing. All I remember is how that city left an impression on a much younger me.

Much like it did in 1996, Rapid City left a positive impression on me in 2010. The second time I visited the “Gateway to the Black Hills,” I went back up to Dinosaur Park and once again looked over Rapid City. This time I saw the city in a new light: I understood where I was and what I was doing. Still, that childhood thrill lingered in me.

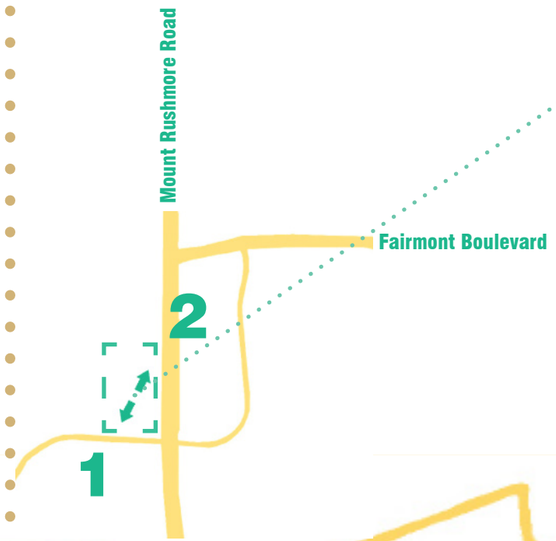
I was excited to get over to where I had proposed the site for this thesis project. I had the privilege of taking skyline drive in getting there. I weaved back and forth through the Hogback Range and looked out over the two sides of Rapid City. I passed impressive newly developed housing, a sign that in the midst of economic struggle, the city was doing alright.

When I arrived at the site, I was not disappointed. It was the landscape I envisioned and hoped for. I could look out to the northeast and enjoy a great view of the city. When I turned around, I saw no sign of urban development; instead there was a dynamic landscape of trees, rock, and tall grass. In this setting I felt comfortable and in control. It seemed free from the hustle and bustle of the city, but not overly isolated.

The topography of the site seemed to bring attention to elements of nature as it revealed them in new ways. The Rapid City Regional Hospital was clearly in view as one point of the site, but just a short walk would hide the large complex. Something that fascinated me was an old abandoned road on the site. Nature had taken over the old cracked pavement. I was astonished to find small pine trees growing out of narrow cracks. It carried a rustic appeal as it asserted nature's beauty

I left the site fully satisfied and excited to get into design. I know the site has great potential in the design of a rehabilitation clinic. Its nature can be utilized to reduce stress and the views are suited to spark intrigue. I am confident that it has the potential to become an ideal environment for healing and restoration.

Site

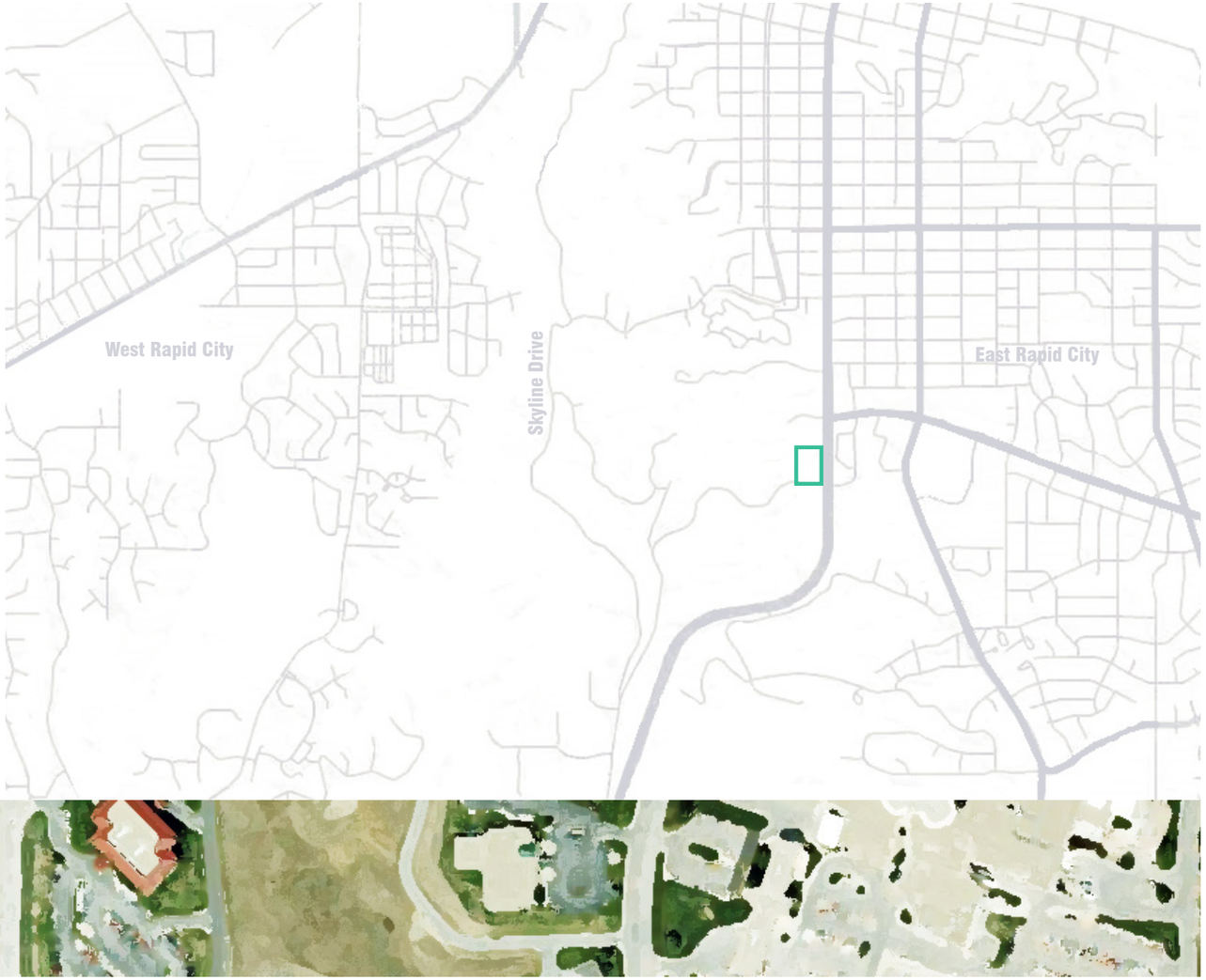


Grids

The site I have chosen has no defined grid. The landscapie is responsible for where development has occured. Rapid City does have a grid, but it has been skewed by the Hogback Range. It seems to split Rapid City into two halves, east and west. The grid is visually more influential on those present on the site.

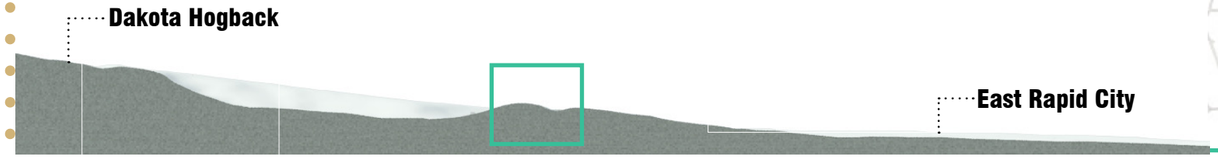
Textures

The textures on and around the site range from natural to man made. West, the site is more natural with trees and tall grass. It offers a beautiful blend of gold and green. The east is much more domesticated. The introduction of buildings, streets, and parking lots illustrate human intervention. An old abandoned road exists in the middle of the site. It has been overgrown with grass and trees.



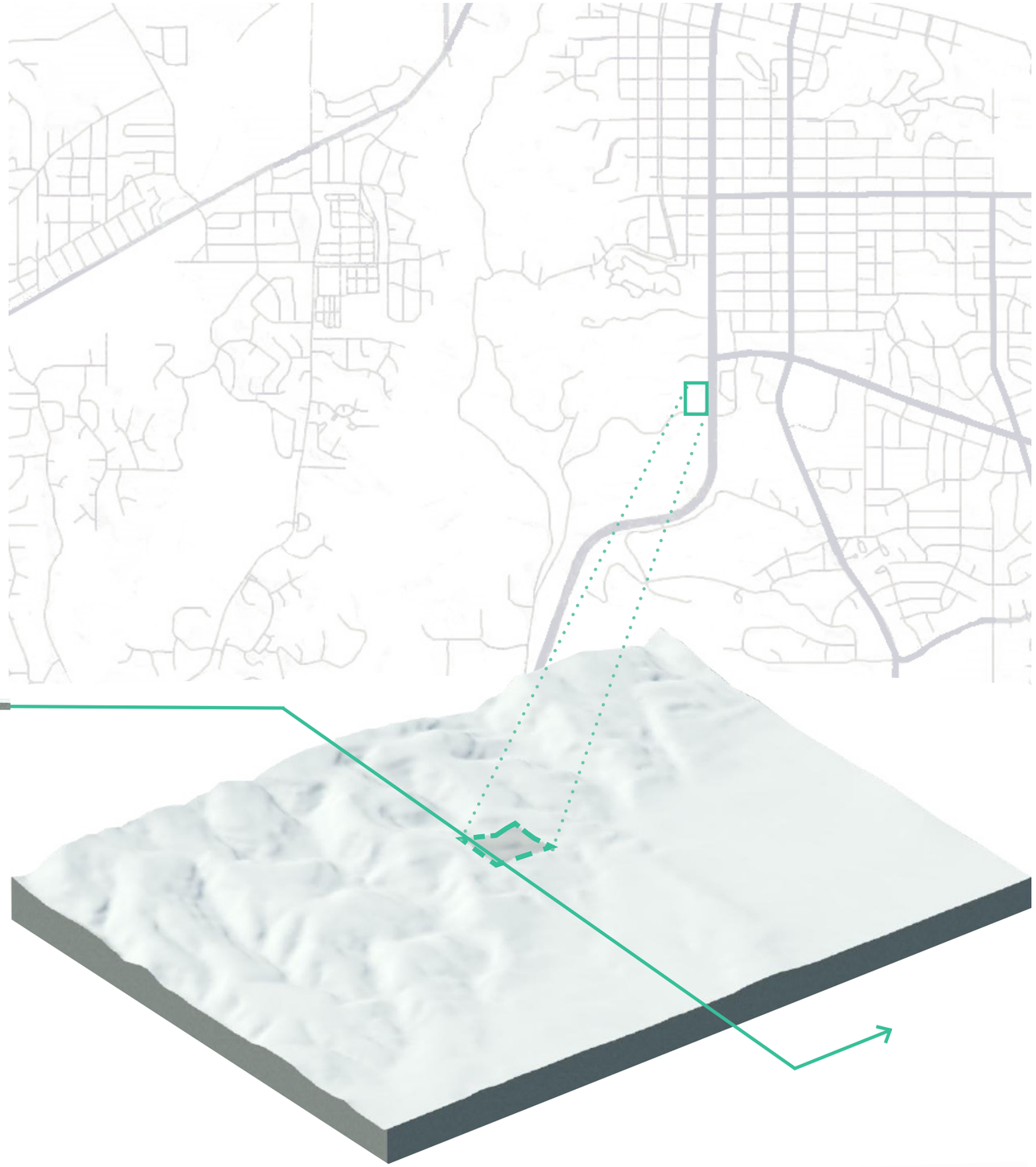
Geometries

Nature has established a strong presence throughout the site. In the image above, fallen branches and trees mesh with what was once a feeding trough to form an appealing aesthetic. The geometry on site is dynamic and free flowing. It seems rugged, but in a very clean way.



Sections

My proposed site is nestled on the edge of Hogback Range. This landform offers a significant amount of elevation variability. When at the site, one can look uphill to the west and downhill to the east. The presented sections show the site's incline and allow for an understanding of the site's dynamic nature.



Built Environment

There are multiple buildings scattered around the site. Density increases as one progresses north and east. There are numerous healthcare facilities that form a medical campus. The heart of this group of buildings is the Rapid City Regional Hospital. Besides the medical buildings, there are a few restaurants, schools, a church, gas station, and hotel. Other than buildings, it is also important to note the bridge that comes up and over Mount Rushmore Drive Residential development is west of the site, up in the Hogback Range.

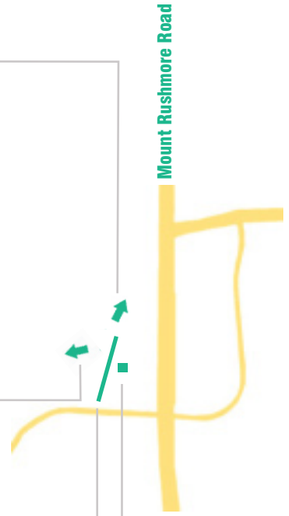
1. Rapid City Regional Hospital
2. Rehabilitation Institute
3. Optical Works Inc.
4. Dakota Radiology
5. Black Hills Pediatrics & Neonatology
6. Cardiology Clinic
7. St Thomas More High School
8. St Elizabeth Seton School
9. Our Lady of Perpetual Help Church
10. Diocese of Rapid City
11. Same Day Surgery Center
12. Black Hills Obstetrics & Gynecology
13. Harrington Bossiness Building
14. Rapid City Medical Center
15. Wendy's
16. Taco Bell
17. Ruby Tuesday
18. Riddle's Jewlery
19. Exxon Gas Station
20. Comfort Inn & Suites

Rapid City at Night

Landscape to Prevent Runoff

Abandoned Road

Wooden Box on Site



Lighting The quality of light is something that changes with the time of year and weather. When I visited the site in early November, the weather was still sunny and the temperature was 75. The tall yellow grass shone like gold in the sun. Looking over to a wooded area, the trees carried great value in the midday sun. In the daylight, the site has a lot to offer in the form of natural elements. When the sun goes down, the city below seems to come to life. Bright lights bring the city to life.

Water Water is powerful in that it shapes the landscape. As water flows down the hills by the site, the surface is altered. Because there is little development uphill, there is little concern for pollutants draining into the water table. The height of the site ensures safety in the midst of heavy downpours. There is currently landscaping in place up hill to help prevent a washout.

Wind

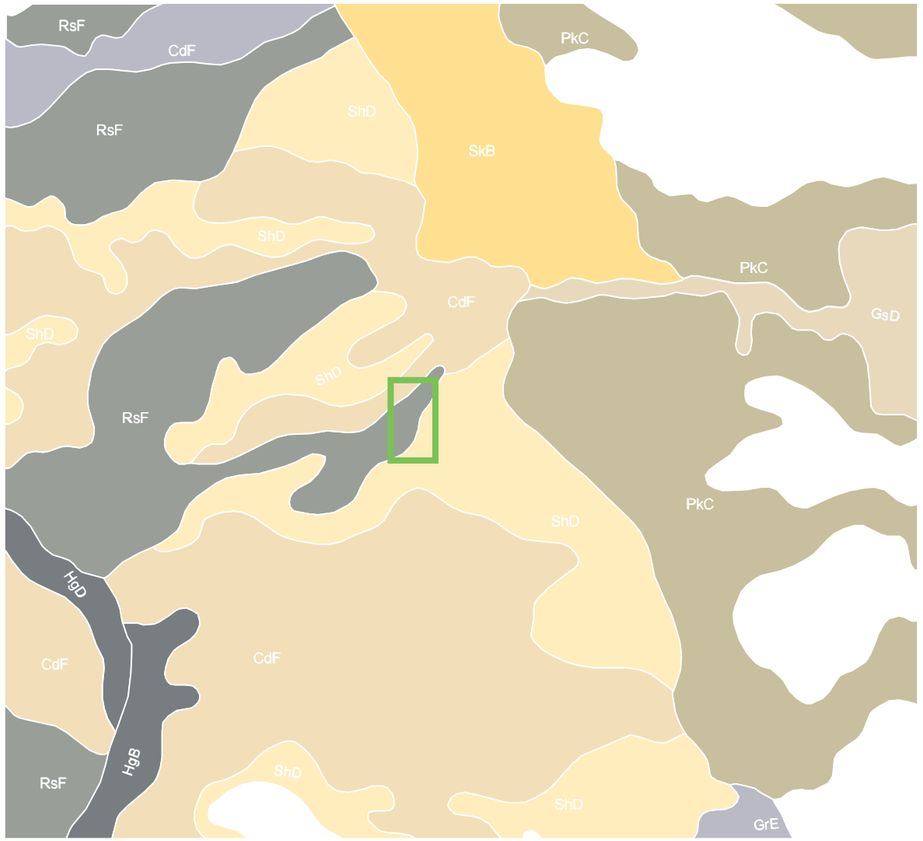
There is great cover from wind on the site. Prevailing winds are out of the northwest where the Dakota Hogback acts as a shield to protect the site. The trees on site are also in place to act as a windshield.

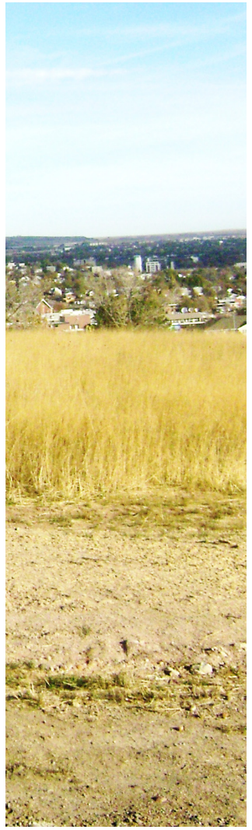
Human Intervention

The site seems to show some signs of past human intervention. One signal is the abandoned road. This road may have once acted as an exit from Mount Rushmore Drive. It is possible that it was rerouted with the addition of the bridge. I also found various debris on site. An old wooden box and a metal trough are signs that people were there years ago. There was little on no modern debris to be found. These elements seemed to give the site a mysterious, historic feel.

Distress

Erosion is the most obvious sign of stress on the site. When walking around the steeper area, I discovered deep ruts in the soil. The hills themselves are a result of distress that occurred over a long period of time. The trough and box also give off a feeling of distress.



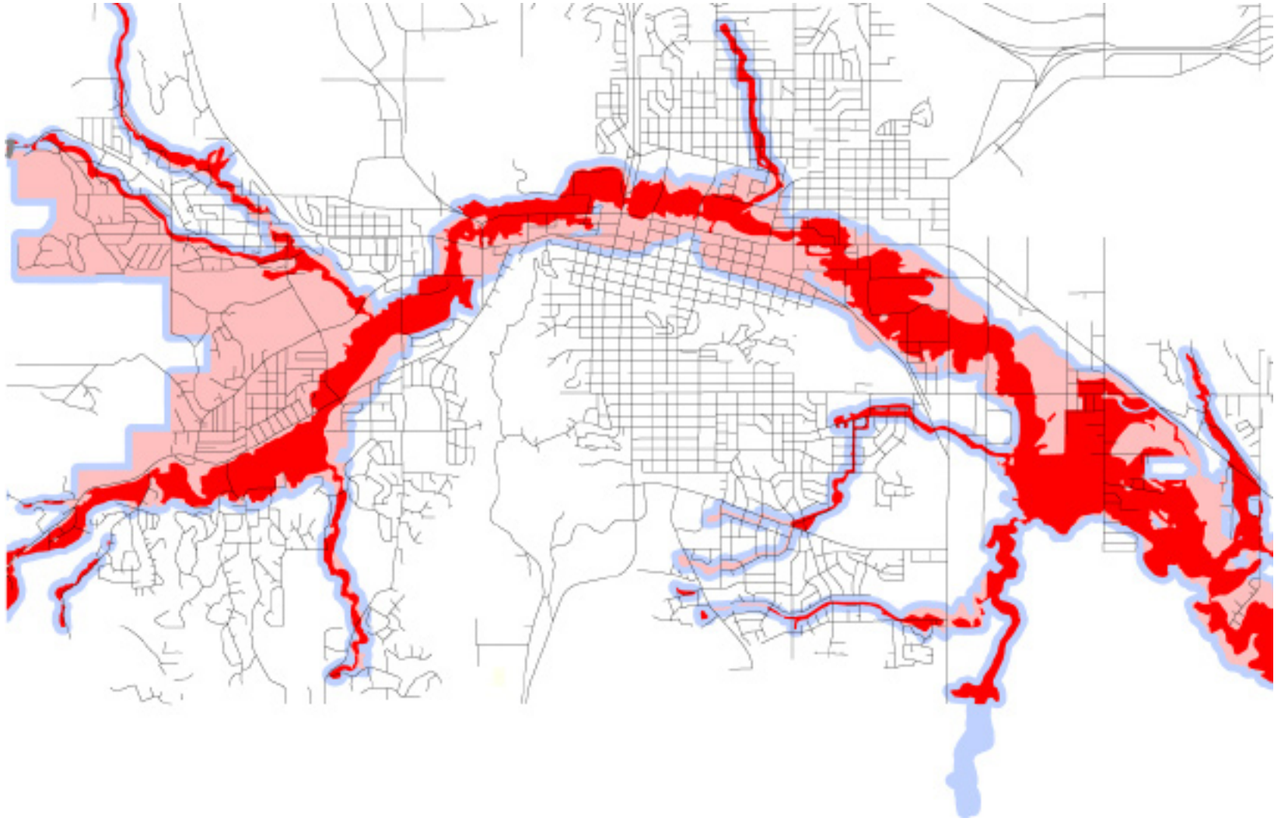


Soil

Soils on the Hogback are a blend of rock outcrop and loam. They range from stony sandy loam to standard loam in texture. It can be considered as a clean gravel to sand. The rocky soil makes it difficult to build on, but drilled foundations become very sturdy. Most of the vegetation on site is on the soil classified as Rockoa-Rock outcrop complex. This suggests that it would better to locate gardens and landscape elements in this region of the site (USDA, 2010).

Custer and Pennington Counties, Black Hills Parts, South Dakota (SD604)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
CdF	Canyon-Rock outcrop complex, 15 to 60 percent slopes	459.6	28.0%
HgB	Hilger cobbly loam, 0 to 6 percent slopes	24.2	1.5%
HgD	Hilger cobbly loam, 6 to 40 percent slopes	16.7	1.0%
RsF	Rockoa-Rock outcrop complex, 25 to 60 percent slopes	221.0	13.5%
ShD	Satanta-Canyon loams, 6 to 15 percent slopes	257.3	15.7%
Subtotals for Soil Survey Area		**978.8**	**59.6%**
Totals for Area of Interest		**1,641.7**	**100.0%**

Custer and Pennington Counties, Prairie Parts, South Dakota (SD605)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
GrE	Grummit-Rock outcrop complex, 6 to 40 percent slopes	7.1	0.4%
GsD	Grummit-Urban land complex, 9 to 30 percent slopes	40.1	2.4%
NwA	Nunn-Urban land complex, 0 to 3 percent slopes	217.6	13.3%
PgD	Pierre-Grummit clays, 6 to 15 percent slopes	2.2	0.1%
PkC	Pierre-Urban land complex, 6 to 15 percent slopes	284.9	17.4%
SkB	Satanta-Urban land complex, 2 to 6 percent slopes	111.0	6.8%
W	Water	0.2	0.0%
Subtotals for Soil Survey Area		**662.9**	**40.4%**
Totals for Area of Interest		**1,641.7**	**100.0%**

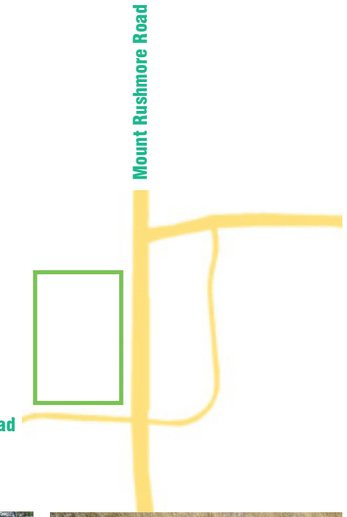


Water Table

Rapid City has had a history of flooding issues. The 1972, heavy rain caused Rapid Creek to flood and destroy much of the town. The image above illustrates the extent of the 100 and 500 year flood plain for Rapid Creek. In this respect, the site is in a good position. The water table lies more than 200 cm below the surface throughout the site. This is good in that it is not likely to cause soil instability. The primary concern comes in how the site is likely to handle heavy rains. Erosion can cause stability issues on hillsides and in valleys. The high position of the site should put it out of danger. Still, drainage is an important consideration in this project.

Utilities

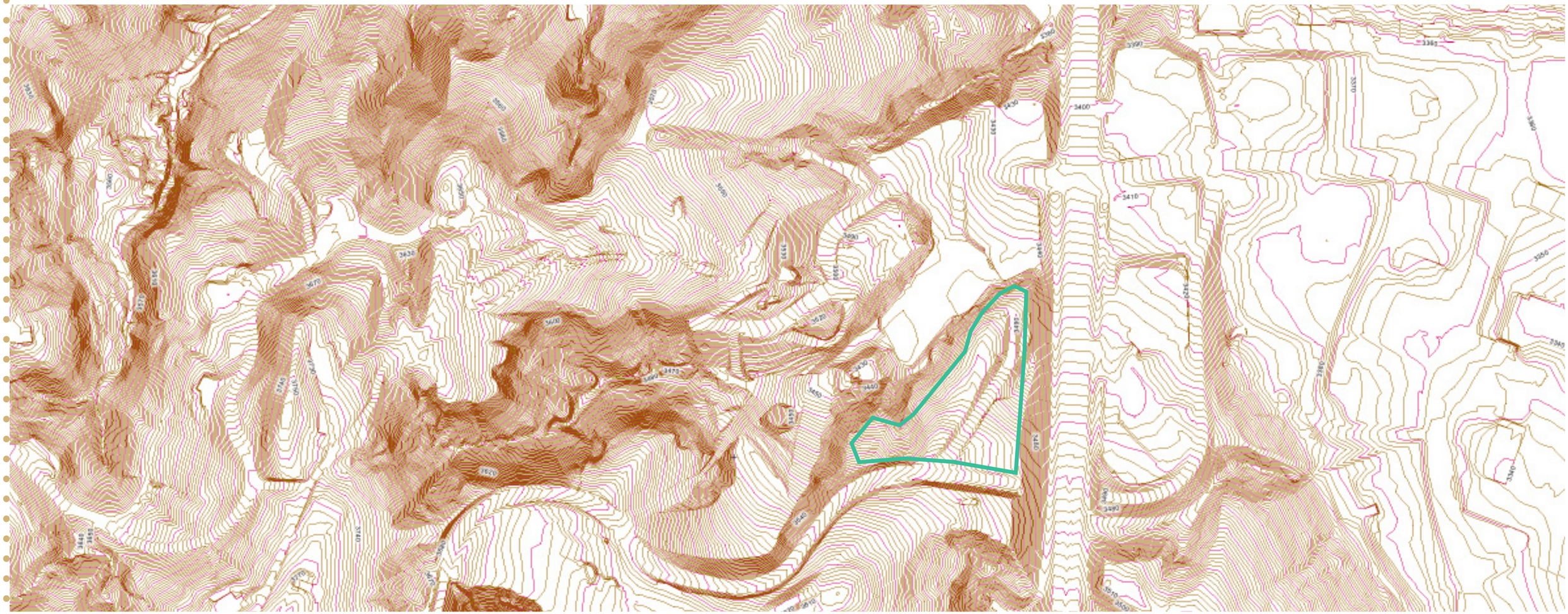
Modern utilities were recently installed on site. The utilities branch from the newly repaved Tower Road. The road has curbs and drainage. The electrical system is below ground on site along Tower Road. Water and fiber optic utilites are also comveniently accessable to the site.



Traffic

There is little to no traffic interferance on site. It is located close to the busy Mount Rushmore Drive, but the steep slope up from the road acts as a screen to vison and sound. Over an hour there were only three vehicals that passed on Tower Road. The scenery may bring an occasional runner or biker. The location is suprisingly secluded for being so close to the city.

Topography



Slope Analysis

The topography of the site varies from low to high slope. It is at a high point with slopes dropping down on all sides but the south. The landform extends out at a northeast angle to offer great views Eastern Rapid City. The slope ranges from 4 to 10% This is desirable for drainage and many types of activity. The slope between the site and Mount Rushmore Road is 40% at its steepest, which is not too concerning. The ridge south and west of the site gets up to between 60% and 70%. This is could cause problems with erosion. The density of the trees seem to be helping.

Plant Cover & Character

It is clear that nature has asserted itself on the site. Because of variation of soil type, the majority of the trees can be found on the western portion of the site. Tall grass can be found throughout the site, from steep ridges to shaded valleys. The wooded areas seem to be showing their age. There are some fallen dead trees.

The site's character is communicated through material, color, and texture. There is a harmonious blend of earth-toned rock, golden grass, and green vegetation. The patina of dead trees and golden grass make a pleasant impression that blends well with the lively green of the trees.

This basemap helps in giving a clear sense of the landscape. It is intended to be used in cross reference with other illustrations. Specific to this map is the location of trees, buildings, roads, and other landforms. Numbers correspond with the following photo grid.

Base Map


4


5

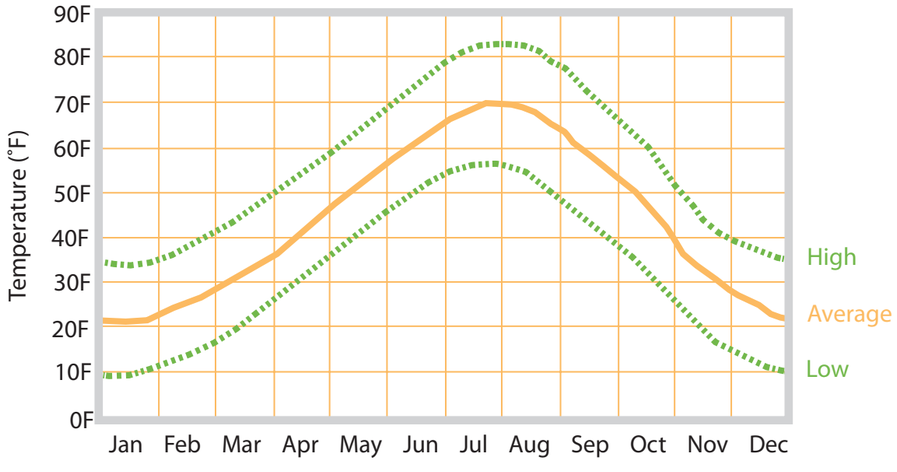

6


7

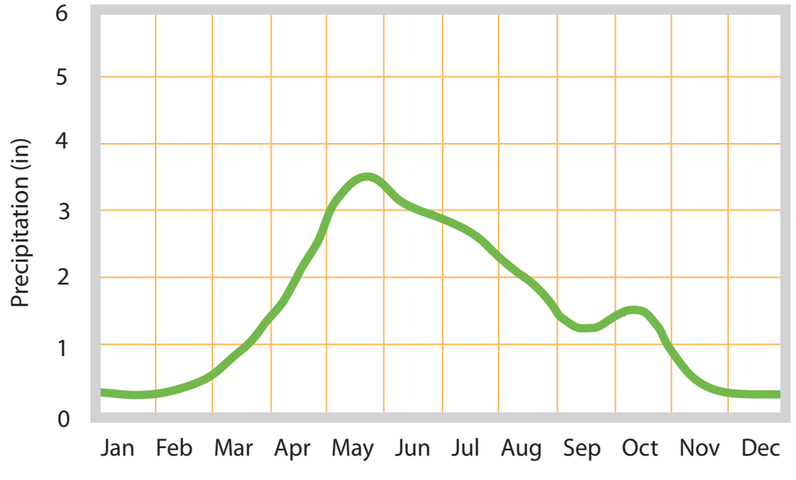

8


9

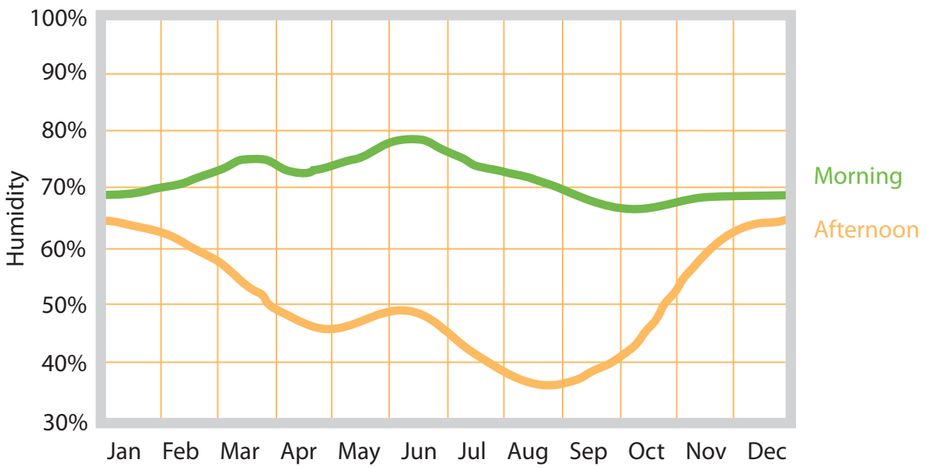
Temperature



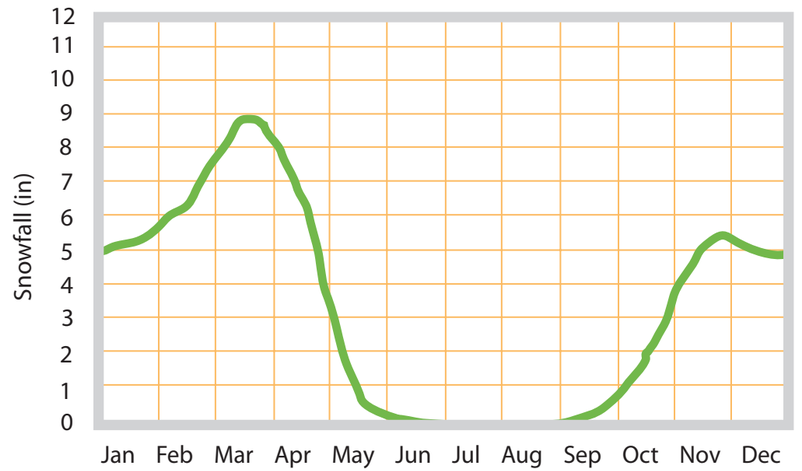
Precipitation



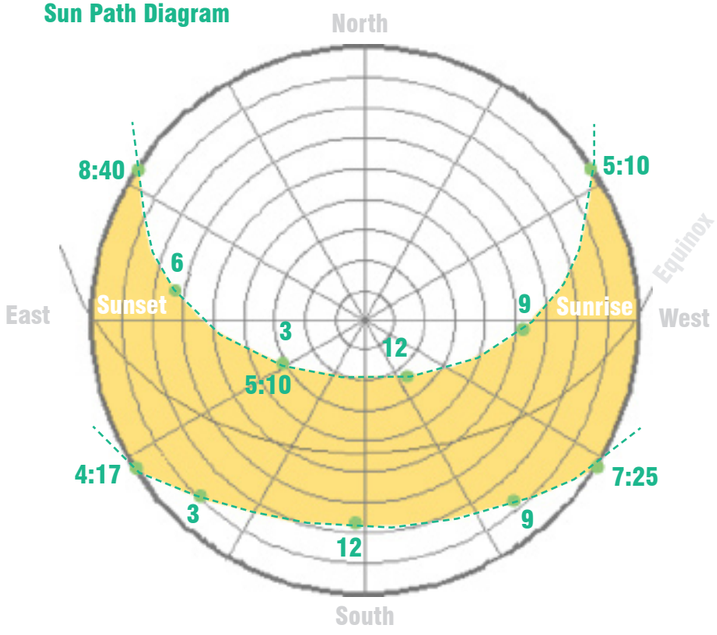
Humidity



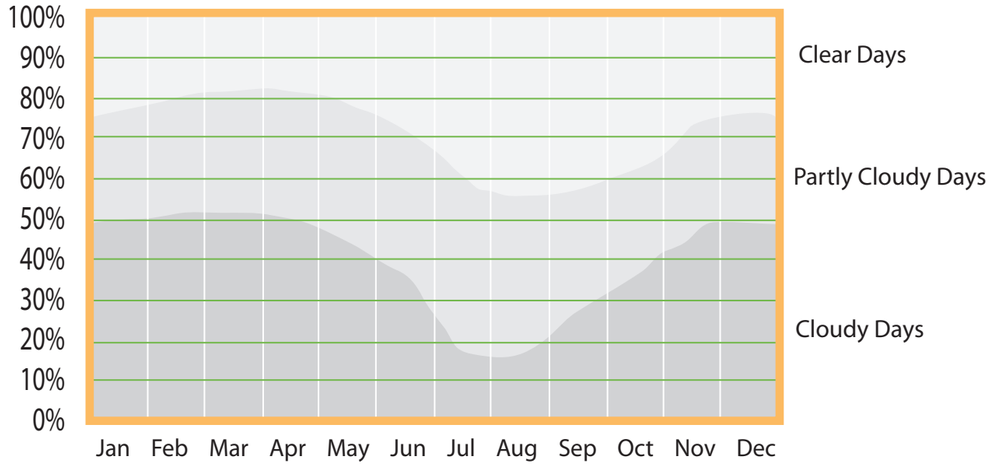
Snowfall



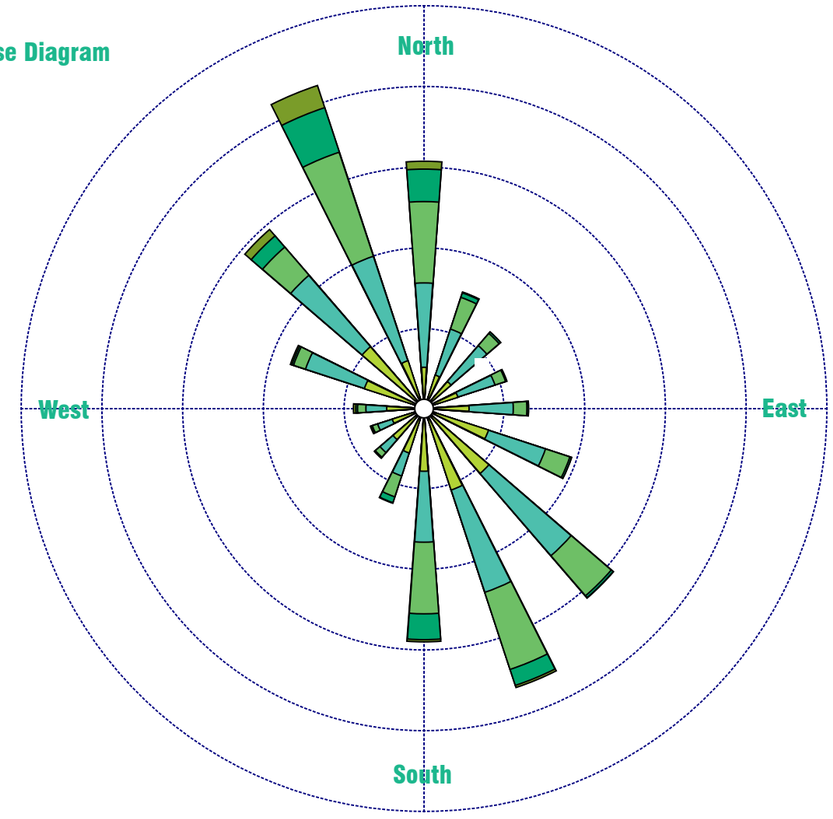
Sun Path Diagram



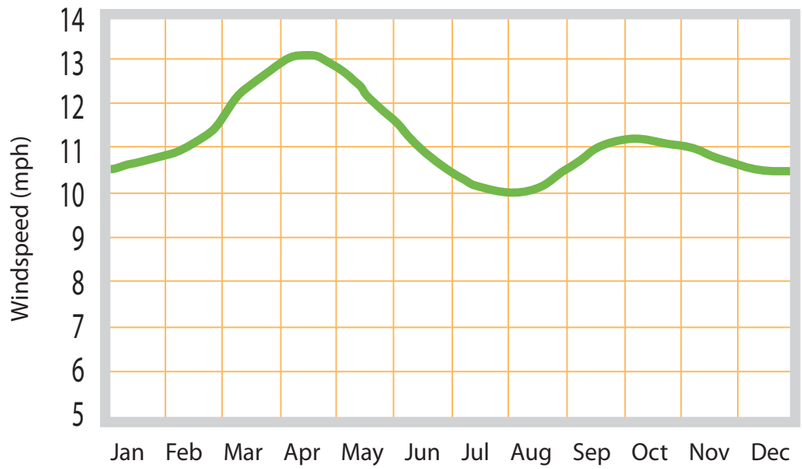
Cloudiness

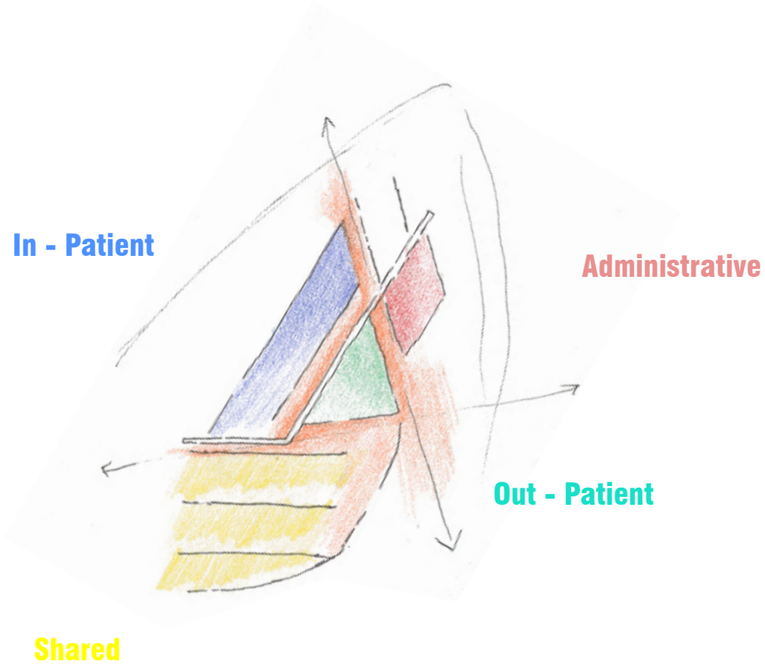


Windrose Diagram



Wind Speed





Programming

This space is crucial to the success of the building in that is should tie inside and out. It should allow for easy circulation and be captivating to patients, staff, and visitors.

Central Corridor

Name	Department	Area
Conference Room	Administrative	222 SF
Janitorial	Administrative	149 SF
Office	Administrative	275 SF
Staff Break Room	Administrative	678 SF
Storage	Administrative	49 SF
Unisex Restroom	Administrative	96 SF
		1469 SF
Classroom	In-Patient	491 SF
Community Space	In-Patient	2792 SF
Dining	In-Patient	1739 SF
Kitchen	In-Patient	856 SF
Meditation Room	In-Patient	926 SF
Patient Room	In-Patient	5280 SF
		12084 SF
Dividable Aerobic Room	Out-Patient	1391 SF
Fitness Assessment	Out-Patient	955 SF
Men	Out-Patient	125 SF
Men's Locker Room	Out-Patient	1336 SF
Nursery	Out-Patient	286 SF
Reception	Out-Patient	343 SF
Waiting Area	Out-Patient	612 SF
Women	Out-Patient	126 SF
Women's Locker Room	Out-Patient	1336 SF
		6509 SF
Cafe	Shared	1161 SF
Cardio/Machine Area	Shared	2442 SF
Central Corridor	Shared	9970 SF
Free Weights	Shared	1585 SF
Indoor Recreation	Shared	6594 SF
Mechanical	Shared	1592 SF
Pool Room	Shared	3691 SF
Running Track	Shared	2312 SF
Spa	Shared	834 SF
		32512 SF
	Total	**52574 SF**

Final Presentation

Boards

Physical Model

Animation

Process Sketch

Hogback Range

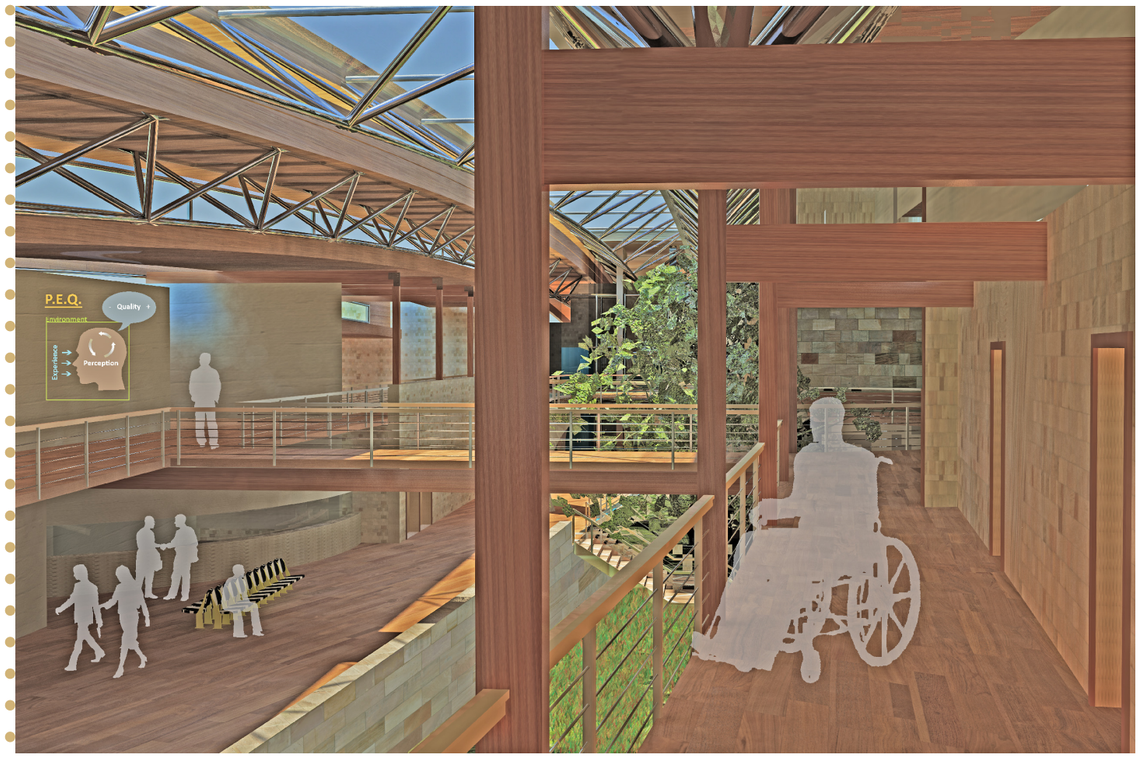
Site

Rapid City Regional Hospital

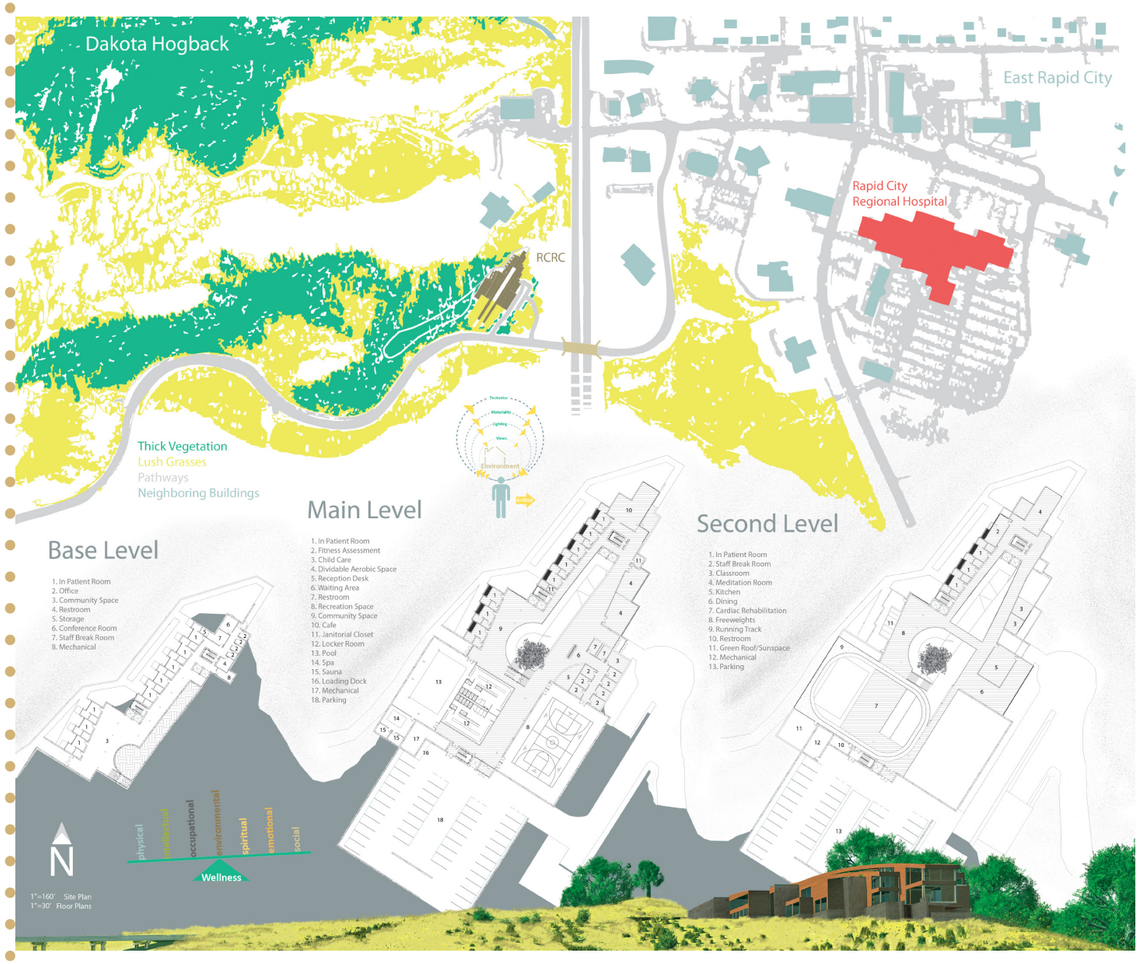
Rapid City Rehabilitation Clinic

RC² Rapid City Rehabilitation Clinic

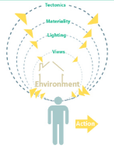
Offering Physical Rehabilitation as a Partner of the Rapid City Regional Hospital



Adam Pangrac
Mark Barnhouse
Rapid City Rehabilitation Clinic
Revit, 3D Studio Max, Photoshop, Illustrator, Indesign



Fundamental Concept



1.

Built

Natural

Our Environment is influential on how we feel and act.

Perceived Experiential Quality

2.

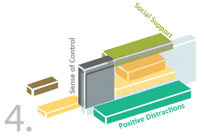
Architecture can encourage the desire improve physical wellbeing by generating a positive perceived experiential quality.

Holistic Wellness

3.

In order to achieve a greater degree of physical wellness, other dimentions must be accounted for.

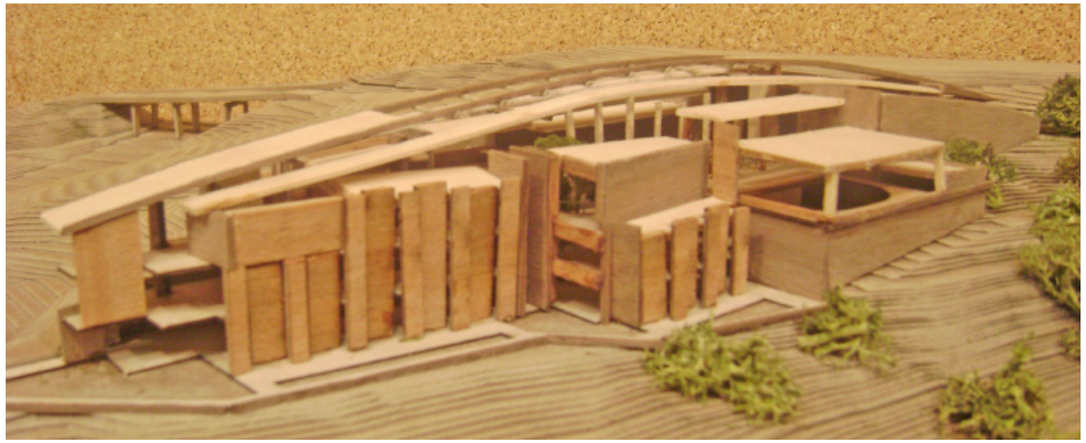
Supportive Design

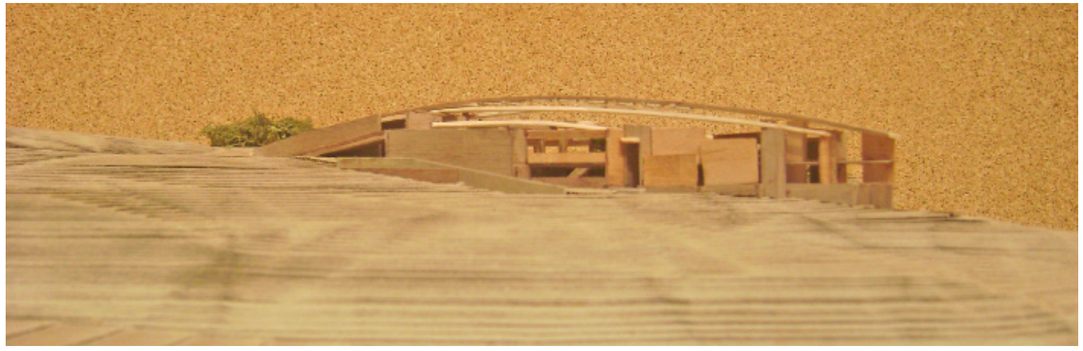


4.

Sense of Control + Access to Social Support + Positive Distractions = Reduced Stress & Improved Recovery

Physical Model





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"The race does not go to the strong nor the swift, but to he who endures till the end."