

**The Nature of Healing: A Proposal for a Therapeutic Garden in
the Cross Cancer Institute in Edmonton, Alberta**

by

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Submitted in partial fulfilment of the requirements
for the degree of Master of Architecture

at

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DALHOUSIE UNIVERSITY
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ABSTRACT

Nature positively affects the physical, mental, emotional, and spiritual wellbeing of all people. In the natural environment, fresh air, daylight, organic materials and plant life exist in harmony. When we come into contact with this harmony, it provides a calming effect and have a direct positive impact on people undergoing cancer treatment, as well as patients' families and friends, and the doctors, nurses and caregivers whose job it is to care for them.

This thesis explores specific architectural interventions to an existing hospital that would provide a complementary healing environment to increase health and reduce stress. Using the Cross Cancer Institute in Edmonton as a project site, this design shows how we might provide therapeutic spaces and gardens to promote holistic healing of the mind, body and spirit.

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CHAPTER 1: INTRODUCTION

It is ironic that when asked to imagine a healing environment, nearly everyone makes some reference to nature, yet when seeking medical (healing) treatment, we find ourselves in environments virtually devoid of nature or access to it.¹

Health is vital to our survival; it binds us together in social, cultural, traditional, economic and political practices and reaches all corners of the world. The World Health Organization defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”² The Public Health Agency of Canada identifies twelve Determinants of Health that form a framework to evaluate overall health. The twelve determinants of health are:

Income and social status; Social support networks, Education and literacy, Employment/ Working conditions, Social environments, Physical environments, Personal health practices and coping skills, Healthy child development, Biology and genetic endowment, Health services, Gender, and Culture.³

None of these social determinants of health exist in isolation from the others; rather, the social determinants interact with each other to produce health.

Institutionalized healthcare is an element of only one of these determinants: Health Services. Hospitals and other medical institutions are meant to heal us, yet they are often designed with little or no consideration for the other eleven determinants of health. The technocratic structure of these facilities, combined with a standard aesthetic geared toward uniformity and sterility, leaves patients feeling unbalanced and out of control. It is this feeling of balance that I seek to restore through an addition to an existing cancer center in Edmonton, Alberta. I will focus on the social determinants of health which include: social support networks, social environments, physical environments, personal health practices, coping skills and culture. It is my ambition to create a prototype for holistic healing by addressing these determinants and integrating nature in an extension of the existing building.

This proposal is rooted in three branches of research: the historical relationship between

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1. Claire Cooper Marcus & Marni Barnes, *Healing Gardens: Therapeutic Benefits and Design Recommendations* (New York: John Wiley & Sons, 1999), 8.
 2. World Health Organization, “Mental health: a state of well-being”, accessed November 25, 2011 http://www.who.int/features/factfiles/mental_health/en/
 3. National Collaborating Centers for Health, “What are the Social determinants of Health?” Accessed November 29, 2011. http://www.nccph.ca/docs/DoH_eng_PRESS_M.pdf

nature and health in the West, current research into the effects of stress on patients and healthcare staff and the study of environmental sustainability and its role in the future of healthcare facilities.

The History of Healing

Western medical practice originated with the ancient Greeks and the Romans. The institution of the hospital did not exist at that time, as medicine was more closely connected to the outdoors and was practiced in the community. Greek medicine was divided into two forms: the first of which was the Hippocratic doctors traveling to meet patients and treat them in their homes. They relied on the same principles that form the basis of clinical medicine today, such as recording patients' histories, and conducting physical examinations. This was founded on a sort of diagnostic acumen.⁴ In a parallel system, the chronically or terminally ill flocked to temples to ask Asclepius, the Greek god of healing, for his care. These temples were often on hilltops, overlooking the sea, and treatments included healthy diet, pure water, music, sleep and dreams, social interactions and, above all, prayer.⁵ These two branches of healing have survived over time and, although the Hippocratic diagnostic system is the norm, there continues to be strong scientific evidence that well-being and balance are equal contributors to overall health.⁶

The first hospitals were built by knights in the Middle Ages to care for pilgrims en route to holy sites such as Santiago de Compostela. The oldest of these, dating back to 1453, is the Hostal de los Reyes Católicos, in Galicia, Spain. Its vaulted ceilings, spacious hallways and quiet courtyard, lined by a wide colonnade, were built specifically to care for the ailing.⁷ Small structures were constructed along these holy routes, in close proximity to streams and forests, and used as clinics for the pilgrims. Access to water for cleaning and drinking and trees for shelter provided an ideal environment for weary travelers to rest and heal.

4. Esther M. Sternberg, *Healing Spaces: The science and place of well-being* (Cambridge, Massachusetts: Harvard University Press, 2009), 220.

5. *Ibid.*, 220

6. Roger Ulrich, "Health Benefits of Gardens in Hospitals" (paper presented at the conference, Plants for People International Exhibition Floriade, 2002), 2.

7. Sternberg, *Healing Spaces*, 221.

Throughout the 19th century, a growing understanding of the nature of infection led to a fundamental shift in the design of hospitals. While serving in the Crimean War (1853-1856), Florence Nightingale, the celebrated nurse, writer and statistician, developed techniques to significantly reduce the incredible 60 percent mortality rate among wounded soldiers (figure 1). Whereas before, soldiers were left in their own excrement and blood, inside dark, damp, overcrowded hospital wards, Nightingale ensured that soldiers were washed and provided with fresh bedding, given beds spaced well-apart, and allowed plenty of sunlight, fresh air and nourishing food.

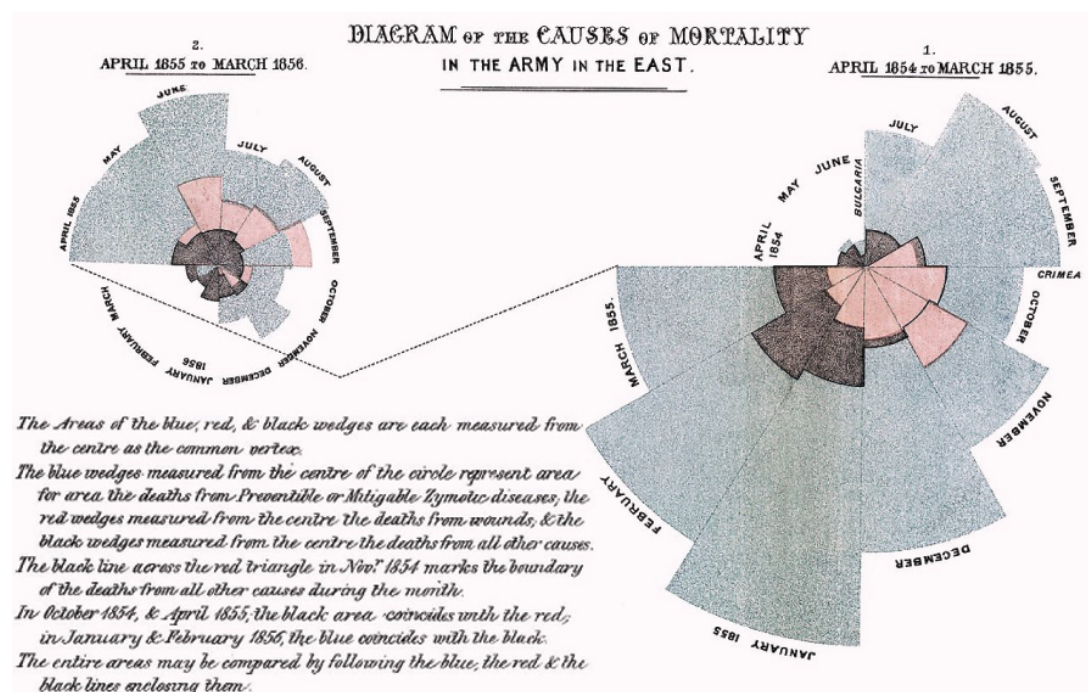


Figure 1. Diagram of the causes of mortality in the army in the East during the Crimean War, 1856. (Florence Nightingale).

Simultaneously, in the mid 1850s, some argued that the hospital was a place where bodies were to be worked on. Order had great importance and was seen as necessary for observation and cure. Michel Foucault argues that:

The therapeutic process itself, the transformation on the basis of which someone who is considered to be ill ceases to be so, can only be produced within this regulated distribution of power. The condition, therefore, of the relationship to the object and of the objectivity of medical knowledge, and the condition of the therapeutic process, are the same: disciplinary order.⁸

8. Michel Foucault, *Psychiatric Power: Lectures at the College de France 1973-1974*, trans. Graham Burchell (New York: Picador, 2003), 3.

This disciplinary order was argued by Esquirol's⁹ belief that the architectural arrangement itself - including spatial organization, the distribution of individuals in space, movement, and visibility - has therapeutic value. Order and observation were thought to play a role in healing and were categorized by Foucault in four elements. The first was permanent visibility. The circular Panopticon, designed by Jeremy Bentham, ensured such visibility and was built as a series of pavilions which would be laid out on three sides, with the fourth opening up to the countryside. This was the design of the first cell (figure 2). The second principle was central supervision, exemplified by a tower (or director's building), from which anonymous power could be executed. The third principle was isolation which at the time, was thought to have therapeutic value. The fourth was the ceaseless punishment doled out by the personnel, or by a set of instruments.¹⁰ Although these elements were set out for psychiatric institutions, hospitals in this period functioned on the same principles. Permanent inspection and uninterrupted observation set up the spatial organization of rows of patients under the eyes of medical personnel.

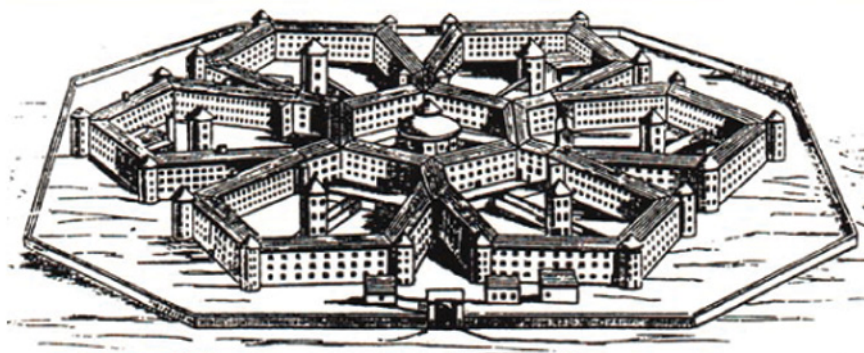


Figure 2. Millbank Penitentiary built to reflect the design of Jeremy Bentham, 1821. (Victorian Crime and Punishment).

Children's hospitals were no different. In 1894, the Boston Children's Hospital had only two visiting days a week: 11am till noon on Wednesdays and 3 to 4pm on Sundays (fathers only).¹¹ Children who cried too much were put in isolation, so as not to disturb the

9. Jean-Etienne-Dominique Esquirol was born in Toulouse on February 3, 1772. He trained as a doctor and specialized in investigating the facilities for the insane. In 1838 he became the main architect of the national law that instituted asylums for all needy French mental patients.

10. Foucault, *Psychiatric Power: Lectures at the College de France 1973-1974*, 103.

11. Howard Markel. "When Hospitals Kept Children From Parents," *New York Times*, January 1, 2008, *Health*, accessed November 20, 2011. <http://www.nytimes.com/2008/01/01/health/01visi.html>

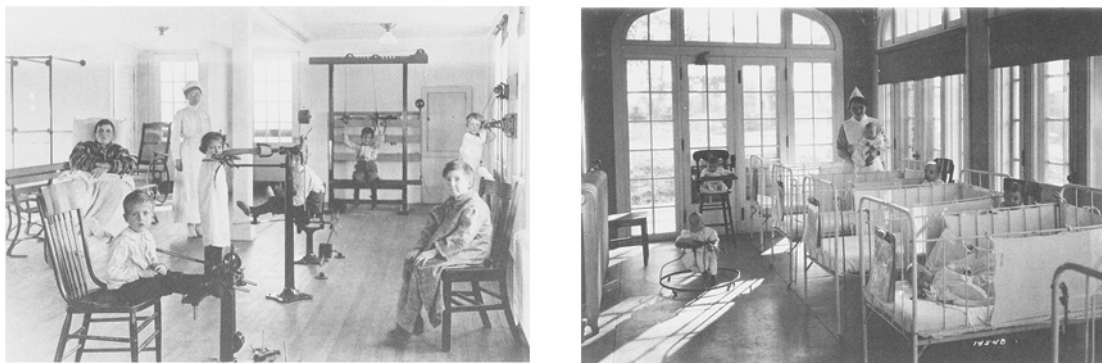


Figure 3. Children's Hospital Solarium and Orthopaedic Room, 1919. (University of Iowa Special Collections).

other patients. These regulations were aimed at controlling behaviour and restoring order, as the patients in hospitals were often seen as poor, unfortunate, and of lesser social status. From the early 1900s to the late 1950s, children's hospitals had strict rules separating children from their parents, as removing children from deleterious home environments was seen as therapeutic¹² (figure 3).

Conversely, in the late 19th and early 20th centuries, architects incorporated "back to nature", "Life Reform", and "light and air" philosophies which explored natural ventilation systems, lighting fixtures and shading devices.¹³ A focus on health and physical freedom was expressed in sunbathing, fitness and outdoor activities; this natural lifestyle translated architecturally into healing places such as tuberculosis (TB) sanatoriums. A good example is Alvar Aalto's TB sanatorium built between 1930 and 1933 in the town of Paimio, in the province of Western Finland. The location offers a quiet hospital environment surrounded by dense forest and natural views, which was the norm for sanatoria in the early 1900s. Since lying in the sun on a balcony was part of the treatment for tuberculosis, balconies were an essential part of the architecture (figure 7). The roof terrace on the patients' wing was used for treatment in summer and winter alike (figure 4). Tuberculosis was treated with fresh air, so sun beds suitable for external use were needed. The dining hall in B-wing was designed with an eye on the natural lighting. On the window side there is a double-height space, so that natural light filters into the farthest corner of the room and

12. Ibid., n.p.

13. Nina Rappaport, "Sustainability A Modern Movement", in *The Challenge of Change: Dealing with the Legacy of the Modern Movement*, ed. Dirk van den Heuvel (Amsterdam: IOS Press, 2008), 337.

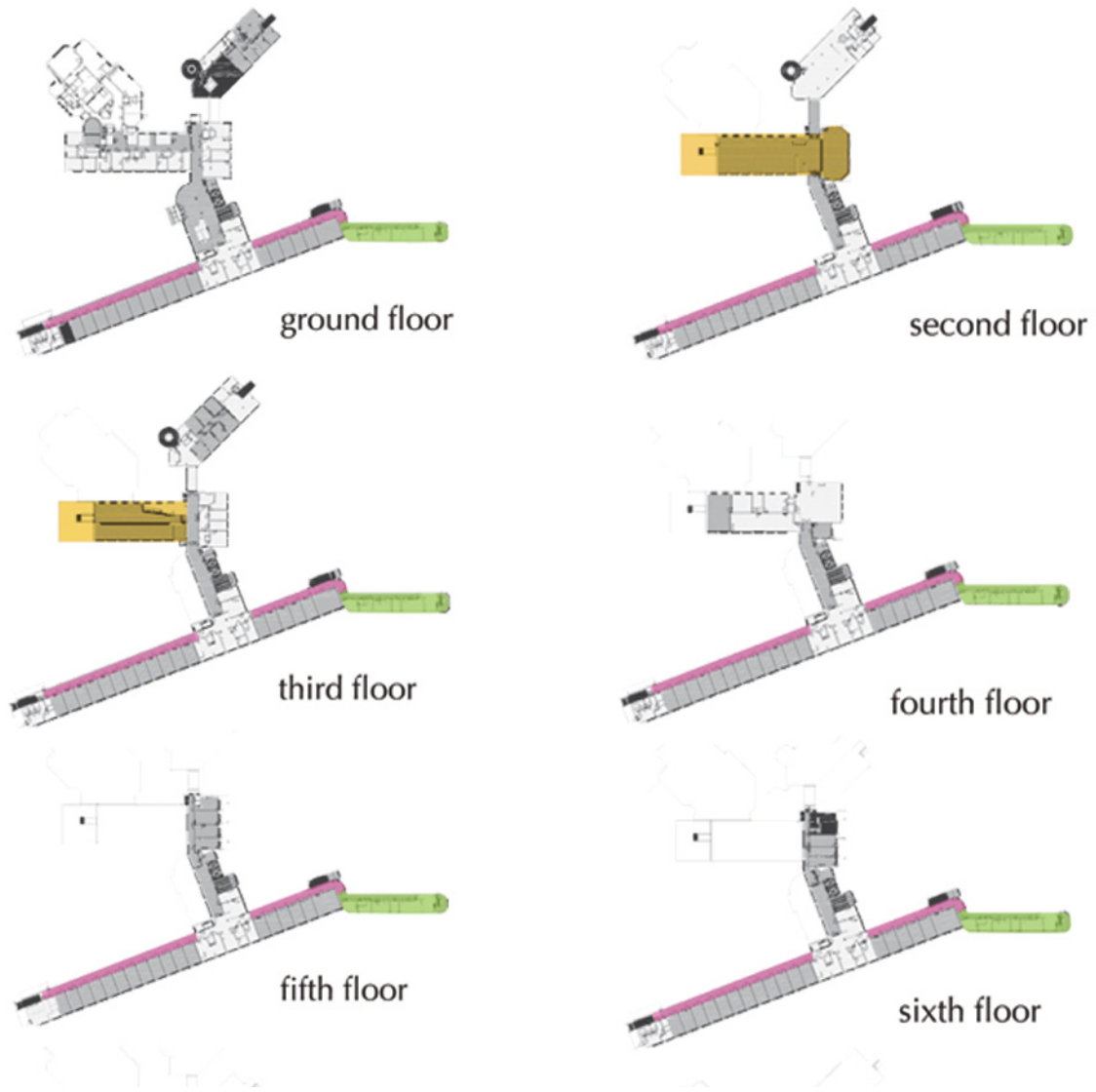


Figure 4. Alvar Aalto's Paimio TB Sanatorium, 1929: floor plans. The amount of space designated to sun exposure is denoted in green. Cross ventilation was an important aspect of the room design as they open towards the hallways seen in pink. The large common areas for dining, reading and gathering are in orange. The colors help to identify the design elements that enhance patient care by allowing nature to enter the building for healing purposes. These design elements provide insight into the early 20th century modernist clean air movement. (Image modified from the National Board of Antiquities).

there are sun blinds outside to prevent glare (figure 5). The rooms in the patients' wing are arranged on the north side of the corridor. Situating the rooms on one side only, Aalto designed the corridor so as to bring natural light and give the patients the feeling that they were in control of the space because they could choose to open their doors to bring in the light and operate them as they pleased (figure 6). We see here that although fresh air, sunlight and activity became known treatments for illness, the ideas of social isolation still

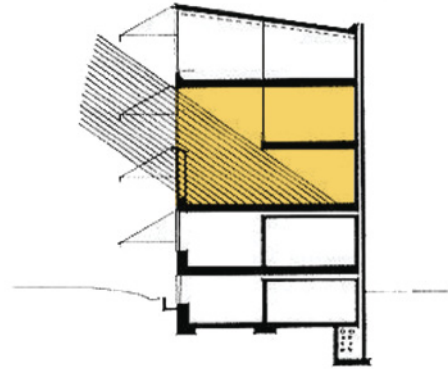


Figure 5. Alvar Aalto's Paimio TB Sanatorium: double height dining room with library above, 1929. (Image modified from the National Board of Antiquities).

existed. In a sense this still exists today and although we are aware of the importance of social support, our hospital facilities remain unable to cater to this need.

Since the 1970s, hospital reform has focused on sterilization and locating certain sanitary rooms, such as morgues and autopsy facilities, far from patient care. These changes positively affected patient care by decreasing disease transmission, leading to declines in



Figure 6. Alvar Aalto's Paimio TB Sanatorium; Hallways, 1929. (Image modified from the National Board of Antiquities).

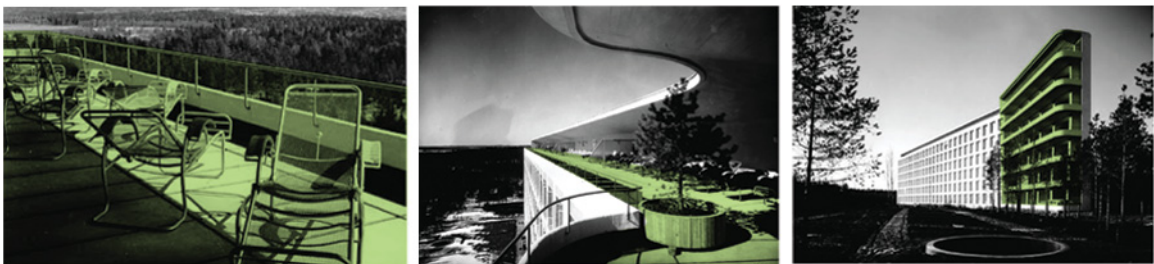


Figure 7. Alvar Aalto's Paimio TB Sanatorium; Outdoor terraces, 1929. (Image modified from the National Board of Antiquities).

infections and death. They also led to the hard, shiny surfaces of the sterile hospital environments we have today. These surfaces reflect sound and produce acoustically stressful environments for both staff and patients. Visits from family and friends are limited and single-bed rooms minimize infection but increase the isolation of the patient. The number of machines and diagnostic tools have increased and have taken over space that could be used for healing.¹⁴ Mechanization of health has produced stressful environments for patients and staff and is leading to a breakdown in mental and emotional health throughout the hospital environment. Current research shows that although the spread of infection is key to maintaining health, patients require a more positive healing environment to heal the body as a whole, not solely the disease (figure 8).

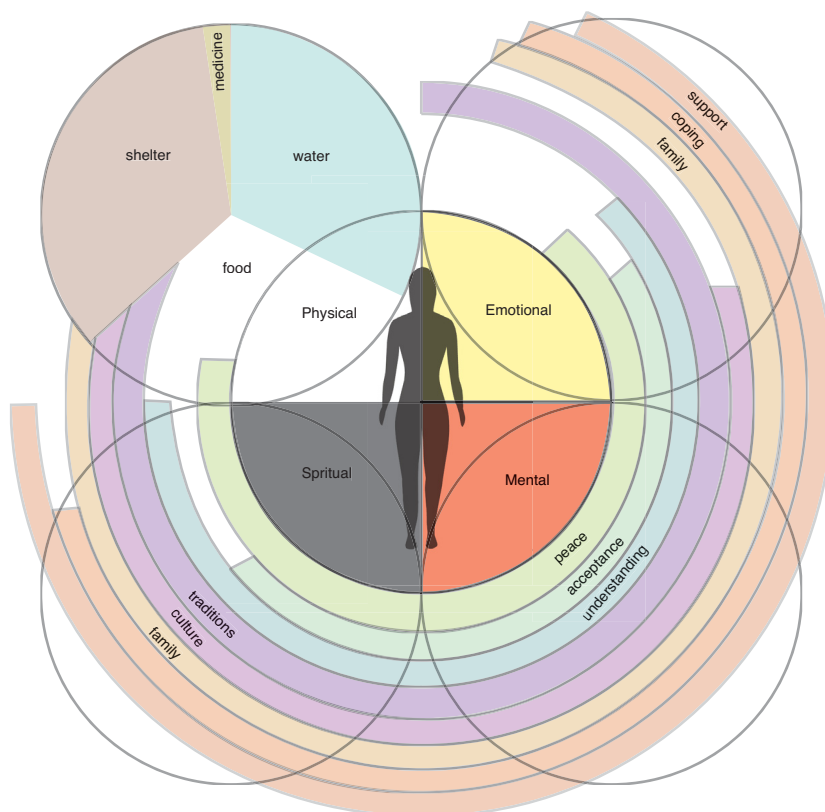


Figure 8. Healing the Person as a Whole: The Natural Human Cycle.

Current Health Research

The strong emphasis on infection reduction, together with the priority given to functional

14. Sternberg, *Healing Spaces*, 227.

efficiency, has shaped the design of hundreds of hospitals internationally. These hospitals are now considered starkly institutional, unacceptably stressful and unsuited to the emotional needs of the patients, their families and the healthcare staff.¹⁵ Presently, the term evidence-based design has emerged as part of an attempt to scientifically quantify environmental stressors resulting from elements of design within healthcare institutions and to decrease them, based on evidence collected from past projects around the world. The idea is a good one and evidence-based practice is commonplace in medicine, as research and analysis has been carefully collected over hundreds of years. Even at that, medical practice changes constantly and scientists are employed solely to research current trends and bring them into practice. This methodological approach to scientific examination is not done for architecture. This is due to many factors ranging from lack of scientific data, a lack of professionals knowledgeable in collecting data, and lack of testing on buildings and on users in post-occupancy evaluations. If we want to improve the present-day hospital design, precedents can be used to identify building efficiencies in an economic sense, but user satisfaction must also be studied and analyzed. The value of user interaction must be acknowledged to provide a holistic approach to delivering health services. This is currently lacking in our healthcare system. A study of wellbeing in hospitals should include factors such as noise and its effects on stress, comfort, seating areas for staff, visitors and patients, and green space. Presently, patients have voiced their need for increased attention to states of mind and emotions by the medical profession and by the health environment.¹⁶ These needs should be recognized to improve the current state of health and well-being of patients and staff.

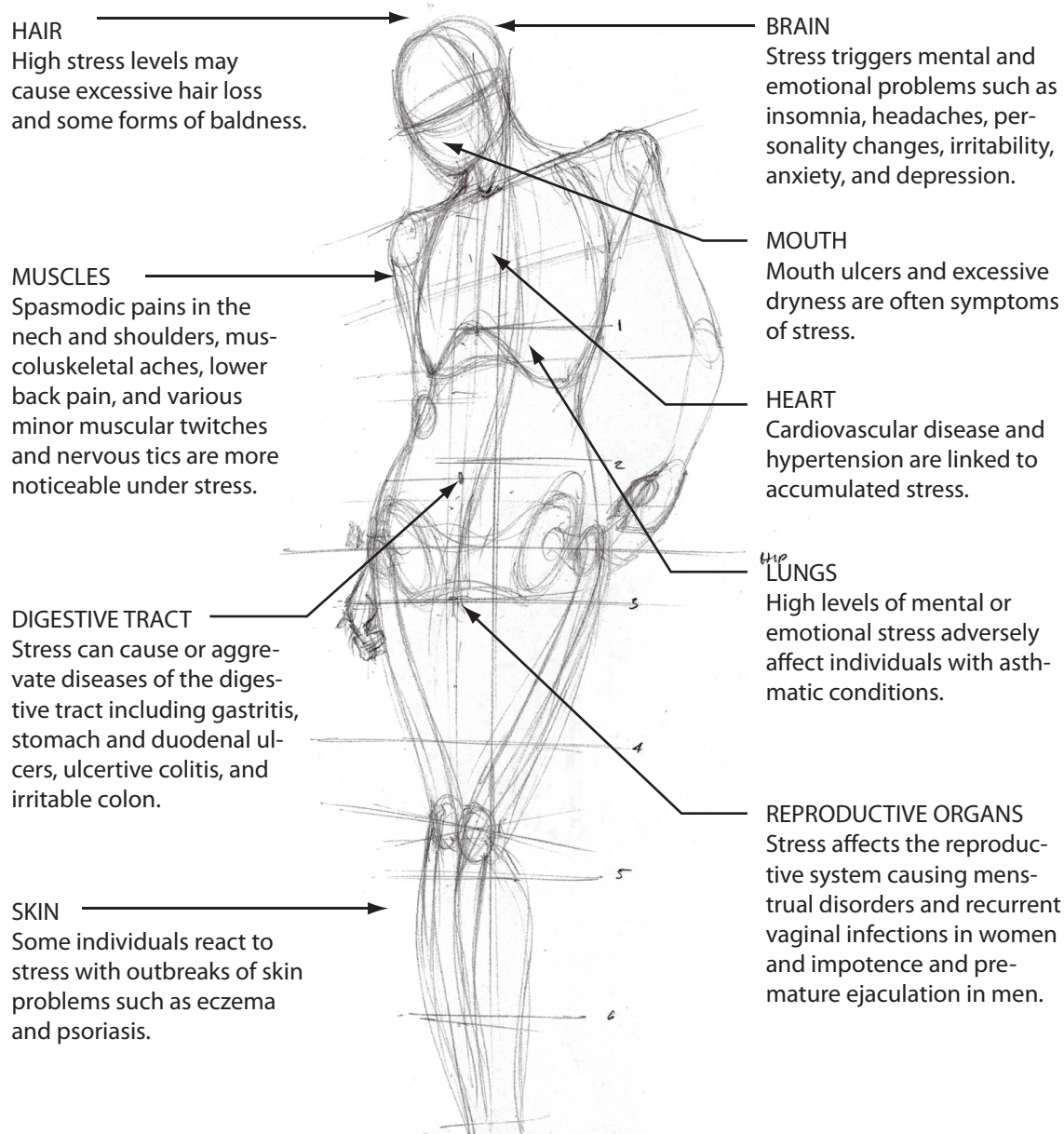
For decades, studies have shown that healthcare occupations such as nursing are stressful because they often involve overload of work, lack of control, or authority over decisions, and stress from rotating shifts.¹⁷ These work conditions lead to lower job satisfaction, absenteeism, and staff shortages, which put stress on other staff members, and negatively affect the quality of care given to patients. Findings by Ulrich suggest that hospital gardens are heavily used by staff as places of escape from the stresses and pressures of work, thereby increasing staff satisfaction and staff retention. These restorative gardens also

15. Ulrich, *Health Benefits of Gardens in Hospitals*, 2.

16. Sternberg, *Healing Spaces*, 219.

17. Ulrich, *Health Benefits of Gardens in Hospitals*, 6.

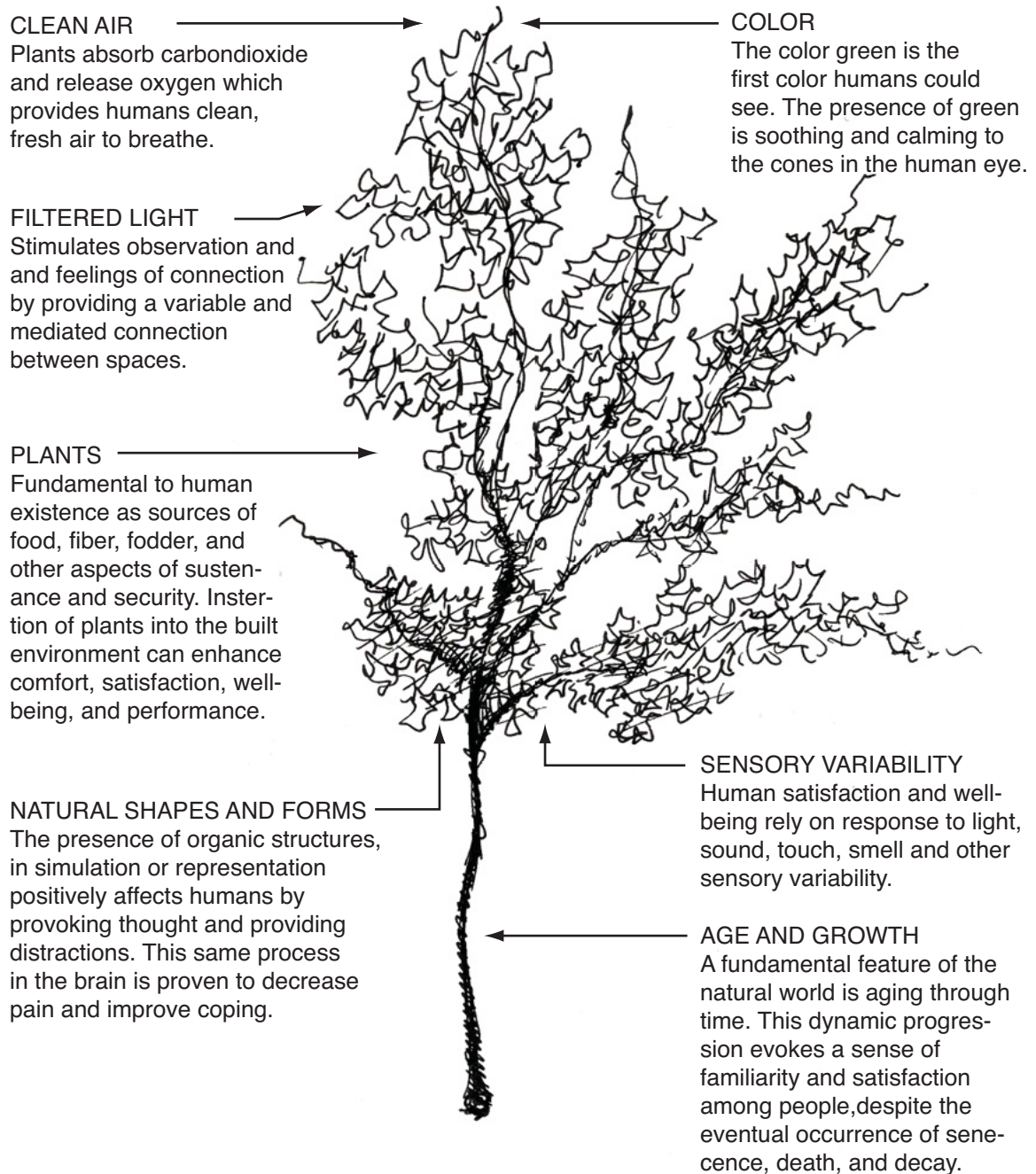
The Effects of Stress



Physical or mental stresses may cause physical illness as well as mental or emotional problems. Here are the parts of the body most affected by stress.

Figure 9. Effects of stress visualized in a human stress diagram. (Image modified from the American Institute of Stress).

Biophilic Effects of Nature



The benefits of nature and the natural environment have been proven to increase critical thinking skills, productivity, attitude, coping and well-being.

Figure 10. Stress-Reducing Effects of Nature. (Image modified from Kellert et. al, Biophilic Design).

become positive incentives to recruit and retain employees.¹⁸

There has been major progress in the medical sciences that investigate the mind's power over the body. Stress and psychosocial factors, including social support and self-appreciation, have been shown to drastically influence the health and coping skills of patients, staff, and caregivers (figure 9). Therefore, stress reduction must become an important consideration in creating new healthcare facilities.¹⁹ This can be done, for example, by simply providing pleasant soothing distractions, the opportunity to engage in spontaneous social encounters, and sensory variability.²⁰ These are all qualities found in the natural environment (figure 10).

There is limited but growing scientific evidence that viewing gardens can measurably reduce stress and improve health outcomes. This evidence is creating a resurgent interest in hospital gardens.²¹ Nature's presence can come in many forms such as daylight, fresh air, plants, animals, or views into the landscape and have proven to aid in stress reduction, increased cognitive functioning and overall increased positive thinking.²² Negative moods have restrictive effects on attention and lead to typical disingenuous responses. For example, a nurse may ask a patient how they are doing, and they will reply, "I'm fine," when they really are not. If the patient does not see themselves as part of the healing process they will not feel positively about their healing. This can be detrimental to the care of patients and can lead to underlying issues never being brought to the attention of the caregiver. If these conditions persist, hospitalizations increase in length and patients can develop increased dependencies on analgesics or narcotics. Alternatively, the positive effects of nature on clients, their families, caregivers and staff could improve client-staff relationships and provide staff the energy to focus on complex solutions and alternative approaches to both methods of care and of dealing emotionally with the effects of a chronic illness.²³

18. Ibid, 7.

19. Ibid, 2.

20. Judith H. Heerwagen, *Design, Productivity and Well Being: What are the Links?* Accessed September 7, 2011. http://greenplantsforgreenbuildings.org/attachments/contentmanagers/Design_ProductivityWelbeing.pdf, 3.

21. Ulrich, *Health Benefits of Gardens in Hospitals*, 2.

22. Heerwagen, *Design, Productivity and Well Being*, 8.

23. Heerwagen, *Design, Productivity and Well Being*, 9.

This is proven by Roger Ulrich's benchmark medical research in 1984. In this study he compared the recovery records of gall bladder surgery patients who had a bedside window view of either trees or a brick wall with no nature. These groups were statistically equivalent, yet the outcomes were dramatically different. Data showed that those with a view of trees had shorter hospital stays, suffered fewer minor post-operative complications, and had more positive feedback by staff, such as "patient is in good spirits". Those with the wall view had far more negative comments, such as "patient is upset", and "needs much encouragement". The patients facing the natural view also required far fewer doses of strong pain narcotics.²⁴ These medical outcomes suggest that nature and natural views positively affect patients. The decrease in complications and in narcotic use is a cost saving measure for hospitals and should be argued when advocating for the importance of natural elements in hospital design.

For people with cancer, this is even more important because although the treatment of cancer through radiation and chemotherapy has come a long way, if the person cannot be happy and cannot find the joy in life and cannot be at peace with their illness, it will not only negatively affect their own lives but also those of the people around them. Views of nature provide positive distractions and these complex and dynamic elements have been proven to release anti-inflammatory chemicals from the brain into the body. It has been proven that serotonin is released when we experience nature. These are the same chemicals that are being artificially manufactured and given to people with chronic pain and illness.²⁵ The bodies own healing mechanisms function regularly on an everyday level and maintain this function when we fall ill. This internal healing system is not supported within the hospital environment due to lack of mobility, a difference in diet, lack of control and increased isolation. For the patient, some of these issues cannot be changed, but for the caregivers and staff, who are also forced to be inside the hospital, this environment negatively affects their health and well being, as well.

Ulrich compiles evidence from three sources and states:

In addition to ameliorating stress and improving mood, gardens and nature in hospitals can significantly heighten satisfaction with the healthcare provider and the overall quality of care. Evidence from a number of different hospitals and diverse categories of care strongly

24. Ulrich, *Health Benefits of Gardens in Hospitals*, 7.

25. Sternberg, *Healing Spaces*, 33.

suggest that the presence of nature, indoor and outdoor gardens, plants, window views of nature, increase both patient and family satisfaction.²⁶

This positive feedback from patients and families has an effect on the staff and the health-care facility itself.

Thesis

My thesis design envisions a prototypical addition to a health facility that will prove to hospital administrators that exposure to nature positively affects healing. This is especially important for northern climates such as Edmonton, where outdoor activity is limited eight months of the year. When people are forced indoors, their activity levels decrease and risk experiencing seasonal affective disorder. This is even more prevalent among those with low mobility or an immunosuppressive disorder, which is the situation of most patients of the Cross Cancer Institute. The indoor natural healing space proposed in this thesis will provide an opportunity for exposure to nature and sunlight for all users year round.

This ambition propels my program to not only design a building that could be built in Edmonton, Alberta, but that also possesses the indoor haptic quality that addresses the mental, emotional and spiritual aspects of healing. This addition focuses on the people who are supporting our healthcare system: the caregivers, families and staff of patients, and thus promotes a healthy cycle of healing for an innovative and holistic approach that I believe is the future of our healthcare system.

Environmental Sustainability

The World Health Organization states that health is “ a state of equilibrium between humans and the physical, biologic and social environment, compatible with full functional activity.”²⁷ To be successful in this natural evolution towards a more complete view and understanding of health, our facilities must succeed in environmental sustainability, organizational effectiveness, and human well-being.²⁸

One way of looking to nature for systems and cycles is through biomimicry. This is the

26. Ulrich, *Health Benefits of Gardens in Hospitals*, 5.

27. World Health Organization. “Definition: emergencies.” *Health*, accessed November 20, 2011. <http://www.who.int/hac/about/definitions/en/>

28. Heerwagen, *Design, Productivity and Well Being*, 2.

study of the natural environment, life cycles of plants and animals and their relationships of interconnecting systems. As an architectural intervention, the natural systems of the built environment can have a great impact on the reduction of overall energy needs of the building and create a harmonious environment that is synonymous to the goal of healing people through a healthy balance. This will produce economic advantages to the current facility by decreasing the amount of mechanically produced humidification, cooling and heating.

Hospital administrators have begun advocating for creating gardens due to this patient/customer satisfaction as they see it having a positive economic and financial benefit.²⁹ This evidence suggests that my proposal is reinforced by many who see the future of healthcare design with facilities that encompass gardens and natural healing spaces. Therefore we must adapt our current buildings to take advantage of this evidence-based knowledge. This project will outline the major programs needed in a healing space and how this will impact the health outcomes of patients, staff and caregivers.

29. Ulrich, *Health Benefits of Gardens in Hospitals*, 6.

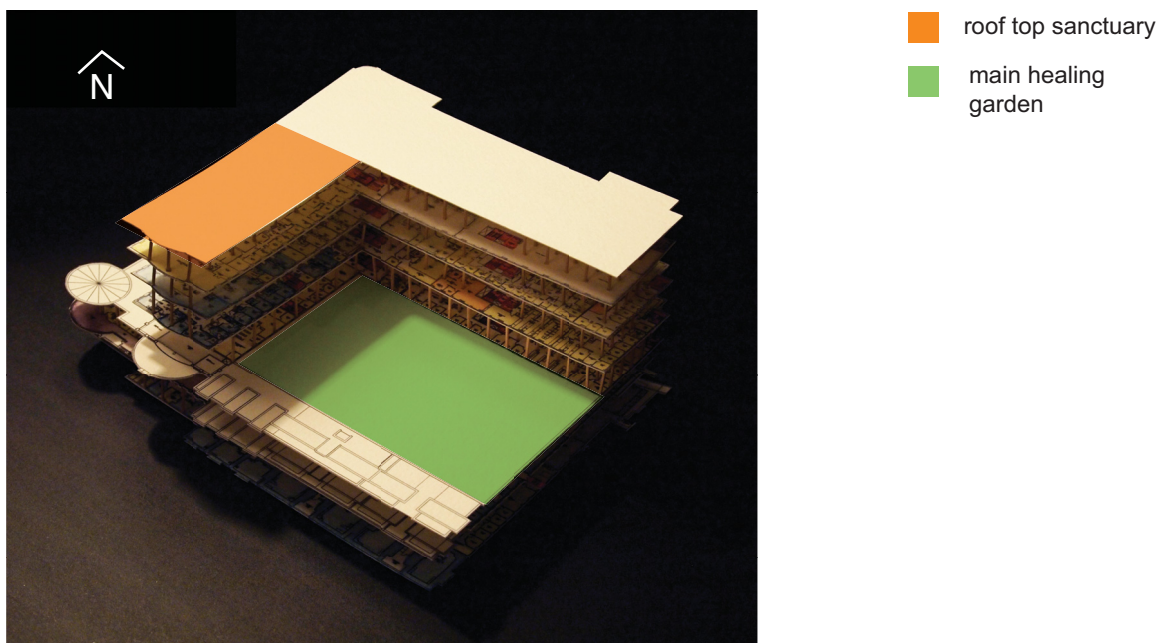


Figure 11. The two separate ecosystems color coded on a model of the existing building.

The facilities that exist presently lack physical and emotional connection and are therefore often torn down as they reach the end of their life cycles. People need to feel an attachment to place and a responsibility to long-term sustainability; this will increase social

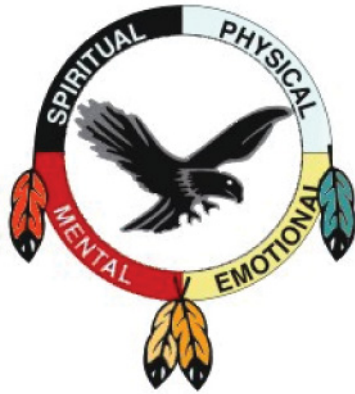


Figure 12. Circle of Healing. (Mi'kmaw Family Healing Centres).

connectedness and promote a regenerative culture, and a spirit of place. This will also be of economic value to the provincial and federal healthcare spending as fewer hospitals, and healthcare facilities will be torn down and replaced. I am proposing a prototype that will allow health facilities to modify their current buildings by introducing a complementary healing facility that will enhance personal attachment and sustainable design.

There are two ecosystems in my design. The first is the main therapeutic garden built on the roof of the first story where my design will be focused. The other is on the roof of the west tower overlooking the river valley (figure 11). This sanctuary on the west roof is phase two of the design and it will have a small shelter and an outdoor roof garden with native Albertan plants.



Figure 13. Sweat lodge. (Plains Healing Lodge).

Spirituality

Spirituality is an important aspect in health and healing. It is seen in the Aboriginal medicine wheel as one of the four quadrants alongside mental, emotional and physical (figure 12). Often times, hospitals do not support any one form of spirituality but offer a non-denominational space. Because my design focuses on complementary healing, I have chosen to provide a sacred space on the rooftop of the west building. The rooftop will also be home to a sweat lodge that is a sacred healing tradition for many Aboriginal peoples in Canada (figure 13). Sweating has a long history of being used for cleansing and heal-

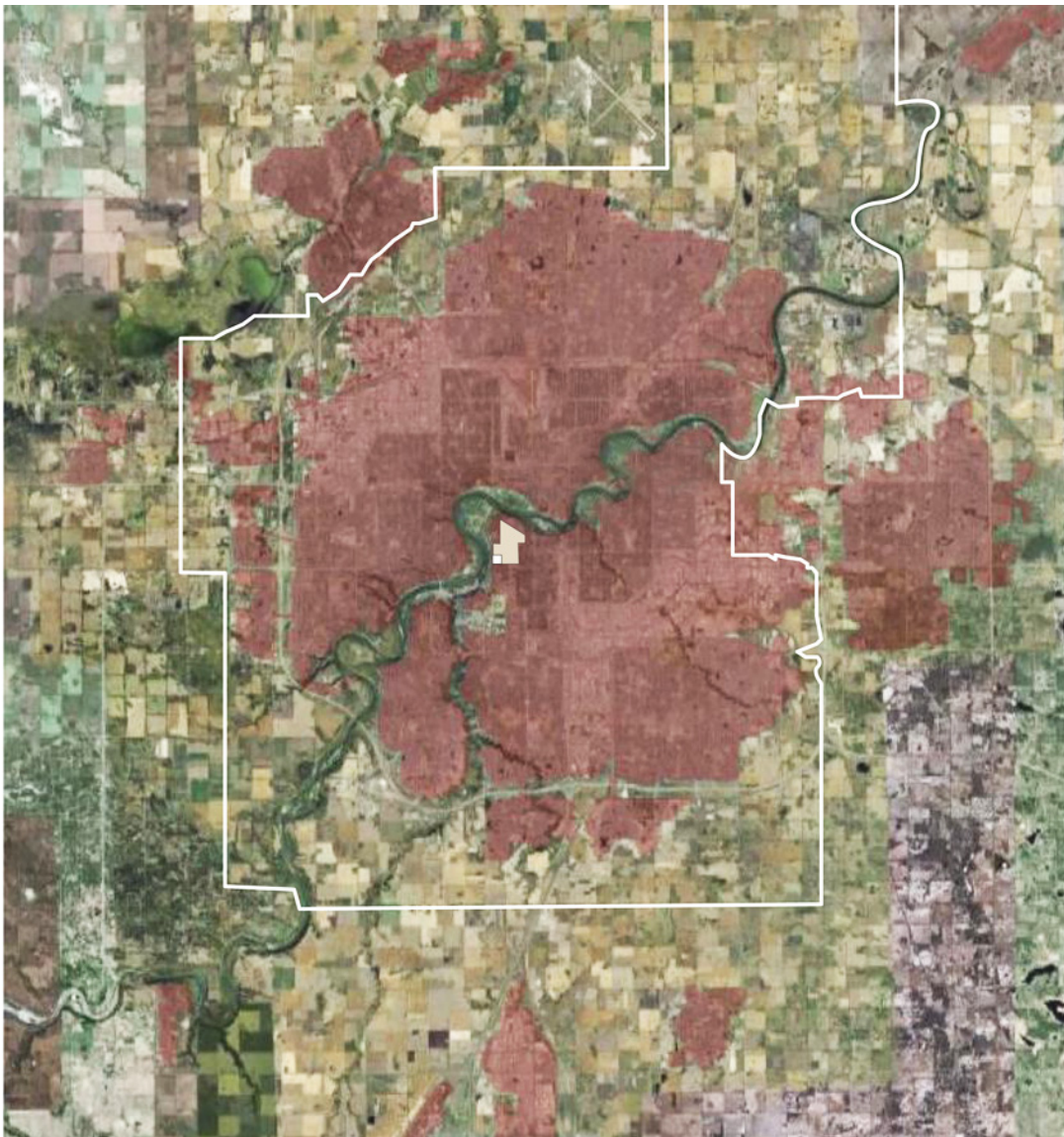


Figure 14. City of Edmonton map with University of Alberta Campus and Cross Cancer Institute highlighted. Edmonton, AB, City Population (in red): 730,372, Metro Population: 1,034,945. (Image modified from Skyscraperpage.com).

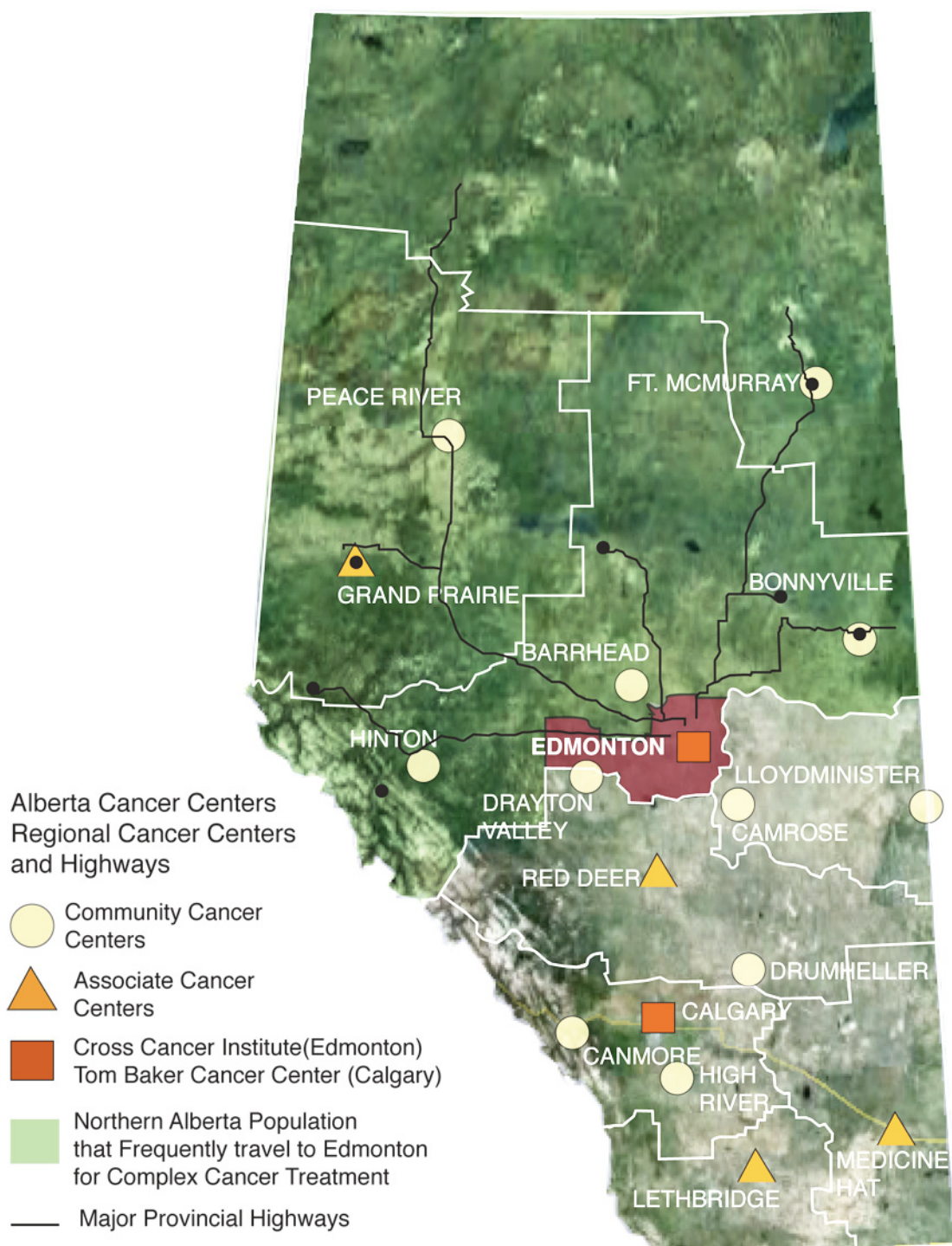


Figure 15. Health Region map. (Image modified from Alberta Cancer Boards, “A Patient’s Guide to the Cross Cancer Institute”.)

ing by numerous cultures in the forms of Mediterranean baths, Finnish saunas, Russian Banya and Aboriginal sweat lodges. This element of the project honours and respects Canada's Aboriginal peoples and expands our minds to alternative forms of healing that are otherwise unknown in our sterile institutional healing system.

Site

The Cross Cancer Institute was opened in 1968 and was built by HFKS Architects in Edmonton Alberta. It sits on the far southwest corner of the University of Alberta campus, which is located in the center of Edmonton, surrounded by the North Saskatchewan River (figure 14). Access to the campus includes numerous bus routes, the LRT system and main roads that lead into the center of the city from the surrounding areas. People from surrounding areas reaching into Northern Canada come to the Cross Cancer Institute to have complex cancer treatments that cannot be done in the smaller cancer centers throughout the province (figure 15).



Figure 16. The Cross Cancer Institute in Edmonton, Alberta, Canada.

My thesis proposal focuses on the area delineated by the box (figure 16). The areas under this open space are occupied by patients, caregivers and staff. The activities that occur are numerous and include: treatment, examination, diagnosis, teaching, research, laboratory and exploratory work. Every day there are over 300 patients, 200 caregivers, 100 volunteers and 500-600 staff occupying the Cross Cancer Institute.

The characteristics of this site which include the view of the river valley, south-facing exposure, access to transportation and its situation in the University of Alberta campus, make it an ideal location for a prototype to integrate nature into large institutions. The beauty of

the river valley, its trees, water, grandeur and undisturbed landscape are extremely valuable to Edmonton, as it brought the first settlers and the Hudson's Bay Company and was the reason that Fort Edmonton was built as a settlement years ago (figure 17 & 18).

The River Valley is 330 meters from the Institute and is too far to travel for people with compromised immune systems, or staff on a short break (figure 19).

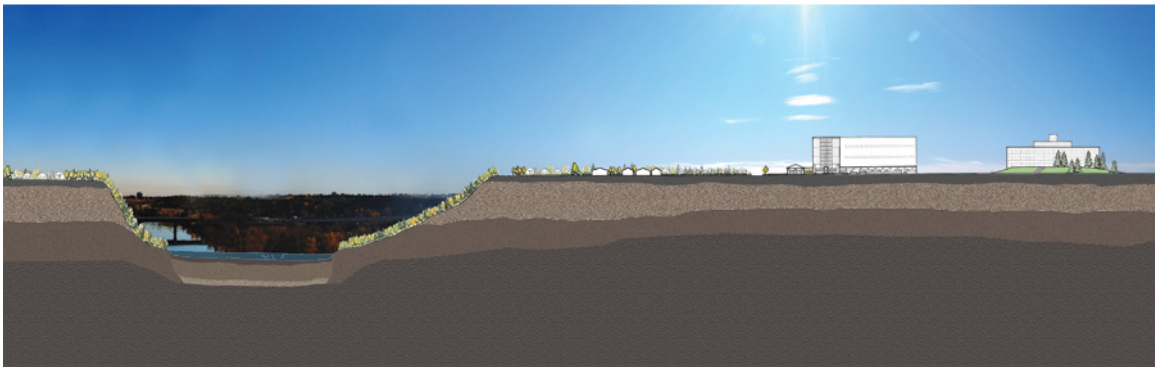


Figure 17. Site Section through River Valley. October 1, 2011.



Figure 18. Site Model of University of Alberta Campus, the Community surrounding its South West side, the River Valley and the Cross Cancer Institute (outlined in black) sitting on the outmost corner of campus.



Figure 19. Proximity Map: Walking Distances and times from the Cross Cancer Center.

The Cross Cancer Institute has an L-shaped tower atop two levels of dense machinery and patient treatment rooms; this allows the opportunity to build a south-facing greenhouse extension on top of the open flat bed of the second level. This flatbed is oriented to the south and benefits from optimal solar heat gain, thus providing excellent vegetation growth, peak hours of daylight and the benefit of the sunrise (figure 20). The strongest and most consistent wind blows from the north and northeast and is blocked by the tower (figure 21).

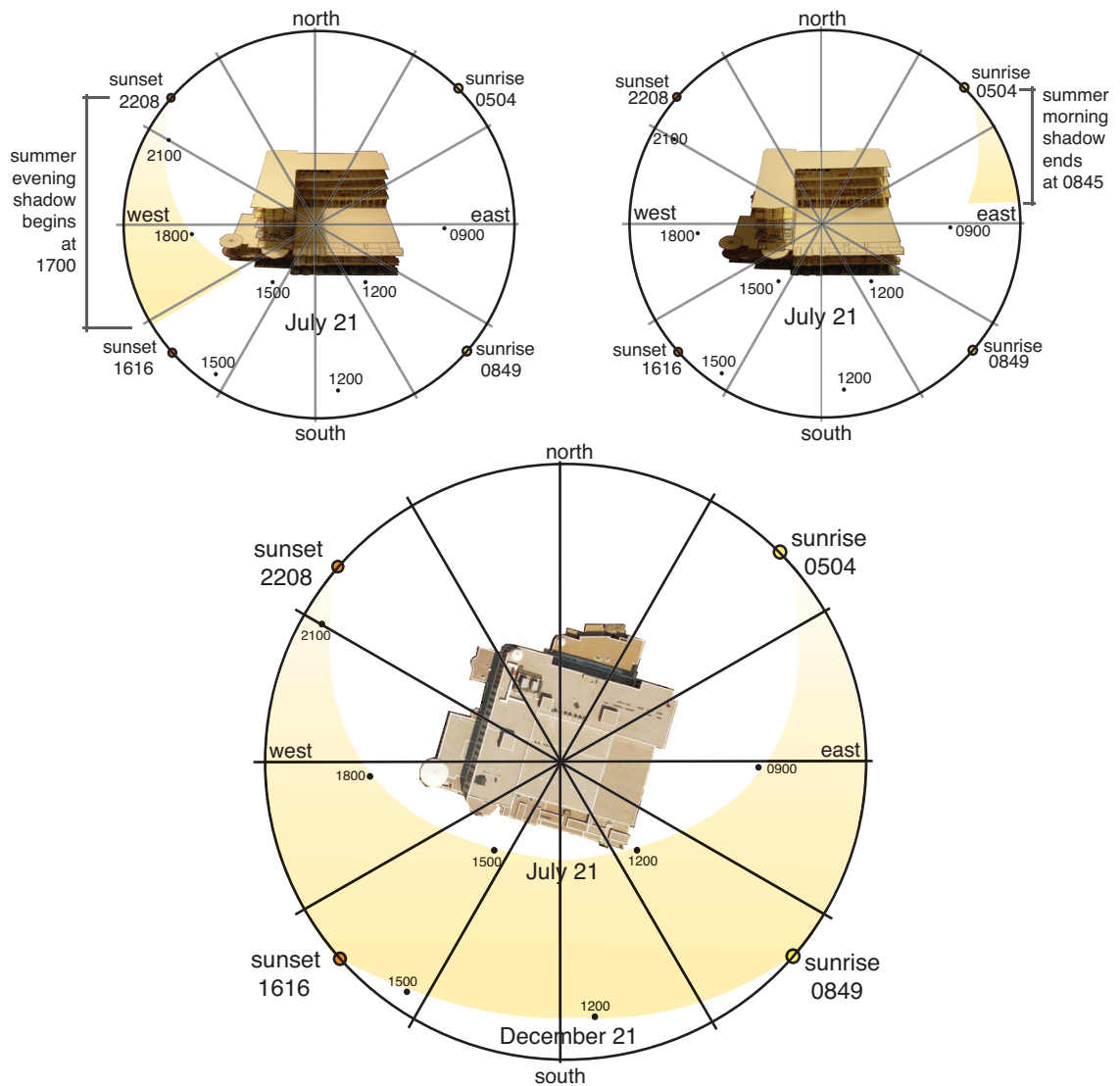


Figure 20. Edmonton Sun Diagrams. (Image modified from Gaisma).

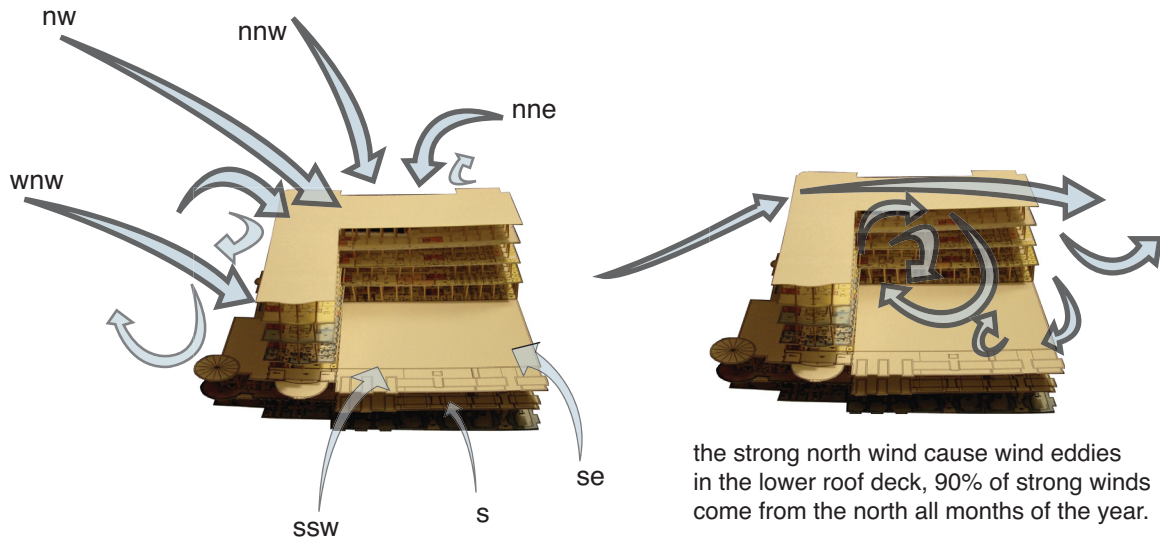
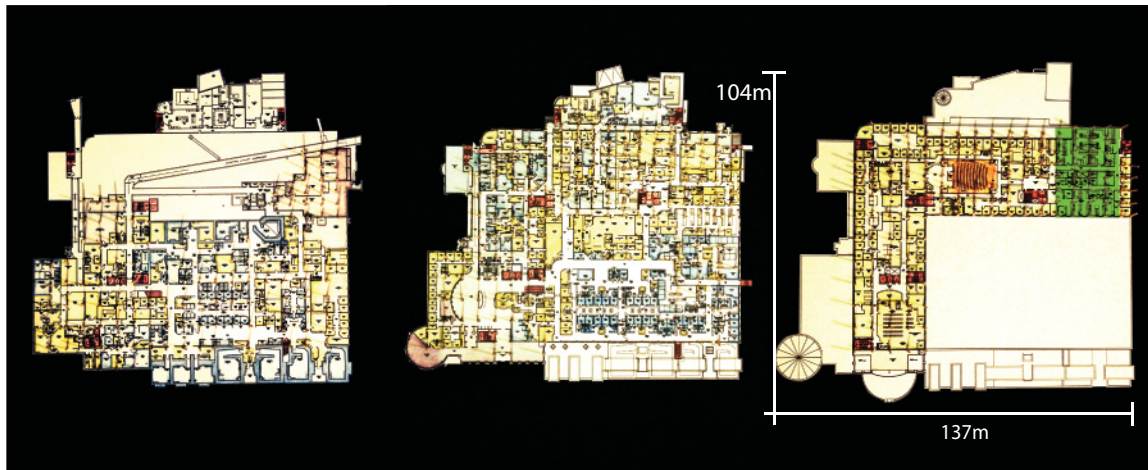


Figure 21. Wind Patterns. (Environment Canada. Canadian Climate Normals 1971-2000: Edmonton City Center).

Program

The program of the existing building has been broken up into patient areas (blue), staff areas (yellow) and circulation (red). Staff enter the patient areas but the patients do not enter staff areas. Common spaces and areas available for families and caregivers are indicated in purple. Those are centered mainly on the first level with the cafeterias (figure 22). Some areas in the building cannot be relocated and must be kept sterile or in controlled environments (without humidity changes or natural ventilation), namely the laboratories which are indicated in green.

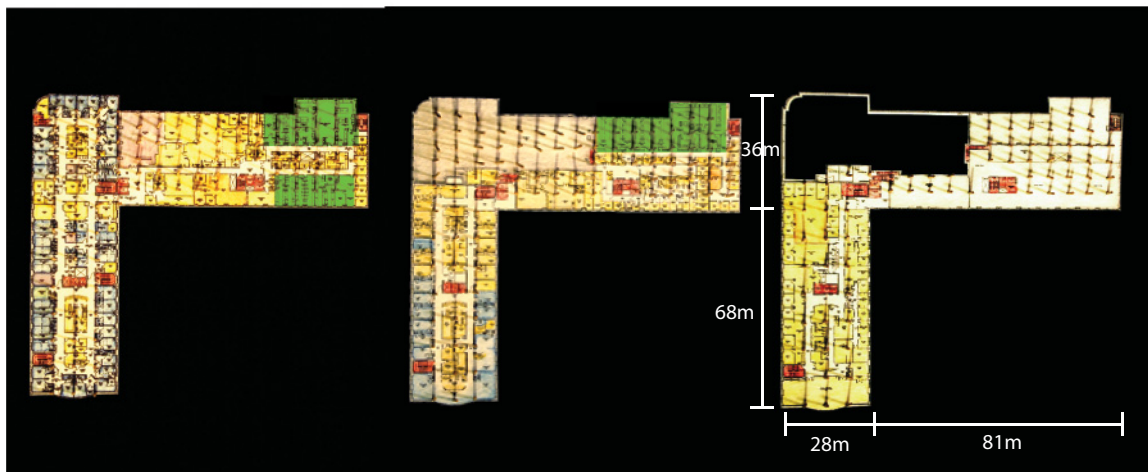
This thesis proposes to move the physiotherapy and wig making room out of the basement into the garden, therefore freeing up space in the basement for the current medical records department. By moving the medical records department, the lobby can be converted to a double height space that provides views and access into the therapeutic garden (figure 23). The existing building will be connected to the garden through two circulation cores on the second floor. Programmatically, a cafe, wig salon and spa, daycare and physiotherapy department will reside as the pavilions in this therapeutic garden.



level 0

level 1

level 2



level 3

level 4

level 5

- Patient areas- blue
- Staff area- yellow
- Circulation- red
- Public space- purple
- Laboratories (cannot displace)- green
- Mechanical- grey

Figure 22. Color-coded plans denoting main areas in the Cross Cancer Institute. (Image modified from Scott Fielding, Cross Cancer Institute).

Existing Program Moves

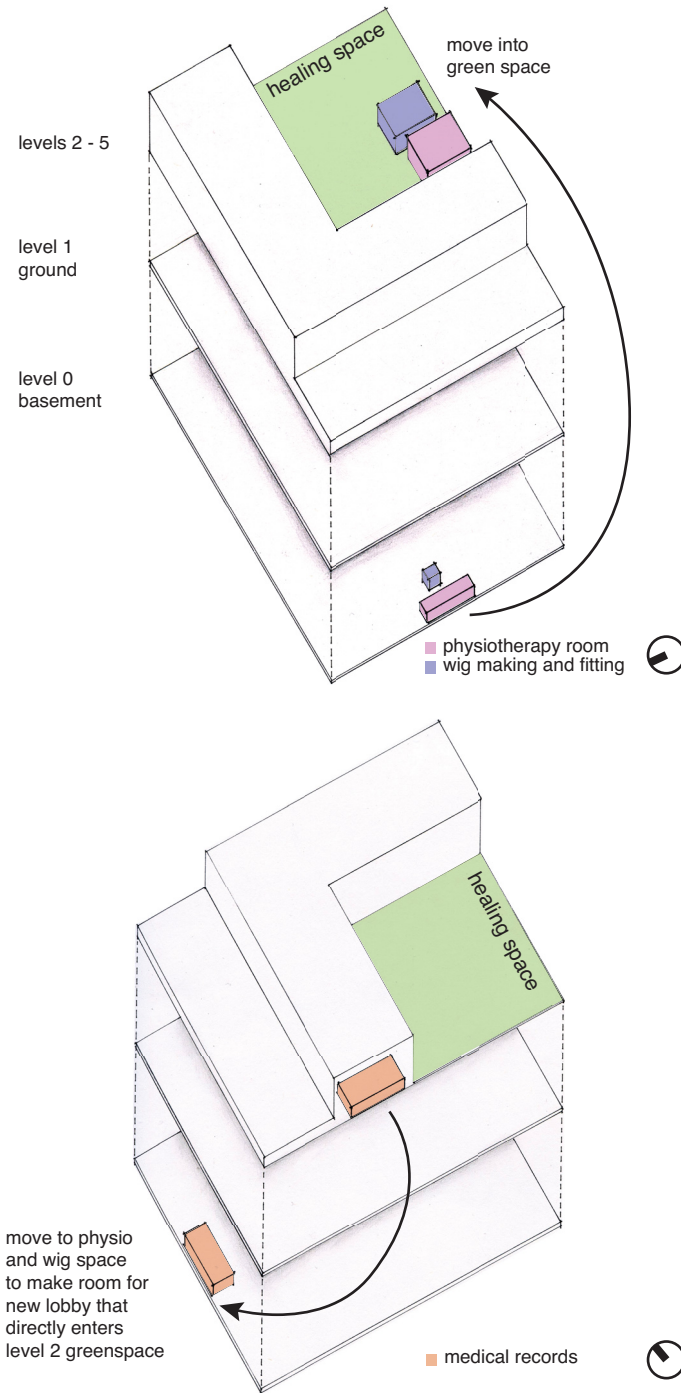


Figure 23. Moving existing program.

Population

Program requirements for a healing space must take into account the needs of all primary user groups: patients, families, caregivers, and other staff. Usually patients are actively prepping for, and going through treatments, while at the Cross Cancer Institute. Family members however, are often waiting alone, while staff are often active on their feet most of the working day (figure 24). Family and friends who act as caregivers are often overlooked as a major support for the healthcare system, but they are the ones who transport, care for, cook, clean and provide mental, emotional, social and physical support for patients once they leave the hospital. The caregivers and the staff are the primary users and the focus of my design interventions.

Physical Activities in the Cross Cancer Institute:
An eight hour study

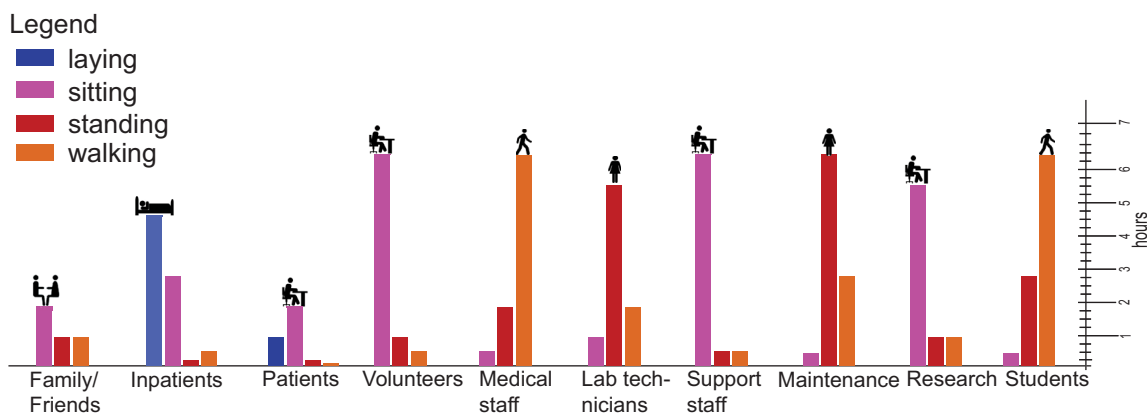


Figure 24. Daily Physical Activities of the Population at the Cross Cancer Institute.

Design Response

User Experience

A therapeutic garden must have many spaces to accommodate a variety of users. Way-finding, accessibility, seating, and public and private areas are incorporated to ensure that users are comfortable and able to relax and de-stress. Social connections are very important for healing and this therapeutic garden will provide an opportunity for interaction among patients, caregivers, and staff through large open areas, flexible seating and numerous pathways and courts where people can meet and pass each other in an open, calm environment.

The connection between our environments and how we perceive them involves seeing this healing space through the eyes of the user (figure 25). It is what is directly in front of the user that effects them the most; this is what they can see, touch, smell and hear at an intimate level. This can further be broken down into more specific sensory levels when we look at physical and sensory ability and will be different for children, adults and the elderly.

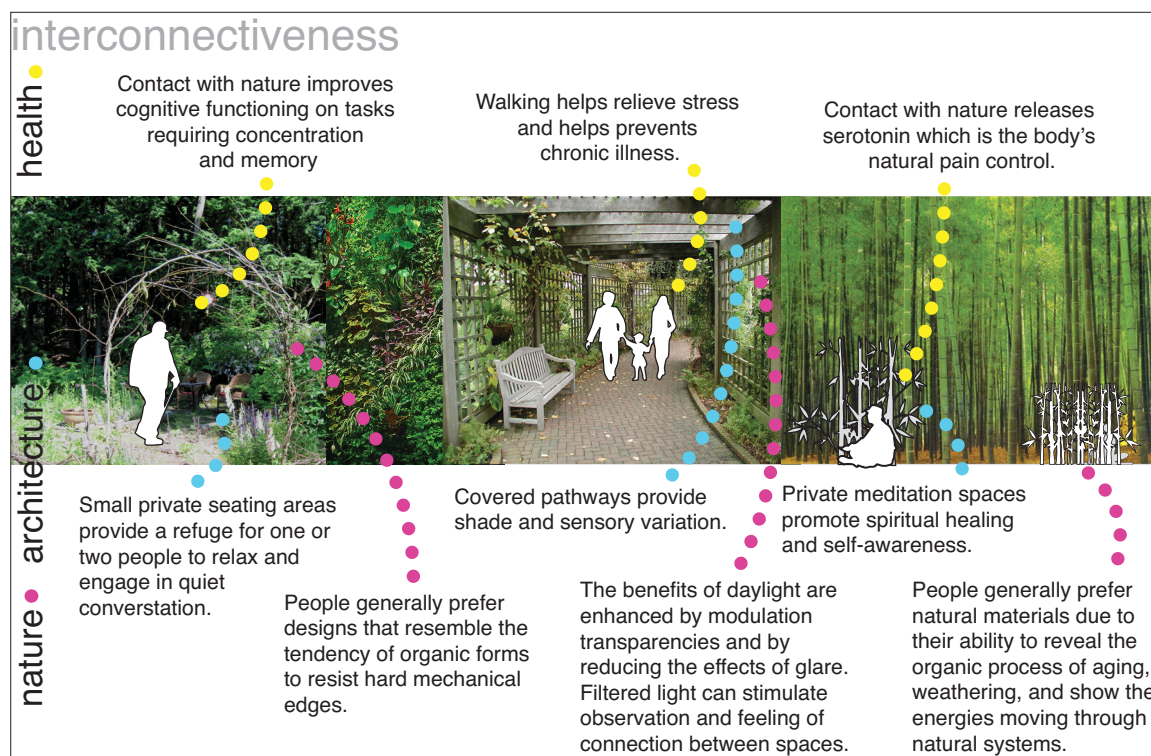


Figure 25. Scale at the eyes of the User: How architecture, nature and health coexist.

Interconnectiveness is a term used by the Mi'kmaw and it means to mindfully live within an expanding sense of holistic relationships with everything and everyone. This mindfulness and connection to the environment provides people with a sense of security and a sense of self confidence. My focus therefore lies mainly on the interior therapeutic gardens as they will be frequented by users, all months of the year.

At a personal tactile and visual level, I have created small device that is given to caregivers and acts as a pager to tell them when their loved one is ready to be picked up (figure 26). This gives the caregivers freedom to go into the garden space and relax in the comfort of knowing that they will be called if they are needed. Control and choice are

taken away from people by illness and hospitalization therefore giving this back is one of my main goals and acts as a design guideline. Some design considerations that follow this guidelines are low operable windows, flexible seating, sunny and shaded areas, indoor and outdoor areas, sitting areas, a walking path are all examples of this design parameter.



An RGB LED and vibrating mechanism turn on when the patient is 10 minutes away from being discharged. This dual personal notification system allows for individuals with various abilities to use the device.

The natural form of the communication device is organic, calming and beautiful. It allows people to connect with others who are also waiting, thus providing support and reassurance that they are not alone.



Figure 26. Personal communication device for notifying caregivers when their loved ones are ready. Prototype by Author December 3, 2011.

Garden Typologies

In using various garden typologies, this therapeutic garden is designed to embrace the program blocks and to provide a heterogeneous palette of garden experiences for the users. An entry garden that is visible and accessible provides a front porch type feel for staff and patients when they first exit the building. The entry garden looks onto the stepped garden that acts as a courtyard or plaza. It is easily viewed from all program blocks and has multiple areas to sit, relax, eat and socialize (figure 27).

A viewing and walk-in garden is next to the other entrance from the existing hospital. This garden provides a bamboo screen to the main pathway, a small private path, multiple seating areas and an near and accessible get-a-way for people with low mobility or staff

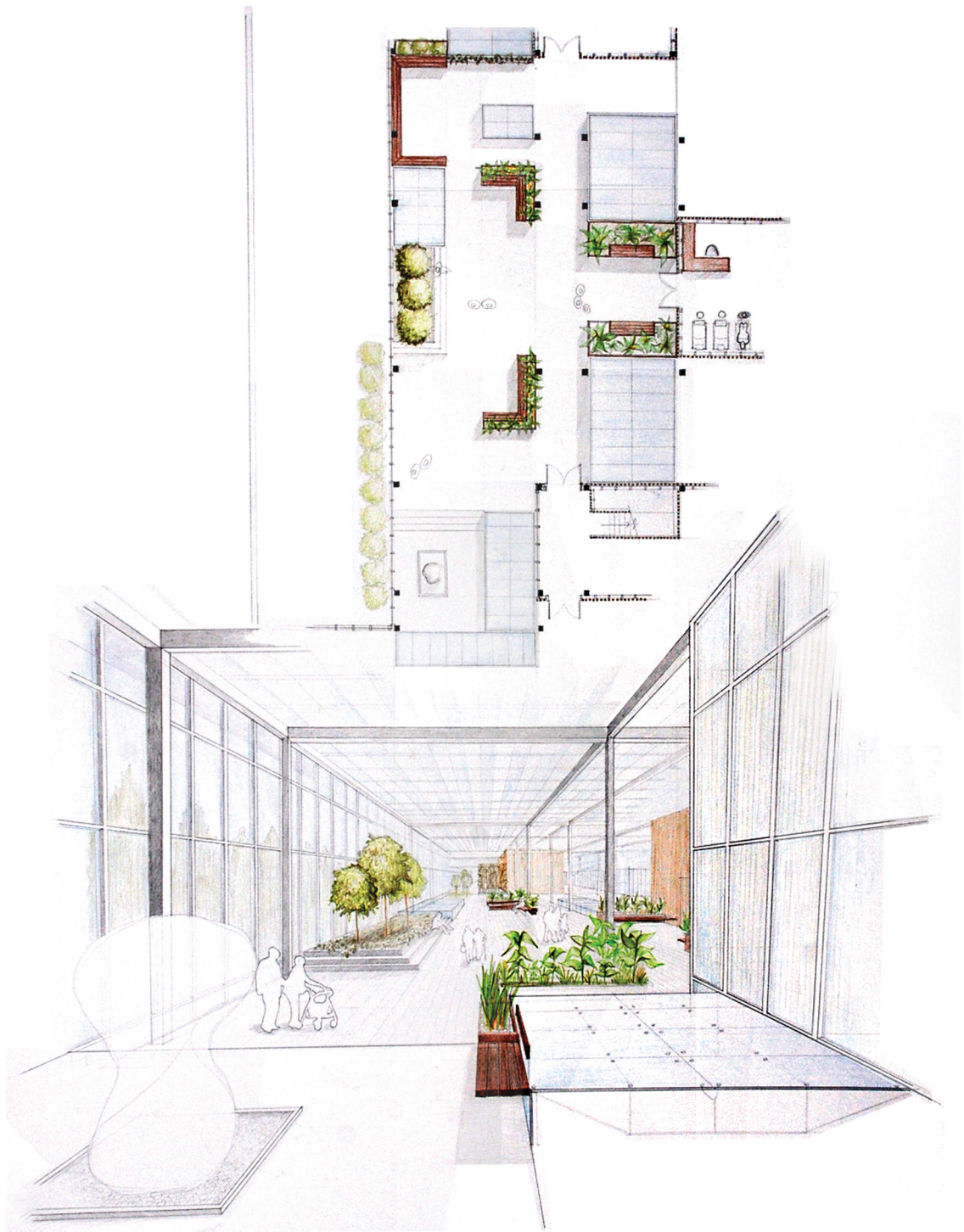


Figure 27. Perspective view and plan of the step and sculpture garden in the grand plaza.

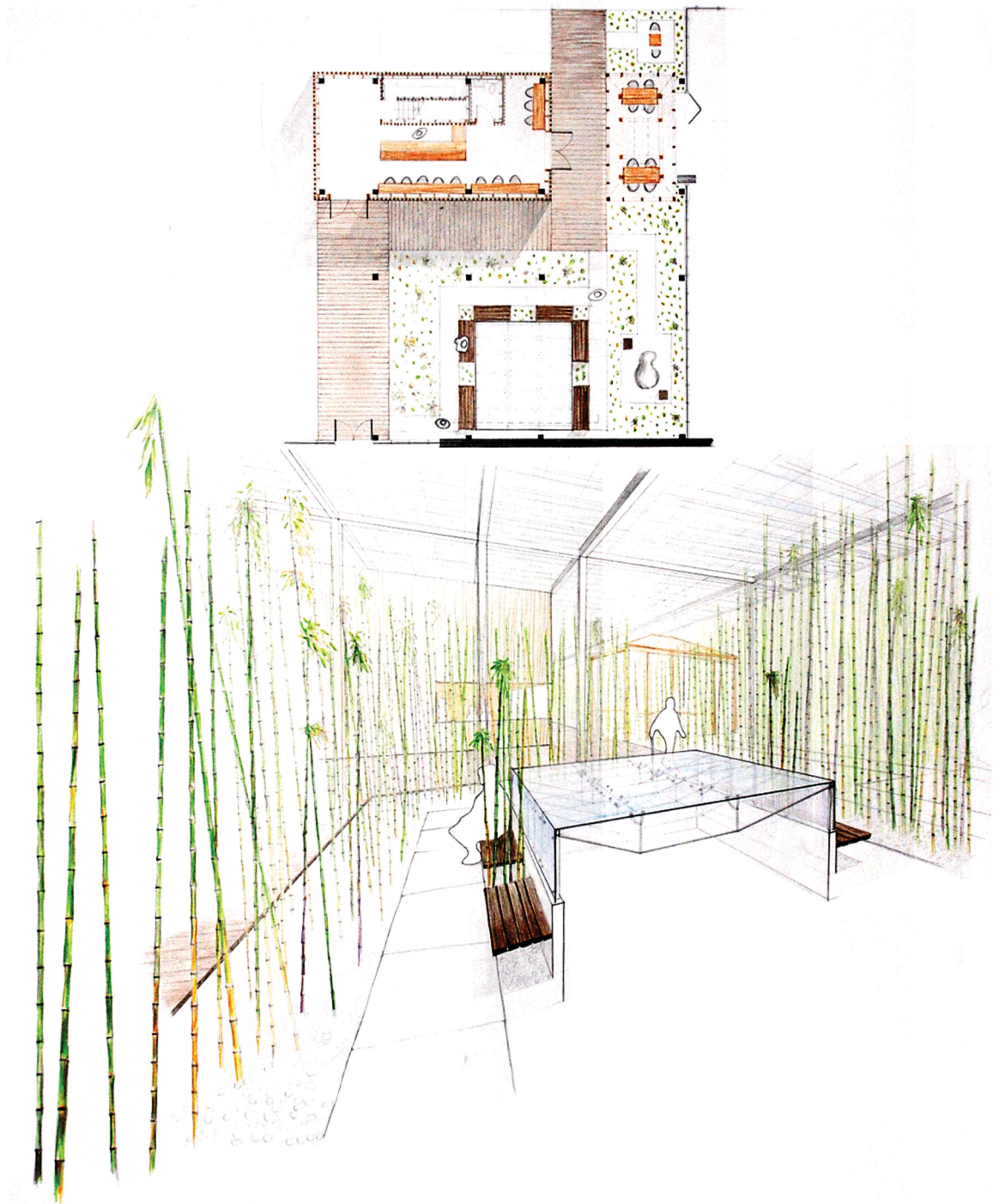


Figure 28. Perspective view and plan of the bamboo garden. In the background the Japanese tea house and cafe are in view.

who are on a short break. The bamboo garden leads to the Japanese tea house and to the cafe (figure 28).

Spirituality is a large, often ignored, part of healing and wellbeing. A sacred space has many definitions and there are numerous historical cultures that view sweats as healing and therapeutic. Due to the large percentage of people traveling to Edmonton from Northern Alberta, I chose to respect and provide the opportunity to honour the healing practice of the sweat lodge on the West roof of the building. Precedence of putting a sweat lodge on the rooftop is seen in the Child Native Friendship Center in downtown Toronto, a project by Levitt Goodman (figure 29). The homage paid to the traditional ways of healing and the idea that a balance between physical, spiritual, mental and emotional health contributes to overall well-being, as stated previously, provides evidence for the need of an alternative form of healing being brought in and recognized in our current western medical system.



Figure 29. Rooftop Sweat lodge at the Native Child and Family Services of Toronto. Levitt Goodman Architects. (Photograph: Jesse Colin Jackson).

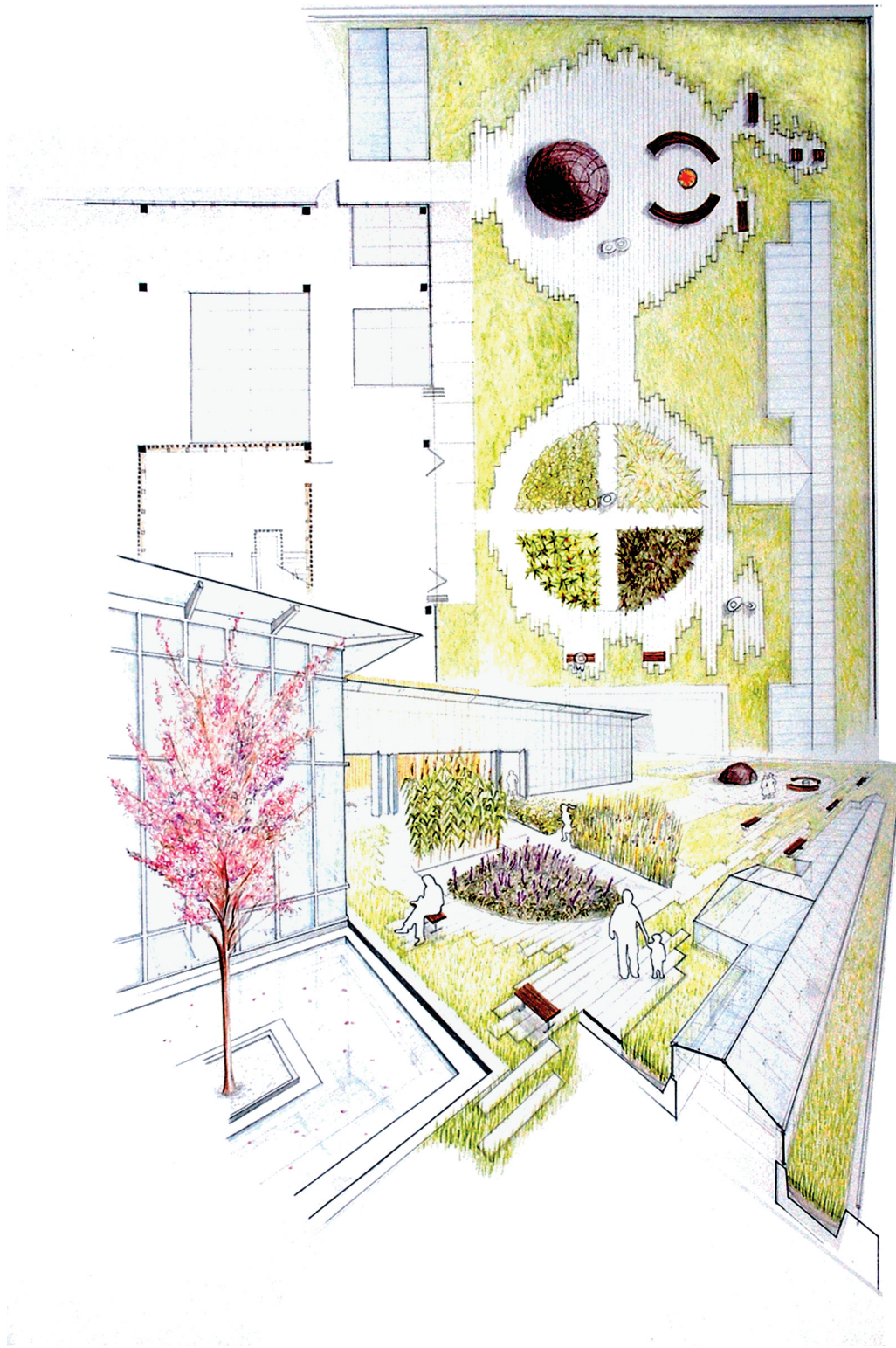


Figure 30. Perspective view and plan of outdoor healing garden. The medicine wheel grows corn, sweetgrass, sage and tobacco and the sweat lodge and fire pit are seen in the background.

Providing this example of understanding of an alternative form of healing, this prototypical natural healing environment enhances the spiritual connection to healing and validates its importance in personal health and well-being. This, along with the medicine wheel make up the primary outdoor elements that can be accessed year-round (figure 30).

Building Performance

The roof of the healing space will disperse wind eddies while small peaks act as solar chimneys, allowing for a natural ventilation system. Air vents in the walls will allow the wind to enter the building as a way of cooling the indoor space in the summertime. As the hot air rises, it can be released through operable roof vents. The existing structure is made up of 2' by 2' concrete columns spaced along a twenty foot grid. The existing columns cannot

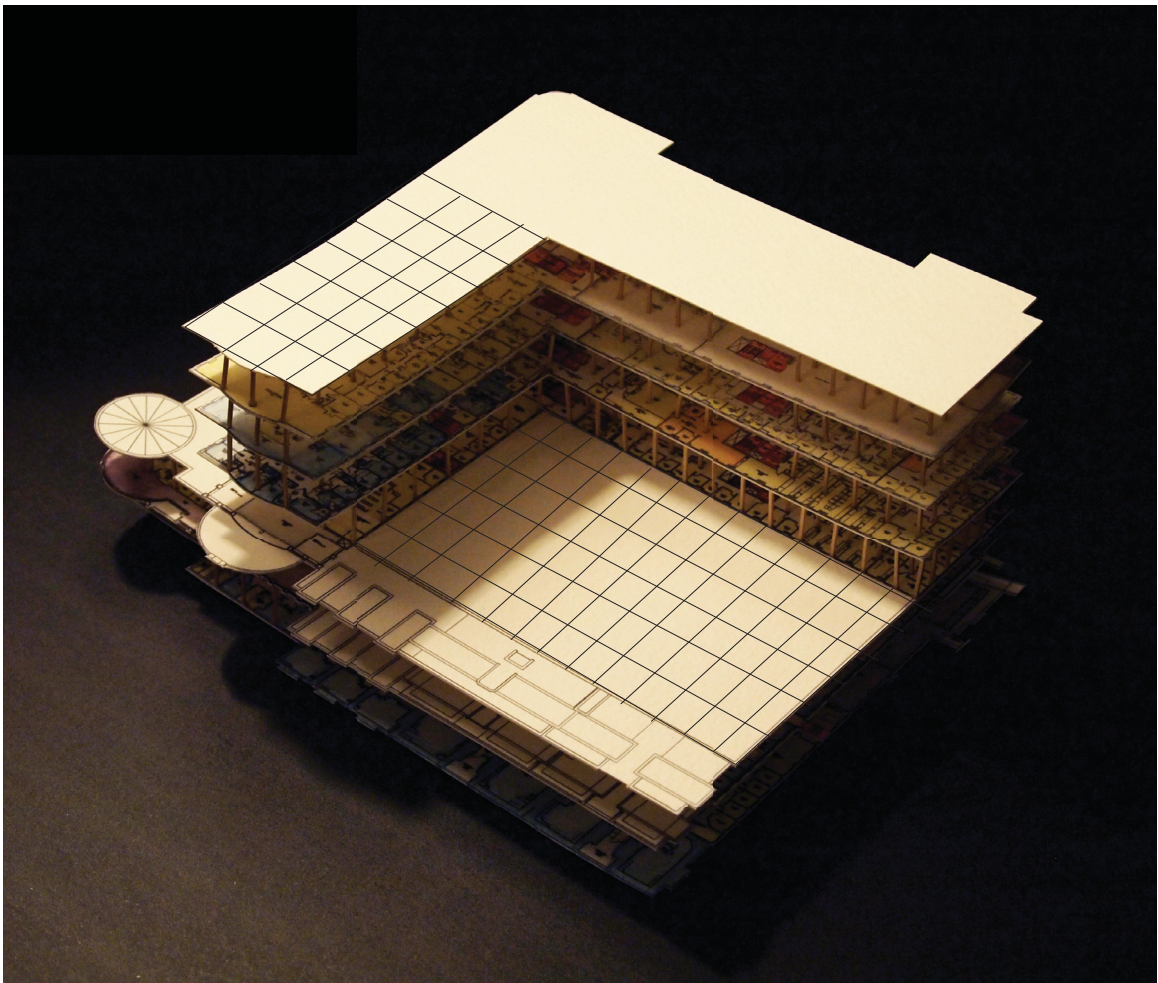


Figure 31. This is a preliminary model grid in future examinations of the existing structure, a more complex grid is revealed.

support additional weight therefore an alternative method of supporting the therapeutic garden has been proposed and will be discussed shortly (figure 31). These building parameters are considered throughout the design of the therapeutic garden.

The building materials determine the feel of the space and also control the sightlines and acoustics of the building. The roof of the healing space is far above the user and therefore will be built in a simple fashion similarly to a greenhouse. The Muttart Conservatory in



Figure 32. Muttart Conservatory in the North Saskatchewan River valley, Edmonton, Alberta.

Edmonton is an example of this rigid double-glazed system and provides evidence that a greenhouse-like structure can withstand the climatic fluctuations of Edmonton. It also demonstrates that local trades can build and maintain the facility, therefore making it a feasible prototype for similar building types in the area (figure 32).

CHAPTER 2: DESIGN

In addition to ameliorating stress and improving mood, gardens and nature in hospitals can significantly heighten satisfaction with the healthcare provider and the overall quality of care. Evidence from a number of different hospitals and diverse categories of care strongly suggest that the presence of nature, indoor and outdoor gardens, plants, window views of nature, increase both patient and family satisfaction.³⁰

My design intentions revolve around the needs of the users at the Cross Cancer Institute. In October 2011 I did in-person interviews of healthcare practitioners to gain insight as to where they go to de-stress and how they cope with work pressures. Through these interviews I discovered two commonalities amongst healthcare providers; their opinions about their workplace environments and how they dealt with work-related stress. Both of these findings suggest that nature and daylight are indeed vital factors in stress reduction. The results are found in the following pages (figures 33 & 34). These findings were instrumental when making design decisions as they brought personal insight into the project.

30. Roger Ulrich. "Health Benefits of Gardens in Hospitals" (paper presented at the conference, Plants for People International Exhibition Floriade, 2002), 3.

Dialog with Healthcare Professionals

Michelle
23 years old
Registered
Nurse
Cross Cancer
Institute

On my breaks I feel as though I just have to get out of here. I go sit in my car because **I don't have a lot of time on my breaks** and I need to get out of the hospital. A place to walk in like an atrium would be great! I would definitely go there to relax, to get away.


Susan
45 years old
Laboratory
Technician
Cross Cancer
Institute

There are no operable windows in the lab so there is no fresh air. If its sunny outside we have to close the blinds because we need to keep the lab at a constant temperature and we can't let it get too hot in there. I like to get outside on my breaks, depending on the weather, I usually walk to the other end of the parking lot and back. I usually have to get outside on my breaks, to breathe, to get fresh air. **It's tough in the winter when it's too cold to walk around.** An indoor place with plants and seating would be great for the staff and patients here.



Allison
30 years old
Registered
Nurse, MPH
Diabetes
Specialist

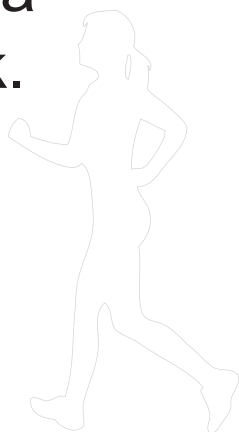
To de stress at work I go for a walk towards the river valley. If it is not nice outside, I like the atrium in the hospital, I have a loop that I do. I also like reading in the quiet room in the student union building because **it's quiet, calm, peaceful and there are full size couches to lie down if you want.** Lots of windows facing south too for sunshine! my favourite yoga is in a warm room with lots of windows and the teacher is awesome.



I usually have to get outside on my breaks, to breathe, to get fresh air. **It's tough in the winter when it's too cold to walk around.**

Figure 33. Interviews from medical professionals.

Can you believe we don't have a window to the outside world in our unit?! The only time I get to see the outside is on a break.



Where I work now is located directly next to the botanical gardens. So that's a no brainer. They're beautiful. I think a green house idea is great for Edmonton because it can be utilized regardless of the weather. The option for an indoor/outdoor area would be great, or one where **the roof of the greenhouse could open up for nice days or at night for star gazing.**

Jennifer
32 years old
Registered
Nurse
Bermuda

Sometimes I take my lunch out to the Botanical Gardens that are just next door to the hospital! Perfect location. Otherwise I sit in the sunlight through the window of our breakroom if I decide not to leave the hospital. **Can you believe we don't have a window to the outside world in our unit?!** The only time I get to see the outside is on a break or going to the change room, lounge, or break room.

Megan
34 years old
Registered
Nurse
Bermuda

Sadly enough I have to admit that when I was a night shift worker in The States, **in a high stress unit, my way to decompress was just to get outside. But that often involved smoking cigarettes, which I know is terrible, but it's true.** A coworker and I would go together (strength in numbers) in the back of the hospital late at night and sit in the gazebo with nurses from other departments. It was actually good for bonding.

Tara
35 years old
Womens'
Cancer
Specialist

Figure 34. Interviews are from medical professionals who presently work in hospital environments. All names have been fictionalized.

Strategy One

Bringing in Daylight

This space above level 0 and level 1 measures 81 metres x 63 metres and only has access to daylight on the few perimeter offices. Access to nature and light are my main priorities and bringing these into the existing building must be done tactfully as not to disturb the complex program and functions that this cancer facility provides.

Bringing daylight into the lower levels through light wells will help wayfinding by illuminating key areas for patients. An in-depth investigation into the plans of level 0 and 1 focuses on looking at where people spend most of their time. Emphasis was put on bringing light

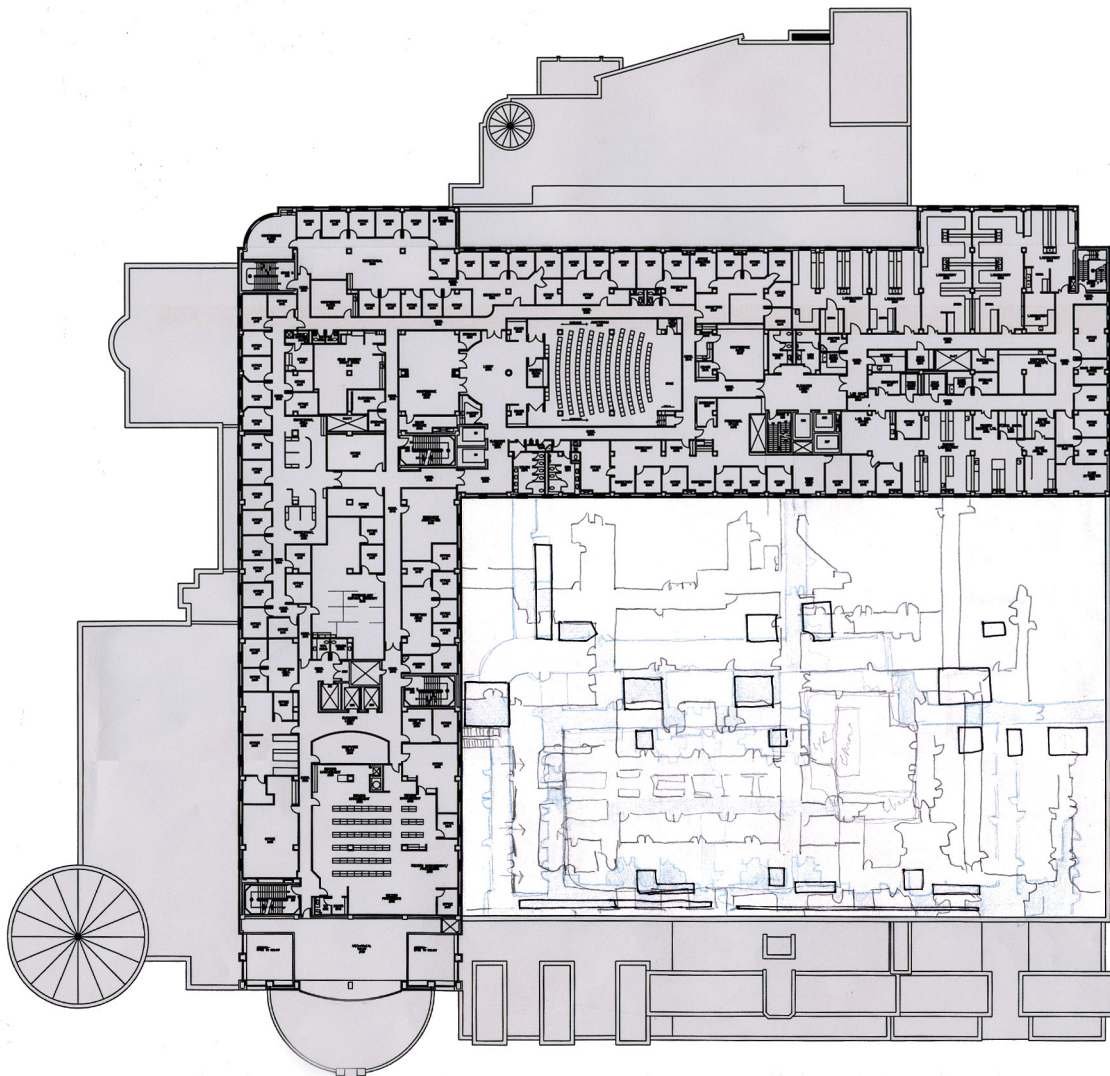


Figure 35. Level 0 and Level 1 plans were traced to find common areas where light well punctures could be most beneficial.

into waiting areas, staff work areas and hallways. My investigation can be seen in Figures 35 & 36.

These black holes are the cut-outs that penetrate through both level 0 and level 1 and they define the boundaries for the new buildings (seen in green). New structural columns will be placed in the corners of the skylights and will provide structural support for the new buildings. An exploration of possible structures was done prior to the solution of the light well structural system (figure 37). A thorough analysis of the existing structure demonstrates the current structural grid, the proposed new structural grid and the master plan of the complementary healing facility (figures 38, 39, 40, 41).

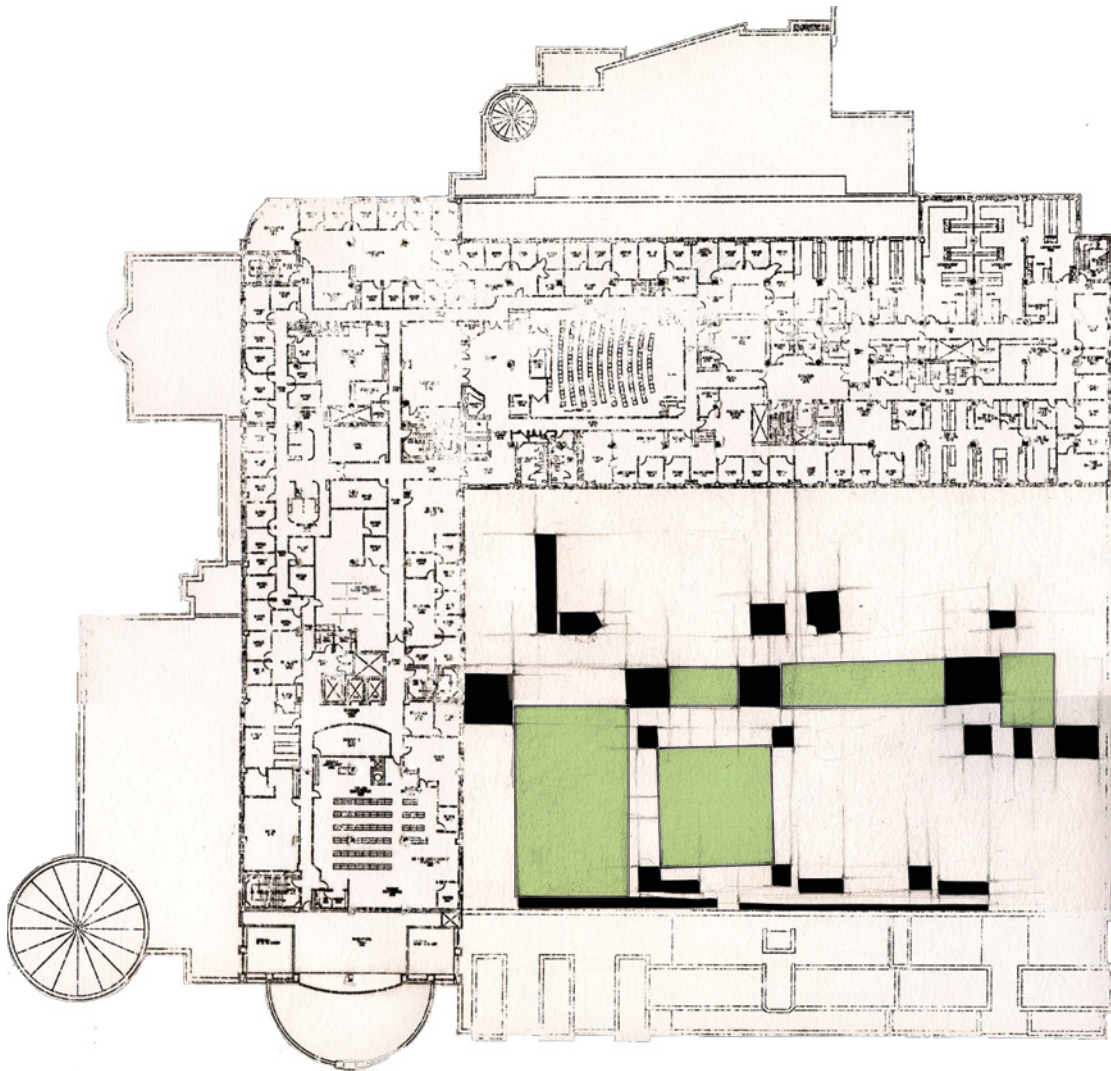


Figure 36. Black cutouts through level 0 and level 1 were made based on the program analysis and best use scenario. Cutouts mainly present in areas of high traffic and long waiting times as well and staff work stations. Model made of acetone for the existing plan and graphite for the new areas defined by the cutouts.

Initial Sketches of Possible Structural Options

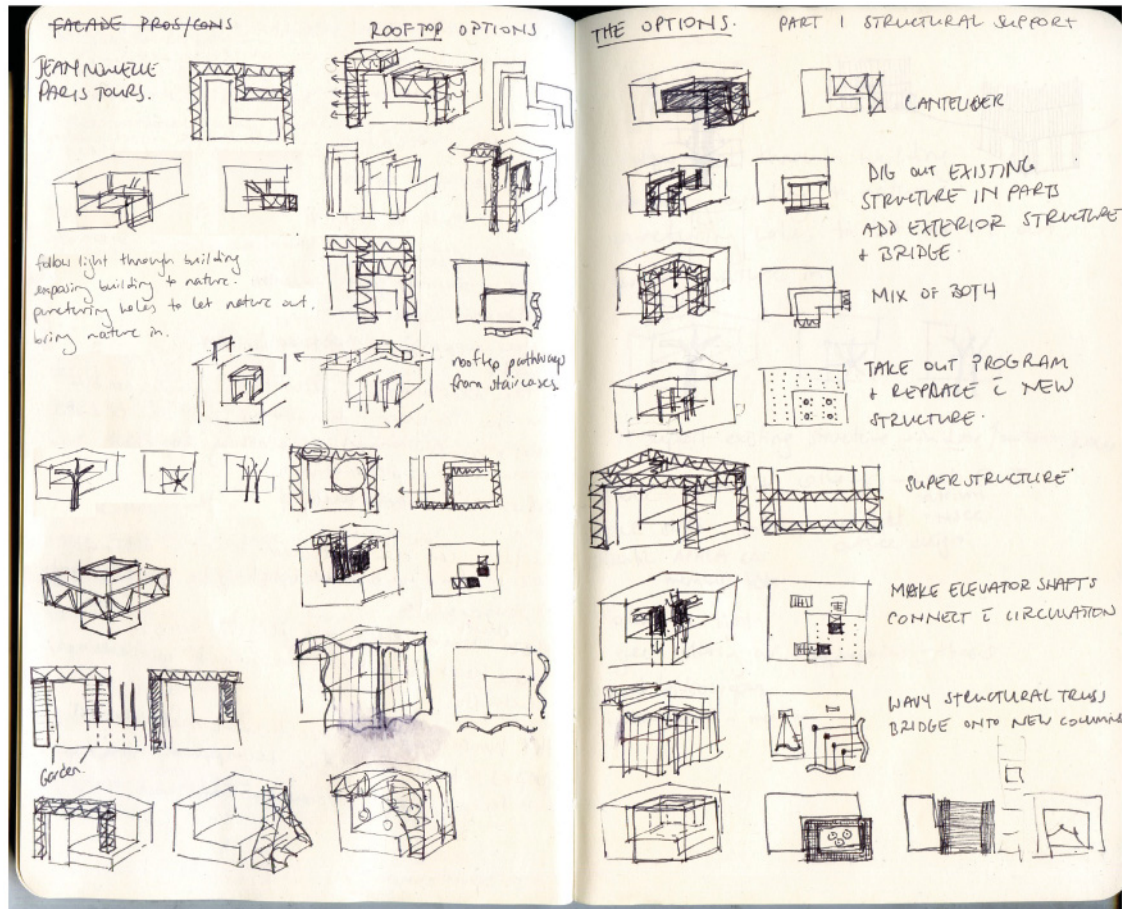


Figure 37. These sketches were done to outline possible structural options.

The structure of existing building cannot support an abundance of extra live load. A new structural system needs to be found. These options are alternatives to building onto the existing structure. The new structure must bring nature into the healing environment and daylight into spaces in the existing building. The design goals are to ease confusion and stress with wayfinding mechanisms, provide an environment for those with various mobility needs (walking, sitting), and focus on comfortable and flexible spaces.

Analysis of Existing Structural Grid

level 0 - 1 column grid

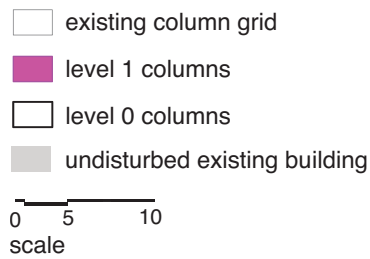


Figure 38. Level 0-1 column grid. (Modified plans of the existing Cross Cancer Institute, Edmonton, Alberta. 2010).

Level 0 and level 1 are situated under the flat bed and I am going to build on top of them. The two bottom levels (0 and 1) have concrete columns spaced 6m x 8m. The column grid changes on the east side of the plan where larger columns are placed, thus increasing the grid size. Machines such as CT scanners, PET scanners, MRI ultrasound and equipment to deliver radiology treatments reside on levels 0 and 1. This specialized medical equipment must have increased protection and can have concrete walls up to 10' thick with steel embedded in them. These measures are standard and precautionary as radiation poses a serious risk to the general public. Therefore, the addition of light and nature into this healing environment will not be built above these machines.

new columns + new column grid

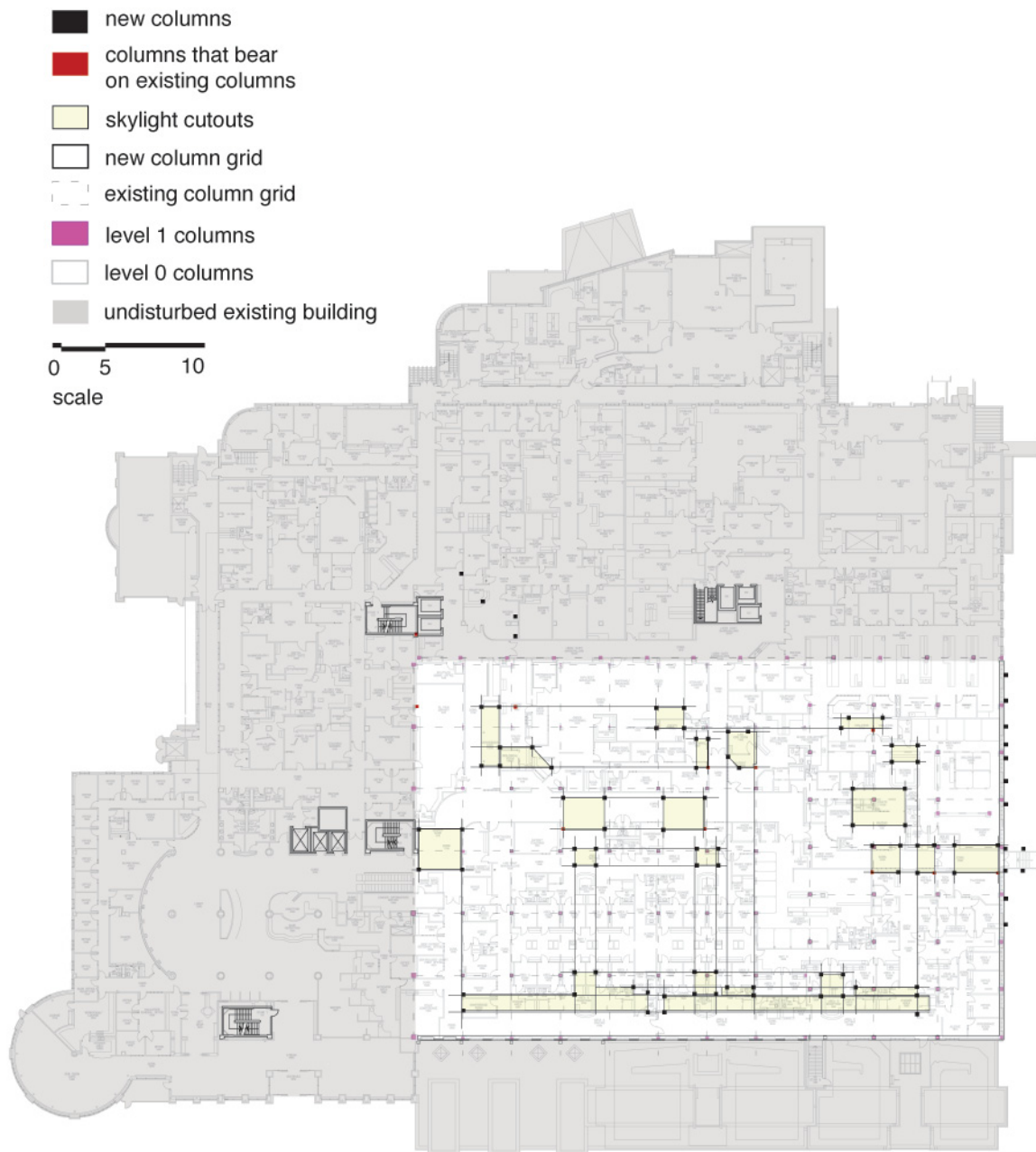


Figure 39. New Columns and New Column Grid. (Modified plans of the existing Cross Cancer Institute, Edmonton, Alberta. 2010).

Level 0 and 1 floor plans were analyzed to determine the best areas for light to penetrate into the existing building. Priority was given to waiting rooms, hallways and meeting areas where people would spend the most time. Strategic removal of floor space will allow light to penetrate down into the two basement levels that presently do not have access to daylight. New structure will be placed in the four corners of the light wells and these will help support the new buildings whose footprints will be determined by the placement of the light wells. A new column grid is formed and the addition of structures above will be supported by this.

Level 2 Garden Plan

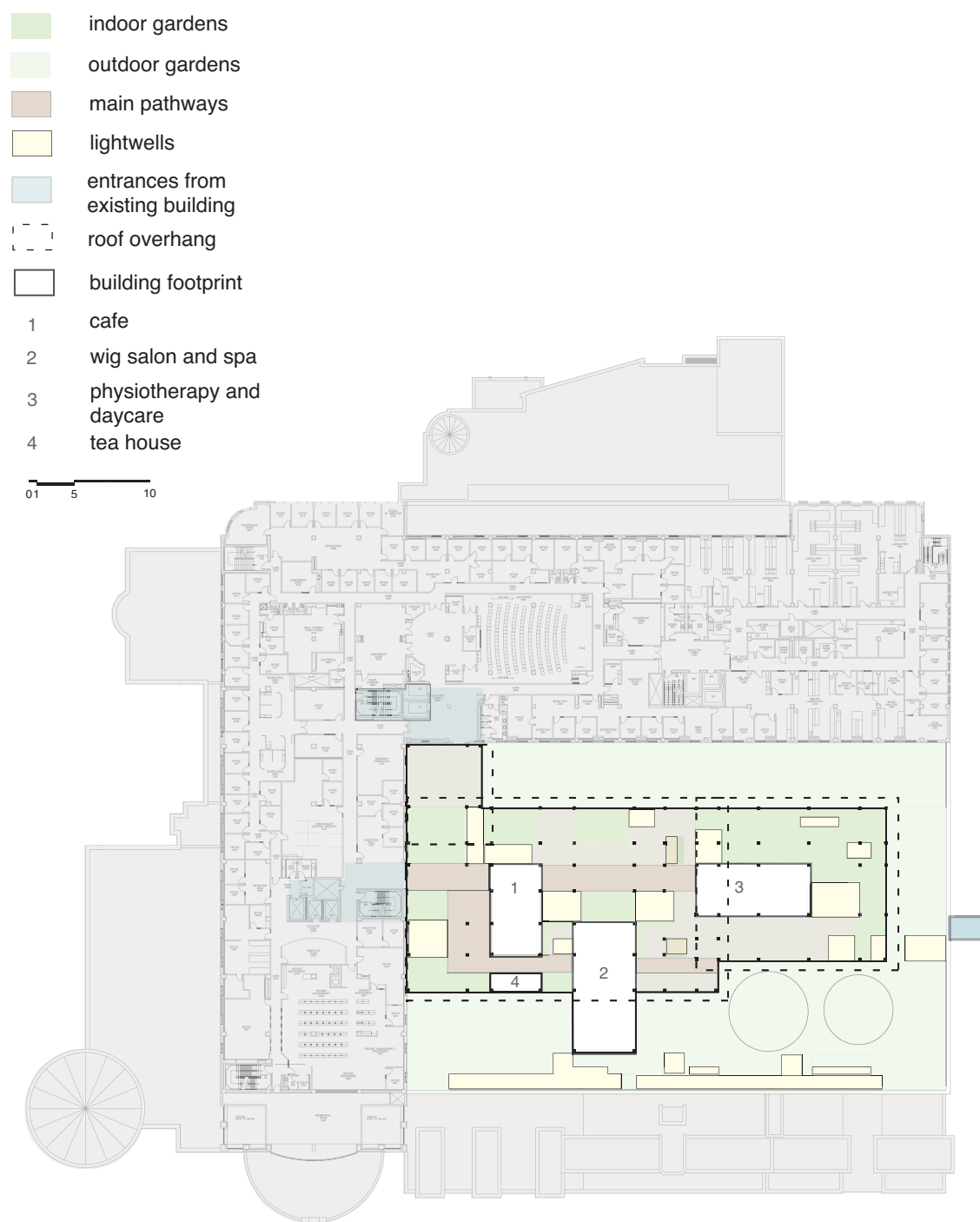


Figure 40. Level 2 Garden Plan denoting roof outlines, building footprints and indoor and outdoor gardens. (Modified plans of the existing Cross Cancer Institute, Edmonton, Alberta. 2010).

The new level 2 therapeutic garden will be accessed by the existing circulation and two new entrances. Another entrance has been added to the east side of the building to gain better access to the daycare and physiotherapy department from the parking lot. Buildings and circulation have been placed to allow light to penetrate the floors below and for the new structure to support the therapeutic garden and its components.

Level 2 Structural Roof Plan

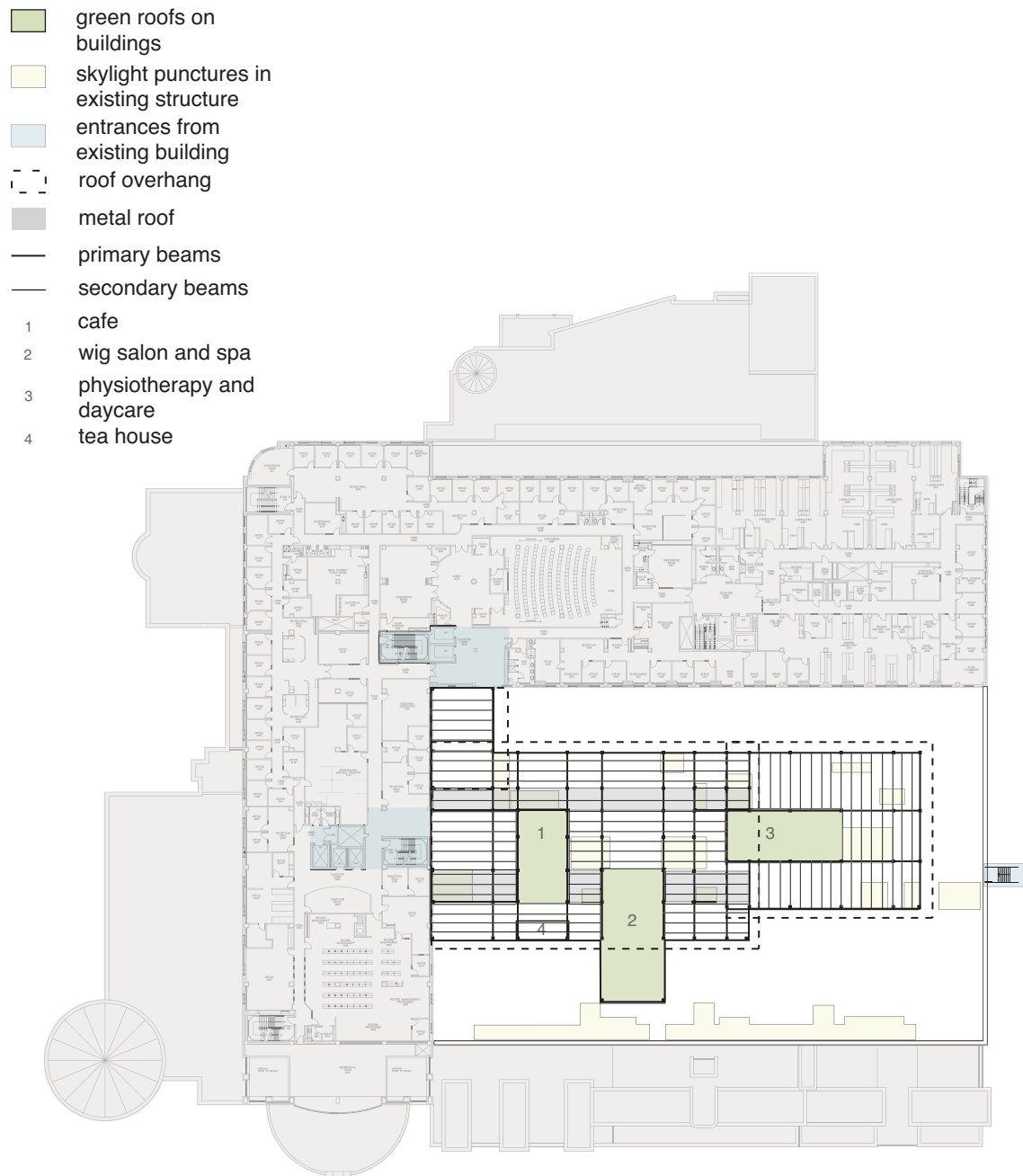


Figure 41. Level 2 Structural Roof Plan. Green roofs are noted on the three pavilions. (Modified plans of the existing Cross Cancer Institute, Edmonton, Alberta. 2010).

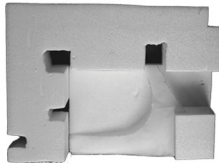
The roof spans over the indoor portion of the therapeutic garden allowing this area to become suitable for tropical plants to grow and users to have a year-round temperate climate. The areas that are not enclosed are outdoor gardens that house native Albertan plants, trees and grasses. These outdoor gardens show the seasonal cycles as well as life, death and regeneration which are important for people who are healing to see. This helps them understand and accept healing as a natural process that surrounds us.

Strategy Two

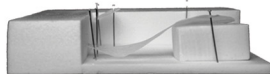
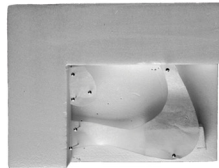
Formal Investigations 1: *ramps, bars, and blocks*



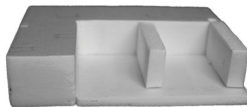
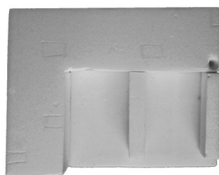
initial idea of enclosing the entire space in a single shed roof



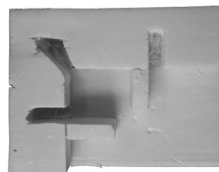
ramp connecting existing circulation



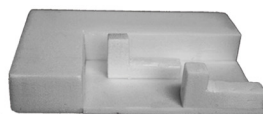
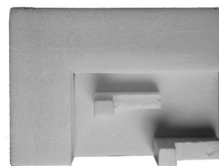
ramp connecting existing circulation with large program block



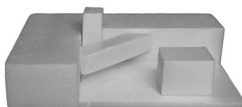
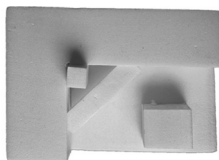
fingers of program extending out of the existing building



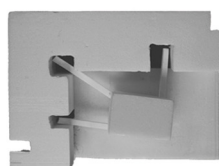
fingers extending out where circulation enters the building



independent bars of program



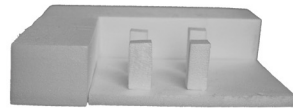
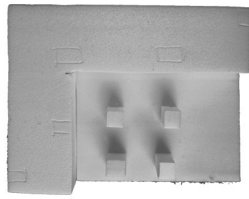
diagonal bar connecting circulation with large program block



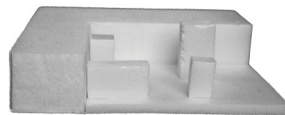
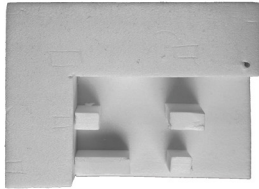
single program block with branches to existing circulation

Figure 42. Foam models investigating formal configurations and extensions of the existing building.

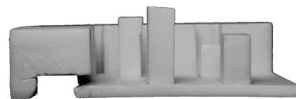
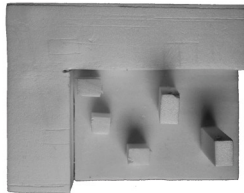
Formal Investigations 2: towers



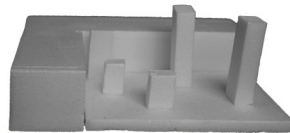
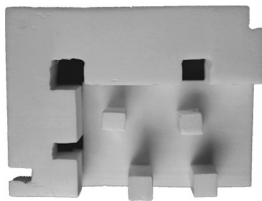
four symmetrical towers



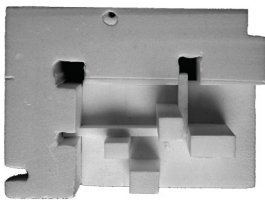
two connecting towers and two independent towers, various sizes



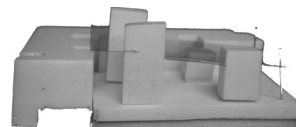
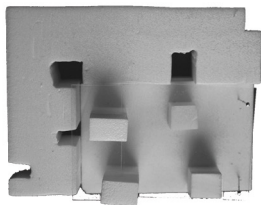
five interspaced towers taking into consideration sun and shadows



four towers considering sun shadows and existing program



towers with connecting circulation



towers set at different heights to divide roof planes as some poke out of the roof and some reside underneath it

Figure 43. Foam models made to investigate forms that program elements should take on the site. By dividing these elements into smaller spaces, roof spans decrease and intimate program spaces become available.

Models were made to play with forms and to visualize program blocks (figures 42 & 43). This helped determine the height and spacing of the program blocks as views from the existing building are important.

Master Plan

The master plan shows the relationship of the gardens and the program blocks (figure 44).

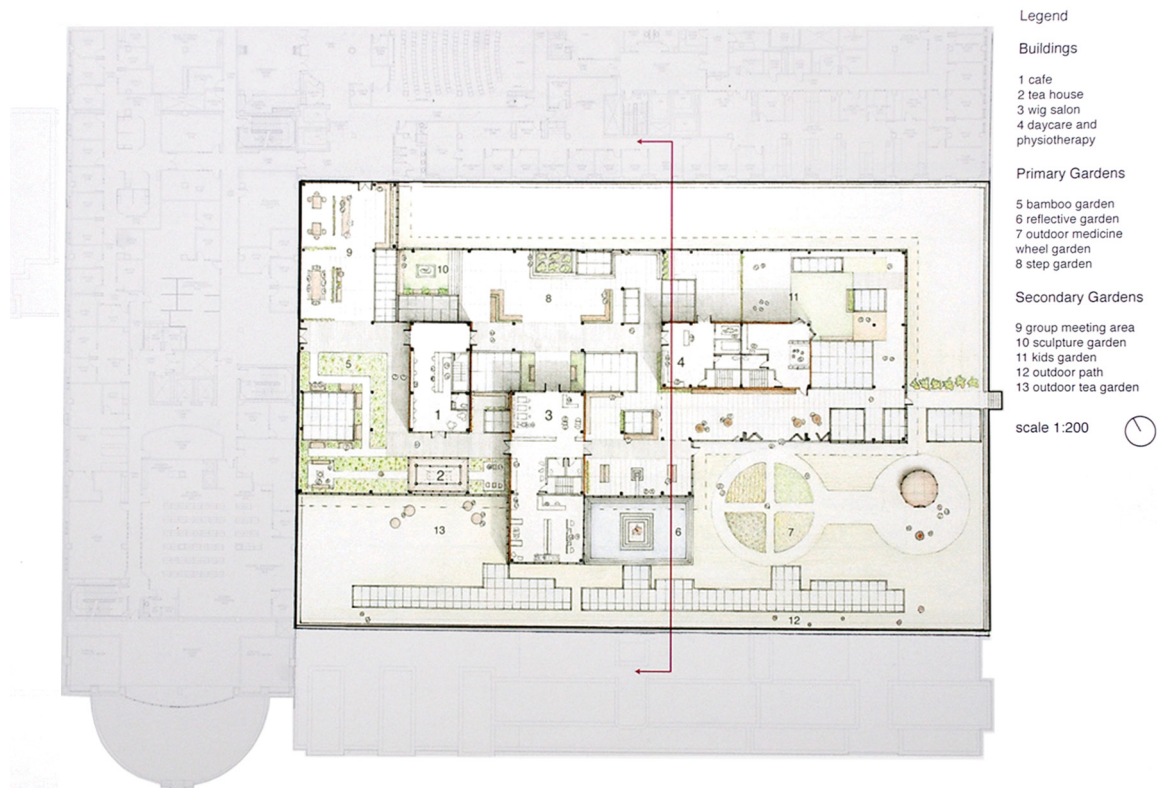


Figure 44. Master Plan of Therapeutic Garden.

Program

The four program blocks as seen on the master plan include 1 the cafe, 2 tea house, 3 wig salon and spa, and 4 physiotherapy department and daycare. The existing main entrance is on level 1. To bring a visual connection to the therapeutic garden on level 2 I have made the lobby into a double height space as seen in figure 23. Medical records presently sit on level 2 above the lobby and I have moved these into the physiotherapy department on level 0. Currently the physiotherapy room is located in the basement of the Cross Cancer Institute.

Physiotherapy

The new physio department incorporates indoor garden facilities that will benefit from the surrounding natural environment and allow clients to walk and gain strength in fresh air and sunshine (figure 45). The private indoor physio garden allows patients to use exercise equipment in privacy while still benefitting from nature and daylight. The physiotherapy department is proximal to the outdoor medicine garden where paths and benches allow for a greater range of activities and strength training opportunities.

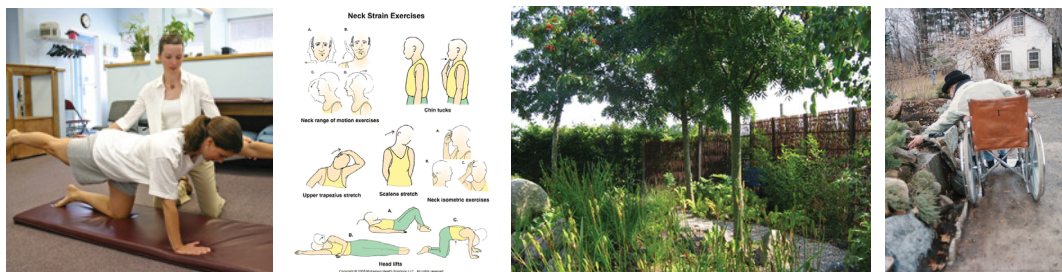
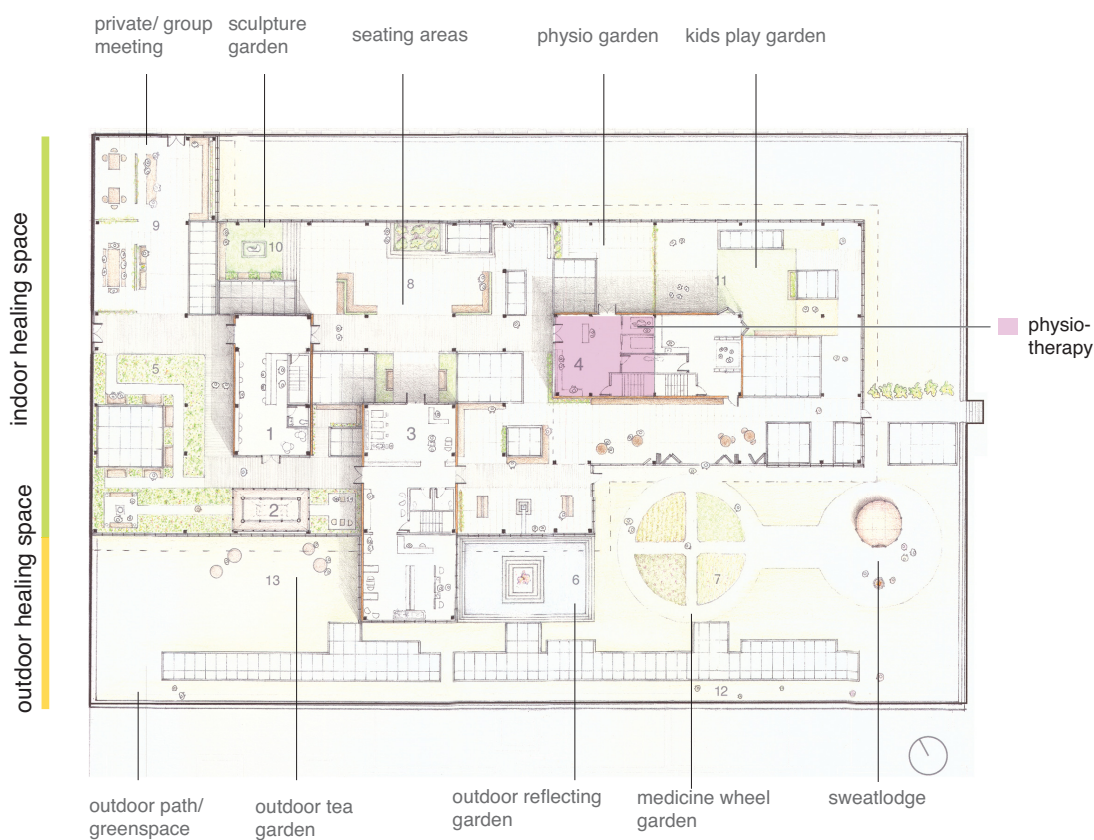


Figure 45. Physiotherapy department is indicated in pink on the master plan.

Wig Salon and Spa

The Cross Cancer Institute provides wig services in the basement, level 0. This wig service is located next to the morgue where no daylight penetrates. I renamed it the 'wig and beauty salon' and brought it into the therapeutic garden. The salon is surrounded by gardens. The inside has views to the bamboo, step garden and fountain and the outside looks onto the reflecting garden (figure 46). Here clients will benefit from wig services as well as beauty essentials such as spa treatments. This salon is intended to focus on the mind and body as a whole and will provide a boost of self confidence and pride for clients whether they be donating hair for wigs, getting a massage at lunchtime or getting fitted for a wig for the first time.

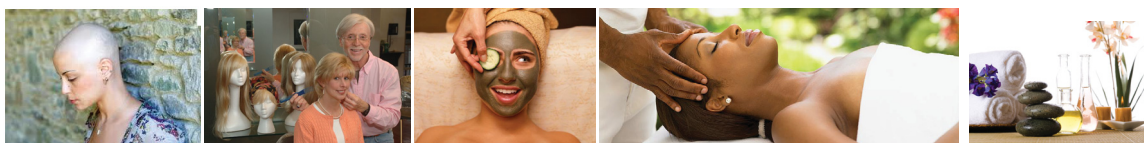
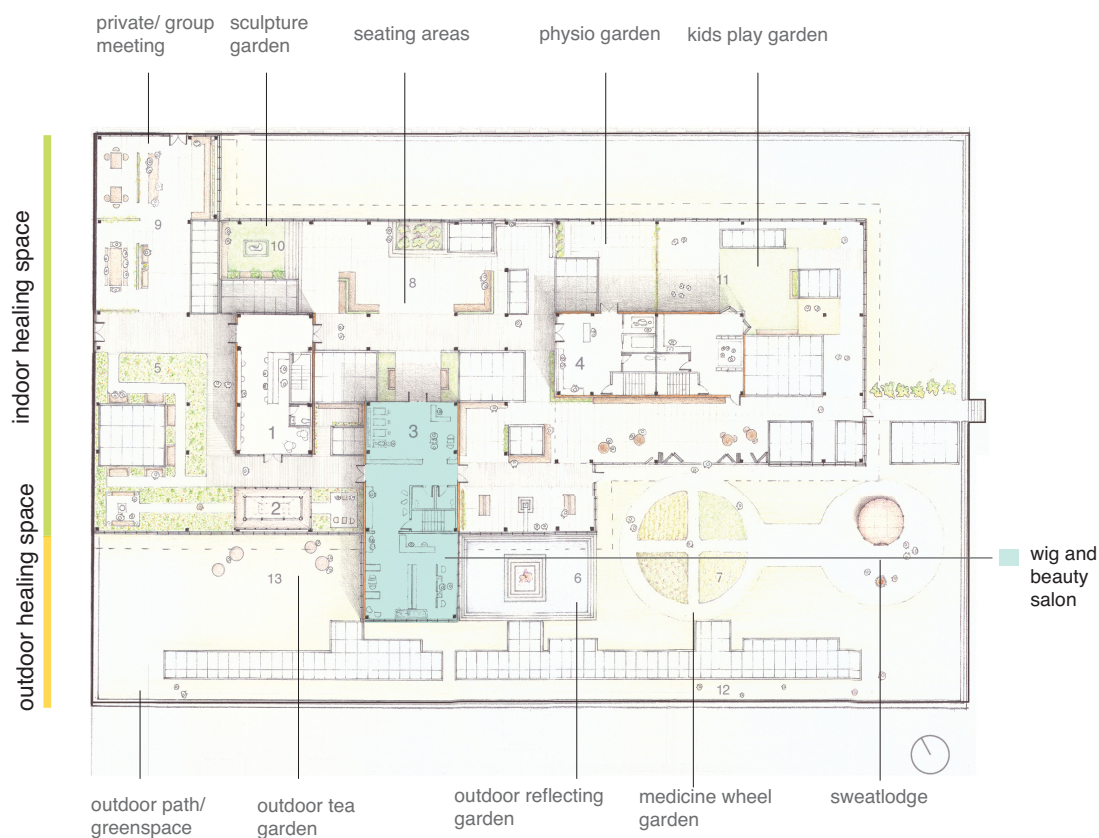


Figure 46. The beauty salon and wig services are indicated in teal on the master plan.

Daycare

The clientele of the hospital include a wide range of people in all stages of life. Family routines are disrupted by cancer treatments and patients can no longer provide a quality of life that is regular or normal. Patients have children that require care and providing a daycare would bring relief and routine to their family life, as it once was. In Canada, there is a major concern in gender inequality that appears in the lack of affordable quality daycare. This forces women to stay at home more and take care of family responsibilities. Making affordable childcare available would increase women's possibilities to participate in work-

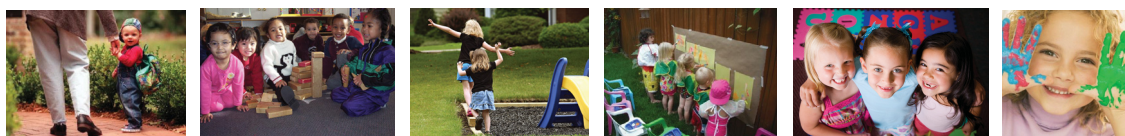
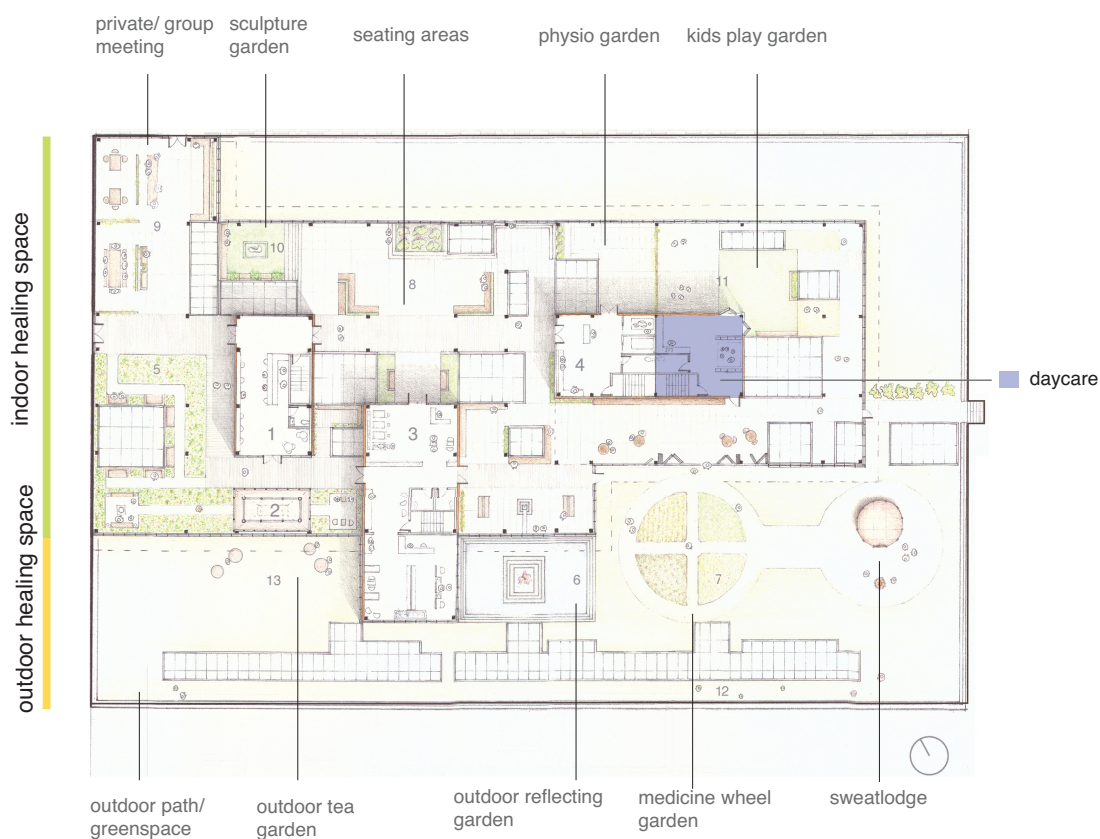


Figure 47. The new daycare is indicated in blue on the master plan.



Figure 48. An interior rendering of the daycare area.

ing life. Single mothers are especially at high risk of entering poverty because of the lack of affordable childcare services and women's generally lower wages. Women make up the majority of healthcare employees and providing a daycare on site would relieve stress by making daycare easy to access and proximal to their workplace in case they are needed (figure 47).

This enclosed garden space allows children to play outside even when the weather is not agreeable. The lowered ceiling in the daycare area make the space more intimate and keeps the childrens voices from resonating into the open garden areas surrounding the space. Grass, sand, decking and soft ground coverings make for a diverse playing field for children of all ages (figure 48).

Japanese Tea House and Cafe

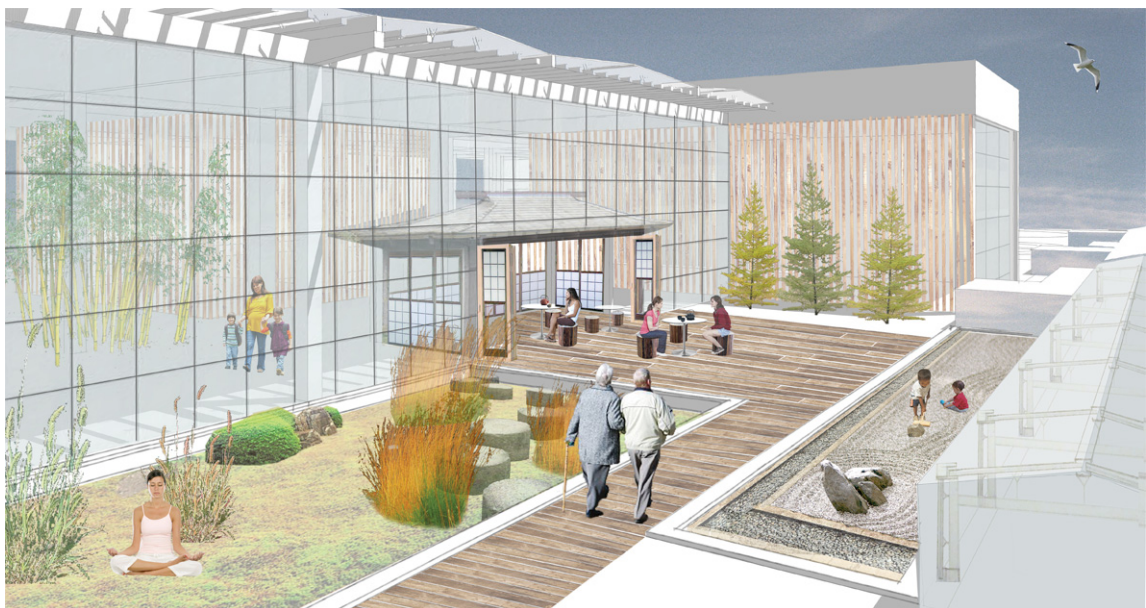
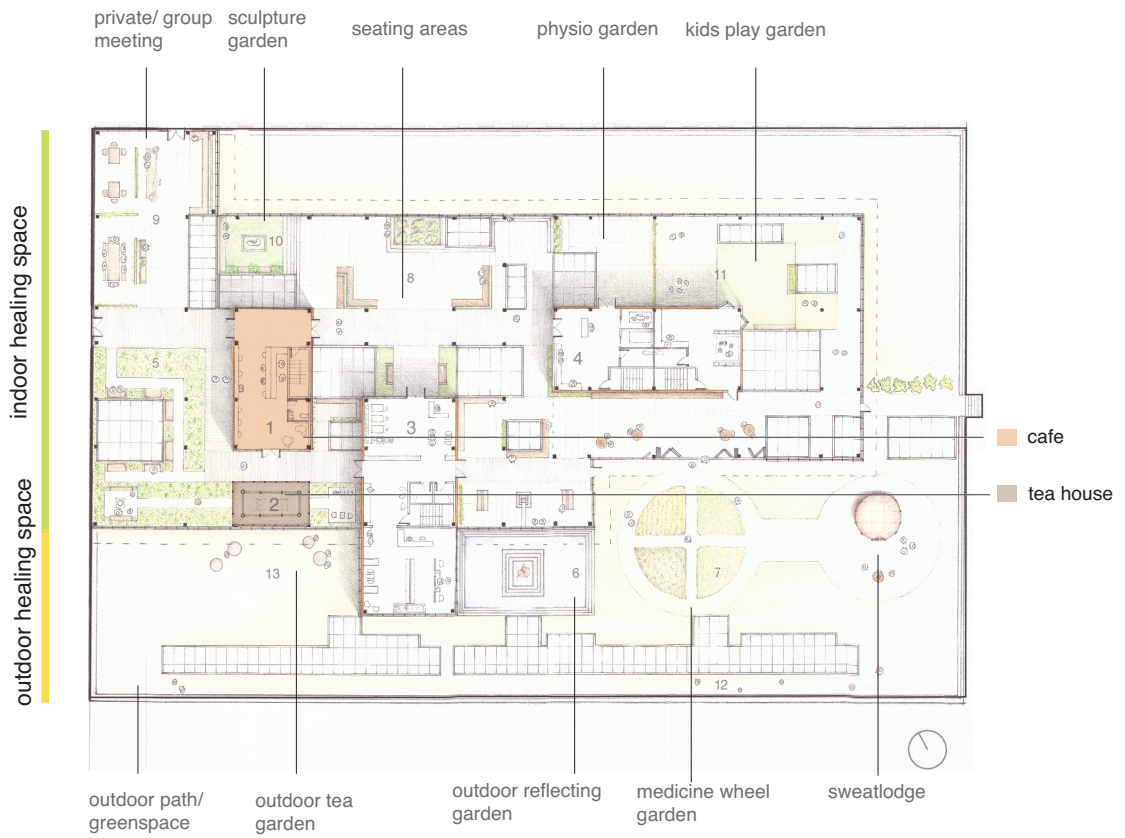


Figure 49. Plan and rendering of the Japanese Tea House opening up to the outdoor garden in the summertime

Sections

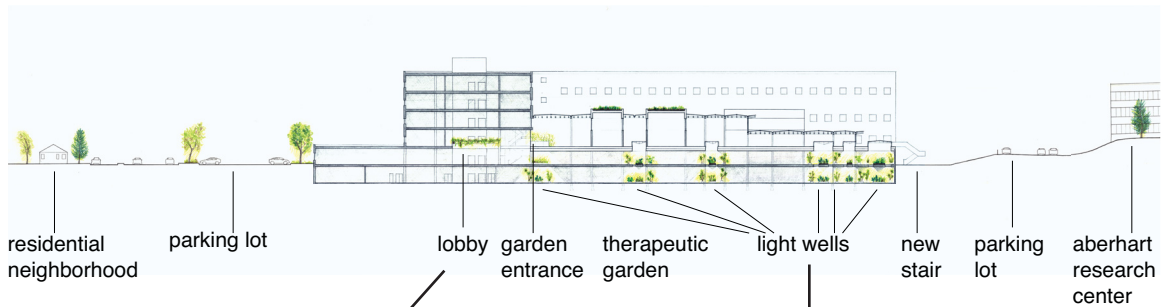


Figure 50. Longitudinal section

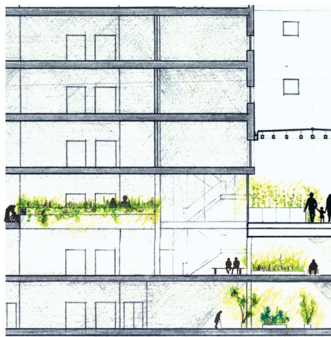


Figure 51. Enlarged Lobby section

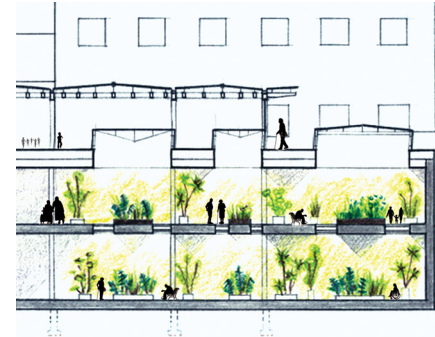


Figure 52. Enlarged Lightwell Section

The double height lobby space (figure 51) is seen here as an entrance to the therapeutic garden. When people enter the building they can see that plants and light are penetrating through the second story and they must take the existing elevators or stairs up to the second level to access the garden. The lightwells that penetrate the existing floors pierce through levels 1 and 0 to bring natural light into an otherwise dark and cavernous plan. The lightwells are placed for greatest access for patients, staff and families as they are placed in waiting, staff and lounge areas (figure 52). The master section shows the contextual relationship to the residential neighborhood on one side and the large research facility on the other (figure 50). The new staircase is proposed for a second mode of egress and for easy access to the daycare and physiotherapy department from the parking lot.

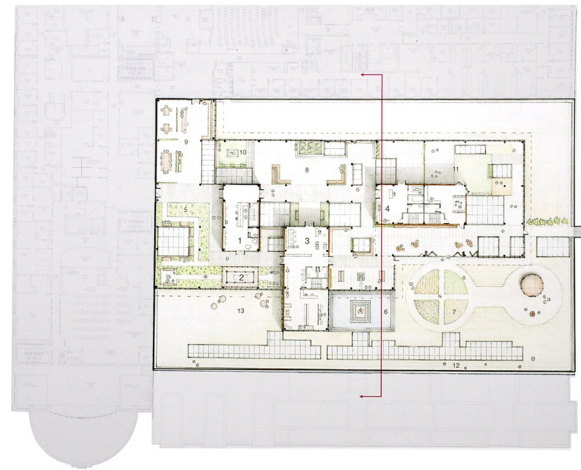


Figure 53. Cross Section with vegetation, daylight and regular activities.

The cross section is cut through the physiotherapy department and highlights the indoor and outdoor reflecting gardens on the south side and the step garden and outdoor wildflower garden on the north side. As seen in the previous section the lightwells penetrate the two floors below bringing light and nature into this previously dark dense plan.

Model



Figure 54. Top view of model. Note the garden spaces on the lower levels are inhabited and daylight can enter from above.



Figure 55. Elevation of therapeutic garden without walls or a roof



Figure 56. Top view of model with roofs framed in.

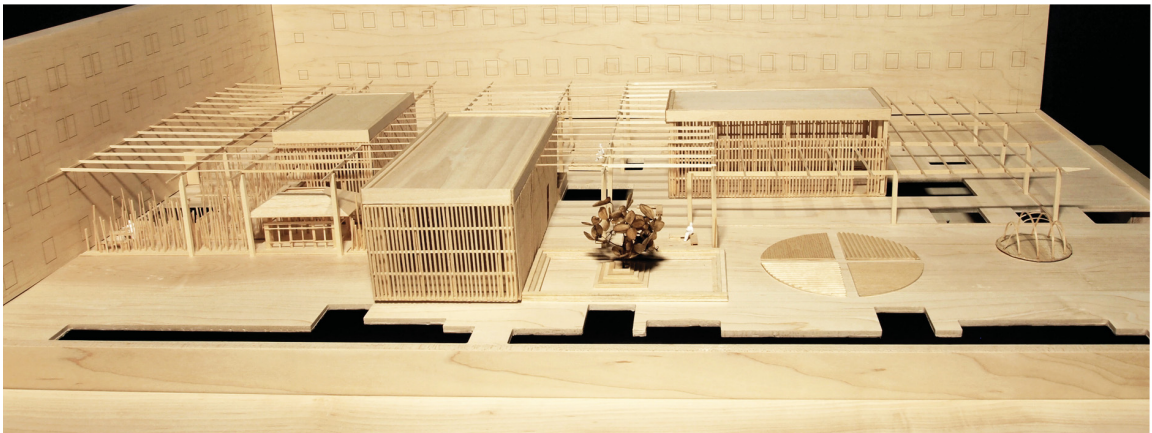


Figure 57. Elevation view of overall model with roofs framed. Note the lowered roof height on the far right over the daycare and in the far left corner over the entrance.



Figure 58. Top view of the indoor fountain and outdoor reflecting pool.



Figure 59. Top view of cafe, Japanese tea house and bamboo garden.



Figure 60. Elevation of tea house and bamboo garden.



Figure 61. North view of the central step garden. Note the north facade glazing for indirect light to the cafe and wig salon.



Figure 62. North view of step garden plaza with the front of the physiotherapy department.



Figures 63. Outdoor reflecting pond and medicine wheel.



Figure 64. Here, at the physiotherapy and daycare pavilion, is where the roof height lowers to four metres from six metres.



Figure 65. Top view of step garden and entry to the wig salon and physiotherapy department. Note the roof height change where the beams change direction

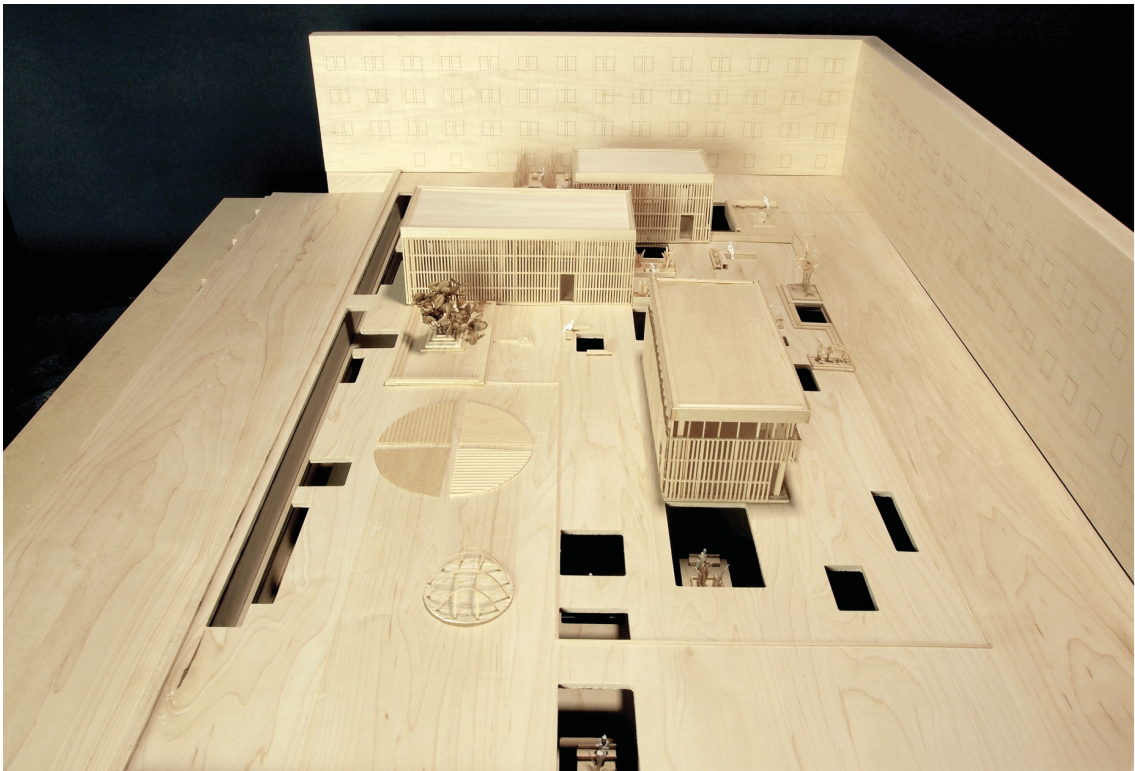


Figure 66. Bird's eye view from the east.



Figure 67. Top view of model to emphasize lightwell penetration of both level 0 and level 1 of the existing Cross Cancer Institute.



Figure 68. Top view of people in the bamboo garden and below on level 1, a person waiting for treatment.

CHAPTER 3: CONCLUSION

The lack of natural environments and daylight in today's western medical facilities contribute to the stress and fatigue of staff, caregivers and patients. Architectural interventions can make the healing benefits of nature accessible to users of any medical institution. This access to plants, daylight, water and natural materials can increase positive mood and coping mechanisms which would thereby increase wellness and capacity for healing. This attention to holistic healing should be built into new facilities but can also be added to existing facilities as seen in this thesis.

The benefits of such interventions are medically proven and should be seen as cost saving and a complement to today's medical system. In all of the interviews, the importance of nature and getting outside, getting away and relaxing were key points that arose. No one has yet to disagree with the benefits that nature can have on healing; we must use architectural interventions to bring this comprehensive form of healing to fruition. If we can build places of healing that support holistic physical, mental, emotional and spiritual health, our society will be able to cope with the stresses of illness that they cannot control.

REFERENCES

- Alberta Cancer Board. "A Patient's Guide to the Cross Cancer Institute." 2003. Accessed February 12, 2012. <http://maps.google.com/maps>.
- Almusaed, A., A. Almssad, Z. K. Abdushaik, & S. Khalil. *Biophilic architecture, the concept of healthy sustainable architecture*. The 23rd Conference on Passive and Low Energy Architecture, Geneva, Switzerland, September 6-8, 2006. Accessed September 15, 2011. http://www.unige.ch/cuepe/html/plea2006/Vol1/PLEA2006_PAPER151.pdf.
- ALNARP new landscapes new lives (photograph). Accessed February 1, 2012. <http://www.ltj.slu.se/eclas/preconf.html>.
- American Institute of Stress. *Effects of Stress*. Accessed October 30, 2011. <http://www.stress.org/topic-effects.htm>.
- Cancer Information. "Natural looking wigs for cancer patients" (photograph). Accessed February 1, 2012. <http://go-cancer.blogspot.com>.
- Diefenbach, Beck. "Kids playing outside" (photograph). Accessed February 1, 2012. <http://beckdiefenbach.com/blog/wp-content/uploads/2009/06/0620-weather-02.jpg>.
- Environment Canada. *Canadian Climate Normals 1971-2000: Edmonton City Center*. Accessed October 1, 2011. http://www.climate.weatheroffice.gc.ca/climate_normals/results_e.html?stnID=1867&lang=e&dCode=1&StationName=EDMONTON&SearchType=Contains&province=ALL&provBut.
- Esquirol, Jean-Etienne-Dominique. *Biography*. Accessed November 15, 2011. <http://med.brown.edu/HistoryofPsychiatry/esquirol.html>.
- Fielding, Scott. Cross Cancer Institute, 11560 University Avenue, Northwest Edmonton, AB T6G 1Z2.
- Foucault, Michel. *Psychiatric Power: Lectures at the College de France 1973-1974*, trans. Graham Burchell. New York: Picador, 2003.
- Gaisma. *Edmonton Canada, Sun Path* (diagram). Accessed October 10, 2011. <http://www.gaisma.com/en/location/edmonton.html>.
- Gaylord Palm Hotel, Relâche Spa & Salon (photograph). Accessed February 1, 2012. http://www.gaylordhotels.com/assets/images/rotator_images/large/palms/PA_Spa02_lg.jpg.
- Guenther, Robin, and Gail Vittori. *Sustainable Healthcare Architecture*. Hoboken, New Jersey: John Wiley & Sons, 2008.

- Haraway, Donna. *Primate Visions: Gender, Race, and the Nature in the World of Modern Science*. New York: Routledge, 1989.
- Heerwagen, Judith H. *Design, Productivity and Well Being: What are the Links?* Accessed September 7, 2011. <http://greenplantsforgreenbuildings.org/attachments/contentmanagers/25/DesignProductivityWellbeing.pdf>.
- Jackson Family Daycare (photograph). Accessed February 1, 2012. http://4.bp.blogspot.com/-wcjiiC5L8Fw/Tclw_LJ0t2I/AAAAAAAAAb4/Xxm-AVQekSU s1600/daycare.jpg.
- Jackson, Jesse Colin. "Rooftop Sweat lodge at the Native Child and Family Services of Toronto" (photograph). Levitt Goodman Architects. Accessed November 14, 2011. <http://www.archdaily.com/120391/native-child-and-family-services-of-toronto-levitt-goodman-architects/>.
- Kellert, Steven R., Judith H. Heerwagen, & Martin L. Mador. *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life*. Hoboken, New Jersey: John Wiley & Sons, 2008.
- Marcus, Claire Cooper & Marni Barnes. *Healing Gardens: Therapeutic Benefits and Design Recommendations*. New York: John Wiley & Sons, 1999.
- Markel, Howard. "When Hospitals Kept Children From Parents." *New York Times*, January 1, 2008, *Health*. Accessed November 20, 2011. <http://www.nytimes.com/2008/01/01/health/01visi.html>.
- Mi'kmaw Family Healing Centres. "Circle of Healing" (diagram). 2008. Accessed November 28, 2011. <http://www.thans.ca/images/image.php?id=25>.
- Muttart Conservatory, Edmonton, Alberta, Canada (photograph). 2009. Accessed October 3, 2011. http://en.wikipedia.org/wiki/File:Muttart_Conservatories_Edmonton_Alberta_Canada_13A.jpg.
- National Board of Antiquities. *Alvar Aalto's Paimio TB Sanatorium; Hallways. 1929* (photograph). Nomination of Paimio Hospital for Inclusion in the World Heritage List. Accessed October 14, 2011. <http://www.nba.fi/tiedostot/c760469d.pdf>.
- National Collaborating Centers for Health. "What are the Social determinants of Health?" Accessed November 29, 2011. http://www.nccph.ca/docs/DoH_eng_PRESS_M.pdf.
- Natural Skin Care Company (photograph). Accessed February 1, 2012. http://www.thenaturalskincarecompany.co.uk/media/upload/image/2033454_mega.jpg.
- Nightingale, Florence. "Diagram of the causes of mortality in the army in the East during the Crimean War, 1856." Accessed November 28, 2011. <http://en.wikipedia.org/wiki/File:Nightingale-mortality.jpg>.

- Outreach Daycare (photograph). Accessed February 1, 2012. http://www.christum.com/wp-content/uploads/2011/08/daycare_gallery__560x400-420x0.jpg.
- Physiodoctor.blogspot.com (diagram). Accessed February 1, 2012. http://1.imimg.com/data/N/L/MY-149448/ortho-physiotherapy__10647866_250x250.jpg.
- Plains Healing Lodge. "Sweat lodge" (photograph). Accessed November 29, 2011. <http://www.historicaltrauma.com/sweatlodge.jpg>.
- Rappaport, Nina. "Sustainability A Modern Movement." In *The Challenge of Change: Dealing with the Legacy of the Modern Movement*, ed. Dirk van den Heuvel, 337-341. Amsterdam: IOS Press 2008.
- Schiebinger, Londa. *Nature's Body: Gender in the Making of Modern Science*. Boston: Beacon Press, 1993.
- Skyscraperpage.com. City of Edmonton map (photograph). Accessed February 12, 2012. <http://forum.skyscraperpage.com/showthread.php?t=193571&page=5>.
- Sternberg, Esther, M. *Healing Spaces: The science and place of well-being*. Cambridge, Massachusetts: Harvard University Press, 2009.
- Suncadia Resort (photograph). Accessed February 1, 2012. http://www.suncadiaresort.com/images/masthead/suncadia_resort_spa_masthead.jpg.
- Ulrich, Roger S. "Health Benefits of Gardens in Hospitals" (paper presented at the conference, Plants for People) International Exhibition Floriade, 2002.
- . "Natural versus Urban Scenes: Some Psychophysiological Effects". *Environment & Behavior*, 13 (5): Sept 1981, 523-556.
- University of Iowa special collections. *Children's Hospital Solarium and Orthopaedic Room, 1919* (photograph). Accessed November 26, 2011. http://farm6.static.flickr.com/5296/5429418792_5d515992b1.jpg.
- Victorian Crime and Punishment. "Millbank Penitentiary" (drawing). Built to reflect the design of Jeremy Bentham, 1821. Accessed November 29, 2011. <http://gallery.e2bn.org/assets/0707/0000/0013/millbank2.jpg>.
- Wellington Physiotherapy (photograph). Accessed February 1, 2012. <http://www.wellingtonphysiotherapy.ca/images/physio.jpg>.
- World Health Organization. "Definition: emergencies." *Health*. Accessed November 20, 2011. <http://www.who.int/hac/about/definitions/en/>.
- . "Mental health: a state of well-being." Accessed November 25, 2011. http://www.who.int/features/factfiles/mental_health/en/.