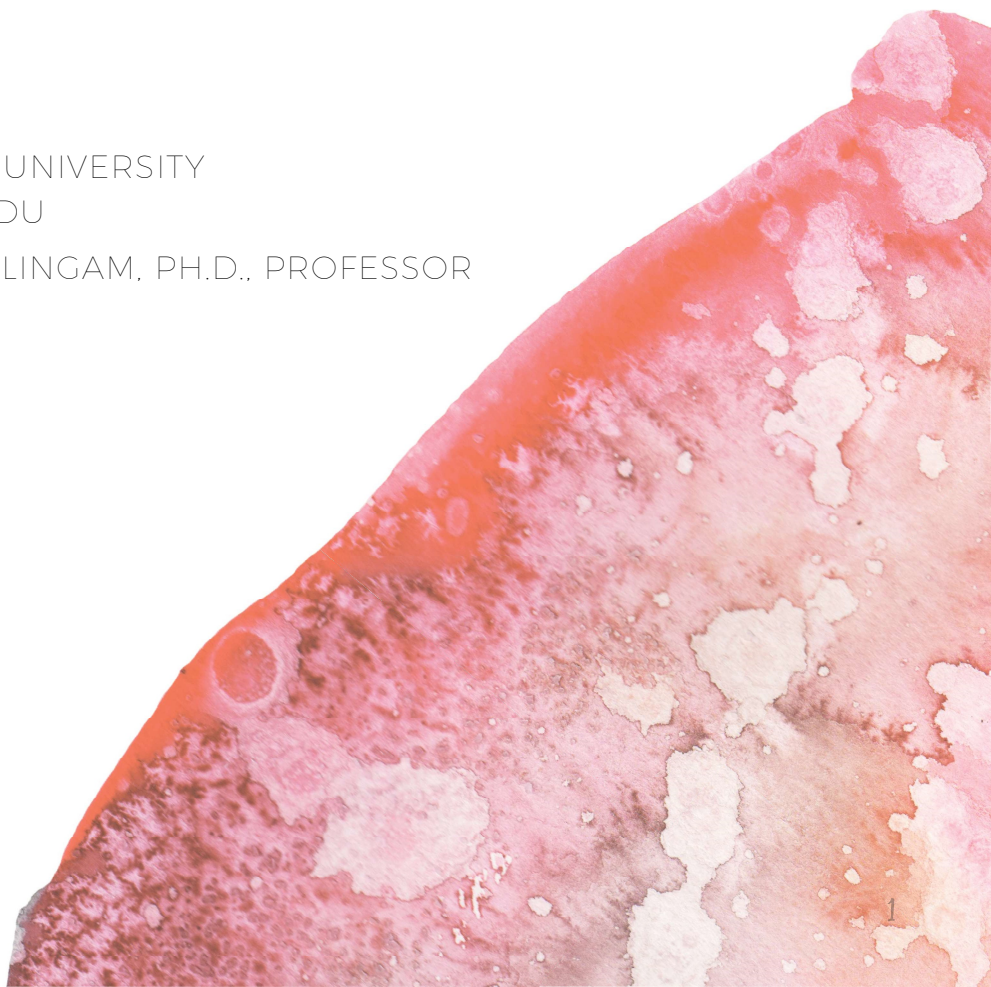


ONCOLOGY CENTER:  
*Healing through*  
ARCHITECTURE

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# ONCOLOGY CENTER: HEALING THROUGH ARCHITECTURE

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

By  
Stina Ostlie

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



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Primary Thesis Advisor



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Thesis Committee Chair



December 2017  
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# TABLE OF CONTENTS

---

## INTRODUCTION

- Thesis Abstract 6
- The narrative of the theoretical aspect of the thesis 8
- Project Typology 10

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## CASE STUDIES

- Case Study 1 12
- Case Study 2 16
- Case Study 3 22

---

## RESEARCH

- Major Project Elements 26
- User/Client Description 28

---

## SITE

- Site Information 30
- Site 54
- Site Analysis 56
- Performance Criteria 64

---

## ANALYSIS

- Project Emphasis 32
- Goals of Thesis Project 33
- Plans for Proceeding 34
- Results 36
- Conclusions 49
- Project Justification 50
- Historical, Social and Cultural Context 52
- Appendix 66

# THESIS ABSTRACT

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The typology of my project is healthcare design. Based on past research, many studies have shown that the environment and space that an individual is in can strongly influence a person's treatment plan and healing process. This specific thesis is founded on evidence-based research, conjunctural research, first person testimony, and anecdotal evidence with the idea that the environment can influence the healing process of patients and their families battling cancer.

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# THE NARRATIVE OF THE THEORETICAL ASPECT OF THE THESIS

Designers play an important and specific role in the design of health-related facilities. Specifically, for diseases such as cancer which has its own criteria within the field of health care design. Besides the physical equipment and correlating spaces required, there are psychological, emotional, and philosophical requirements. Designing environments for the care and treatment of people with cancer requires a holistic and sustainable approach, encompassing empathy, operational knowledge, and creative design thinking from the architects, interior designers, engineers, and client team (Schroer, 2014).



Fg. 1





# PROJECT TYPOLOGY

## HEALING ARCHITECTURE

The concept of Healing Environments emerged in 1980's research when environmental psychology addressed the interplay between the environment and people's well-being. Environmental psychologists studied characteristics of restorative environments and found the environment influences health outcomes (Van der Linden, Annemans & Heylighten, 2016). If identifying stress as the main negative influence, then that implies that a relaxing environment impacts people in a positive way. Even though there is scientific research to prove that the built environment influences people and their well-being, designers don't tend to rely on it when they are designing therapeutic environments. The absence of an integrated framework on designing healing environments seems to hamper architects from implementing scientific research in design (Van der Linden et al., 2016).

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# CASE STUDY 1

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## MAGGIE'S WEST LONDON

**LOCATION:** London, UK

**PROJECT TYPOLOGY:** Cancer Care Center

**DATE COMPLETED:** 2008

**ARCHITECT:** Rogers Stirk Harbour + Partners

**SIZE:** 1213 ft<sup>2</sup>

**CONTEXT:** Inspired by Richard Rogers's concept of a heart nestled in the protective wrap of a building's four walls, Rogers said: "The idea was to try to minimize the overbearing impact of Charing Cross Hospital. The roof, the landscaping, the hearth inside, the views out, each was to take you away from the hospital and the bustle of the road."

**CHARACTERISTICS:** Maggie's Centres provide practical, emotional and social support for people with cancer, and their family and friends, following the ideas about cancer care originally laid out by Maggie Keswick Jencks.



Fig. 3

### SPACES:

- Outside entrance area/walkway - 467 ft<sup>2</sup>
- Entrance space - 77 ft<sup>2</sup>
- Kitchen area - 350 ft<sup>2</sup>
- Inner Courtyards/garden - 265 ft<sup>2</sup>
- Sitting/yoga room - 250 ft<sup>2</sup>
- Gathering/communal space - 300 ft<sup>2</sup>
- Intimate seating - 435 ft<sup>2</sup>
- Studio/art room - 260 ft<sup>2</sup>
- Upper mezzanine level - 1,050 ft<sup>2</sup>



Fig. 4

# MAGGIE'S SITE PLAN



Fg. 6

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# CASE STUDY 2

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## ATLANTICARE CANCER CARE INSTITUTE

**LOCATION:** Egg Harbor Township, New Jersey

**PROJECT TYPOLOGY:** Cancer Care Center

**ARMC HOSPITAL FOUNDED:** 1898

**ATLANTICARE FOUNDED:** 1993

**AWARDS:**

- 2009 - Green Building Council's LEED® Gold certification
- 2010 - Modern Healthcare's "Best Places to Work in Healthcare"
- 2016: The Human Rights Foundation recognizes AtlantiCare as a "Leader in LGBT Healthcare Equality"

**SIZE:** 39,600 ft<sup>2</sup>

**CONTEXT:**

**SERVICES:**

- Advance Care Planning
- Behavior Health
- Cancer Care
- Emergency/Trauma Services
- Fitness Center
- Primary Care Plus
- Radiology/Medical Imaging
- Outpatient Surgery
- Women's Health & Wellness

**VALUES:**

- **Integrity.** Our actions and decisions consistently reflect the highest ethical standards. We operate on the basis of openness, to nurture an environment of honesty and trust.
- **Respect.** We treat each individual with dignity and compassion; encourage creativity and assist one another to achieve our fullest potential. We believe that each individual is equally important in a unique way.
- **Service.** We build our customer commitments upon the philosophy that quality and service will improve over time using a process of continuous quality improvement. We measure our performance against customers' standards and strive to exceed their expectations.
- **Teamwork.** We combine our efforts with the efforts of others to achieve the greatest success. Collaboration and open communication are essential to our relationships.
- **Safety.** Safety of patients and staff is our top priority. We continue to integrate new learning in quality improvement and safety.  
("About AtlantiCare", 2017)



## HEALING ARTS - BRINGING THE ARTS ALIVE:

- The décor of the institute is inspired by nature. Some of the features are: sculptures, paintings and other works of art that create a sense of tranquility and peacefulness for patients, visitors and staff.
- AtlantiCare believes that art can make people feel better. Their research has shown that the arts can reduce stress during waiting, reduce patient anxiety, improve the working environment for healthcare providers and enhance the patient-visitor experience.
- By integrating the arts into their institute, they are demonstrating the intent to create a healing presence in the community.
- The Healing Arts program was commissioned on the theme of healing through nature.
- Employee Art Exhibit - recognizes artistic talents with the employees of ArtlantiCare. Every year around the holidays, 12 pieces are chosen to be featured on a calendar. There are a wide range of mediums including: pencil, paint, and photography.

'Freedom' by Eddie G. Tate III



Fig. 9

'Quiet Contemplation' by Marie Natale



Fig. 10

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# GREEN BUILDING COUNCIL'S LEED® GOLD CERTIFICATION

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LEED® Scoreboard	
Sustainable Sites	10 of 14
Water Efficiency	2 of 5
Energy & Atmosphere	5 of 17
Material & Resources	6 of 13
Indoor Environmental Quality	11 of 15
Innovation	5 of 5
39/69	

**WATER USE REDUCTION - 30% REDUCTION:** Employ strategies that in aggregate use 30% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements. Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the building): water closets, urinals, lavatory faucets, showers and kitchen sinks. 1/1

## **CONTROLLABILITY OF SYSTEMS - LIGHTING:**

- Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences.

### **AND**

- Provide lighting system controllability for all shared multi-occupant spaces to enable lighting adjustment that meets group needs and preferences. 1/1

## **LOW-EMITTING MATERIALS - PAINTS AND COATINGS:**

- Architectural paints, coatings and primers applied to interior walls and ceilings: Do not exceed the VOC content limits established in Green Seal Standard GS-11, Paints, First Edition, May 20, 1993. Primers must meet the VOC limit for non-flat paint.
- Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates: Do not exceed the VOC content limit of 250 g/L established in Green Seal Standard GS-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.
- Clear wood finishes, floor coatings, stains, and shellacs applied to interior elements: Do not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004. The following list of SCAQMD VOC limits are examples. Refer to the standards for complete details. 1/1

# CASE STUDY 3

## MAGGIE'S HONG KONG

**LOCATION:** Hong Kong, SAR, China

**PROJECT TYPOLOGY:** Cancer Support Center

**DATE COMPLETED:** 2013

**ARCHITECT:** Frank Gehry

**LANDSCAPE ARCHITECT:** Lily Jencks architect + landscape with urbis HK

**SPACES:** Comfortable interiors - public living and dining room, three meditative counseling spaces, quiet, protected outdoor gardens, open rooms to the pond and private terraces

**FEATURES:**

- Information support - drop-in service, individual support, Chinese nutrition class, beauty workshop "Look Good Feel Better"
- Emotional and Psychological support - individual and group relaxation sessions, support groups for those with cancer/carers, psycho-educational courses
- Relaxation and stress management - managing symptoms and side effects, Tai Chi, Yoga, creative writing, art and music therapy (Welch, 2017)

**CONTEXT:** This is the first international Maggie's Centre outside of Europe and Frank Gehry's second Maggie design. Gehry lost his daughter to cancer during the process of designing this building. He hoped to design something 'hopeful and respectful' that speaks to the classical Chinese gardens of Suzhou with pagodas and water features. The Tuen Mun Hospital Oncology unit is separate but located nearby. The strategy behind the design is to incorporate a series of interconnected pavilions to encourage movement throughout the space. The relationship between the building and the pond underneath it work together to form deliberate views that overlook the water or the distant mountains. The lively roof patterns complement the surrounding plants that according to Jencks 'represent the macrocosm of the universe within the microcosm of the landscape' (Menocal, 2013).

**CHARACTERISTICS:** Maggie's Centres provide practical, emotional and social support for people with cancer, and their family and friends, following the ideas about cancer care originally laid out by Maggie Keswick Jencks.



Fig. 15



Fig. 16



Fig. 17

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# Major Project Elements

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- **Multiple different patient room layouts (one person rooms, multiple person rooms)** - From my observations and talking to my mom, I think there should be multiple spaces for patients to choose from.
- **Spaces for retreat/rejuvenation** - After enduring chemotherapy and the whole process that comes with that, there should be a place for the patient to relax a little bit and rejuvenate.
- **Office space for employees** - There needs to be a separate area for the employees to organize their papers or have breaks in.
- **Storage for medical supplies/machines (screening, diagnosis, treatment)** - Just like the employee offices, there should be a separate space for supplies and medical equipment.
- **Emergency access** - There obviously needs to be an emergency access because that is required by code.
- **Parking** - Depending on the size of the site and building, there needs to be the adequate amount of parking for employees and patients. The patients should have closer access to the building to minimize the amount of walking they have to do.
- **Bathrooms** - The bathrooms need to be within walking distance for the patients.
- **Support service areas – social workers, dietitians, other members of health care team** - Because cancer is a very physically, emotionally, and mentally draining disease, patients need to have access to social support and counseling.
- **Inpatient/Outpatient services** - Just like the multiple different organizations of room layouts, there needs to be the option of inpatient or outpatient services. It depends on the patient, how far along their disease is, how far away they live etc.
- **Resource center** - A resource center is important because it can provide information for patients and visiting family ;members. Some people might want to learn more about their disease and their options.
- **Pharmacy** - To make it easier on the patients, there should be a pharmacy in the same building as the treatments.
- **Patient privacy is very important** - Privacy is imperative for patients. They already have enough doctors and nurses in their personal business and don't need the whole world to know about their personal life.



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# User/Client Description

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1. For whom will the project be designed?
  - The clients that this building would be designed for would be patients battling cancer and their families. Also taken into consideration are the nurses, doctors and other professionals that are needed in this healthcare type of space/structure.
2. Will the project be owned by one party and then used by another or others?
  - Since this building will be fairly small and near a few established hospitals, perhaps the nearby businesses would be able to help with costs and own a share of the building. The space will be used for the staff that are employed there and the patients registered at the facility.
3. What are the unique requirements?
  - There are unique requirements for the patients especially. In the treatment areas there are infusion bays, consultation rooms and exam rooms. Other spaces that required are a resource library and retail pharmacy. Minimizing the walking distance will be very important, comfortable and upscale bathrooms, and spaces to make a cup of tea or read a book.
4. How many people will there be?
  - Depending on the dimensions and scale of the building, the number of employees/staff will need to be decided on.
5. What are their parking requirements?
  - The amount of space that will be allowed for parking and other necessities will depend on the building codes of the area of choice.
6. Are there any physical restrictions?
  - As this will be a healthcare related facility, there will need to be handicap accessible areas. There should be minimal stairs to lessen the burden on patients.
7. Are there medical or mental health issues that are important to know?
  - This building will need to have close access to medical professionals in case of emergencies and will need to follow the AIA building codes for medical facilities.

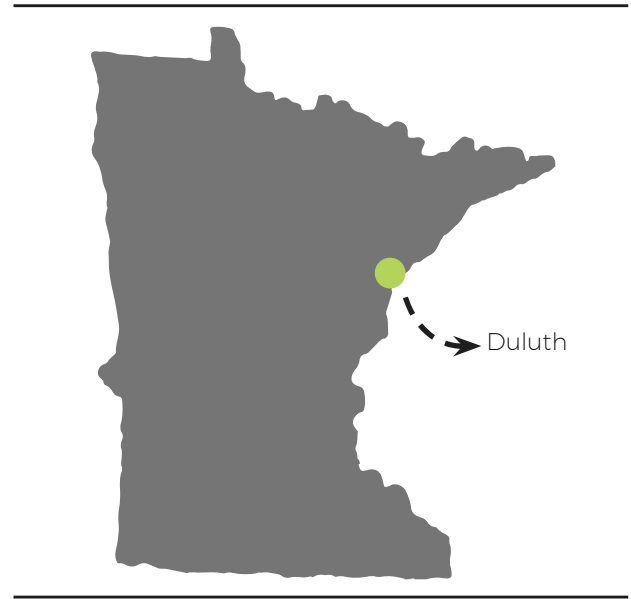
# SITE INFORMATION

**REGION:** Arrowhead Region

**CITY:** Duluth

**STATE:** Minnesota

This site was chosen for its proximity to nature and other medical facilities. Originally, I had wanted my site to be located up in the mountains of Colorado, but I knew that wasn't logical because of the logistics of the landscape. One of the key requirements that I had in mind was that the site needed to be located in an area that had a larger population of people for the facility to be staffed and filled with patients. Another requirement was that there needed to be walking distance to a secluded landscape area or nature for the patients and staff to stroll through. My site is within walking distance to multiple grocery stores, First Lutheran Church, a CVS and Walgreen's, St. Luke's Hospital, and the Duluth Rose Garden is right across the street.



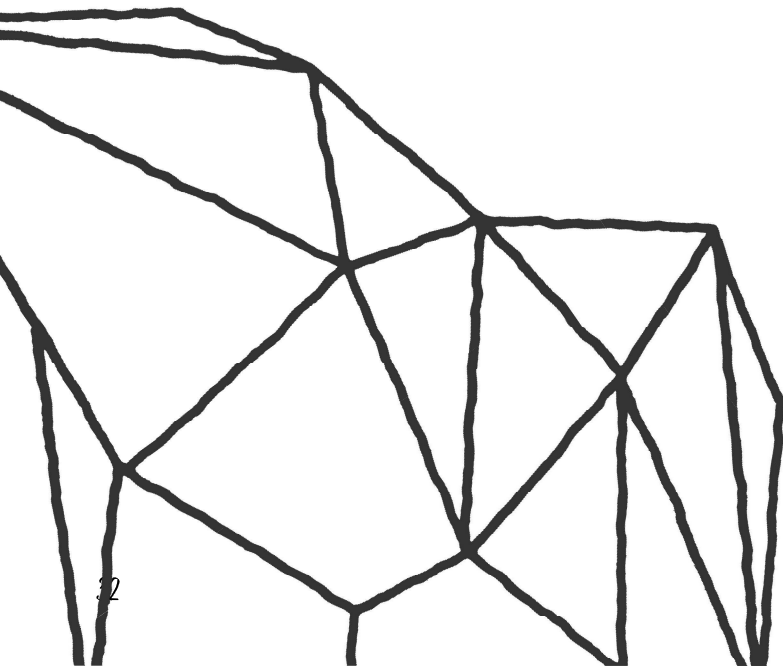
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# Project Emphasis

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The emphasis of my project is to focus on the emotional, mental, and spiritual wellbeing of patients with cancer.

This design must show that there is no specific right way to heal or treat someone. Every person is different and requires different needs. There must be a wide range of options for people in order to make them feel as comfortable as possible. With this complex disease comes a complex to-do list for patients such as doctor appointments, treatment visits, medical records, filling and refilling prescriptions, etc. The physical layout and flow of space in the design will be based off these needs. It is also important to bring a sense of normalcy upon the patients. I will design with empathy and understanding to create a uniquely responsive place that has the potential to aid the healing process and provide a space that reinforces dignity, security, control, and normalcy. This thesis will require a holistic and sustainable approach to design.



# Plan for Proceeding

---

The plan for proceeding with this project is to use research information (evidence based design and conjectural research), case studies, and first-person testimony. There will need to be large amount of research done Online and through reading articles that other researchers have published. The goal will be to find if there are healthcare facilities that are thoughtfully designed and deliberately designed with the idea of healing environments. There are tons of hospitals and cancer centers in the world, but I am interested in the spaces that are designed with the soul purpose of a patient-centered design approach. I plan on delving into some psychology and art research. The idea of healing environments is a fairly new idea in architecture and design and I'm not sure if there will be many examples to base my project on.

The philosophical framework for this research is quantitative and qualitative. It is quantitative because the data that would be collected would be by direct and indirect observation. Data will be obtained by visiting various cancer treatment centers and directly observing my mom that is currently going through chemotherapy. Research that is found on scholarly websites and library books and articles will be the indirect observations that others have reported. Much of the data will be measured with numbers and based on cause and effect. The framework will also be qualitative because the reality is subjective. Every person has different feelings and preferences. In the case of healing, this is based on feelings and there is not a specific formula to use. There will be the use of interpretation because the facts I will be using are based on perception. The kind of logic that will be used will be inductive because the conclusions made will be from data. One research strategy for my thesis is qualitative research. By studying verbal text and quotes from several patients, I will have various views to collect.

# RESULTS

Designers play an important and specific role in the design of health-related facilities. Specifically, for diseases such as cancer which has its own criteria within the field of health care design. Besides the physical equipment and correlating spaces required, there are psychological, emotional, and philosophical requirements. It is very much a human-centered design problem that necessitates delicate care and empathy from the designer. Cancer is one of the most frightening and stress-inducing diagnoses a person can receive. Providing a space that can help to improve outcomes, would be beneficial to people battling cancer.

## Introduction

In today's growing population, the number of cancer patients in the United States is increasing. There are more than 1.6 million newly diagnosed cancer patients every year, but fortunately, with medical and technological advances, mortality rates are decreasing (Schroer, 2014). The facilities that care for cancer patients are faced with greater numbers of this unique disease which in turn, increases the number of specialty treatment and care centers. The designers of these particular facilities must remember that the spaces they design are for the people that inhabit those spaces. The key is to design in an empathetic and understanding mindset.

No cancer patient's journey is the same. Their feelings and opinions are subjective and individualized. Translating this to design is tricky because while collecting survey data can help hone in on trends, there aren't clear guidelines to follow. Therefore, designers must take this idiosyncratic information and provide spaces that are flexible and can adapt to the changing needs of different patients. Patients with cancer need more than just practical medical support. They need emotional, psychological, and social support from their doctors, nurses, friends, and family. People's needs are very different, but fortunately, so are ways to support someone. There is counseling for how to manage stress, what cancer treatment will be like at the beginning, in the middle and the end, and what to do after treatment is over or returning to work.

One of the most helpful discoveries was the Maggie Centers scattered throughout Europe. They are the perfect example of a beautifully designed space for patients with cancer. They were envisioned and planned by writer and designer Maggie Keswick Jencks in 1993 in Scotland. Maggie was diagnosed with cancer and there wasn't much hope for recovery. During her exhausting and draining trips to the hospital to receive chemotherapy infusions, she started thinking about how the noisy thoughtless space with its plethora of fluorescents could be transformed into a space that was quiet, private and filled with natural light. Wouldn't that be a better place to await results, receive treatment, or just contemplate one's situation? If this bad design could have such a negative effect of demoralizing patients, could it not go the other way around and prove to be restorative? With her husband Charles Jencks, an architectural historian and theorist, they drew up a blueprint of a cancer care space that was inviting, warm, contemplative, and healing. The first Maggie Center opened in Edinburgh in 1996. Since then, it has expanded to 17 buildings with some being designed by celebrated architects such as Richard Rogers, Frank Gehry, and Zaha Hadid. These gorgeous and thoughtful structures and spaces are very big influences for me.

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## Results

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By narrowing down the results into four categories, there were some definite and clear guidelines to follow. However, there were still a few results that were ambivalent which is due to the nature of this type of research. Studying people's emotions and how they feel in certain spaces and what makes them comfortable or uncomfortable, will have different results.



Just like a hospital environment is not a constant, a patient's needs and wants will change from patient to patient. This means that the staff need to be flexible with how they approach each patient and understand that cancer affects people in different ways. Healing environments are complex relations between practices, space and care, where recognition of the individual needs, values and experiences of the patient are key to developing the environment to support the patient well-being (Høybye, 2013) Each person with cancer has to find their own way along the precarious path of their illness, but they do need both information and reliable guidance (A View from the Front Line pg. 2). A theme that kept cropping up was the rooms that the patients were in and the different ways that they could be arranged. It was found that there are three types of treatment settings: private treatment rooms, semi-open areas (defined as treatment areas with other infusion patients and retractable screens or curtains), and open areas with other patients receiving infusion treatments. This offers patients the potential ability to choose a desired treatment setting depending on how they feel on the day of treatment. Allowing patients a choice to screen their treatment environments may psychologically foster a sense of control and help patients feel satisfied, comforted and hopeful (Wang et al., 2011). Along with the arrangement of rooms, the patients' need to privacy or social interaction is very important. The patient may want to have their privacy curtain open to the nurses and people walking by or other times they want the curtains to be closed.

## 2. Visuals/Colors/Art/Sound

Color schemes and the interior design of the space can make a world of difference and provide a welcome distraction for patients that are waiting for diagnoses or chemotherapy sessions. Colors have an impact on people's emotions. For instance, colors and lighting can help to change perception of space, alter a patient's emotional state and enhance staff productivity. Generally, people feel more secure in spaces with warm colors. Cooler colors give the perception of a more open space and are recommended in areas with limited access to natural light or in small spaces with low ceilings (Interior designs for cancer care pg. 7). Neutral colors can be calming, but also can increase boredom. When neutrals are used, accent colors with a higher saturation should be used to invoke an element of surprise. When selecting colors for finish materials, a neutral color can be used for doors and casework so they can last over time, while floor and wall coverings that need to be replaced more often don't need the same long-term consideration (Interior designs for cancer care pg. 7). ). Lighting is also another important feature that must be considered. Designers should choose the right light temperature to complement the color scheme — cool colors are enhanced by cool light temperatures and warm colors are enhanced by warmer color temperatures. Light levels should be high in work areas and lower in lounges and other relaxing rooms.

### 3. Furniture/Physical Elements

The materials and furniture that are chosen for a space are selected by looking at the clientele. In this case, the client's need a space that is relaxing and calming but practical at the same time. Carpeted flooring is comfortable and inviting, but it can be hard for maintenance and wheelchair navigation. Carpet should only be used in the sitting area, and hard flooring should be used for the passages (Itani, 2015 pg. 2). Comfort was also key in determining the types of furniture to include. Recliner comfort was positively related to patient comfort, satisfaction, hope and stress reduction. When selecting furniture, design teams should pay special attention to the comfort level of recliners (Wang et al., 2011 pg. 74). Besides comfortable seating, interior design strategies included: providing appropriate artwork, developing areas for book/magazine reading, providing patient recliners with tablet arms, providing a wireless Internet connection, providing spaces for personal television, and providing food/drink and personal storage spaces (Wang et al., 2011 pg. 70). To cut down on the distance of travel that patients have to endure, distributing service areas such as nurse stations, nourishment stations and patient toilet rooms evenly are the most practical way. Providing alternate environments for patients and family members such as roof gardens to spend time in that are near the infusion bays make the most sense.

Design strategies for the infusion centers included:

- providing private/semi-open/open treatment stations;
- providing retractable screens in each semi-open treatment station;
- distributing patient toilets;
- providing spaces for guest chairs; and
- creating a lounge area with a faux fireplace adjacent to the nurse station.
- distributing service areas including nurse stations, nourishment stations and patient toilet rooms to reduce the distances that patients need to travel

### 4. Spatial Layout

The layout of a space is so important because it determines the flow and efficiency of the space. Different layouts can also convey different emotions.

For this very stressful disease, the environment has an important role to play in attracting patients and in supporting their treatment (Eastman, 2003 pg. 9/269). The amount of time that a patient spends in an infusion chair can vary but, chances are, that it adds up to be a lot of time. Having a nice view out a window can help de-stress the patient and take their mind off their worries. The architectural strategies focused on developing quality window views are: selecting appropriate building orientation to invite daylight and active views into the interior; developing a multiple-edge floor plan to increase opportunities to open windows to the outside; appropriately placing windows for quality views; and creating a garden adjacent to the building for visual access to nature (Wang et al., 2011 pg. 70). Patients who had an enjoyable window view to the outside during infusion treatment reported higher levels of privacy, comfort, satisfaction and hope and lower levels of stress than those who did not have the view. To improve the quality of window view, strategies of appropriately placing windows with views to landscaped space should be considered (Wang et al., 2011 pg. 73).

The layout of a cancer center must be made to flow easily for the patient with minimal walking distance. The organization of the building itself should promote ease of use by the patient. The entrance should be obvious, welcoming, and not intimidating. The layout should be clear and the building as light as possible. The lavatories should not be all in a row with gasps under the doors; they should be private enough to cry in (Annemans et al., 2012 pg. 3). The reception areas include comfortable seating with a separate television viewing area, a refreshment area, patient education carrels and separate check-out stations where patients talk with the nursing staff about their next visit and treatment in between visits. The typical patient waiting areas include comfortable seating, a refreshment area, and a patient education area (Eastman, 2003 pg. 3/263).



## Waiting Rooms

*"A variety of furniture configurations provide patients with socialization preferences: Clusters invite interactions while linear layouts prevent feelings of awkwardness related to direct eye contact with other patients. Outlets for charging cellular phones and portable devices should be provided at chair height or integrated within the furniture. Family areas or lounges often are designed near waiting rooms, with comfortable soft seating and finishes that include a dining area with a kitchen."*

## Infusion bays

*"The layout of the infusion area should allow for private, semiprivate or open bays. The configuration of the bays should be around the windows to maximize patients' exposure to natural light and outside views. Visibility from the nurses' station is best when the bays are grouped in a circle around it. In this case, the ceiling might be designed to bring in natural light."*

## Consultation Rooms

*"Consultation rooms provide patients and doctors with space to talk about diagnoses and treatments. Arranging chairs around a table with hard floors and fluorescent lights can feel like an interrogation room. Instead, patients feel more at home sitting in a sofa with carpeted flooring and soft lighting. Equipment for these rooms includes a computer, wall-mounted monitor and a phone."*

## Exam rooms

*"Preserving the patients' dignity is important in exam room design. Soundproofing the walls prevents confidential information from being overheard. The door location and swing direction as well as the placement of the exam table should ensure that the patient is not exposed when the provider walks in and out of the room. Adding a privacy curtain might be an easy solution for an existing space."*



## Nurse's Stations

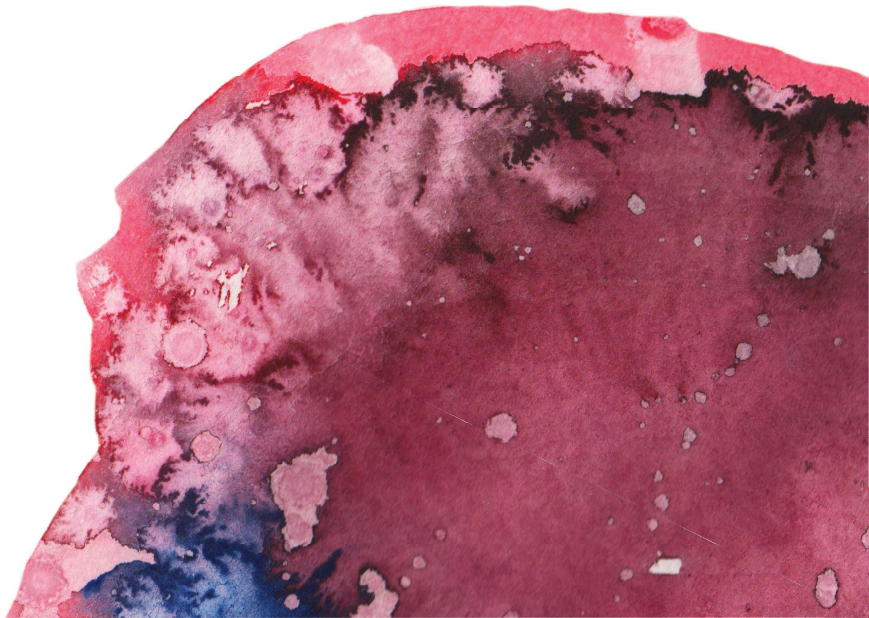
*"Location of the nurses' station should allow nurses to see patients, with measures in place to prevent patients from overhearing conversations among staff. Maximizing leg room facilitates cooperation among users, and planning for additional power and data provides flexibility for additional users."*

## Offices

*"The location of offices should allow privacy, encourage staff collaboration and be close to patient treatment areas. When locating the private offices, some health care models follow the concept of grouping them all in one area. However, spreading them throughout the facility keeps management and doctors near the patients and front-line staff. Radiation oncologists collaborate with dosimeters, so it makes sense to locate them in the same vicinity."*

## Staff Lounges

*"While ergonomics and good lighting are important design considerations for staff, meeting their emotional and psychological needs should not be ignored. They should have access to respite areas and staff lounges that are away from the clinical and patient areas. Lounge design lies in the ability to create multiuser spaces to relax, eat, socialize or watch TV within one open room. Comfort and access to natural lighting are essentials for staff to fully replenish. Bulletin boards with work-related postings should be replaced with artwork" (Itani, 2015 pg. 1-5).*



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# PROJECT JUSTIFICATION

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- Why is the project that you have defined important to you as a person (your personal reasons)?

*This chosen Thesis project is very personal and important to me because it has come at a time in my life where my family is dealing first hand with cancer and experiencing the effects that come with the disease.*

- Why is it important for you to do this at this stage of your academic development?

*For logical reasons, I cannot graduate and receive the necessary Master's degree without completing this Thesis project.*

- Why is it important to do at this stage of your professional development?  
*I need a Master's degree if I want to continue with the architecture career and become a licensed architect.*

- How is the project going to add to your knowledge base?

*I will obviously learn more about my topic of designing for the unique group of cancer patients. There are a lot of firsts in this project for me such as: writing a journal article in the hopes that it will get published, spending this amount of time on research, and choosing my own site to design my project on.*

- How is the project going to add to your set of skills?

*Every year I learn more and more about programs such as Revit, AutoCAD, Photoshop, Illustrator, etc. I also am learning more about presenting data in different and aesthetic ways.*

- Why is doing the project important for the profession at this time?

*I believe that this is a very important topic that needs to be talked about because it deals with millions of people that are going through a terrible disease.*

- Why is the project important as an academic exercise at this time?

*This project has really pushed me and opened my eyes to the amount of information out there that can be found for this topic. At the beginning, I didn't think I would find enough information but now, I need to force myself to stop and move on to the next step.*

- How can you justify the project economically?

*Perhaps with this kind of information collected, buildings and spaces can be better designed to improve the lives of many people and maybe even help cure them.*

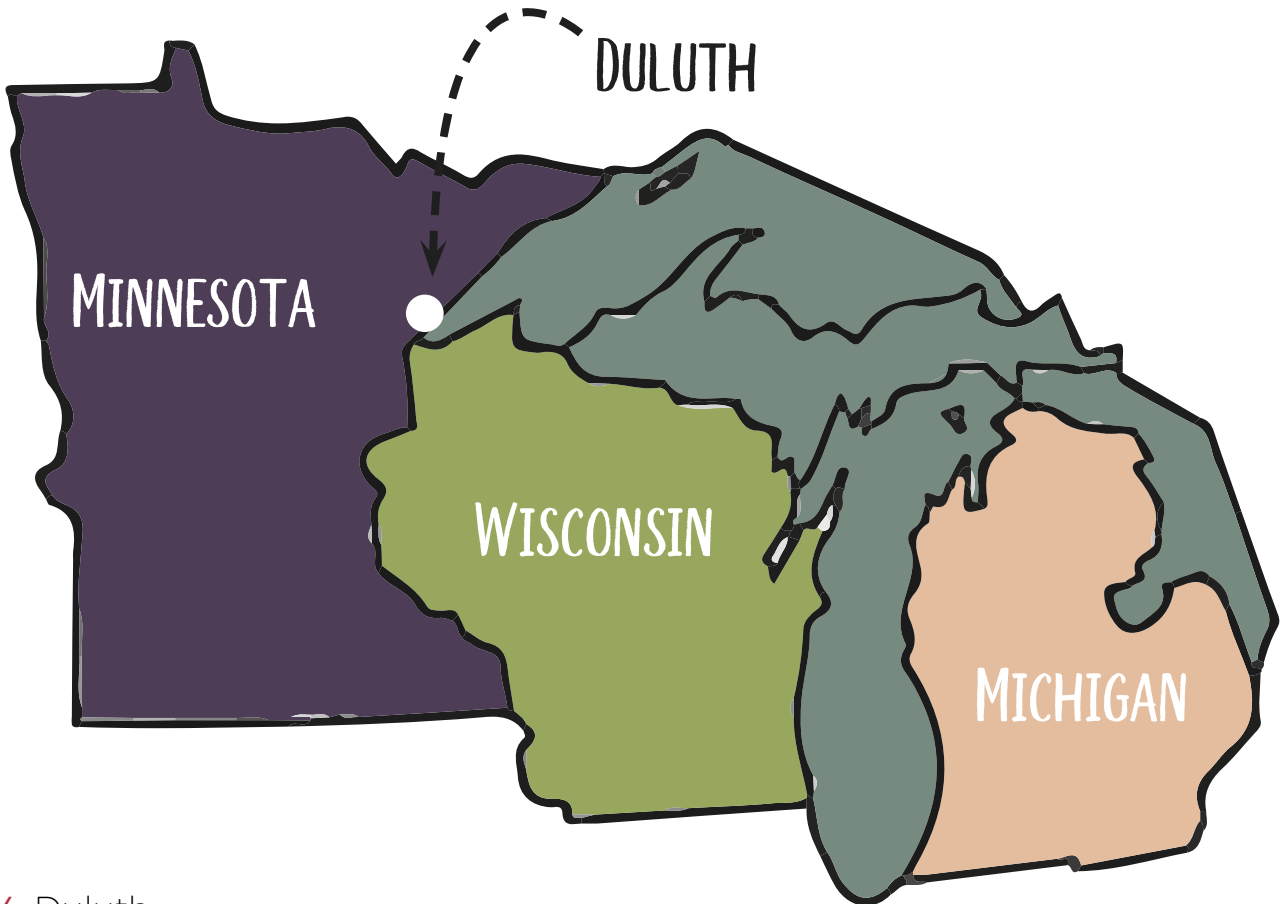
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# HISTORICAL, SOCIAL, & CULTURAL CONTEXT

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Why is it important right now in today's society to hone into the problem of healthcare and its relationship with environment? With the growing population and increased employment of medicine to treat illness, it is important to consider natural remedies that are clearly being looked over because of lack in awareness of its successful properties. Over the past few decades, new attitudes toward health and healing have begun to determine how decisions are made in design. As the medical field increases its knowledge of healthcare, this eventually correlates with architecture and design. The other fields such as commercial and industrial begin to adapt to these standards as well. How can the built environment support the new directions toward a healthy lifestyle and make people feel better?

# SITE



**CITY:** Duluth

**STATE:** Minnesota

**ADDRESS:** East Hillside, corner of S 12th Ave. E and London Rd.

**COUNTY:** St. Louis County

**REGION:** Arrowhead Region

**STRENGTHS:**

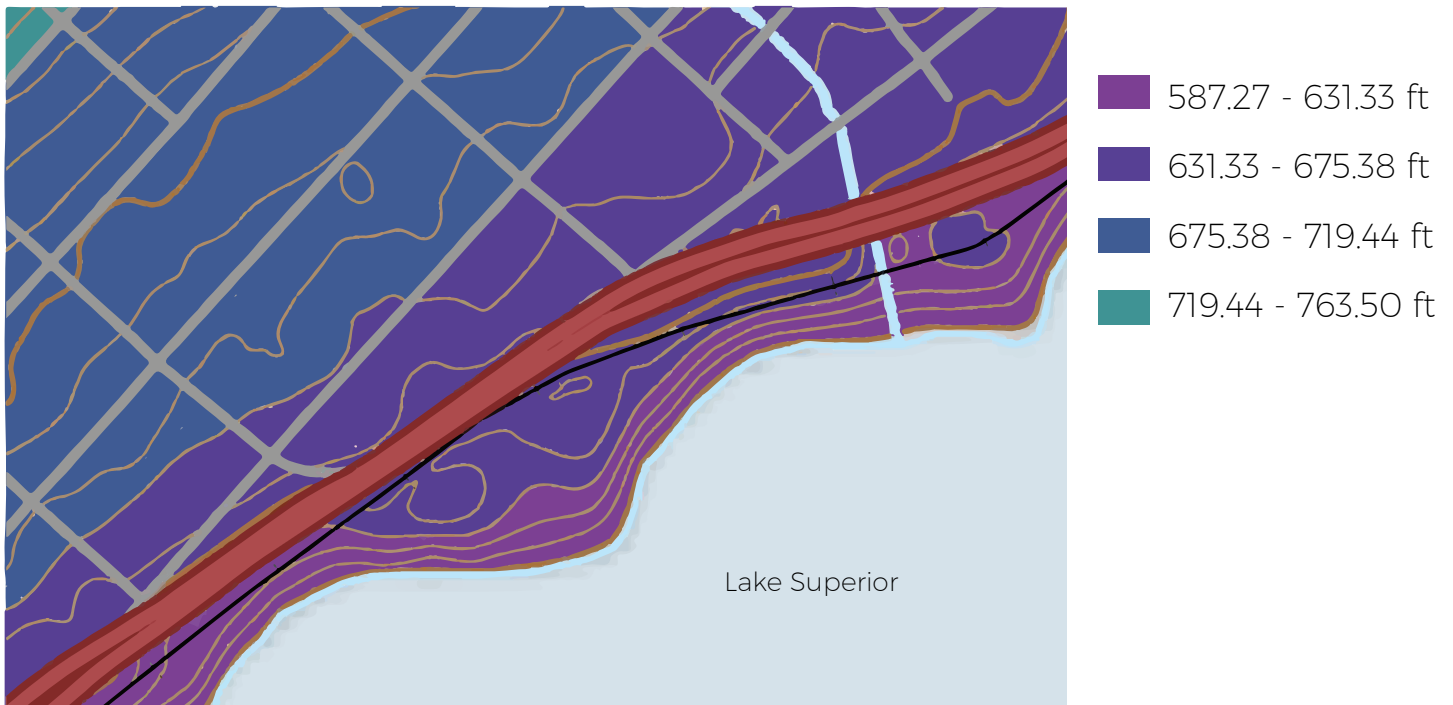
- Within walking distance of two hospitals and a surgery center
- Rose garden across the street
- Close to grocery stores and pharmacies
- Lake Superior is within walking distance with a great view of the shore

**WEAKNESSES:**

- Right next to fairly heavy traffic flow (pedestrian and auto)
- Very small site
- Not a very great view to the NE

# SITE ANALYSIS

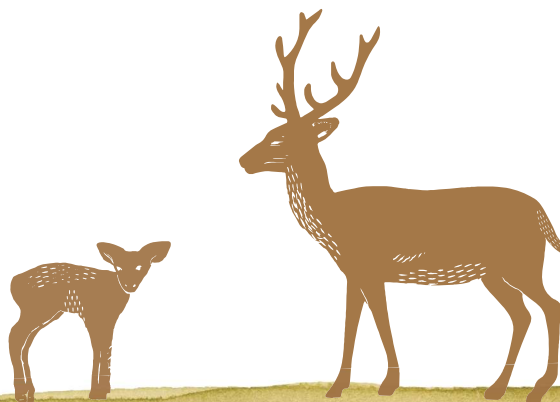
## Elevation and Contours



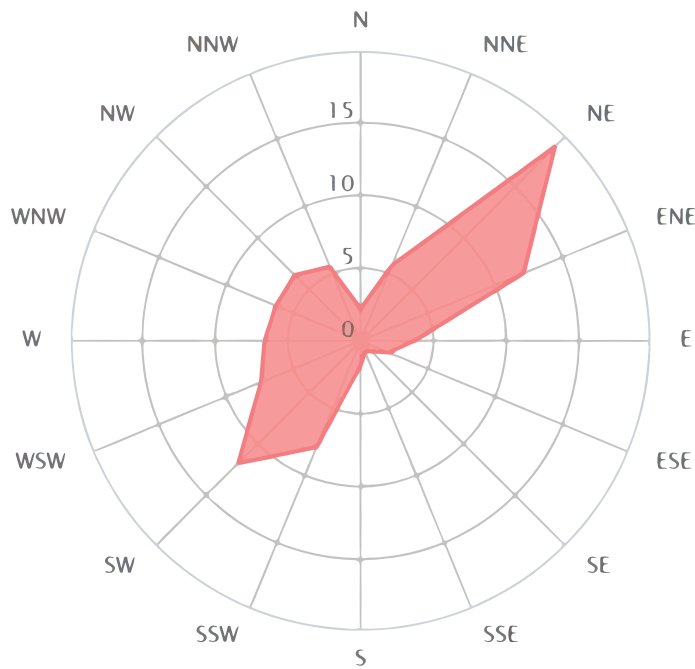
Lake Superior: 1,634,122 acres

Lake Superior is the largest of all the Great Lakes. Straddling the border between Canada and the United States, Lake Superior has the largest surface area of any freshwater lake in the world. Major centers on this lake include Duluth, Minnesota, and Thunder Bay, Ontario, Canada.

Duluth is dominated by steep hillsides that rise up and away from Lake Superior. At the highest, the ridge can be as much as 600-800 ft about the level of Lake Superior. Stream slopes can range from 5% - 20%. Most of the city is built upon this steep hillside. These hillsides provide dramatic views of the expansive Lake Superior.



# Climate

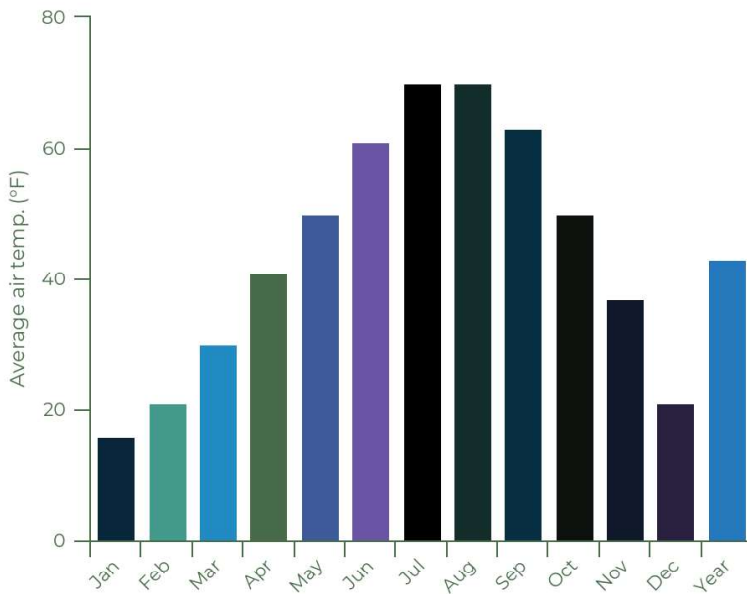


Wind Direction Distribution in %

Duluth's winter's are cold and snowy with cool to moderately warm summers. Lake Superior moderates the climate and makes winters warmer and summers cooler. During the time between late spring and late fall, the shore can be full of fog while the inland is sunny. In the fall big gusts of wind and rain called "northeasters" occur.

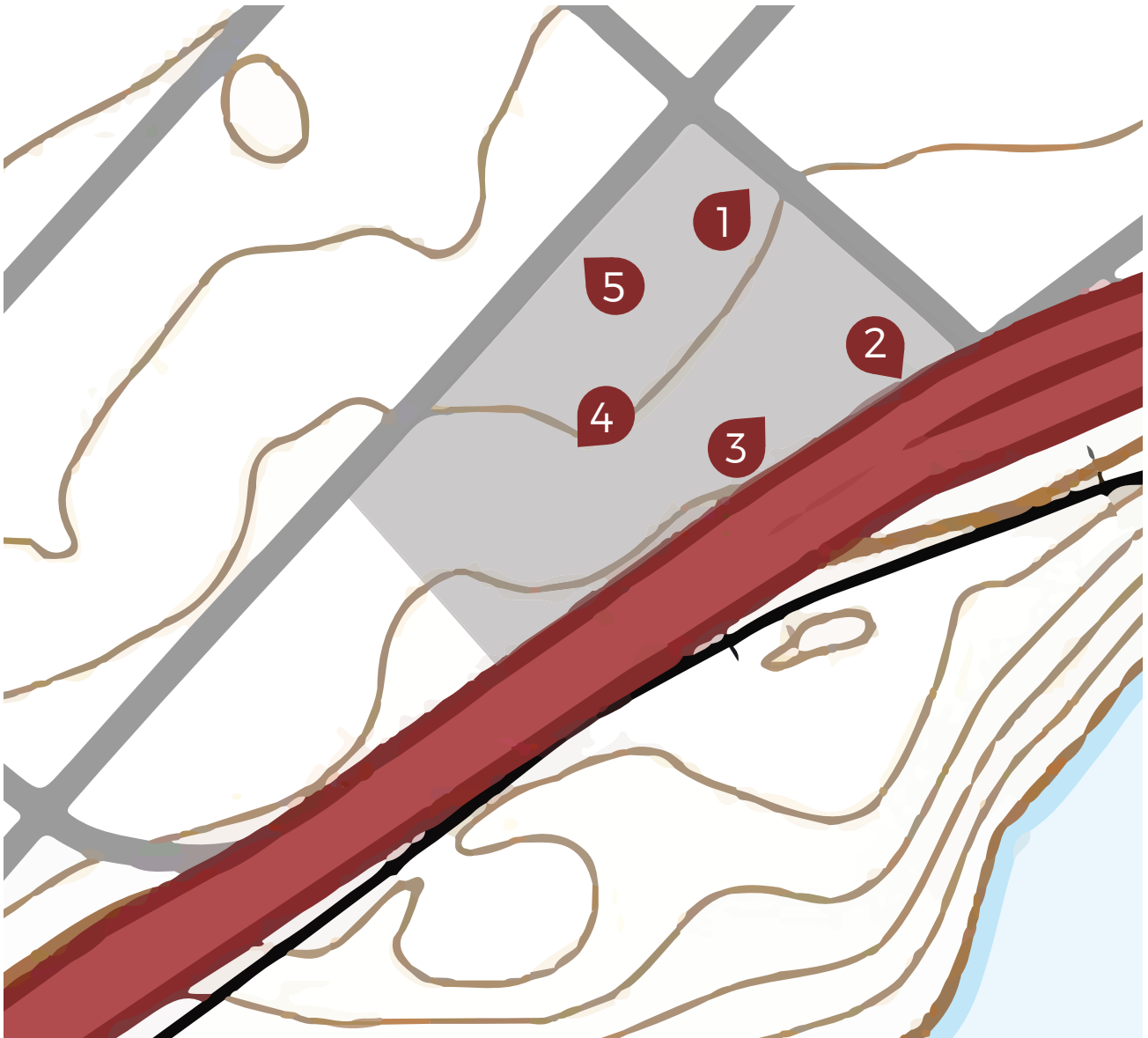
Average annual:

- Precipitation: 30 in.
- Snowfall: 77.6 in.
- Jan low temp: -2.2°F
- July high temp: 77.1°F



Source: Windfinder.com

BEAM [venngage.com/beam](http://venngage.com/beam)  
Average Air Temperature



1



2



# PERFORMANCE CRITERIA

Spaces	Ft <sup>2</sup>	%
Outside entrance area/walkway	467	13.5
Entrance space	77	2.2
Kitchen area	350	10.1
Inner courtyards/ garden	265	7.7
Sitting/yoga room	250	7.2
Gathering/ communal space	300	8.7
Intimate seating	435	12.5
Studio/art room	260	7.5
Upper mezzanine level	1,050	30.4
Total	3,454 ft <sup>2</sup>	99.8%

# APPENDIX

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# DESIGN SOLUTION

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## Pre - Design

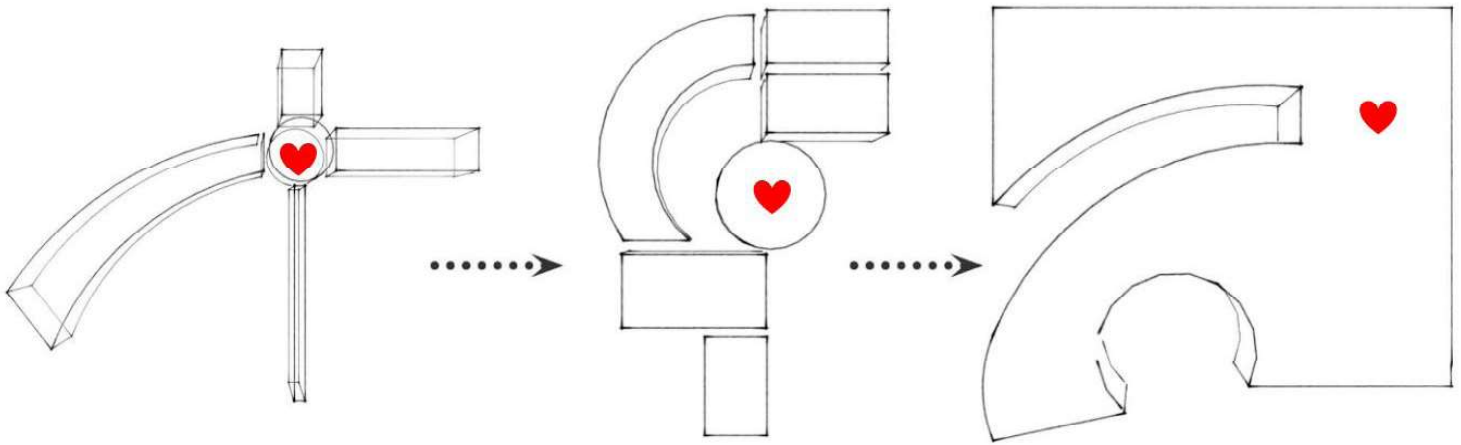
To begin the design process, I needed to revisit the Thesis Question that was assigned at the beginning of this project. Thesis Question: **What is the ideal environment to help patients and their families battling cancer heal emotionally and physiologically through architecture and design?**

- The emphasis of my project is to focus on the emotional, mental, and spiritual wellbeing of patients with cancer.
- This design must show that there is no specific right way to heal or treat someone. Every person is different and requires different needs.
- It is also important to bring a sense of normalcy upon the patients.
- My plan is to create a uniquely responsive place that has the potential to aid the healing process and provide a space that reinforces dignity, security, control, and normalcy.
- To me, it is imperative that this should be my thesis project. My mom was diagnosed last summer with cancer. I have had a firsthand experience witnessing the reactions and feeling of someone told they have cancer.
- I want to design something that is worthwhile and would lessen the weight on patients with cancers' shoulders.
- Currently, this is a small niche in the architecture world and if something like this was designed and built, it would be the first of its kind in the U.S.

Notes on Maggie Centers:

- This oncology center is based off Europe's' successful Maggie Centers
- Notes about Maggie Centers:
- Design is a contrast from opposing hospital buildings
- Smaller, domestic scale
- Flexible space that is able to accommodate very different and important tasks
- Domestic-like retreat
- Avoid corridors - at least keep space feeling open
- The kitchen = of home
- Size about 950 sq. ft.
- Interior subdivided into private and communal spaces

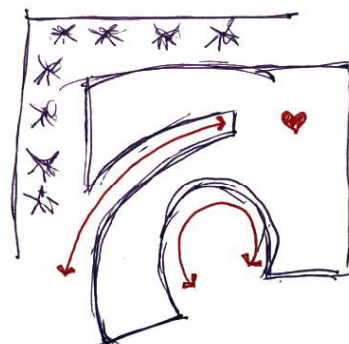
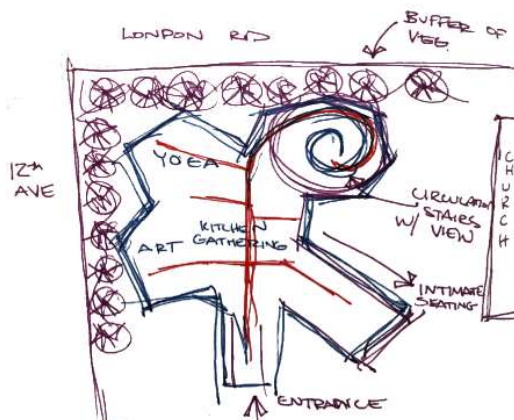
# PROCESS



## Centralized and Radial Organization

- Central - a central dominant space about which a number of secondary spaces are grouped
- Radial - a central space from which linear organizations of space extend in a radial manner

From the research, it was stated repeatedly that the kitchen should be the center focus. The kitchen acts as the “heart” of the building. It represents collaboration, togetherness, and support.





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## Kitchen

The kitchen space provides a dining table where people can gather, full kitchen supplies including a refrigerator, oven, stove, and sink. Guests are encouraged to make themselves at home and use the space. The open floor plan provides an open view of the flex space and in the distance, Lake Superior.

The warm color scheme was carefully chosen, along with the natural wood materials.



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## Small Counsel Space

There are two small counseling spaces. These spaces are meant for one-on-one therapy or counseling sessions. It is also completely private for anyone who needs a private space for themselves. Private space is hard to find in traditional cancer centers and it is very important that patients have an area that they feel comfortable in. The natural leather and wood textures are carried out through this space as well.

**Inpatient/Outpatient services** - Just like the multiple different organizations of room layouts, there needs to be the option of inpatient or outpatient services. It depends on the patient, how far along their disease is, how far away they live etc.



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## Outdoor seating Space

This outdoor space is for people to take a break and experience nature. A meditation pool is surrounded by plants and various seating arrangements. Large windows keep the connection between the interior and exterior.

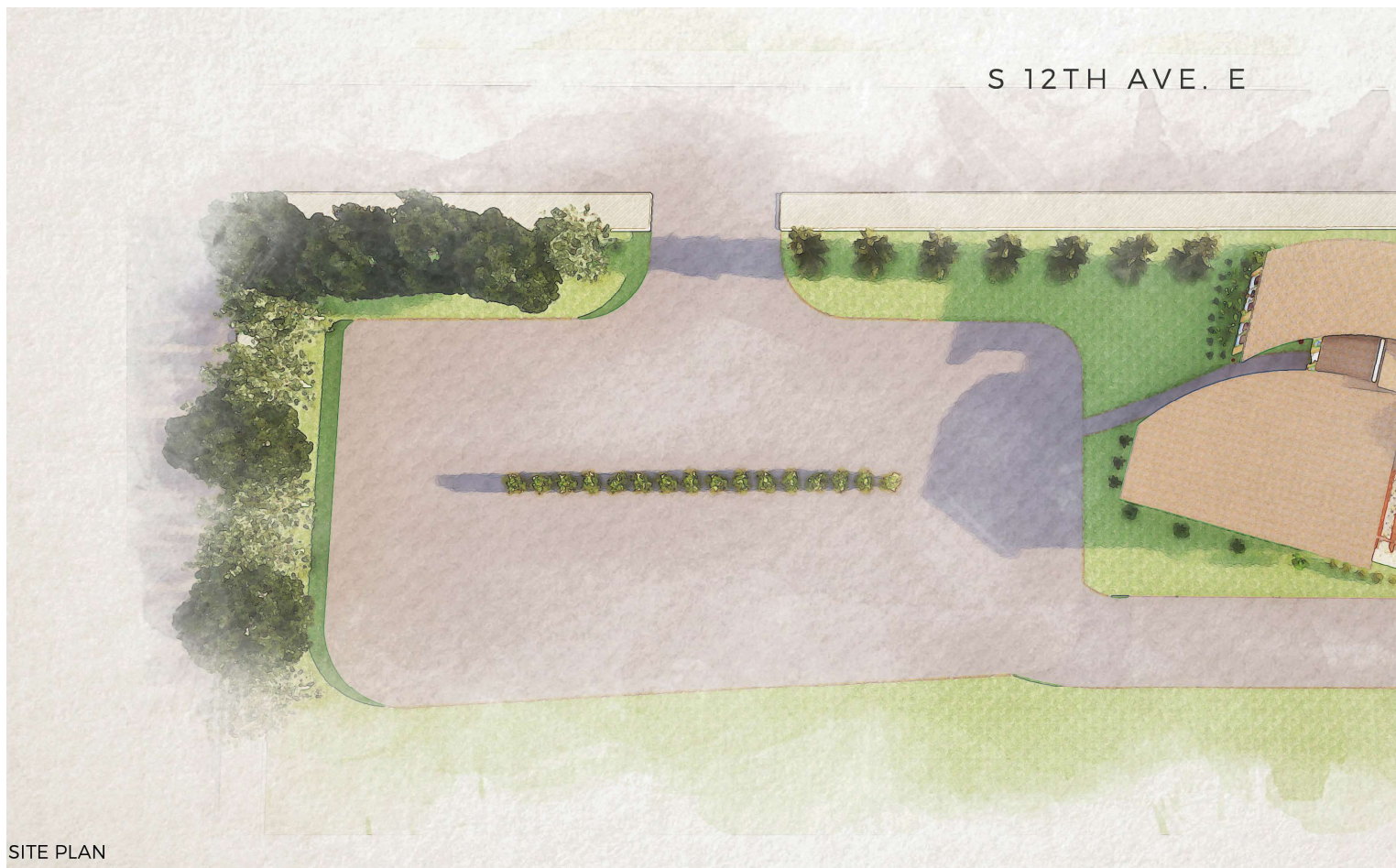
**Spaces for retreat/rejuvenation** - After enduring chemotherapy and the whole process that comes with that, there should be a place for the patient to relax a little bit and rejuvenate.

## Exterior Perspective

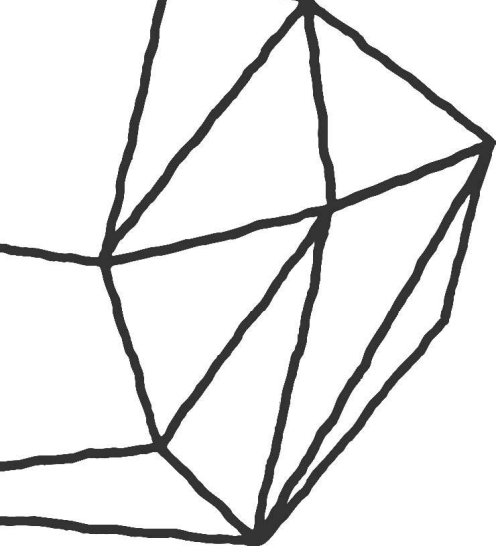
This northern view provides a look at the building from the outside. The various roof heights can be seen, as well as, the curtain wall and the tall ceilings in that area. Local vegetation buffers the building from the busy street that surrounds two sides.

### Local Vegetation:

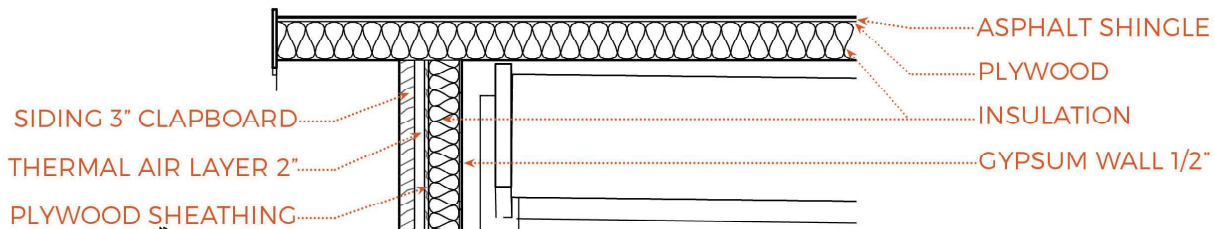
- Red Maple
- Honey Locust
- Eastern Hemlock
- Douglas Fir
- White Pine
- Red Cedar
- Lilac
- Hydrangea
- Viburnum
- Boxwood
- Switchgrass



SITE PLAN

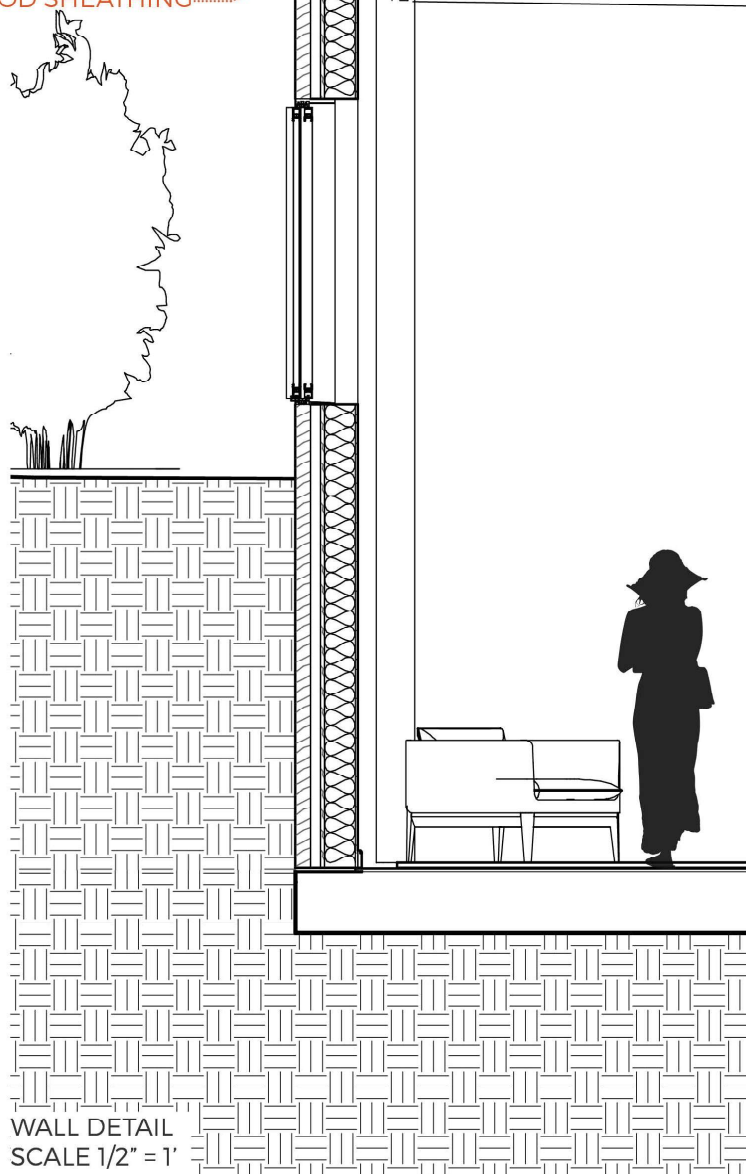


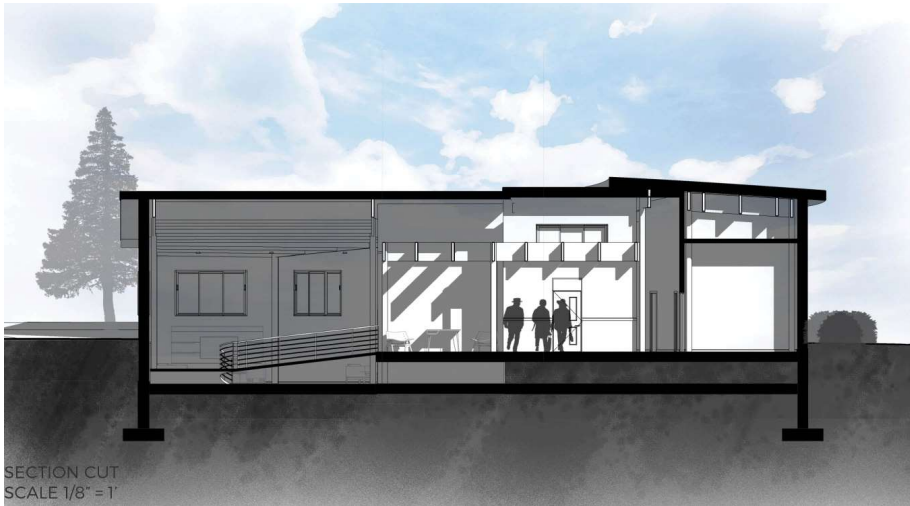
# STRUCTURE



## Glued laminated timber (Glulam) framing:

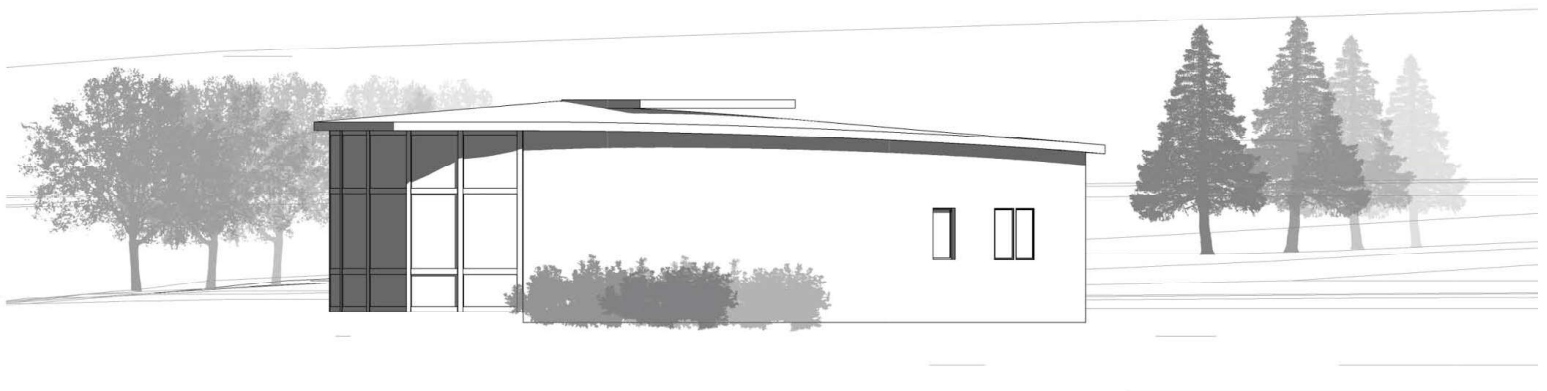
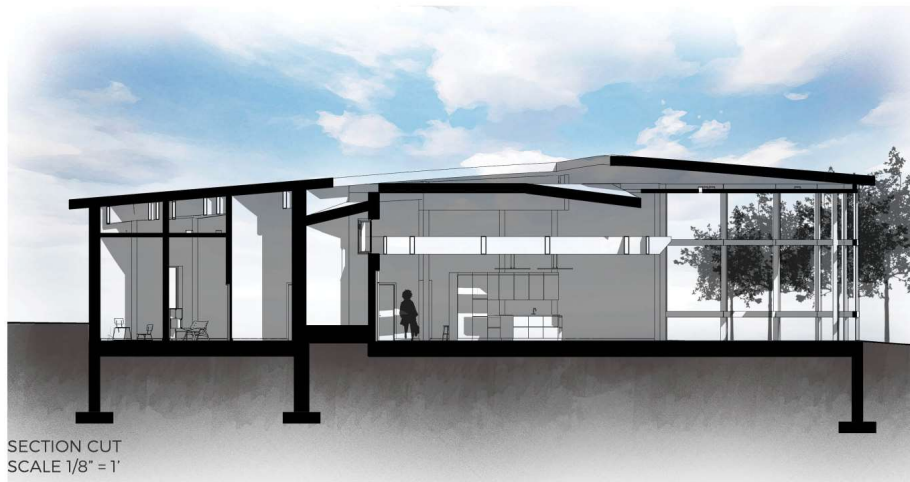
- Versatile - from simple and straight beams to complex and curved
- Stronger than steel pound for pound
- Reliable
- Cost efficient





Pictured to the left are section cut views. They provide a look into the building from a different point of view. They also show the foundation footings, structure, and roof levels.

Pictured below are the east and south elevations. These views show more of the roof design and various surrounding vegetation.

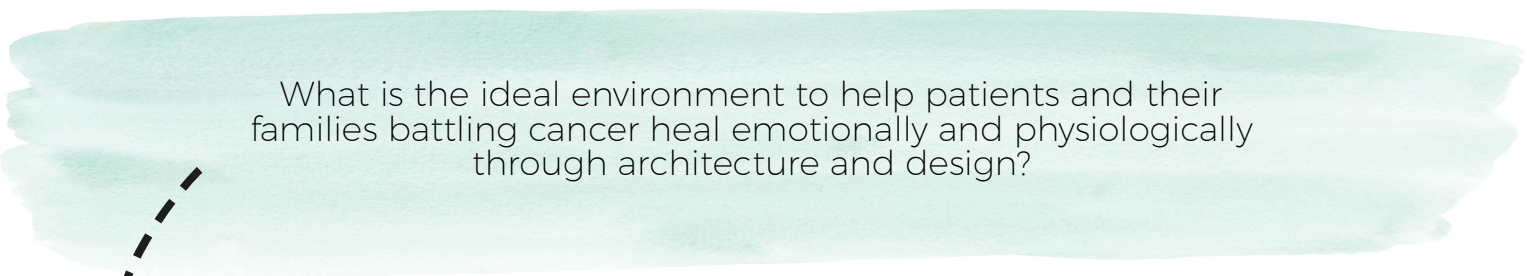


EAST ELEVATION  
SCALE 1/8" = 1'

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# FINAL THOUGHTS

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What is the ideal environment to help patients and their families battling cancer heal emotionally and physiologically through architecture and design?



The ideal environment is a space that is comfortable, peaceful, and accommodating. It features natural light and textures, a communal gathering space, various intimate seating arrangements, and multi-use spaces. Using a warm color scheme gives the space a welcoming feeling. The wooden beam system is a nod to the vernacular of Duluth and it's local architects. I think that with the research that I have done and the information from the Maggie Centres, this would be a great blueprint of the ideal healing environment for patients with cancer.

