Healthcare and the Environment: A Holistic Approach

by

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I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

There is an increasing need for a local comprehensive cancer treatment centre that caters primarily to children. This design proposes a paediatric facility that will be located in Waterloo Region to meet the needs of the area's rapidly increasing population. It will serve children under the age of eighteen, their families, and the surrounding community. The proposed site will be in Floradale, a small rural community in Waterloo Region, approximately 15 km from Kitchener/Waterloo. This site is located directly adjacent to the Woolwich Reservoir and was chosen because of its close proximity to this natural environment. Although it is located in a rural area, the proposed facility is still close to the urban core and the two existing general hospitals in the region. Based on the rapid population growth of the region, the city boundaries are quickly expanding outwards, closing the gap between Floradale and Kitchener/Waterloo.

The thesis offers a series of design principles that have been applied to the proposed facility. The design principals were established by completing a historical review, researching a variety of architectural precedent studies, and through various site visits to healthcare facilities.

In order for the proposed paediatric facility to be a successful, functioning component of the community, it will recognize and incorporate the existing services present in Floradale and Waterloo Region and build upon them. The design explores the existing community groups, organizations, services, and community needs in order to propose a holistic approach connecting services to the healthcare facility, which will in turn enhance community vitality.

The purpose of a healthcare facility is to access, treat, and heal the patients and families that visit. This design creates a facility where the natural and the built environment will aid in the healing process.

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AUTHOR'S NOTE

As with any research there are certain limitations of the work performed. Healthcare is an extensive, timely, and complex topic. It would take years to become a specialist in many aspects related to this subject matter. At times, it can be quite daunting and overwhelming.

I do not claim to be an expert in the topic of healthcare design. This thesis was written to initiate a discussion on healthcare design that involves the environment and community.

I focused on a small area of healthcare and made general decisions and assumptions for areas of healthcare that required intense study. I tried to obtain a general overview of topics that are appropriate to the research. I then dedicated the majority of my research to creating a holistic approach that recognized the existing community groups, organizations, services, and community needs. This allowed me to propose a holistic approach to the healthcare facility which will in turn enhance community vitality. My hope is that the architectural prototype I offer will help link the community and the healthcare facility to the natural environment, in turn, creating a positive healing environment for all who use the facility.

INTRODUCTION

If anyone had asked me two years ago about my personal experiences with cancer, my answer would have been that I had limited exposure to the disease. Through various co-op placements I have had several opportunities to work on oncology projects. I have also known people who had either a family member or friend that had been diagnosed with cancer but never knew the person directly. While working on my thesis, this relationship has changed. I have had family members, friends, and acquaintances that have been diagnosed with cancer and now have their own personal experiences. All have been courageous in their fight. Some battles have been won, others lost, and others are still fighting daily.

The reality is that all of these people, their families, and friends are affected by the disease and most of their lives have changed because of it.

This thesis investigates better approaches to healthcare design, in particular paediatric healthcare. The majority of hospitals are typically located in large cities, often in a downtown area made up of concrete, asphalt, and with minimal vegetation. Although these hospitals may not have been originally designed this way, the facility expanded over time, along with surrounding healthcare facilities, and so did the city. As a result, the buildings became larger and closer together, isolated from its neighbourhood and natural settings. Conversely, for those living in the country, rural healthcare is often not readily available. Residents must choose to either venture into larger civic centres to receive treatment or choose to avoid medical treatment altogether.

"Cancer is a disease that starts in our cells. Cells are the building blocks of our body tissues and organs. Normal cells grow, divide and die. In most parts of the body, dying cells are replaced by new, healthy ones. Cancer develops when the cells in part of the body begin to grow out of control. Instead of dying, cancer cells continue to grow and divide. After a while, groups of these abnormal cells form lumps or tumours. Tumours can be either benign (non-cancerous) or malignant (cancerous). Benign tumour cells stay in one place in the body and are not usually life-threatening. Malignant tumours can invade tissues around them and cancer cells can spread to other parts of the body," (Canadian Cancer Society. 2007: 2).

A hospital creates its own internal community but for the most part does not participate with the surrounding community. For many people, hospitals are places to be avoided. They are seen as a place where one goes when one is severely ill or dying. Many people would not be able to imagine visiting a hospital on a daily basis other than to be treated for an ailment or to visit a loved one.

"Hospitals are among the most fascinating buildings ever conceived. They have a direct impact on the people who use them, whether they are patients, visitors, or the medical staff. Hospitals are public buildings, and they reveal how society treats its citizens once they have fallen victim to illness and injury, they represent social and cultural values, and since the late eighteenth century, they have manifested the way science and philosophy conceive the origins, causes and cures of disease," (Wagenaar (ed.) 2006: 11).

This thesis will examine an alternative proposal for a healthcare community based on a cyclical relationship among healthcare, environment, and the community. It will also explore the relationship between healthcare facilities and the environment as a holistic approach to the healing and recovery process.

When a person, particularly a child, is diagnosed with cancer, it can be a traumatic experience, not only for the child, but also for the family. It often represents a disruption in the daily lives of those individuals affected. This disruption can lead to emotional, physical, and financial stress, which in turn may lead to anxiety. The same can be true for all childhood illnesses.

The architecture and social structure of the healthcare facility should help reduce the anxieties while offering comfort and support to the patients and their families. It is important that the time spent in a healthcare facility should be as positive an experience as possible. Designers need to create a positive healing environment - one that will support both the patient and their family. After all, this experience will be a lasting one for a child and their family. The proposed design will "put the patient in the best possible condition for nature to act upon him." (Nightingale 1859/1946: 6 in Selanders 1993: 21).

Studies conducted by Roger S. Ulrich (1984) and others have found that patients with exposure to nature or gardens healed quicker, required less pain medication, and had fewer complaints while recovering. To enhance a positive healing experience, a variety of gardens will be provided throughout the grounds in this design. "We know that after contact with nature, our immune system works better, hormones that promote healing are activated, neuropeptides that ease pain are produced, and we simply and immediately feel better,"

(Gerlach-Spriggs et al. 1998: 41). The gardens will provide patients, families, visitors, and staff members opportunities for quiet contemplation, exploration, and the experience of sounds and smells. These spaces will offer gentle winding paths for physiotherapy and rehabilitation as well as different features and seating options for the visitors.

By 2031, the region's population is expected to reach 729,000 (Region of Waterloo Public Health 2006b). With the population of Waterloo Region increasing rapidly, it is important that the essential services continue to grow and evolve to meet the needs of the community. Healthcare is considered one of these essential services. Although the region has provided advanced equipment and services such as the Grand River Regional Cancer Centre, and the Regional Cardiac Care Centre at St. Mary's General Hospital, it is still limited in advanced paediatric care. When a child becomes seriously ill and requires either hospitalization or treatment, they are often sent to a facility specializing in paediatrics. Usually this referral translates to the Children's Hospital in London, The Hospital for Sick Children in Toronto, McMaster Children's Hospital in Hamilton and sometimes as far away as the Children's Hospital of Eastern Ontario in Ottawa. More often than not this results in increased costs to families, who are forced to endure travel expenditures and lost wages while their sick child undergoes treatment away from home. It is, therefore, imperative that such centres be located within close proximity to its community – integrative and engaged with its real surroundings.

Each year over 400 children in Ontario are diagnosed with cancer (Camp Trillium 2007). Approximately 3500 children undergo treatment in Ontario annually (POGONIS 2009). The proposed paediatric oncology facility will be located in Waterloo Region to meet the needs of the area's rapidly increasing population. There are approximately 130,000 children under the age of eighteen in the region (Statistics Canada 2007). Since children can be treated in various hospitals, outpatient clinics, or doctors' offices, it is difficult to determine how many children aged 0-18 in Waterloo Region and the neighbouring Dufferin-Wellington County have cancer and how many of these children are currently undergoing treatment. However, statistics do show that between 2000 and 2008, there was an average

of 18 childhood cancer cases diagnosed for children aged 0-18 living in Waterloo County and 69 childhood cancer cases diagnosed for children in Dufferin-Wellington County (POGONIS 2009). The proposed oncology facility will serve these children, their families, and the surrounding community.

The proposed site is in Floradale, a small rural community in Waterloo Region approximately 15 km from Kitchener/ Waterloo. This site is adjacent to the Woolwich Reservoir. It was chosen because of its close proximity to the natural environment. The reservoir, wetlands, and land surrounding the Woolwich Reservoir are owned and protected by the Grand River Conservation Authority (GRCA). Since this body of water is part of the water system, the land surrounding it will not be heavily developed. Although this site is located in a rural area, the proposed facility is near the urban core and two existing general hospitals in the region. Based on the rapid population growth of the region, the city boundaries are quickly expanding outwards, closing the gap between Floradale and Kitchener/Waterloo.

The purpose of a healthcare facility is to assess, treat, and heal both the patients and their families. For the proposed paediatric facility to be a successful, integrative part of the community, it will complement and expand the existing services available in Floradale and Waterloo Region. It will also include patient and family services aimed at reducing anxieties and offering comfort and support during this difficult time.

Figure 0.1
(above) Diagram of link between community, healthcare and the environment
Author's Diagram

This document has been divided into three chapters that provide background information and research to support a design proposal for a local rural paediatric oncology facility.

The first chapter consists of a historical review that discusses the hospital, paediatric healthcare, and oncology. The history of garden therapy, the history of nature as a healer, and alternative healing practices are also discussed. The possible links between pesticides and cancer are also examined as the site is located in an agricultural area where pesticides could be commonly used.

The second chapter looks at architectural precedent studies

including healthcare facilities and schools.

The third chapter outlines a proposal for a paediatric oncology facility in Floradale, Ontario. A series of design principles were developed based on the completed research outlined in Chapter 1 and 2 and have been applied to the design.

A series of design principles is presented that can be integrated into any healthcare facility that is interested in creating a space where both the natural and built environments influence the healing process.

01: BACKGROUND

APPROACH

Chapter 1 presents a historical review that encompasses the hospital, paediatric healthcare, oncology, garden therapy, alternative healing practices, nature as a healer, and building for children. The possible links between exposure to pesticides and cancer have also been explored as the site for the proposed paediatric oncology facility is located in an agricultural area where pesticide use could be common. The historical review was undertaken to understand the challenges associated with healthcare and healthcare architecture. It also helps inform a series of design parameters that can be applied to healthcare facilities where importance is placed on the natural and built environments in order to influence the healing process. The historical review demonstrates how far medicine, treatment, healthcare, and design have evolved. Hospitals were once viewed as places where one went to die. Today, medical miracles are performed that would not have been imaginable a few years ago.

HISTORY OF THE HOSPITAL

> *"The word 'hospital' is a trap, for it has meant different things in different eras. The earliest definition given in the Shorter Oxford English Dictionary is 'a place of rest and entertainment,'" (*Lansdown 1996: 1).

The word hospital comes from the Latin word 'hospitalis,' meaning: "a house for the reception and entertainment of pilgrims, travelers, or strangers," (Senior, Peter in Kayne (ed.) and Blee (ed.) 1997: 21-22).

Approximately 50,000 years ago cave dwellers from the earliest Neolithic settlements in Mesopotamia, dedicated 'nests' to care for those who were sick or dying," (Verderber and Refuerzo 2006: 9).

> The hospital, as we know it, is a recent invention. Its forerunners included the medieval houses for lepers and Renaissance hostels for foundlings; from the seventeenth century there were insane asylums and, from the eighteenth, clinics for teaching medical knowledge. The District General Hospital is a twentieth-century development of the Victorian general infirmary. The infirmary was originally a new building type for large cities, and its design reflected a wider institutional ethos, (Kaye (ed.) and Blee (ed.) 1997: 242).

Figure 1.0
(left) Verandah treatment was common until the 1960s
Hoskins and Haggard 1999: 9

Historically, patient rooms were open wards with multiple patients as in the Nightingale Plan. Gradually patient rooms evolved from eight-patient, to six-patient and then four-patient wards. After World War II, patient rooms became two-bed spaces with shared toilets. Shared toilets and showers between rooms are still present today (Kliment (ed.) 2000).

The single-bed patient room is not a new idea. In 1920, Asa S. Bacon, superintendent of Chicago's Presbyterian Hospital strongly petitioned for the private room. Bacon discussed the importance of the patient's privacy and comfort as well as the hospital's objective to have maximum occupancy (Kliment (ed.) 2000). Bacon's discussion also pointed out that private patient rooms reduced the spread of illness, and the doctor or nurse was able to take more comprehensive patient histories and give better instructions in a private space (Kliment (ed.) 2000). For almost 50 years, Bacon's ideas were ignored. Over the last number of years, single-bed patient rooms have become the norm, especially in the United States, where the healthcare system is private and hospitals are trying to attract potential patients. Many hospitals in both Canada and the United States are renovating to update ward style rooms to single rooms.

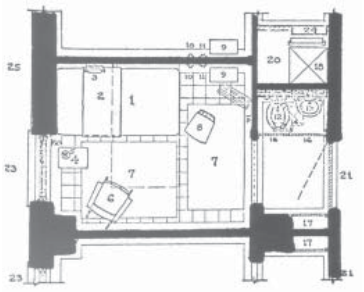


Figure 1.1
(above) Asa Bacon's proposed plan for single-bed rooms
Kliment (ed.) 2000: 145

Prior to World War I, hospitals in Canada were institutions for the poor. Those who could afford it paid for medical care at home. At the time, as an example, funding for the Royal Victoria Hospital in Montréal was provided by volunteer support, private donations, and municipal grants (Agnew 1974 in Adams 2008).

In 2008 Adams documented a description of a form of patient ward, known as the pavilion plan. By 1893, the pavilion plan became the norm. Separate or minimally connected pavilions allowed for the wards to receive maximum ventilation. At the time, the designers were focusing on the elimination of miasma, which they thought spread infection. The plan was influenced by ideas from Florence Nightingale, a pioneer of modern nursing. The layout consisted of open wards with thirty to forty beds arranged equally along the exterior walls. Large windows were also located in regular intervals in the exterior walls. This design allowed for fresh air to circulate between the patients and reduce the chances of infection.

"Pavilion-plan hospitals were intended to function as 'a great machine' for healing in which fresh air had a crucial function, despite the germ theory," (The Royal Victoria Hospital, Standard (Aug. 8, 1909) in Adams 2008: 10).

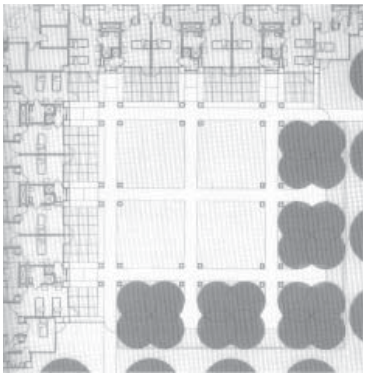


Figure 1.2
(above) City of Hope National Medical Center patient pavilion plan and gardens
Kliment (ed.) 2000: 135

The pavilion plan became the international standard in the late nineteenth and early twentieth centuries. Examples of the pavilion plan can be found in India, Persia, Russia, Australia, Europe, and North America. In Canada, the Toronto General Hospital and Montreal's Hotel-Dieu are examples of the pavilion style of patient wards (Adams 2008).

"As sociologist Lindsay Prior and many hospital architects have noted, the key dimensions of the ward were the distances between beds, the heights of ceilings, and the relationship between windows and beds," (Prior 1988: 94-99 in Adams 2008: 10). "Also fundamental to its operation were the relationship between the patients' beds and the nurses' station or desk, and the relationship between the administration building and the pavilion itself," (Adams 2008: 10).

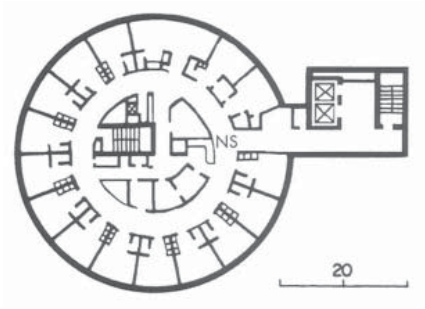
Figure 1.3
(above) Bright Ward, Gay Hospital, London, 1902 - home touches
Hoskins and Haggard 1999: 71

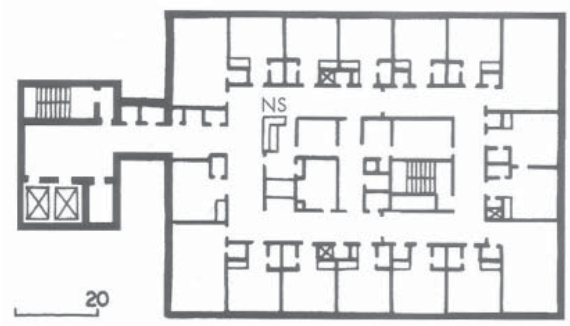
Kobus et al., 2000 provide further background on hospital configurations. Since the early 1900's, hospital designers have tried various configurations in an attempt to improve efficiency. The double-loaded corridor was typical of the 1900's as it allowed for cross-ventilation and natural lighting. The downfall of this layout was that the distance between the nurse's station and the end rooms of the unit was quite great.

In the 1940's the Race Track (or Double Corridor) plan became the norm. The layout includes nurse's stations between the two corridors and the core contained circulation and support spaces. Pass-through 'nurseserves' were located adjacent to each patient room and provided supplies to staff members. The plan functioned well in the day but with reduced staff at night, the distance from the ends of the floor posed a problem.

Both the compact rectangular plan and the compact circular plan were introduced in the 1950's. The compact rectangular plan is much more flexible than the circular unit in terms of the ratio between patient rooms to the amount of support

space. The compact circular plan presents some problems, notably that the room numbers and sizes are controlled by the program requirements, which in turn dictate the diameter of the circle.





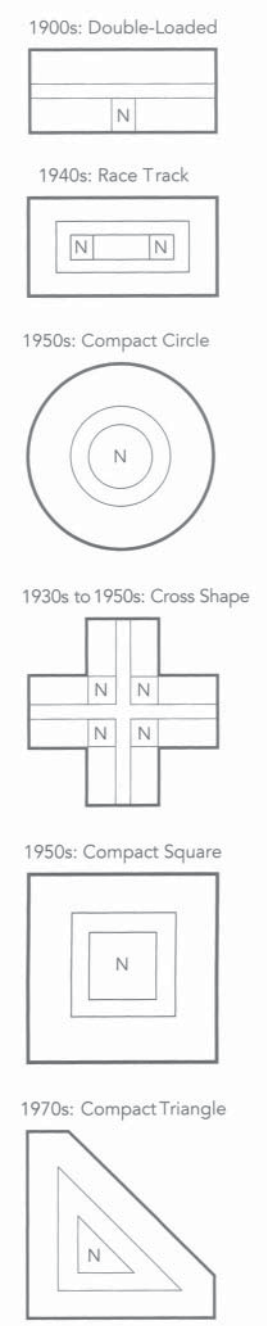


Figure 1.4
(above) Common nursing unit plans.
Kliment (ed.) 2000: 140

Figure 1.5
(left above) Example of Compact Rectangular Circular Plan and Compact Rectangular Plan
Kliment (ed.) 2000: 142

HISTORY OF ONCOLOGY

Cancer is a very old disease. "Cancer occurs in all known species of higher animals," (Tannock et al. 2005: 1). Ancient civilizations have described malignant tumors in pictures and writings (Tannock et al. 2005). Bone cancers (osteosarcomas) have been found in Egyptian mummies (Tannock et al. 2005).

Until the Middle Ages, early civilizations believed cancer was caused by various gods. In 400 B.C., Hippocrates was the first to suggest the link for the source of cancer to natural causes. He believed cancer was an imbalance between the spleen (black humor) and the three bodily humors: blood, phlegm, and bile (Tannock et al. 2005).

In the Middle Ages, writings referenced cancer houses, cancer families, and cancer villages, suggesting that cancer might be hereditary or a result of the environment (Tannock et al. 2005).

Sir Percival Pott, an English Physician conducted one of the first scientific studies in 1775 which looked into the cause of cancer. Young boys were used as chimney sweeps in London since they were able to fit into the small openings. The physician found that boys who were used as chimney sweeps had a high rate of death in their twenties because of scrotum cancer. Pott's believed that the chimney soot (now known to be tar) could be causing the cancer. He also found that cancer may develop years after being exposed to the contributing factor (Tannock et al. 2005).

Figure 1.6
(left) Radiation therapy room with linear accelerator
Malkin 2002: Plate 23 (Figure 5-57)

It is now universally known that cancer can result from

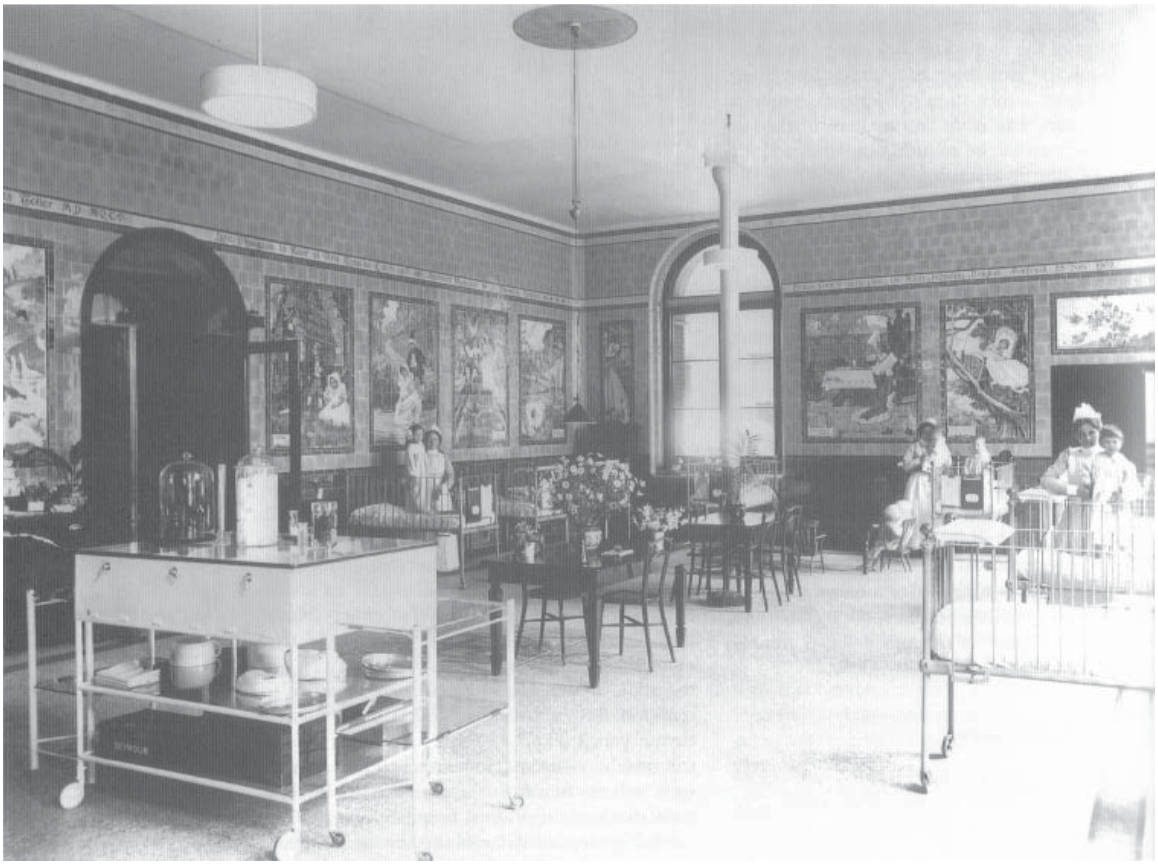
environmental causes such as tobacco smoke and a variety of occupational exposures.

In the nineteenth century, Virchow, a pathologist, stated "'every cell is born from another cell,'" (Tannock et al. 2005: 1). In tumors, "cells continue to accumulate beyond what is required for normal growth or replacement of cells in renewing tissues, such as the bone marrow, skin, and intestine. Thus, cancer was established as a cellular disease, where there was loss of normal control of cell proliferation," (Tannock et al. 2005: 1).

Previous studies have also found that cancer can be a genetic disease. One study that used Mormons in Utah, found that many types of cancer resulted in the sharing of genes (Tannock et al. 2005).

Today, the three most common ways to treat cancer are surgery, radiation therapy, and chemotherapy. Detailed descriptions of these therapies can be found in the Glossary.

"Surgery removes the cancer from one area of your body. Radiation therapy directs x-rays to the affected area of your body. Chemotherapy is different from surgery or radiation therapy because it affects the whole body. Sometimes these different treatments are combined" (Canadian Cancer Society 2006).



HISTORY OF PAEDIATRIC HEALTHCARE

> *"The first children's hospitals were, indeed, places of shelter, their inmates having been abandoned. The very first children's hospitals were probably the foundling asylums," (Lansdown 1996: 1).*

The following timeline has been compiled to illustrate important events related to the history of paediatric healthcare. Although there are different notions of the medical history, the following events were chosen to illustrate the history of the evolution of hospital spaces. Unless otherwise noted, the facts are compiled from Lansdown, 1996.

1500 BC - The study of children's medicine is said to have begun.

FIRST CENTURY AD - "The Ancient Greek physician Aretaeus mentioned children's diseases briefly in the 1st century AD" (1996: 2).

30 AD - Cornelius Celsus wrote De re medicina, the earliest Latin medical work which emphasized that children should be treated differently from adults.

787 - One of the earliest children's hospitals was established by Archbishop Datheus in Milan.

982 - A children's hospital was opened in Bergamo, Italy.

1161 - A children's hospital was opened in Florence, Italy.

Figure 1.7
(left) Children's Ward, St. Thomas Hospital, London, 1910
Hoskins and Haggard 1999: 136

1472 - Pietro Bagellardo of the University of Padua published Libellus de egritudinibis, the first distinct book on paediatrics.

1572 – Bagellardo's book was published in English.

1545 - Thomas Phaire wrote The boke of chyldren that stressed the importance of feeding and disease transmission.

1639 - 75% of infants brought from the provinces to the French Hospice des Enfants Trouves died.

1765 - Rosen von Rosenstein wrote the book entitled The diseases of children and their remedies which is said to be the foundation of modern paediatrics.

1769 - The Dispensary for the Infant Poor was opened in Red Lion Square in London by George Armstrong. This was a place where the poor could go for free advice and medicine for their children. In 12 years, 35,000 children were treated.

1771 to 1777 - 80% of the 31,951 infants admitted to the French Hospice des Enfants Trouves died before the end of their first year. An inquiry found that there were 8 to 9 children per bed.

1787 - Although England and Wales still admitted children to adult's wards, Continental Europe started to open paediatric hospitals.

PRIOR TO THE 19TH CENTURY - Adults rarely became attached to their young children because of high levels of infant mortality. This could explain the lack of interest in medical treatment for children at the time.

1856 - The first children's hospital opened in the United States in Philadelphia.

1860's – Louis Pasteur, a French chemist and microbiologist, confirmed that microorganisms exist in air but are not created by air. Through experiments, he found that when air was withheld, there was no contamination but that

contamination was due to something carried by air (Germ Theory of Disease 1998). This research benefitted all age groups, including children.

1862 - Louis Pasteur and Claude Bernard, a French physiologist, were responsible for developing pasteurization, a process that heats liquids (i.e. milk, beer, and wine) to kill bacteria present within them, therefore, not causing people to get sick from drinking the liquids (Germ Theory of Disease 1998). This new process benefitted adults and children alike. In Canada, the first milk pasteurization plant was installed at the Hospital for Sick Children, 46 years after the invention of pasteurization.

1875 - The Hospital for Sick Children opens in Toronto, Ontario, Canada (The Hospital for Sick Children 2007b).

1914 - Florence Nightingale believed in putting children in women's wards since the older patients "often became the child's best protector and nurse," (Franklin 1964 in Lansdown 1996: 6).

TODAY - Most children's hospitals take the family centered care approach. Private rooms allow for family members to stay with the child. Parents are often a part of the medical teams and are actively involved in the care of their child. This care ranges from providing emotional support for the child to helping to nurse the child back to health.

A critical turning point for hospital evolution in North America came in the 19th century when hospitals dedicated to the care of children started to emerge. The Hospital for Sick Children (SickKids) played a large role in the treatment of children in Ontario. Throughout their history, SickKids has implemented their own high levels of standards. For example, in 1908, they installed the first milk pasteurization plant in Canada. This occurred 30 years before pasteurization became mandatory (The Hospital for Sick Children 2007b), which has undoubtedly saved many children.

This historical review has enforced how valuable individual hospital rooms are; not only to reduce the spread of illness, assist in cleaning after a patient has checked out, but also for patient comfort and to improve the healing process.

HISTORY OF PAEDIATRIC HEALTHCARE IN ONTARIO

There are three paediatric hospitals located in Ontario within driving distance of Waterloo Region. The most well known is The Hospital for Sick Children (SickKids) located in Toronto. McMaster Children's Hospital (MUMC) is situated in Hamilton and Children's Hospital, formerly the Children's Hospital of Western Ontario (CHWO), is located in London. It is important to have an understanding of these hospitals, their catchment areas, and their programs when designing a paediatric oncology facility. The following tables compare the origin and expansion of the three facilities, the existing services offered, the catchment area, and the annual admissions. Unfortunately statistics are not available for admissions related specifically to cancer.

TABLE 1.0: Comparison Chart Detailing the Founding of SickKids, MUMC, and Children's Hospital

	The Hospital for Sick Children (SickKids) Toronto, Ontario	**McMaster Children's Hospital (MUMC)** Hamilton, Ontario	**Children's Hospital** London, Ontario
Founding	• First paediatric hospital in Ontario • **1875** - The Hospital for Sick Children is founded • **1875** - first hospital is an 11 room rented house in downtown Toronto with 6 iron cots • **April 3, 1875** – the first patient was admitted. • **1875 to1876** - 44 admitted patients in the first year and 67 outpatients	• **Early 1980's** - The paediatric services were gradually consolidated to a single site, McMaster University Medical Centre (MUMC). • **1988** - McMaster Children's hospital was officially designated as a children's hospital with concentrated specialized paediatric services	• **1917** – The hospital was originally established as War Memorial Children's Hospital to care for children in London and the surrounding area • **1922** - The War Memorial Children's Hospital opened across the street from Victoria Hospital and had 60 beds

Sources: The Hospital for Sick Children 2007a and 2007b; Hamilton Health Sciences 2007; LHSC, 2008.

Fig. 1.8
(left top) The Hospital for Sick Children, Elizabeth St. Entrance (Atrium)
The Hospital for Sick Children 2007

Figure 1.9
(left bottom) Children's Hospital (Formerly Children's Hospital of Western Ontario)
LHSC 2008

Fig. 1.10
(left) Atrium at The Hospital for Sick Children
The Hospital for Sick Children 2007

TABLE 1.1: Comparison Chart Showing the Expansion of the Hospitals

	The Hospital for Sick Children (SickKids) Toronto, Ontario	**McMaster Children's Hospital (MUMC)** Hamilton, Ontario	**Children's Hospital** London, Ontario
Expansion	• **1876** - Hospital moved to a larger building with 16 beds (still a space shortage) • **1891** - moved to a new 4-storey, 320 bed facility in Toronto • **Feb. 4, 1951** - the hospital moved to its current location • **1951 -** shift from nutritional research to the repair of congenital defects • **1954** – Research Institute was created • **1960's** – one of the first hospitals in North America to open a NICU • **Jan. 1993** - The Atrium, a new patient-care wing, opened. (Most patients rooms are private with washroom, storage, and a day bed for parents) • The architect, believed light was important to healing - building was designed around a 9-storey, glass-roofed atrium to maximize the amount of light that penetrates into the space • **1993** - Critical Care Unit & Emergency Department expanded	• The free-standing children's hospital offered the ability to expand programs and services • **2001** - New Neonatal Intensive Care Unit (NICU) was added to accommodate 47 babies instead of 33 • The hospital is also affiliated with McMaster University's teaching programs	• **1970's** – The number of beds increased to 185 beds • **1985** - The hospital was renamed to Children's Hospital of Western Ontario (CHWO) when it moved to the Westminster site • **1995** - Victoria Hospital and the University Hospital merged and Children's Hospital of Western Ontario became part of the London Health Sciences Centre (LHSC) • **October 1, 2007** – The Children's Hospital of Western Ontario (CHWO) became known as Children's Hospital

Sources: The Hospital for Sick Children 2007a and 2007b; Hamilton Health Sciences 2007; LHSC, 2008.

TABLE 1.2: Comparison Chart Explaining the Existing Services Offered

	The Hospital for Sick Children (SickKids) Toronto, Ontario	**McMaster Children's Hospital (MUMC)** Hamilton, Ontario	**Children's Hospital** London, Ontario
Current Services	• "SickKids is now a place where patient care, research and education – our three cornerstones – play equal roles in improving the health of children," (The Hospital for Sick Children 2007a). • More than 100 clinics • Teaching hospital of the University of Toronto	• Second busiest children's hospital in Ontario • 119 acute care beds, 55 paediatric inpatient beds, and 12 paediatric critical care beds • 41 paediatric clinics • Teaching hospital of McMaster University	• Paediatric emergency department, 13 critical care beds, 58 inpatient beds (medical and surgical), 7 adolescent psychiatry beds, paediatric medical day unit, and a paediatric day surgery unit. • CHWO takes a family centered care approach • Teaching hospital for physicians, nurses, and other health professionals

Sources: The Hospital for Sick Children 2007a and 2007b; Hamilton Health Sciences 2007; LHSC, 2008.

TABLE 1.3: Comparison Chart Illustrating the Catchment Area

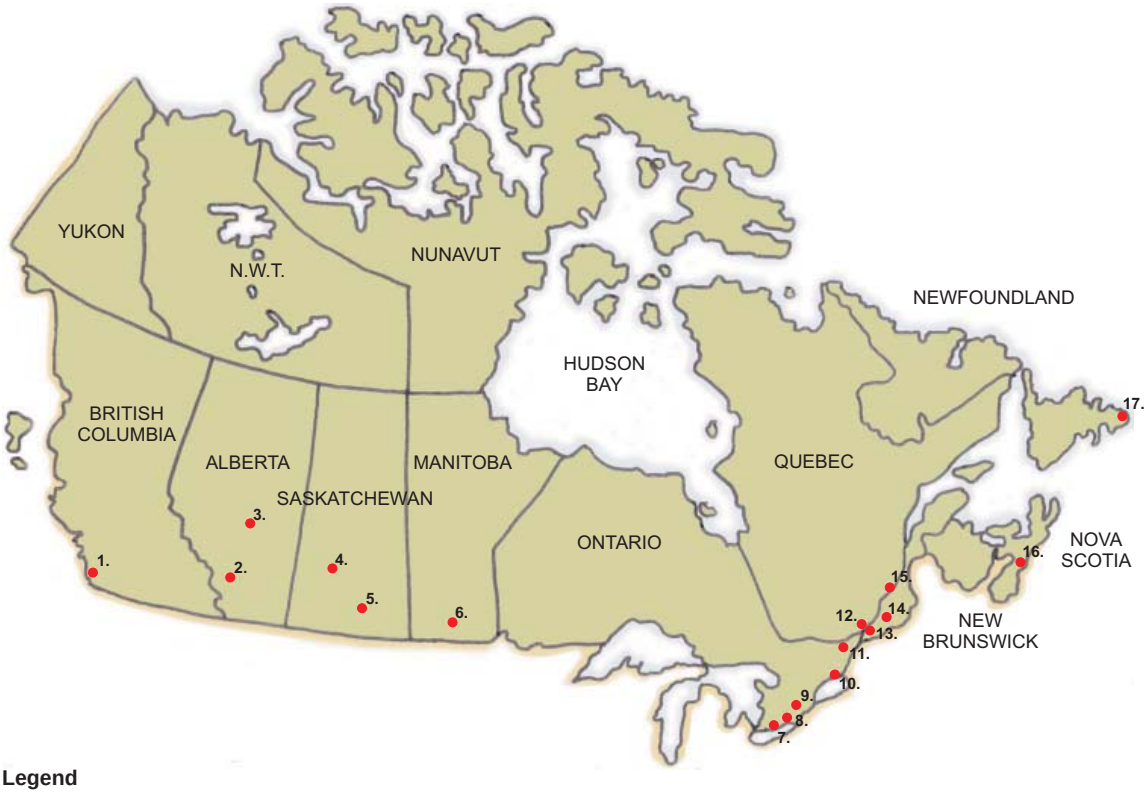
	The Hospital for Sick Children (SickKids) Toronto, Ontario	**McMaster Children's Hospital (MUMC)** Hamilton, Ontario	**Children's Hospital** London, Ontario
Territory	• Treats children 18 years or younger • The hospital does not have a defined catchment area • Children can come from local areas, Ontario, or all over the world as part of the International Patient Program	• Provider of tertiary health care (specialized consultative care) services to children in Hamilton and the surrounding area	• Serves children in southwestern Ontario, from birth to age 17. • Territory includes the counties of Bruce, Gray, Huron, Perth, Oxford, Middlesex, Elgin, Lambton, Kent, and Essex and extends southwest to Windsor, and east to Kitchener • This region amounts for almost 29,000 sq.km

Sources: The Hospital for Sick Children 2007a and 2007b; Hamilton Health Sciences 2007; LHSC, 2008.

TABLE 1.4: Comparison Chart of the Annual Admissions

	The Hospital for Sick Children (SickKids) Toronto, Ontario	**McMaster Children's Hospital (MUMC)** Hamilton, Ontario	**Children's** London, Ontario
Annual Numbers	• Approximately 15,000 children are admitted • Close to 300,000 clinic visits • Emergency room treats approximately 50,000 children • Performs 13,000 operations	• 5365 discharges, and 45,129 visits to outpatient clinics in 2006-2007 • 21,862 visits to the emergency department and urgent care (14,195 were at McMaster) • 68,621 visits to specialized community-based outpatient services	• Approximately 3589 admissions • 779 outpatient visits • 31,540 emergency visits

Sources: The Hospital for Sick Children 2007a and 2007b; Hamilton Health Sciences 2007; LHSC, 2008.



Legend

1. BC Children's Hospital
2. Facility of Medicine, University of Calgary
3. Cross Cancer Institute
4. University of Saskatchewan
5. Allain Blair Cancer Centre
6. Manitoba Cancer Treatment & Research Foundation
7. Children's Hospital of Western Ontario
8. McMaster University Health Sciences Centre
9. The Hospital for Sick Children (SickKids)
10. Kingston General Hospital
11. Children's Hospital of Eastern Ontario (CHEO)
12. Hospital Ste. - Justine
13. Montreal Children's Hospital
14. Centre U Sante du L'Estrie - Fleur
15. Hospital Univ. Laval
16. IWK Health Centre
17. Janeway Child Health Centre

PAEDIATRIC CANCER TREATMENT IN ONTARIO

"Each year, about 1500 children in Canada are diagnosed with cancer. About 10,000 children are currently in treatment" (Childhood Cancer Foundation 2007). In Ontario, approximately 400 children are diagnosed with cancer each year (Camp Trillium 2007).

Most children who develop cancer will survive. Between 2000 and 2004, there was an average of 1276 new cases every year for children aged 0 to 19, and an average of 208 deaths each year from the disease (Canadian Cancer Society 2008c). The 5-year observed survival rate between 1999 and 2003 of the disease was 82% (Canadian Cancer Society 2008c). The five-year survival estimates differ depending on the diagnostic groups (Canadian Cancer Society 2008a). Leukemia is the most common type of childhood cancer. It represents 26% of all new cases and 28% of deaths related to cancer (Canadian Cancer Society 2008a). Lymphomas follow with 18% of all new cases of childhood cancer and 8% of deaths related to the disease (Canadian Cancer Society 2008a). Cancers of the central nervous system represented 16% of new cases and accounted for 24% of deaths related to cancer (Canadian Cancer Society 2008a).

Children represented by the above statistics are treated in one of 17 children's hospitals and childhood cancer treatment centres. Of those seventeen facilities, five are in Ontario. These include Children's Hospital (formerly Children's Hospital of Western Ontario) in London, McMaster University Health Sciences Centres in Hamilton, The Hospital for Sick Children (SickKids) in Toronto, Kingston General Hospital, and Children's Hospital of Eastern Ontario (CHEO) in

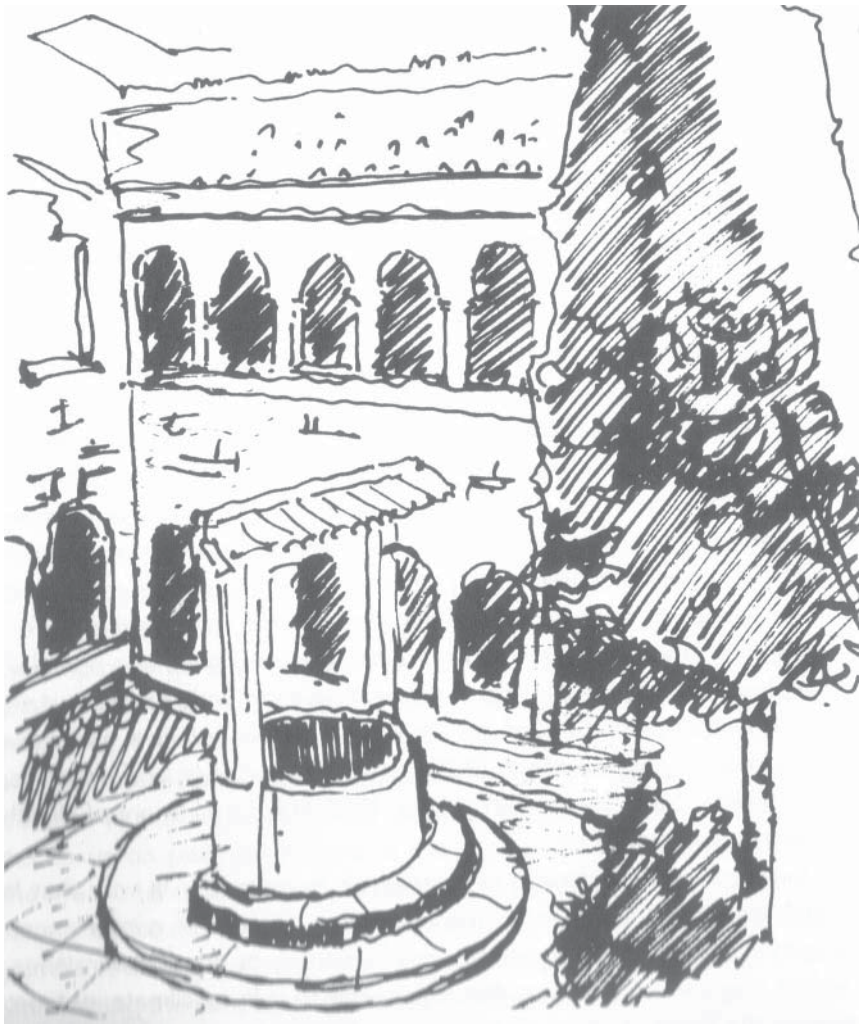
Figure 1.11
(left) Childhood Cancer Hospitals/ Treatment Centres
Author's Diagram recreated from Childhood Cancer Foundation 2007.

Ottawa.

The Provincial Pediatric Oncology Satellite Program (POGO) includes a series of tertiary hospitals and satellite clinics where children can also receive treatment. The three tertiary hospitals include The Hospital for Sick Children, Children's Hospital of Eastern Ontario, and London Health Sciences Centre. Satellite clinics allow patients to receive certain aspects of care closer to their home. The satellite clinics include Grand River Hospital (Kitchener), Orillia Soldiers' Memorial Hospital, Sudbury Regional Hospital, Windsor Regional Hospital, Rouge Valley Centenary (Toronto/ Scarborough), and Credit Valley Hospital (Mississauga).

"On average, 75% of children with cancer survive, but approximately 50% of survivors are faced with significant effects as a result of their diseases and its treatment. These can include sterility, cardiac complications, neurocognitive impairments, secondary cancers and more," (Pediatric Oncology Group of Ontario 2006). The Pediatric AfterCare Clinics ensure follow-up of survivors at regular intervals throughout their lives, as well as promote health, and health education. These clinics are located at The Hospital for Sick Children and the Children's Hospital of Eastern Ontario. The Pediatric and Adult combined AfterCare Clinics in Ontario are located at Hamilton Health Sciences Centre, Children's Hospital, London Health Sciences Centre, and Kingston General Hospital.

If a child is diagnosed with cancer in Waterloo Region, they will most likely be treated at the Children's Hospital in London.



HISTORY OF GARDENING THERAPY AS AN ALTERNATIVE HEALING PRACTICE

> *"Gardens help us heal, and where healing is not possible, gardens can bring peace to the dying," (*Gerlach-Spriggs et al. 1998: 41).

Historically, people have often turned to nature for sanctuary. Ancient Egyptians prescribed walks in the garden for the mentally disturbed. (York 2001).

Gardening has been used as a treatment for a variety of conditions throughout history. During the 300s BC, Greeks used gardens, gardening with music, water sounds, and aromas extracted from flowers to treat mental illness. The Romans also used similar therapies for coping with post-traumatic stress disorder, resulting from war (Larson and Hockenberry Meyer 2006).

Restorative gardens first appeared in Europe during the Middle Ages. Gardens were connected to Christian charitable institutions that cared for the poor and the sick between the tenth through to the fourteenth centuries (Gerlach-Spriggs et al. 1998).

Restorative gardens started to decline when the grounds were no longer charitable adjuncts of monasteries, hospitals, and hospices.

Figure 1.12
(left) A cloister garden
Tyson 1998: 4

> Moreover, during the fifteenth, sixteenth, and seventeenth centuries, the corruption of old charitable foundations and the emergence of political and religious conflict deprived many of the established foundations of their economic resources. As a result, it often proved impossible for the old institutions to provide a decent environment for the sick and disabled poor, (Gerlach-Spriggs et al. 1998: 11).

The restorative garden returned in a new way. "The late eighteenth-century restorative garden, in both its hygienic and therapeutic goals, owed its invention to the convergence of certain ideas and institutions born in previous centuries," (Gerlach-Spriggs et al. 1998: 14).

Garden Therapy Programs were present in American hospitals, institutions, and reformatories by the early 1900's (Rice and Remy 1994). Garden Therapy Programs became a therapeutic tool in North America in the 1970s. The therapy "uses nature and gardening activities to improve body, mind and spirit with the intervention of a trained horticultural therapist," (York 2001: 7). Programs can be found in hospitals, nursing homes, hospices, and prisons. Horticultural therapy programs are becoming increasingly popular with AIDS, Alzheimer's, and cancer patients where medicine is not always able to offer a cure for their disease. This therapy has been shown to help patients heal (York 2001).

> Healing gardens are an age-old therapeutic intervention designed for the restoration of the body, mind, and spirit. From the monastery courtyards and cloistered gardens of the Middle Ages, to the centuries-old Buddhist and Shinto shrines of Japan, to today's application of the concept by healthcare providers and by private homeowners, the tradition of the healing garden demonstrates the value of establishing a transactional connection to nature, (Verderber and Refuerzo 2006: 36).

In 3000 BC, people in Persia first used gardening as a way "of recovering the beauty and pleasure of lost paradise. The first gardens were magical, religious places. Throughout the centuries the garden came to symbolize the highest of human aspirations. Gardens were designed for display, realization, solitude, public events, and spiritual uses," (Verderber and Refuerzo 2006: 36).

> Restorative gardens are for the healthy as much as the sick, and for all ages. For the healthy, such gardens encourage sociability, promote relaxation and contemplation for the solitary visitor, and establish a sense of community among those who live in quarters surrounding a hospice garden. For the sick of body or troubled of spirit, a garden can relax and soothe, as has been proven from antiquity to the present, (Verderber and Refuerzo 2006: 36).

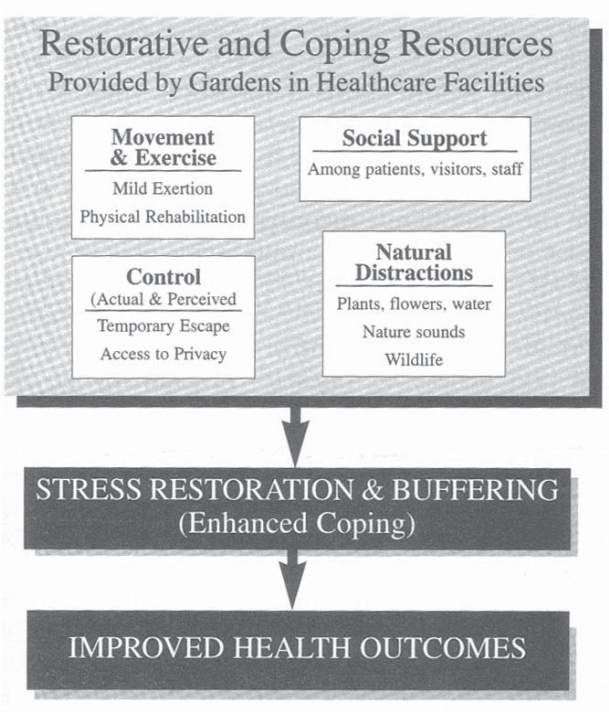


Figure 1.13
(right) Conceptual model: Effects of gardens on health outcomes
Cooper Marcus and Barnes 1999: 37.

ALTERNATIVE HEALING PRACTICES

The healing process involves more than just curing the body; it also includes healing the soul and mind. By providing alternative therapy options for patients and their family members, additional choices are available to help the person or persons learn to cope with the illness. It is up to the users to determine if they wish to participate, and in what capacity.

"Gardens are employed as a means of therapy: as places for the relief of pain, places to assist the patient's struggle for orientation and equilibrium." (Gerlach-Spriggs, et al. 1998: 7).

Garden therapy can help relieve stress. It also provides a type of physical therapy where the person is in control by deciding what tasks they wish to undertake. The act of digging or playing with the earth is also reminiscent of something that most children did at one point or another. For a parent, gardening can provide them with a sense of normalcy in an otherwise uncontrollable situation.

Music and art therapy provide creative outlets for dealing with the emotions associated with being hospitalized. The ability to create something whether in the physical or musical sense can instill feelings of accomplishment, leading to positive feelings and emotions.

Animal therapy and the ability to spend time with a pet while in the hospital offer another normal experience for the child and their family. For children with a family pet, being hospitalized means they have to leave their pet behind and are uncertain as to when they will be reunited. Visiting therapy animals can help to brighten a child's day, reduce loneliness, and allow the child to have a normal childhood experience.

Gardening as Therapy

Gardening can be an enriching and therapeutic experience. Homewood Health Centre in Guelph, Ontario treats Canadians struggling with additions, depression and anxiety, post-traumatic stress disorder, eating and mood disorders, dementia, and schizophrenia. The Centre employs three registered horticultural therapists that provide a variety of plant and nature-related activities and classes in their Conservatory, classroom or outside in the raised therapeutic flower beds. The Centre is located on 47 acres, containing gardens and forest (Hewson 1994).

Figure 1.14
(above) Homewood Health Centre
Homewood 2008

A program is developed for each individual patient based on their needs. The daily horticultural therapy activities help patients develop an awareness of the environment. These activities are also balanced with psychotherapeutic sessions. The intention is that patients will take the newly acquired skills and renewed energy back to their families and community.

"The horticultural environment provides nonthreatening conditions to alter the client's mood and enhance or rehabilitate emotional well being," (Hewson 1994: 29).

"Horticultural therapy is a therapeutic process that uses plants and other horticultural activities to improve an individual's quality of life. Horticulture provides excellent stimuli for the senses – sight, taste, touch and smell," (Hewson 1994: 16).

Horticultural therapy can promote self-esteem, self worth, teach clients practical skills to be used after they are discharged, relieve stress through physical and creative

Figure 1.15
(left) Gardening in Homewood's Greenhouse
Homewood 2008

activity, help teach proper nutrition, and build physical strength (Hewson 1994).

Patients learn to socialize and work together to achieve a common goal when working through group activities. Through gardening they also learn about nature's life cycle (Hewson 1994).

> Researchers such as Roger S. Ulrich of Texas A&M and Mary Honeyman of University of Illinois have found that simply looking at greenery can reduce stress, lower blood pressure, decrease muscle tension and increase positive feelings. Ulrich studied patients in hospital recovering from gall bladder surgery and discovered that those with a view of vegetation had shorter stays, required less medication and were easier to deal with than those looking at brick walls. Cancer patients who gardened regained their normal lives faster than those who did not. Prisoners who overlooked trees and gardens had fewer medical problems and symptoms of stress (York 2001: 5-6).

Music and Art Therapy

Music and Art Therapy provide additional ways that patients can cope with their disease. Although these types of therapy have not been researched in great detail in this proposal, studies have shown that they can greatly help a child battling with cancer. Personal observations show that Bloorview Kids Rehab, in Toronto is one successful example of a facility that incorporates such programs into their care.

Art therapy can help a child to temporarily forget about their disease. It provides a creative outlet and the artwork can also be used as a topic of discussion by therapists and counselors. The art created by the patient, or their families, can also help to personalize their hospital room.

Like gardening as therapy, art therapy helps a patient regain self worth, and satisfaction in the project's completion (Kaye (ed.) and Blee (ed.) 1997). Art programs also help

participants to make choices, communicate, and increase mobility (Kaye (ed.) and Blee (ed.) 1997).

Richard Cook, art critic and writer stated "art is able to provide solace, exhilaration and satisfaction in a huge variety of different forms. Above all it is able to humanize a building, infusing an often soulless and impersonal environment with affirmation…many critical moments in our lives occur there – from birth through to death – and they ought to take place in surroundings which honour their true significance," (Barron and Greeve 1994: 1731-1737 in Kaye and Blee (ed.) 1997: 48).

Music therapy also provides an artistic outlet. Whether it is a child learning to play an instrument and the success associated with such an achievement, or local musicians performing for the patients, families, and staff members, music offers an enjoyable and often touching experience.

Music provides a fresh topic of conversation and it is something special to share with loved ones (Kaye (ed.) and Blee (ed.) 1997).

Art That Heals (ATH) is a non-profit program at the University of California at Los Angeles Medical Centre/Cancer Centre that uses art interventions to reduce stress and help patients manage being confined to the hospital. Strolling Musicians is one of ATH's programs. Volunteer musicians go room to room and play for the patients and their families. The program has been very successful: "we learned rapidly that infants and young children were immediately responsive to live music. You could see instantly how their mood changed from pain and fear to a calmer state. People seemed to be either relaxed or energized by the experience," (Kaye (ed.) and Blee (ed.) 1997: 129-130).

Animal Therapy

Another type of therapy that is becoming more common is animal therapy. The Alberta Children's Hospital, designed by Kasian Architecture, is a recent example of a project that incorporates pet therapy into the program. A dedicated pet visiting room was incorporated with separate entrances for the patient and the animals to ensure the patient's health

and safety. The hospital wanted to have the children come to the pets.

Other hospitals have programs where the pets, often dogs, visit the patient rooms and spend time with the children and their families. Depending on the hospital, family pets may be allowed to visit a child or if not, trained therapy dogs are used. One study discussed in Malkin (1992), found that petting a dog or a cat reduced the test subjects' blood pressures and helped increase endorphin release. Petting a dog can also reduce feelings of isolation and alienation (Malkin 1992).

HISTORY OF NATURE AS A HEALER

"Researchers such as Roger S. Ulrich of Texas A&M and Mary Honeyman of University of Illinois have found that simply looking at greenery can reduce stress, lower blood pressure, decrease muscle tension and increase positive feelings," (Malakoff, David 1998 in York 2001: 5-6).

Roger S. Ulrich studied patients in a suburban Pennsylvania hospital between 1972 and 1981 that were recovering from cholecystectomy (gallbladder removal) surgery (Ulrich 1984). He was interested in determining whether recovering in a room with a view to a natural setting could have restorative influences.

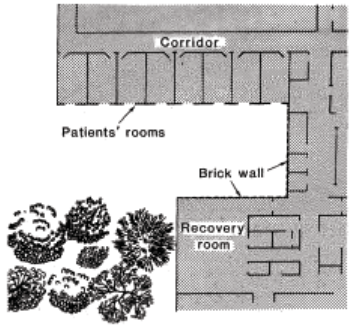


Figure 1.16
(above) Plan of second floor of study hospital showing tree and wall views from patient rooms
Ulrich 1984 in Science 224, No. 4647, 1984: 421

Figure 1.17
(left) Natural Setting, Elmira Lions Trail, Floradale, Ontario
Author's Photograph

Patients were assigned to rooms on the hospital's second and third floors and either had a room that looked out to trees or to a brown brick wall (Ulrich 1984). Each patient room had a window that allowed for an unobstructed view of the outside while lying in bed. Results from surgeries completed between May 1st and October 20th were used as the trees had foliage during these months. Patients between the ages of 20 and 69 that did not have major complications or a prior psychological history were included in the research. The researcher then matched patients so that one had a view to the trees and the other to the brick walls. Criteria for matching patients included, but was not limited to, sex, age, smoker or nonsmoker, weight, previous hospitalization, and year of surgery.

Ulrich (1984) looked at the number of days of hospitalization, number and strength of daily painkillers, number and strength of doses for anxiety medication, minor complications (i.e.

headaches, nausea) that required medication, and nurses' notes detailing patient's conditions and recovery.

The study by Ulrich (1984) found that patients with a view to the trees spent 7.96 days in the hospital compared with 8.70 days for patients with a view to the brick wall. Nurses' notes detailed more negative notes for patients with views to the brick wall. The patients who looked out to the wall required more powerful narcotics while the patients looking out to trees often received less powerful medication such as aspirin and acetaminophen. Findings for anxiety medication produced no major variations between the two groups. It is possible that the wall group was already drowsy or sedated from the narcotic painkillers.

Clare Cooper Marcus and Marni Barnes published a study in 1995 that looked at where people in hospitals went when they were stressed. The study found that 95% of people interviewed reported a positive change in mood after spending time outdoors. Individuals went from feeling stressed, anxious, or depressed to a calmer state (In Cooper Marcus and Barnes 1999). More than two thirds identified that this mood change was triggered by natural elements (i.e. trees, flowers, greenery, colours, and seasonal changes) (Cooper Marcus and Barnes 1999). Over half also declared that this change was brought about by elements that stimulated the senses, such as hearing the sounds of water or a bird call, the smell of fragrances, or through touch (Cooper Marcus and Barnes 1999).

A study published by Francis and Cooper Marcus in 1992, asked 154 university students to recall a place that they had gone to when they were feeling exceptionally upset, stressed, depressed, angry, confused, or grief-stricken. Of the 71% that described going outdoors, 40% described going to a natural setting and 31% mentioned designated outdoor locations including parks or places on campus. The primary characteristics associated with the particular place that were linked to the mood change included natural elements, sensory qualities, an evocation of safety and/or comfort, and the provision of privacy and/or solitude.

In 2008, Anshen + Allen, an international architectural practice, exhibited "Greening the Patient Experience," at

IIDEX/NeoCon 2008. This 400 square foot fully sustainable patient room showed current design concepts related to patient wellness and caregiver safety. “The Green Patient Room emphasizes the need for creating healing environments that deinstitutionalize healthcare, encourage family visits and care, reduce stress for staff, and cultivate wellbeing and comfort for all users,” (Focus on Healthcare 2008). The room design was based on best practices and evidence-based design and demonstrated how a healing environment can improve the quality of life for patients, families, and staff (Focus on Healthcare 2008). The proposal also demonstrated that green materials and technologies can be economically feasible when designing healthcare projects (Focus on Healthcare 2008).

Figure 1.18
(right) Greening the Patient Experience Room 2009
Anshen + Allen 2009

Anshen + Allen incorporated a variety of principles when designing the concept room (Green Patient Room 2008). They wanted to create a safe healing environment for the patient with direct connections between the outdoor and indoor environment. The design incorporates an outdoor terrace that provides access to view, exposure to fresh air, and natural light which help the patient observe the passing of time. The architects also believed in creating a space that promotes the health and well-being of staff and families was also important. Dedicated zones for the staff reduces stress while dedicated family areas provide

comfort and encourage family visits. The firm also believed in minimizing the room's impact on the natural environment through sustainable practices including but not limited to material selection, daylighting, and natural ventilation.

PESTICIDES AND CANCER

The site for the proposed paediatric oncology facility is located in an agricultural area in Floradale, Ontario, near Elmira. Since the pesticide practices of farmers in the area are not known, it is possible that pesticide use could be common on the farms surrounding the oncology facility. Therefore, it is important to have an understanding of the possible links between exposure to pesticides and risks of developing cancer.

"The research to date does not provide a conclusive link between pesticides and human cancer, but evidence does suggest a possible association. Research shows a link with non-Hodgkin lymphoma (NHL), leukemia, multiple myeloma, prostate, kidney, brain and lung," (Canadian Cancer Society 2009).

Since the 1980s, over 100 studies have looked at occupational (work-related) exposure (Canadian Cancer Society 2009). A number of these studies have studied farmers exposed to pesticides and have found a possible link between exposure and a higher risk of NHL (Canadian Cancer Society 2009).

The US Agricultural Health Study, sponsored by the National Institutes of Health, started in 1994 to explore the "potential causes of cancer and other diseases among farmers and their families and among commercial pesticide applicators," (AHS 2009). North Carolina and Iowa were chosen as the two study states. The study only included farmers who have a license to apply restricted-use pesticides (AHS 2009). It is possible that the farmers could have exposure to other items

or practices that could also affect their health (AHS 2009). Although agricultural workers are on average healthier than the general United States population, they may have higher rates of some types of cancers including, leukemia, myeloma, non-Hodgkin's lymphoma, and cancers of the lip, stomach, skin, brain, and prostate (AHS 2009).

In 2007, The Canadian Family Physician also released a review of studies published between 1992 and 2003 on non-Hodgkin lymphoma, leukemia, and 8 solid-tumour cancers: brain, breast, kidney, lung, ovarian, pancreatic, prostate, and stomach cancer. The review found that there is a relationship between exposure to pesticides and developing some types of cancer, particularly in children (Canadian Family Physician 2007).

In 2006, a Canadian research study was released by Brophy et al. that looked at women aged 55 and younger treated at Windsor Regional Cancer Centre with new cases of breast cancer. The two and a half year study looked at the lifetime occupational histories of women with breast cancer (Brophy et al. 2006). The results found that women who developed breast cancer were 2.8 times more likely to have worked in the agricultural industry compared to the control group. The study also found that women who then went to work in the automotive industry were 4.0 times more likely to develop breast cancer than the control group. Women who worked in healthcare after working in agricultural were found to be 2.3 times more likely to develop breast cancer compared to the control group (Brophy et al. 2006).

Another study noted in Brophy et al. found that women who reported being in the fields during or shortly after pesticides were used were at an increased risk of developing breast cancer (Duell et al. 2000). However, there was no elevated risk to developing breast cancer if the women wore protective clothing (Duell et al. 2000).

On April 22, 2009 (Earth Day), Ontario implemented a new pesticide legislation that prohibited the use of pesticides for cosmetic reasons, therefore reducing potential exposure to toxic chemicals and protecting families and young children. Although the Pesticide Act prohibits the cosmetic use of pesticides around the farm house and lawn, it does not

apply to agricultural operations.

When deciding the location of a future healthcare facility it is important to carefully analyze the site on a number of different levels to ensure it is the best and safest place to build. Although there is research that suggests a possible increase in cancer between agricultural workers and exposure to pesticides, the potential healing benefits of the natural environment outweigh the associated risks. By significantly reducing or eliminating the use of pesticides on the neighbouring farmland, the exposure to these toxins will be greatly reduced, in turn, hopefully reducing new cases of cancer.

SUMMARY

This historical review provides insight into the vast advances in medicine, and architecture for healthcare. The evolution of the hospital plans has helped inform the proposed design and will be explained in greater detail in the proposal chapter. The lessons learned from the historical review, research studies, and alternative healing practices have also been applied to the design portion of this proposal and were also used as a framework for developing the design parameters that will be identified in Chapter 3 of this document.

02: HEALTHCARE AND ARCHITECTURE

APPROACH

The second chapter of this document investigates healthcare architectural precedent studies in addition to a variety of Herman Hertzberger's school designs in order to gain an understanding of a variety of different projects that can be used as precedents for the proposed healthcare design. The precedents also help inform a series of design parameters discussed in Chapter 3 of this document.

HEALTHCARE PRECEDENT STUDIES

"Research has shown that the process of healing can be helped when patients feel relaxed and at ease; and in environments that are non-stressful, supportive and easy to comprehend, these features are of even greater importance when patients are long-stay and, perhaps mentally ill," (Kaye (ed.) and Blee 1997: 80).

A variety of precedent studies were examined for this thesis and the following healthcare precedent studies were chosen as they provide examples of buildings or design proposals that incorporate the natural environment, and/or the community into the design. With the exception of the works by architect Eberhard Zeidler, all of the chosen precedents are recent architectural examples. Each precedent was chosen for a number of reasons; some of which include proximity to Waterloo Region (ability to visit), program, close proximity to the natural environment (or proximity to gardens), design choices, and size of the facility. The work by Zeidler provides historical examples illustrating the integration of the natural environment into healthcare facilities.

"Common experience and many consultants tell us that patients benefit from having a good, well designed environment rather than a depressing one; that good natural light, natural ventilation, plants and landscape and a good outlook onto views all conspire to help our feeling of well-being and healing," (Kaye (ed.) and Blee 1997: 77).

Walter C. Mackenzie Health Science Centre

The Walter C. Mackenzie Health Science Centre, located in Edmonton, Alberta, was constructed between 1975 and 1986. Architect, Eberhard (Eb) Zeidler's firm acted as the design architects and along with two local architectural firms worked to complete the large 843-bed university hospital, which was integrated into the university campus (Thomsen 1992). Included in the design were large outpatient research and teaching facilities that were completed in two phases for a cost of $450 million. (Refer to Figure 2.1 for site plan.)

Figure 2.0
(above) Aerial view of university campus
Thomsen 1992: 79

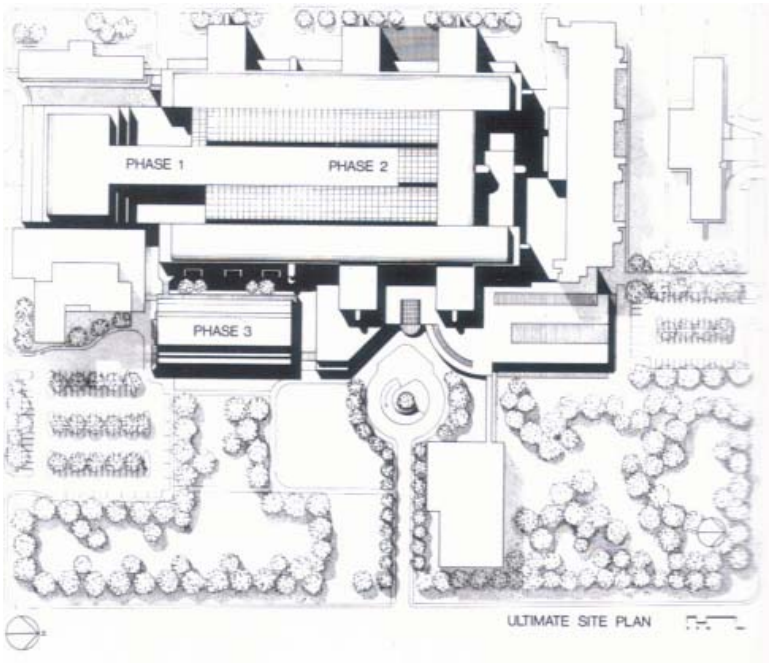


Figure 2.1
(left) Site plan showing phases
Thomsen 1992: 78

The 843-bed facility is divided into smaller 54-bed hospitals or nursing units. Each of the smaller hospitals has its own entrance, common areas, and kitchen (Thomsen 1992: 82).

Since temperatures in the winter can be extremely low, the east and west enclosed atriums, located between three hospital wings, provide spaces that can be enjoyed year round. The glass-enclosed atriums allow natural light to pour into the spaces to create pleasant environments for patients, staff, and visitors. As Zeidler stated:

Figure 2.2
(above) Patient garden inside east atrium
Thomsen 1992: 78

> The key to our overall design was to create a building in which the various departments would work efficiently together as a total unit. The building should also create a cheerful green atmosphere on a year-round basis. All this time I was working much of my time in Edmonton and experienced its dark winters. I would walk in the morning darkness to the hospital, work there all day without seeing daylight and walk back home, in darkness again. I found this extremely depressing and felt that an atrium space filled with green plants that would let daylight in would create a more enjoyable atmosphere for the patients (Thomsen 1992: 82 from Eberhard Zeidler, Private Notes, vol. Health Care, p.32).

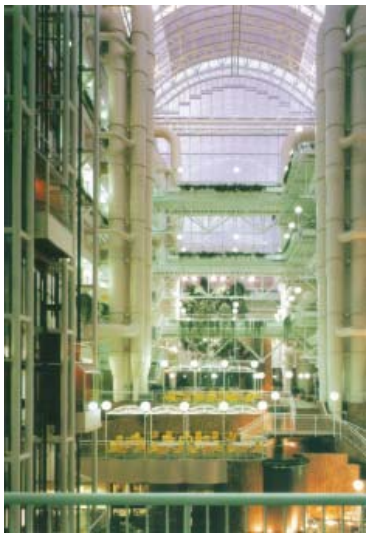


Figure 2.3
(above) West atrium
Thomsen 1992: 81

The atriums differ from one another but some elements include small pavilions, narrow bridges leading to smaller nursing units, cafeteria, a three-storey interior waterfall, trees, tropical plants, and open-air courtyards (Thomsen 1992: 79-80). The atriums act as streets that contain shops, cafes, cafeteria, and outpatient waiting areas (Thomsen 1992: 80). Public glass elevators are a feature in the space while also helping with orientation within the facility. This project marked the beginning of the inclusion of atrium spaces in healthcare facilities.

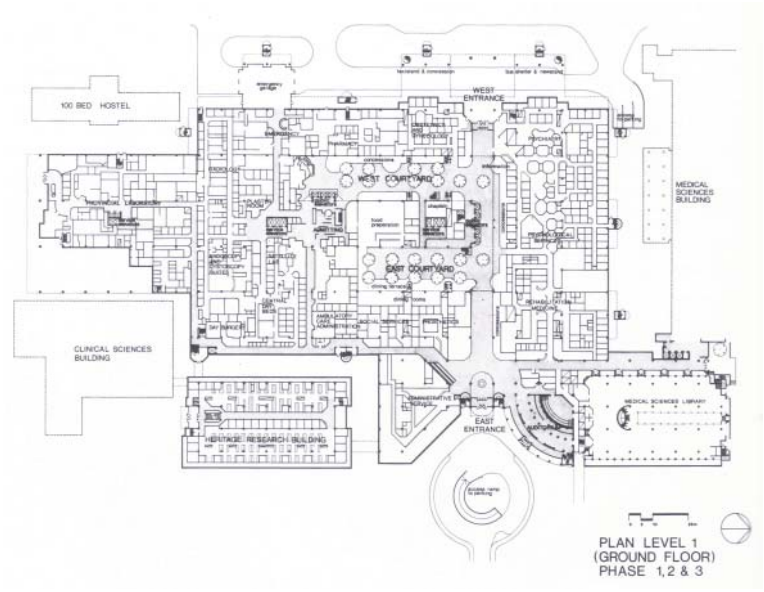


Figure 2.4
(right) Ground floor plan
Thomsen 1992: 80

When Thomsen's book was published in 1992, statistics had shown that since the hospital's opening, patients recovered quicker and there was a 30% reduction in the use of pain medication (Thomsen 1992), proving the spaces are effective.

Bloorview Kids Rehab

Bloorview Kids Rehab, located in Toronto, Ontario serves children from birth to about 19 years old with disabilities, rehabilitation needs, and/or ongoing complex health needs.

Figure 2.5
(above) Aerial Photograph of Bloorview
Google Earth

The $78 million children's rehabilitation hospital was designed by Montgomery Sisam Architects and Stantec Architecture along with Carlyle Design Associates. This 353,000 square foot, 5-storey facility has 75 beds which are made up of single family rooms and shared rooms. The Ambulatory Care portion of the building opened in February 2006 and 24-Hour Care opened in November of the same year. Approximately 7000 outpatients and over 650 inpatients are treated at Bloorview each year.

The design and the program successfully brings the community into the facility. On a recent tour of the facility, Anne Carlyle, the Interior Designer of Bloorview Kids Rehab stated "in a real way this building welcomes children and families from the surrounding communities, both disabled and able-bodied."

Figure 2.6
(above) Pool
Bloorview Kids Rehab 2008

The facility includes Bloorview Research Institute, a recreation pool (open to the public), therapy pool, school, resource centre, art therapy room, playroom, café, outdoor gardens, Snoezelen Room,[1] assistive device fittings, and lodging for family members.

Each patient room has a washroom while a shower is shared between two rooms (access is from the washroom). Sliding doors used in the washroom allow for greater mobility. Family dining and activity rooms are located in the units. Outdoor terraces are accessible from these spaces. Commissioned artwork, located throughout the building, adds interest to the facility.

Figure 2.7
(above) Typical Circulation Corridor
Author's Photograph

1 Refer to Glossary for definition.

Figure 2.8
(above) Grounds from Common Room Balcony
Author's Photograph

Large windows can be found throughout the hospital which allows natural light and views out to the gardens. The location of the site also allows views of the cityscape and the adjacent ravine.

The gardens are zoned to provide both different experiences and different types of paths. Summer art programs mix able bodied children from the community with disabled children. Artists are hired to work with the children and create installations. An example of this is the recent creation of a bamboo water course.

Canadian National Institute for the Blind

Figure 2.9
(above) Aerial Photograph of CNIB
Google Earth

Figure 2.10
(above) Entrance
CNIB 2008

Figue 2.11
(above) Corridor
Author's Photograph

The relatively new $25 million Canadian National Institute for the Blind (CNIB) headquarters in Toronto was completed in 2004 to replace the existing aging facility. Sweeney, Sterling, Finlayson & Co. Architects designed the 140,000 square feet, five storey building. The "Universally Accessible"[2] building for the visually impaired houses the CNIB National Office, the Ontario Division, the Toronto Office, and the Library. The facility also includes fragrant gardens, the CNIB store, conference rooms, and recording studios. Braille books are published onsite. Conference rooms are also rented out to the community as a way of generating income.

The building was not designed to look like it was built for people with disabilities. The architect consciously sought to make the building blend into its surroundings. As an example, there is one entrance for everyone; the design does not segregate.

The entrance canopy was designed to protect people from the elements while waiting for rides and helps to equalize light from the inside to outside. This helps people to adjust to the lighting change.

The halls have been designed so they are wide enough for two wheelchairs or a wheelchair and a guide dog. The materials and lighting were chosen in order not to produce glare. The south stairwell has been designed as an area of safe refuge and allows for five wheelchairs in the case of a fire.

2 Refer to Glossary for definition.

The fragrant garden located adjacent to the building has many textures which helps people with vision problems. Not all people who use the CNIB services are completely blind; many still have some vision. The tactile pathways help define the path of travel. Vibrant coloured flowers were also chosen for people with vision problems. The original gardens at the old facility had trees and plants that were chosen because they attracted birds and butterflies. Even though the gardens were designed to accommodate people with vision problems, they still provide a successful example of fragrant gardens in raised beds that also attract wildlife.

Figure 2.12
(above) Fragrant Garden
CNIB 2008

Camp Trillium

Camp Trillium started in 1984 in London, Ontario. In 1990, Garratt's Island Camp (recently renamed Camp Trillium Oddfellow & Rebekah Island), near Bellville was built. Eight years later, in 1998, Camp Trillium Rainbow Lake opened in Waterford, Ontario. The Rainbow Lake site is 143 acres with a 35 acre private lake.

Figure 2.13
(above) Aerial Photograph of Camp Trillium, Rainbow Lake Site
Google Earth

Camp Trillium is the largest cancer camp program in North America. In 2006, Rainbow Lake had 2900 children at summer camps.

"The Trillium Childhood Cancer Support Centre offers and promotes recreational experiences to bring children with cancer and their families together. The Trillium Centre provides an environment that normalizes relationships and experiences, helping children and families in the healing process and enhancing their quality of life," (Camp Trillium 2007).

Camp Trillium takes a family approach to cancer. Cancer also affects parents and siblings. One of Camp Trillium's approaches is to provide support to families. Their goal is to provide a special place for children living with cancer where they can enjoy childhood and temporarily get away from the disease, stress, and anxieties associated with cancer.

Figure 2.14
(above) Cabins
Author's Photograph

The Rainbow Lake Camp consists of 7 cabins, a bell tower with a rock climbing wall, activity and dining hall, staff cabin, arts and crafts cabin, "Body Shop" (first aid and infirmary cabin), camp daycare, and lake. The camp like setting allows

Figure 2.15
(above) "The Body Shop"
Author's Photograph

Figure 2.16
(above) The Water
Author's Photograph

Figure 2.17
(above) Aerial Photograph of The Darling Home for Kids
Google Earth

Figure 2.18
(above) The Darling Home for Kids
Darling Home for Kids 2008

for archery, canoeing, swimming, nature walks, campfires, and the opportunity to experience the wilderness.

The operating budget for the Rainbow Lake site from May to October is $500,000. It costs approximately $700 to send a child to camp. All services are provided free of charge to families.

Camp Trillium offers sleep-away camp and family camp. A typical Family Weekend Summer Camp will have 30 families. The day camp is a one week program for 4-7 year olds and takes place in London, Toronto, Kitchener, Hamilton, Sudbury and Windsor. Camp Trillium offers 54 programs in Ontario throughout the year which include youth groups and the provision of staff and volunteers at the cancer clinics that play with the children.

Darling Home for Kids

The Darling Home for Kids (formerly known as The Rose Cherry Home for Kids) is located in Milton, Ontario. This paediatric hospice facility delivers programs to children between infancy and 18 years. The facility is owned by the Cedarbrook Society, a non-profit children's charitable organization dedicated to optimizing the care and quality of the lives of children with complex medical care needs by creating a centre based community hospice program. The home was completed in 2004 at a construction cost of $3.5 million.

The home is located on 77 acres of the Niagara Escarpment. The building is divided into a respite wing and a palliative care wing. The respite wing contains two bedrooms that can accommodate two children each, a shower room and Snoezelen area. The palliative wing contains two palliative care suites with ensuite bathrooms, a tub room, and nature nook. The home also has a gathering area, nurse's station, and kitchen. An administration area is located on the second floor. The facility also has therapeutic gardens, a wheelchair playground, trails, and a waterfall. In 2006, a caretaker's cottage was added (Darling Home for Kids 2008).

In September 2008, construction began on phase two of the Darling Home for Kids. This addition will provide the

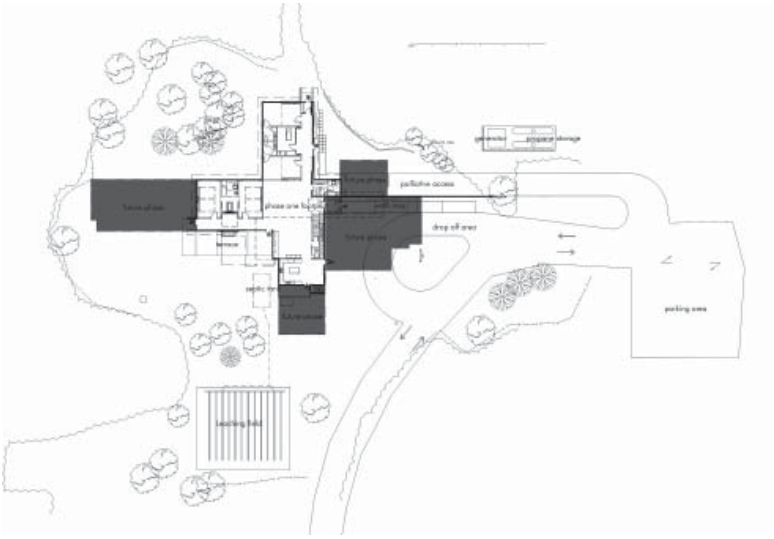


Figure 2.19
(above) Current Floor Plan
Darling Home for Kids 2008

Figure 2.20
(left) Proposed Plan
Darling Home for Kids 2008

Home with a dedicated living area, larger eating space, multipurpose activity room, improved Snoezelen area, three new bedrooms to accommodate an additional 6 beds, and increased storage and mechanical areas (Darling Home for Kids 2008). The addition will allow the Home to reduce the waiting list by providing increased respite and palliative service. It will also allow space to accommodate their programs, events, and outreach services (Darling Home for Kids 2008).

Bay Park Community Hospital

Bay Park Community Hospital, located in Oregon, Ohio was completed in September 2001 for a cost of $53 million. The 29,000 square foot hospital includes 40 Inpatient Rooms, 4 Operating Rooms, 10 Labour Delivery and Recovery Rooms, 4 Surgery Units, Women's Center, Emergency Services, Diagnostic and Treatment, Cardiology and Respiratory and Rehabilitation Services.

Figure 2.21
(above) Bay Park Community Hospital and park
NBBJ 2007

The architect, NBBJ, stated that "the medical campus provides more than treatment for an individual's health; it is a destination where members of the community gather for educational programs, community programs, and recreational activities," (Beaver 2004: 16).

The design incorporates a series of meandering pathways called "the braid." This feature influences the form of the

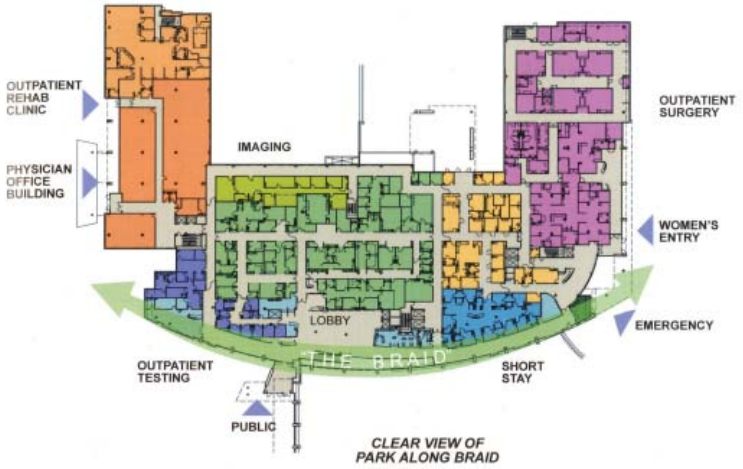


Figure 2.22
(right) Floor plan showing hospital layout
Beaver 2004: 19

Figure 2.23
(above) Central Circulation Spine
NBBJ 2007

building, site character, and building organization. Adjacent neighbourhoods and walking paths around the ponds are connected by pathways. The braid becomes the central circulation spine inside the facility and allows views out to the community park. All patient destination and major departments are located off this main circulation route which runs along the hospital's perimeter.

Figure 2.24
(right) Site Plan
Beaver 2004: 17

The hospital's concept was to bring the outdoors in and help patients and visitors feel a sense of harmony with nature (Beaver 2004).

Good Samaritan Regional Medical Center

When The Good Samaritan Garden in Phoenix, Arizona was completed in August 1996, it was the first garden specifically designed to support the healing process in the Phoenix metropolitan area and one of the first in the United States. Since the garden was finished, wellness gardens have become more recognized and have started to appear in many healthcare facilities specifically in the United States where the healthcare system is still private.

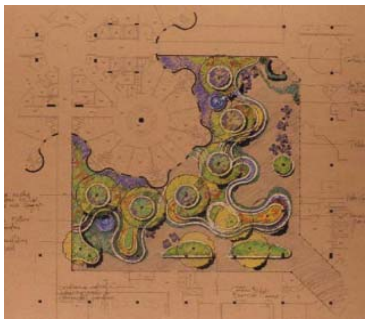


Figure 2.25
(above) Garden Site Plan
Thompson 1998: 68

The 20,000 square foot healing garden is a place where patients, staff, and family members can experience fresh air and observe plants growing. The garden was not only designed to help with the patients' recovery but was also intended to provide comfort for waiting family members, and to offer staff a momentary break from their high-pressure jobs. The garden was "designed to support the healing process by awakening patient's senses of sight, smell, and touch and promoting body movement by inspiring the patient to explore the garden if only in a wheelchair," (Thompson 1998: 68).

The hospital required that there be sufficient room to move around the garden in wheelchairs or stretchers, making the therapeutic garden accessible. All the plants and water in the terraced planters are within reach of the visitors. Low steps resulting from the terracing allow for cardiac-rehabilitation patients to use the garden for exercise. A continuous wall of terraced planters offers seating for anyone who wants to rest or reflect in the garden.

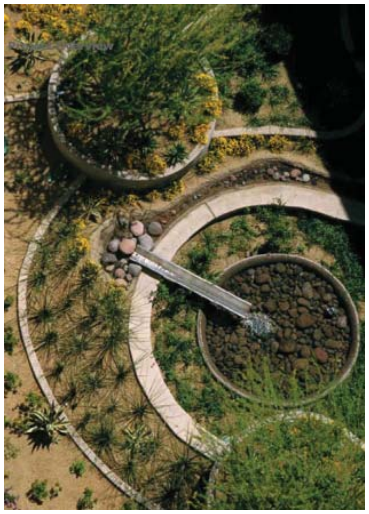


Figure 2.26
(above) Aerial view of Garden
Ten Eyck Landscape Architects 2007

Plants located in the garden were chosen based on their historical medical affiliations and their abilities to attract birds and butterflies. Desert trees were also included to add beauty to the space.

Greening the Patient Experience

At IIDEX/NeoCon 2008, Anshen + Allen, an architectural firm exhibited "Greening the Patient Experience." As discussed in Chapter 1, the 400 square foot fully sustainable patient room showcased current design ideas related to patient wellness and caregiver safety. The design was based on

seven key principles, as previously outlined in History of Nature as a Healer, located in the previous chapter.

The proposed patient room was separated into three zones: the patient zone, the family zone, and the staff zone. A terrace was also located off the room which provides access to views, exposure to fresh air, and natural light, which help a patient to observe the passing time (Focus on Healthcare 2008).

Figure 2.27
(right) Greening the Patient Experience Room 2009
Anshen + Allen 2009

Legend:
1. Staff work area
2. Patient zone
3. Patient Washroom
4. Family Zone
5. Outdoor Terrace

The patient zone features non-institutional approaches to design including a headwall that contains medical gases that are hidden behind the millwork, but still remain accessible to staff members, as well as the wood-paneled ceiling. The patient is also given greater control over their personal comfort (Focus on Healthcare 2008).

A dedicated staff work area at the entrance to the room helps reduce stress. Modular millwork is included in the room which allows for greater flexibility in reconfiguring rooms and to accommodate staff preferences.

The family zone includes features characteristic of a living room, including sleeper sofa, workspace, wall unit, and television. The workspace allows family members to work from the hospital room which in turn reduces stress, and allows them to stay for longer periods of time.

Figure 2.28
(left) View of 2009 Patient Room from Family Zone
Focus on Healthcare 2009

"Green Patient Room emphasizes the need for creating healing environments that deinstitutionalize healthcare, encourage family visits and care, reduce stress for staff, and cultivate wellbeing and comfort for all users," (Focus on Healthcare 2008). The room design was based on best practices and evidence-based design and demonstrated how a healing environment can improve the quality of life for patients, families, and staff (Focus on Healthcare 2008). The proposal also demonstrated that green materials and technologies can be economically feasible when designing healthcare projects (Focus on Healthcare 2008).

After receiving considerable feedback from the 2008 exhibit, Anshen + Allen returned to IIDEX in 2009 with a slightly modified patient room. One of the significant changes was the patient headwall that had been relocated from behind the millwork, to the side to provide greater access for the caregiver. Another important change was the location of the patient washroom. The original design showed the washroom across from the bed, while the new design brings the washroom closer to the patient bed for greater access and to reduce patient falls.

BUILDING FOR CHILDREN

Architect Herman Hertzberger, in the course of his design career, pays particular attention to various design details related to the child and their interactions and relationships with the building and its users.

For example, in the Delft Montessori School in the Netherlands, he designed L-shaped classrooms to provide different areas of concentration and to facilitate different types of learning. The area off the main classroom can be used for various activities during a teaching lesson or for children working individually or in small groups without distracting the larger group. In the corridor Hertzberger also designed the podium block which acts as both a place for formal gatherings and spontaneous acts (Reinink 1990). Porch-like spaces in the Apollo Schools offer areas for individual study or workspaces. Although this space is outside the classroom, it is still in close proximity for supervision. These work surfaces contain their own light, bench, and are enclosed by a half wall for some privacy.

Hertzberger (2002) was also interested in softening the threshold from outside to the inside. The entrance at the Delft Montessori School was designed as a place where children can be welcomed when they arrive, and also as a place where they can wait after school for their friends. The low walls provide seating options. The entrance is also a place where parents can wait and get to know one another. The playground is not closed off from the neighbourhood; it remains open so local children can use it after hours.

Figure 2.29
(left) Podium Block at Montessori School Delft
Hertzberger 1987: 53

In the majority of Hertzberger's school designs, he

incorporates a common space or hall (the heart of the school) that can accommodate both large and small groups. In the Apollo Schools (Amsterdamse Montessori and Willemspart Primary Schools in Amsterdam), this central amphitheatre or open-air classroom accommodates a variety of activities that extend beyond the typical classroom. In De Koperwiek Primary School Venlo, also in the Netherlands, Hertzberger created a central sunken area which functions as a city square.

Figure 2.30
(above) Central Amphitheatre in Apollo Schools
Hertzberger 1987: 278

In Montessori College Oost in Amsterdam, particular attention was given to the spaces beyond the classrooms. Stairs were designed larger to provide places for seating. This provides opportunities for lessons to be taught outside the typical classroom spaces. The large stairs also provide places for students to meet outside of classes. “Stairs, landings, voids and open spaces were designed spacious to invite encounters and impromptu discussions,” (Hetzberger 2002: 165).

Hertzberger also believed it was important that children have a place to display things they have made. In the Delft Montessori School, display cases outside of the classrooms not only provide places to display the work created in each of the classrooms but also act as a transition between each classroom and the hallway space. The cases offer a quick glimpse into the class.

Many of Hertzberger’s ideas about spaces and design details for children can be applied to a paediatric healthcare facility. In particular these include entrances that welcome the child and provide seating options, spaces inside the building for chance encounters, and display cases outside patient rooms where personal items about the child can be displayed to offer a glimpse into the child’s life.

A series of anthropometric measurements of children have been compiled and can be found in Appendix A.

SUMMARY

Many precedents have helped inform the proposed design and the design principles that will be outlined in Chapter 3 of this document. Observations of a wide range of architectural projects helped introduce non-institutional elements into the design.

Although the Walter C. Mackenzie Health Science Centre is much larger than the proposed paediatric oncology facility, it is still an excellent example of a way to introduce nature and natural light into the design which can be enjoyed year round. It also reinforces the idea that creating a pleasant healing environment can reduce patient recovery time and lower the need for pain medication. The project's two atriums contain smaller spaces, an idea which can be applied to the proposed design. The notion of the smaller nursing unit with their own common areas and kitchen is also something that has been applied to the proposed design.

Bloorview Kids Rehab is an excellent example of a regional facility that invites the community into the hospital through various design elements and programs. The surrounding gardens also play an important role in the design and program delivery.

The Canadian National Institute for the Blind (CNIB) headquarters, located adjacent to Bloorview Kids Rehab, was built as a Universally Accessible building. Fragrant gardens surrounding the building are an important feature of the design.

Camp Trillium is a childhood cancer camp that helps children

to temporally escape from the disease and its' associated worries and have a normal childhood experience. This precedent was chosen because of its close proximity to Waterloo Region, but specifically because of the program and connection to the natural environment.

The Darling Home for Kids is a small hospice facility, located in a natural setting between Waterloo Region and Toronto. Therapeutic gardens, trails, and a waterfall are all available for patients, staff members, families, and visitors to enjoy. This precedent was also chosen because of the size of the facility and the hospice element.

Bay Park Community Hospital is an example of a facility in the United States that was designed to be a vital connection and destination place for the community. Nature paths are located throughout the grounds and are used by the patients, visitors, and the community. Patient rooms also have views of the grounds which allow bedridden individuals the opportunity to experience the natural environment by simply turning their head. The hospital believes in family centered care and includes a family space in the patient rooms.

Good Samaritan Regional Medical Centre in Phoenix, Arizona was one of the few healing gardens in 1996. Since then, wellness gardens have become more accepted and are appearing in many healthcare facilities in the United States. Since Canada's healthcare system is government funded, the funding structure often does not allow for such spaces and healthcare facilities are often forced to raise the money on their own or eliminate the garden from the project. The Good Samaritan Garden is successful for many reasons. Not only is it accessible to all who wish to use the space, but it also offers a place of escape and quiet contemplation for patients, families, and healthcare workers and therefore served as a great resource for wellness gardens.

Greening the Patient Experience offers an example of a fully sustainable patient room that deinstitutionalizes healthcare. The room incorporates the three zones: patient, family, and staff which have been incorporated into this design proposal. The room layout allows for a family-centered care approach. The design also provides a connection to the

natural environment through a series of large windows and a balcony which also informed the proposal outlined in the following chapter.

Herman Hertzberger's school projects provided successful examples of schools designed with the child in mind. Display cases, play space, areas for chance encounters, and interactions are just a few of the kid-friendly elements incorporated into his designs.

03: A PROPOSAL

METHOD

This thesis proposes a set of design principles that can be used in future healthcare projects where there is an interest in improving the healing environment through a connection to nature, the community, and/or the users. These design parameters were developed by researching existing healthcare facilities, architectural precedents, studies that involved healthcare and the environment, and site visits to various facilities.

The first section of this chapter proposes a series of design principles and strategies that can be applied individually or as groups to future healthcare projects. A site analysis identifies the existing conditions in Floradale and Waterloo Region and helps inform the proposed program. A discussion of the patients, treatment timelines, and the existing local oncology services also aids in the proposed program and design. A final section discusses the green or sustainable design elements incorporated in the proposal.

DESIGN PRINCIPLES

The design principles were developed after completing a thorough literature review, examining various precedent studies, and through site visits to healthcare facilities. The following design principles outline elements of a successful healthcare project that incorporates nature and the community in order to create a holistic approach to the healing process. These principles have been applied to the proposed paediatric oncology facility discussed later in this chapter.

DESIGN PRINCIPLE	DESCRIPTION	PRECEDENT STUDY	PRECEDENT STUDY EXPLANATION	APPLICATION IN PROJECT
A. Select a site that is in a rural area	As cities grow and expand outward, a site removed from the urban core, protected from heavy development, or in a protected environment is vital to maintaining a green environment.	Camp Trillium, The Darling Home for Kids	*Camp Trillium's Rainbow Lake* Site is located in Waterford, Ontario, about 11 km from the town of Simcoe. The camp is approximately an hour and twenty minutes away from Kitchener/Waterloo. The area surrounding Waterford is primarily agricultural land. The Rainbow Lake site is made up of 143 acres with 35 acres of private lake. The location and size of the property ensures that the site will remain protected from heavy development in the future. *The Darling Home for Kids* is located in a rural area north of Milton on the Niagara Escarpment. The home is surrounded by 77 acres of woodlands. As is the case with the Rainbow Lake Site, this location allows the site to remain tucked away, protected from heavy development in the future.	By locating the proposed paediatric oncology facility in Floradale, a small rural community in Waterloo Region, it offers an escape from the city and the hectic life associated with it. This rural area offers fresh air, no smog, and peace and quiet. The area surrounding the site (Woolwich Reservoir) is protected from future heavy development, ensuring that the site will remain green in the future. Even though the site is located in a rural area, it is still in close proximity to amenities and required services.
B. Select a site that is located in close proximity to the natural environment	Site selection can offer natural views, opportunities for exploration, and exposure to wildlife, such as birds and butterflies.	Bloorview Kids Rehab, Camp Trillium, Bay Park Community Hospital	Although *Bloorview Kids Rehab* was built in a large city, it is still an excellent example of a facility that is located in close proximity to the natural environment. Situated on 11 acres of land adjacent to a wooded ravine, the site and building orientation allows for views of mature trees and wildlife around the ravine. *Camp Trillium's* natural setting provides easy access to the outdoors, just by stepping outside one of the cabins or camp buildings. The site allows for an exploration of nature and potential wildlife sightings, both on land and by water on the private lake. *Bay Park Community Hospital* offers an example of a hospital located near a residential community that is still near a series of green spaces. Three parks surround the hospital and offer pleasant views from inside the facility. A series of pathways connect the hospital to the parks but also to the adjacent communities, so the parks can be enjoyed by all.	The proposed site is located adjacent to the Woolwich Reservoir and Elmira Lions Lake Trail. The site location allows for views of the wooded area surrounding the reservoir as well as views of the adjacent fields. This location also provides an opportunity for bird and wildlife sightings. The trails and reservoir provide opportunity for exploration and recreational activity including hiking, biking, horseback riding, snowmobiling, cross country skiing, as well as various water sports and fishing.

DESIGN PRINCIPLE	DESCRIPTION	PRECEDENT STUDY	PRECEDENT STUDY EXPLANATION	APPLICATION IN PROJECT
C. Develop a connection to the natural environment (including views)	The building design and landscaping plans must be coordinated. A variety of gardens for different uses to add interest, give depth, and increase user enjoyment should be provided. Landscaping is also presented to accommodate bedridden patients.	Bloorview Kids Rehab, Bay Park Community Hospital, Good Samaritan Regional Medical Center, Roger S. Ulrich (1984)	*Bloorview Kids Rehab* provides various views to the adjacent ravine and landscaped garden and play area. A large green roof, planted with grasses and wildflowers, creates a place where birds and other wildlife visit. The garden is visible from the upper floors of the hospital but it is best viewed from the waiting area on the second floor. A variety of outdoor terraces have been provided on the patient wings. Outdoor terraces are located off of the patient wings and provide access to the outdoors. Unfortunately these spaces are not actively used and have been locked by the hospital. The design of *Bay Park Community Hospital* provides clear views of the parks all along the circulation braid. Landscaped paths provide access from the facility to the various parks. *Good Samaritan Regional Medical Center's* healing garden is a place where patients, visitors, and staff members can escape from the stressful hospital atmosphere and enjoy nature. The garden was designed to accommodate wheelchairs and stretchers to ensure everyone could use the space. *Roger S. Ulrich's 1984* study proved that patients recovering from surgery who were able to look outside and see nature healed quicker and required less pain medication than those who looked out to a brick wall.	Wherever possible in the design, large windows have been provided which extend within a foot of the floor and offer views to the surrounding grounds, gardens, and natural environment beyond. The large windows in the patient rooms allow for bedridden patients to simply turn their head to see the gardens outside. Various gardens and natural features have been provided both inside and outside the facility to allow users to have a choice of natural environments that will meet their needs. Raised planters and landscaping allows those in wheelchairs to work in the gardens or be able to reach out and touch the plants and water features.
D. Create a warm and welcoming environment	Open and airy spaces, choices, and a sense of control are provided.	Entrance at the Delft Montessori School, designed by Herman Hertzberger	Architect Herman Hertzberger designed the entrance at *Delft Montessori School* to be a place that functioned in a variety of ways. It is a place where children are welcomed before school, a spot where they can wait for their friends after school, and also provides a comfortable place for parents to wait for their children and get to know one another. Hertzberger made every attempt to soften the threshold from outside to inside. The playgrounds are also open outside of school hours, welcoming the neighbourhood kids into the space.	The double height spaces, clerestory windows, glulam beams and columns, and large rooms and spaces provide an open and airy environment that is enjoyable by all. Information desks are located at entrance to the facility and the wings which helps to welcome visitors and provide direction. Large windows, views to the outdoors, and access to the gardens provides a warm environment. Private patient rooms provide the child and their family a space that they can call their own. Unconventional lighting in the room also provide the users with greater control over this space.

DESIGN PRINCIPLE	DESCRIPTION	PRECEDENT STUDY	PRECEDENT STUDY EXPLANATION	APPLICATION IN PROJECT
E. Create a child-friendly environment	Look at the space through a child's eye. Provide interest for the child, and create opportunities for independence.	Delft Montessori School in the Netherlands, Montessori College Oost in Amsterdam, the Apollo Schools	Herman Hertzberger took particular care in designing the various details for children in his school projects. In the *Delft Montessori School* he included a podium block in the corridor that can be used for spontaneous acts, but also for larger gatherings. Display cases outside classrooms provide places where children can show their work and feel a sense of accomplishment. In the *Montessori College Oost*, stairs were designed larger to provide places for seating to create places for change encounters and also for larger gatherings. In the *Apollo Schools*, an open-air classroom serves as the heart of the school and can accommodate a variety of activities outside the typical classroom for both small and large groups.	A variety of child-friendly design features and spaces have been incorporated into the proposed design. Patient rooms have been designed larger to provide a place for children to play. Lower windows allow small children to see outside without having to climb onto something. Patient room washrooms contain steps to the bathtub, additional room around the tub, and moveable steps that smaller children can use to reach the sink, which all provide children with independence. Corridors contain chalk-style games on the floors that children and families can play. Art display walls, and whiteboards provide a place where children can express their creativity. A Playroom/Multi-Media room on the wing provides a place that children can play with one another, while a Teen's Room gives older children some independence. Covered outdoor play areas allow children to play outside and still remain protected from the sun.
F. Provide opportunity for a family-centered approach to healthcare	Incorporate family spaces into the patient room and the entire design.	Bloorview Kids Rehab (family rooms and common spaces), Greening the Patient Experience	The design of *Bloorview Kids Rehab* includes numerous spaces that can be used as precedent examples because they successfully cater to the family. Family sleep rooms are located on the upper floor of the hospital and provide a comfortable and affordable place for parents and family members to stay when a child is hospitalized. They also provide a place for children who are outpatients and their family to stay while treatment is taking place. Common rooms included in the design that have acted as references for this proposal include family dining and activity rooms located on the units. The *Greening the Patient Experience* hospital room successfully incorporates three zones into the design: the patient zone, the caregiver zone, and the family zone. By providing space where the family can feel welcomed, they will feel comfortable and want to spend more time with the patient and can be a partner in the medical care of the patient.	Each patient room incorporates a family zone where parents can stay with the child and be actively involved in their care. Extra storage space has been provide in both the patient room and the washroom for the family's personal possessions. Patient wings contain family friendly spaces that family members can use while their child is admitted. These include Family Rooms, lounges, Teen's Room (for teenage family members), and Play Rooms/Multi-Media Rooms. Four family sleep rooms have also been included in the design which provide larger families with a place to stay while their child is in the hospital.

DESIGN PRINCIPLE	DESCRIPTION	PRECEDENT STUDY	PRECEDENT STUDY EXPLANATION	APPLICATION IN PROJECT
G. Provide a sense of community	Incorporate spaces for interaction; create units for similar aged children.	Bloorview Kids Rehab, Bay Park Community Hospital, Walter C. Mackenzie Health Science Centre	*Bloorview Kids Rehab* provides an example of a hospital with a program that helps integrate the surrounding community into the facility. Their various summer art programs bring together able bodied children from the community with patients at the hospital. The program helps teach the children that they should not fear going to a hospital. It also teaches acceptance and understanding - children who are hospitalized or have disabilities are kids too. The hospital also creates its own internal communities on the care units by providing common spaces where patients and their families can get to know one another. For example, the family rooms and dining areas, lounge areas, and the childcare space are all places where parents and children can come together. *Bay Park Community Hospital* provides an example of a building that opens its doors and welcomes in the surrounding community. It is a place where the community gathers together for educational programs, community programs, and recreational activities within the hospital and in the surrounding parkland. *The Walter C. Mackenzie Health Sciences Centre* is an example of a large facility that is broken up into smaller nursing units. Each of these units has its own entrance, common areas, and kitchen which provide places for interaction and allow patients and family members to get to know one another.	The proposal offers a possibility for connections with existing services. There is an opportunity to link with the elementary school for educational events and programs. Patients can benefit from interacting with children outside the facility as it provides a normal childhood experience. Students also benefit because it will help them to learn about childhood illness. The Senior's Residence can be linked with the facility through volunteering, baking, gardening, and storytelling. This connection will not only benefit the patients, their families, and the staff of the facility, but also the seniors. For those seniors who are lonely, this connection can offer them companionship and opportunities to stay active. The two churches can provide additional spiritual services to the proposed facility. The new facility not only offers new jobs and volunteer opportunities but it also provides spaces and services that the community can use including the Resource Library, Multi-Purpose Room, Chapel, Coffee Shop, and public healing gardens. The proposed facility's design also provides an internal sense of community. The patient wings have been divided into similar age groups which allows children at similar places in life to interact with one another. The patient size allows patients and family members to get to know one another during their stay. Various spaces have been designed in the patient wings and throughout the facility that provide opportunity for interactions and include lounges, healing gardens, corridor play spaces, and the Coffee Shop.

DESIGN PRINCIPLE	DESCRIPTION	PRECEDENT STUDY	PRECEDENT STUDY EXPLANATION	APPLICATION IN PROJECT
H. Recognize, incorporate, and build upon the existing services present within the surrounding community	Work to expand the existing medical services within the region. Work with the existing community services in the immediate and greater surroundings.	Bloorview Kids Rehab, Camp Trillium	*Bloorview Kids Rehab* saw a need to create an art program where both able-bodied and hospitalized children could interact with one another. Although it is not a medical service, the program still helps with the healing process in various ways through creativity and art therapy. When *Camp Trillium* started in 1984, it was the first camp of its kind dedicated to offering recreational experiences for children with cancer and their families. The longevity and expansion of the programs prove that the services are needed. It offers an example of a proposal that was unique at the time and has proven to be successful.	The new paediatric oncology facility recognizes the existing services available at the Pediatric Oncology Group of Ontario's (POGO) Satellite Clinic located at Grand River Hospital. The intent is that the Satellite Clinic will be relocated from Grand River Hospital to the new facility in Floradale and existing services will be expanded on. A child will now be able to receive their initial diagnosis, treatment, and follow-up in the region.
I. Create a first-rate medical facility	Create a medical facility that is well programmed, promotes healing, and attracts excellent staff. Such a facility should reduce staff turn-over rates.	The Hospital for Sick Children (SickKids), McMaster Children's Hospital, Children's Hospital in London, Ontario	*SickKids, McMaster Children's Hospital, and Children's Hospital* are all well known for their level of patient care. For further information refer to the Comparison Charts of these three hospitals in Section 01: Background.	The proposed paediatric oncology facility will provide comprehensive paediatric oncology services to Waterloo Region and the surrounding communities. Children will be able to receive their initial diagnosis and any future treatment close to home at the new facility. The new facility will provide additional jobs in the region. The open and airy spaces, warm and welcoming environment, healing gardens, positive staff working conditions, and community connections will hopefully help to attract excellent staff and reduce staff turn-over rates.

THE SITE

The proposed paediatric oncology facility will be located in Waterloo Region to meet the needs of the area's rapidly increasing population. There are approximately 130,000 children under the age of eighteen in the region (Statistics Canada 2007). The proposed oncology facility will serve these children, their families, and the surrounding community.

Since 1993, the population in Waterloo Region has increased 1.9% on average per year (Region of Waterloo 20xx). At the end of 2008, it was estimated there are approximately 533,700 people living in the region which includes full-time college and university students (Region of Waterloo 20xx). By 2031, the region's population is expected to reach 729,000 (Region of Waterloo Public Health 2006b). The number of children age 0-6 is expected to increase by 31.6% by this time (Schumilas 2007). "Preliminary population projections indicate that the townships of North Dumfries, Wilmot, and Woolwich will experience the highest rates of growth of all the municipalities in Waterloo Region over the next twenty-five years," (ROW Public Health 2006a).

The proposed site is Floradale, a small rural community in Waterloo Region, approximately 15 km from Kitchener/ Waterloo. Floradale is situated in Woolwich Township, at the north end of Waterloo Region. The site is located directly adjacent to the Woolwich Reservoir at the corner of Highway 21 (Arthur Street North) and Florapine Road. It was chosen because of its close proximity to the natural environment and also because the natural environment surrounding the site is protected from heavy development. Camp Trillium

Figure 3.0
(above) Context map
Author's Diagram

Figure 3.1
(above) Waterloo Region
Author's Diagram

Figure 3.2
(left) Elmira Lions Trail, Floradale, Ontario
Author's Photograph

and The Darling Home for Kids offer precedent studies that helped inform the process for making the decision to locate the proposed facility in an area that will be protected from heavy development, and as a result maintain a green environment over time. The proposed site also provides opportunity for increased exploration and physical activity on the surrounding trails, as well as the potential for camp-like experiences, such as canoeing and various water sports. The close proximity to community services discussed later in this chapter was also part of the deciding factors in the site selection process. This area of land is currently used as farmland. Although it is located in a rural area, the proposed facility is still in close proximity to the urban core and two existing general hospitals in the region. Based on the rapid population growth of the region, the city boundaries are quickly expanding outwards, closing the gap between Floradale and Kitchener/Waterloo.

Figure 3.3
(above) Existing entrance to farm field
Author's Photograph

Figure 3.4
(left) Proposed site (existing farmland)
Author's Photograph

The Community

According to the 2008 Population of the Individual Settlements within Woolwich Township, Floradale has a population of 205 people.

Although a large portion of Floradale and the adjacent area is farmland, there is still a small residential settlement.

Floradale and the surrounding community consist of a large Mennonite population. Mennonite groups in the area include Modern Mennonites, Old Orders, Conservatives, Waterloo Markham Mennonites, and Mexican Mennonites (Anonymous 2007). The majority of Mennonites who would live near the proposed Paediatric Oncology Facility are Conservative (Anonymous 2007). The Mennonite Story, a local museum, is located in nearby downtown St. Jacobs and provides an overview of Mennonites in the area, their history, culture, and faith.

Healthcare

Waterloo Region has four hospitals: Grand River Hospital (formerly KW Hospital) in Kitchener, St. Mary's Hospital in Kitchener, Freeport Hospital (Long Term Care) in Kitchener, and Cambridge Memorial Hospital, in Cambridge.

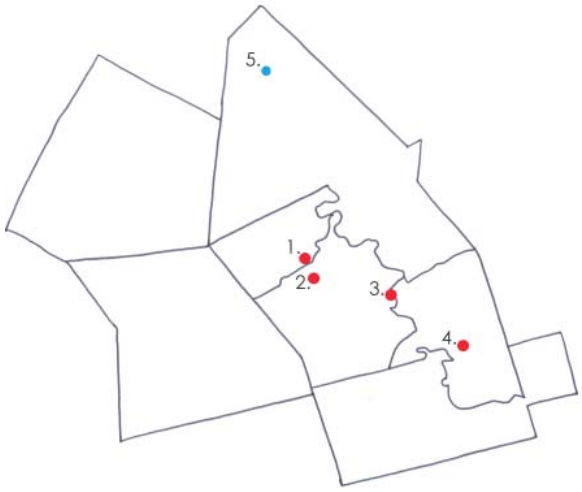


Figure 3.5
(right) Healthcare Facilities in Waterloo Region,
1. Grand River Hospital
2. St. Mary's General Hospital
3. Freeport Health Centre
4. Cambridge Memorial Hospital
5. Proposed Paediatric Healthcare Facility
Author's Diagram

The Woolwich Community Health Centre (WCHC) is located in St. Jacobs, approximately 4 km away from Floradale, and serves a geographical catchment area that includes Woolwich Township. This non-profit organization is funded by the Ontario Ministry of Health (not by OHIP) and provides services to residents in the defined catchment area. A number of the programs and services at WCHC are for the 'priority populations' which is a group of people that face barriers to health and to accessing healthcare. The 'priority population' includes seniors and their caregivers, rural and

farming families, and families with young children under the age of six.

St. Jacobs is also home to the St. Jacobs Midwives. A significant number of their clients are from the Mennonite or surrounding communities. Even though this service is not relevant to the proposed facility, it provides an understanding of the medical services available to residents.

Emergency Services

The Township of Woolwich operates five volunteer Fire Departments. They are situated in Conestogo, Elmira, Floradale, Mayhill, and St. Jacobs. A new Station was recently constructed and is located at 50 Florapine Road. The Woolwich Fire Departments provide emergency services within its boundaries and the neighbouring municipalities (Township of Woolwich 2008).

Figure 3.6
(above) Original Floradale Fire Department
Author's Photograph

The closest Police Station is located in Elmira on Industrial Drive.

The Region of Waterloo Emergency Medical Services has eight stations in Kitchener, Waterloo, Cambridge, St. Jacobs, and Baden and serves approximately 1382 sq. km of Waterloo Region (Region of Waterloo Public Health 2008). The station in St. Jacobs is situated on Parkside Drive.

Figure 3.7
(above) St. Jacobs EMS Station
Region of Waterloo Public Health 2009

Education

In 2005, The Ontario Early Years Centres published a report in Waterloo Region entitled "A Community Fit for Children: A Focus on Young Children in Waterloo Region." The research study looked at the needs of children under the age of 6 in terms of requirements for healthy development. The report was divided into four categories: family, community, health and safety, and early learning. Waterloo Region was then divided into 45 neighbourhoods to examine each of the four categories.

Floradale was classified as Woolwich Rural North. The study found that there are a significant number of low income families with children in the area. Education, defined as the percentage of people aged 20+ without a high school

diploma, was found to be in the bottom third compared to the region (The Ontario Early Years Centres). These findings could be a result of the large population of Mennonites and farmers who stopped school after a certain age to help out with the family farm.

Figure 3.8
(above) Floradale Public School
Author's Photograph

Floradale Public School, located on Florapine Road, across the street from the proposed paediatric facility, educates approximately 227 students from Junior Kindergarten to grade eight (Waterloo Region District School Board 2008b). The school community is composed of students from rural and farming areas in Floradale, Wallenstein, Yatton, and Hawkesville. Almost half of the student population comes from the Mennonite Community.

The school has 9.83 acres of playground for the students to enjoy (Waterloo Region District School Board 2008b). Floradale Public School also uses the Woolwich Reservoir and the Lions Lake Trail for environmental education and to teach students about the outdoor ecological system.

Music is also an important part of the school's program. The school's choir is made up of 200 students who perform together in the spring (Waterloo Region District School Board 2008b).

Elmira District Secondary School (EDSS), located in Elmira on University Avenue, serves the Township of Woolwich. Approximately 1100 students are currently enrolled at EDSS and another 80 Mennonite students are enrolled in the "Elmira Life and Work School" program which takes place off site (Waterloo Region District School Board 2008a).

Childcare

According to the study "A Community Fit for Children," the number of licensed centre-based child care spaces for children aged 0-6 and the number of licensed home child care spaces for ages 0-12 is significantly low in this area (The Ontario Early Years Centres). Again, this could be due to the large Mennonite population.

Eldercare

Floradale Parkview Manors Seniors Residence is located on the Northwest corner of Woolwich Reservoir on Florapine Road. The residence is comprised of individual apartment style units for seniors. Floradale Parkview Manors, also benefits from the trails around the reservoir and the views.

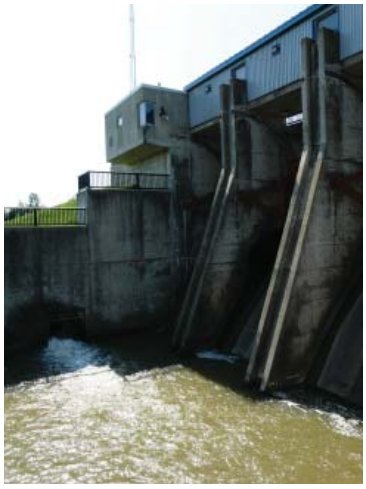


Figure 3.9
(above) Woolwich Dam
Author's Photograph

Environment

The proposed regional paediatric oncology facility is located adjacent to the Woolwich Reservoir. The building has been set back from the flood plain line as will be discussed later in this chapter. The Woolwich Dam and Reservoir was completed in 1974 by the Member Municipalities of the Grand River Conservation Authority in co-operation with the Government of Canada and the Province of Ontario. This natural area is maintained by the Grand River Conservation Authority (GRCA). Not only does this body of water help to maintain watershed management in Waterloo Region but it also provides an opportunity for recreation and environmental education within the community. The park is open to the public between May 1st and October 15th. The 7 kilometer Elmira Lions Lake Trail surrounds the Woolwich Reservoir and allows for hiking, biking, and cross country skiing. Although horses and motorized vehicles are prohibited on the trails, local residents still use the paths for horseback riding. In the winter, Lions Lake Trail is also used for snowmobiling.

Figure 3.10
(above) Woolwich Reservoir
Author's Photograph

Worship / Spiritual

The Floradale Mennonite Church is situated adjacent to Floradale Parkview Manors, and the Woolwich Reservoir. A new church building was constructed on this site and completed in the spring of 2006. An existing cemetery is also adjacent to the new church building. This modern Mennonite Church is part of the Mennonite Conference of Eastern Canada (The MCEC). The leadership team is made up of a lead pastor, a youth pastor, a parish nurse, and an administrative assistant. One modern Mennonite stated:

Figure 3.11
(above) Floradale Mennonite Church
Floradale Mennonite Church 2007

Figure 3.12
(above) The Crystal View Mennonite Church
Author's Photograph

> From my perspective, we are not a preaching and evangelical people, but rather a church group that promotes community building and development efforts over that of relief responses. Giving and receiving and gathering strength through community are themes that are present both in our church congregation but also in our work with our broader contexts. I'd say we're about building relationships and finding ways to co-exist with people who differ from ourselves – not about making you like us, (Anonymous).

The Crystal View Mennonite Church is also located in Floradale.

Local Businesses

Figure 3.13
(above) Floradale Feed Mill Ltd.
Author's Photograph

A number of small businesses are located in Floradale. These include: The Floradale Feed Mill Ltd., located directly adjacent to the Reservoir on Floradale Road, GSI Horst Systems Ltd., and the Elmira Produce Auction Co-operative Inc.

The local post office is situated at the corner of Floradale Road and Ruggle's Road. A small automotive garage and gas station, called the Floradale Garage, is located across the street from the post office on Floradale Road.

Other businesses and farms in the area include a pigeon farm, Holstein farm, and numerous family farms which are characteristic of a community with a large Mennonite population.

Figure 3.14
(right) Pigeon Farm
Author's Photograph
Figure 3.15
(far right) Garage and Gas Station
Author's Photograph

THE PATIENTS

Statistics from The Pediatric Oncology Group of Ontario (POGO) and its database POGONIS 2009, provide the following description of the demographics of the proposed site, unless otherwise noted.

For the purpose of this design, the information obtained has been divided into two counties: Waterloo County and Dufferin-Wellington County. Waterloo County is located in Southwestern Ontario and includes three urban municipalities: Kitchener, Waterloo, Cambridge, and four rural townships: North Dumfries, Wilmot, Wellesley, and Woolwich. The combined population of Waterloo Region in 2006 was 478,121 (Statistics Canada 2009a). It is one of the fastest growing areas in Ontario. Waterloo Region is made up of 1368.64 square kilometers (Statistics Canada 2009a). Dufferin County is located in South-Central Ontario and is made up of three towns: Mono, Orangeville, and Shelburne, and five rural townships: Amaranth, East Garafraxa, East Luther Grand Valley, Melancthon, and Mulmur (County of Dufferin 2003). The combined population of the 1442 square kilometers in 2006 was 54,436 (County of Dufferin 2003). Wellington County, located in Southwestern Ontario, includes the city of Guelph, towns of Erin and Minto, and the townships of Puslinch, Guelph/Eramosa, Centre Wellington, Mapleton, and Wellington North (County of Wellington 2009). The 2006 population of Wellington County and Guelph was 200,425 (County of Wellington 2009). The land area of Wellington County is 2626.66 square kilometers (Statistics Canada 2009).

Figure 3.16
(left) Child with Doctor at Paediatric Hospital
Source unknown

It is difficult to determine how many children aged 0-18 in

Waterloo County and Dufferin-Wellington County have cancer and how many of these children are currently undergoing treatment, however, there are approximately 3500 children in Ontario that are undergoing treatment in the province annually (POGONIS 2009).

The children in Waterloo County and Dufferin-Wellington County receive their initial diagnosis and treatment at one of the tertiary paediatric oncology centres: Children's Hospital at London Health Science Centre, the Children's Hospital at Hamilton Health Sciences, or The Hospital for Sick Children in Toronto. Some of the children also receive treatment at the paediatric clinic at the Grand River Hospital in Kitchener. The hospital is a Pediatric Oncology Group of Ontario (POGO) Satellite Clinic. The Grand River Satellite Clinic's catchment area includes the following counties: Brant, Bruce, Dufferin-Wellington, Grey, Huron, Perth, and Waterloo.

"The Satellite Clinics affiliated with POGO and the tertiary pediatric centres in Ontario follow set guidelines established by the Pediatric Oncology consortium in Ontario," (POGONIS 2009). The Satellite Clinics complete physical assessments, administer outpatient standard chemotherapy, blood transfusions, and distribute supportive care medications including anti-nausea medication, painkillers, and intravenous care and fluids. The clinics also perform acute assessments for complications related to treatment. Continuing patient and family education and support are additional services provided by the clinics. Palliative care is another program that the Satellite Clinics offer to patients with terminal cancer. Over the last 5 years, the Grand River Satellite Clinic has seen about 53 patients annually. On average, there are about 75 appointments per month. The clinic appointments can range from 30 minutes for blood work to full-day appointments for treatment. Depending on the type of treatment and follow-up required for each child, they can attend the Satellite Clinics between 2 to 5 years.

Between 2000 and 2008 there was an average of 18 childhood cancer cases diagnosed for children aged 0-18 living in Waterloo County. In Dufferin-Wellington County, there was an average of 69 childhood cancer cases diagnosed for children aged 0-18. The survival rate of

children with cancer is not reported by county. The overall survival rate of paediatric cancer is 80%.

The timeline for children to receive treatment depends on the type of cancer diagnosis. For leukemia patients, the treatments range from 6 months to 3 years. If the child's cancer relapses, a new treatment plan is created. Once the therapy has been completed, the child is followed closely for a number of years. For 2 years following the treatment the child is actively monitored. These visits can be weekly or more often when the child is being monitored for relapse or for early complications associated with the treatments. The follow-up visits can take place at both the tertiary centres and satellite pediatric oncology clinics. After the two year period, these children are transferred to one of the AfterCare clinics in Ontario for long term follow-up, where they are monitored yearly into adulthood. These clinics are located at Hamilton Health Sciences Centre, Children's Hospital, London Health Sciences Centre, and Kingston General Hospital (Pediatric Oncology Group of Ontario 2006).

Statistics were not available illustrating how many children within Waterloo County and Dufferin-Wellington County are admitted to the hospital annually. On average there are approximately 2500 children with cancer admitted annually to tertiary paediatric centres in Ontario. This number includes multiple admissions per child. The Satellite Clinic at the Grand River Hospital reports an average of 45 paediatric oncology admissions yearly. The average hospital stay is 6 to 7 days.

In Ontario, the most common types of cancer in children are leukemia, brain tumours, and lymphoma. The same is true for Waterloo County and Dufferin-Wellington County. Leukemia accounts for approximately 30% of cancer cases in the two counties, brain tumours account for approximately 20% of all cases, and lymphoma accounts for approximately 15% of regional cases.

With various statics missing, it was realized that it was more appropriate to base the size of the proposed paediatric oncology facility on the annual number of new cases of cancer in Waterloo County and Dufferin-Wellington County. However, this is still not entirely accurate as the current

catchment areas for the Satellite Clinic at Grand River Hospital also includes an additional five counties: Brant, Bruce, Grey, Huron, and Perth. Therefore, the number of new cases would be even higher.

As previously stated, on average there are 87 new cases of cancer between the two counties every year; however, the local Satellite Clinic only reports seeing 53 patients annually. This is because all new cases receive their initial diagnosis and treatment at one of the tertiary paediatric oncology centres. Depending on the course of treatment, the child may never be treated locally. The proposed paediatric oncology facility in Floradale would allow for the initial diagnosis to take place locally as well as further treatment and monitoring. Since the proposed facility's focus is on chemotherapy and radiation, only minor surgeries would be performed at the new facility. All major surgeries would still be referred to one of the tertiary centre.

The Grand River Satellite Clinic sees patients for an average of two to five years depending on the type of cancer, treatment, and follow-up. Assuming the extreme end in order to allow for new cases in the five additional counties, there could be approximately 435 children being treated at the new facility annually.

Many of these children would be treated as outpatients; however, the majority of children with new cases would be hospitalized initially and potentially during their initial diagnosis and treatment. The Grand River Satellite Clinic only reports an average of 45 admissions per year with an average stay being 6 to 7 days. Since there are no statistics available for how many children in the catchment area were hospitalized either for treatment or complications at a tertiary hospital, an educated guess was made in determining the number of patient rooms required. In determining the number of rooms required, it was important to accommodate extra space for future growth, but also to ensure that the patient units were still small enough to function as a community.

If there are currently 3500 children undergoing treatment in Ontario for cancer and on average 2500 admissions annually, each child is admitted 0.714 times. Therefore, if there are 435 children undergoing treatment at the proposed

facility there would be approximately 311 stays, accounting for 2177 days of care (not including hospice care). This equates to 109 days per year that each patient room is in use. Since the number of active cases in the catchment area was only estimated to reach this value, the reality is that the number of care days would likely increase.

The size of the facility allows for the current care needs of Waterloo County, Wellington-Dufferin County, and the other counties covered in the original catchment area for the Grand River Satellite Clinic, but also offers the potential to accommodate children in other catchment areas. The size of the clinic will ensure that future needs are also met if there is an increase in the number of cancer cases in the area.

THE PROGRAM

Grand River Hospital is one of the 4 satellite oncology clinics which is part of the Paediatric Oncology Group of Ontario (POGO). The intention is that this existing clinic would move to the proposed paediatric oncology facility in Floradale, approximately 20 kilometers away from its current location. The currently offered services would then undergo an expansion.

The added healthcare facility and increased population in Waterloo Region requires additional services to be introduced into the community to meet the changing needs. Based on the needs of the facility, lodging must be incorporated into the design. These accommodations will provide a place for the immediate family to stay during the child's treatment as well as those relatives who visit for shorter periods of time. It will also act as a temporary home when the child needs to revisit the facility for checkups.

Along with accommodations, a small coffee shop is also important to the design. This space provides a place for families to visit, eat, and meet while their child is undergoing treatment. It can be a place of distraction or a place of support where families can gather with other families who are in the same situation. The coffee shop is also part of the larger community. It is a place for the local area residents and temporary visitors to interact with one another.

Figure 3.17
(left) Patient, family, medical, and community services necessary to make the healing process successful
Author's Diagram

For patients staying at the paediatric oncology facility for extended periods the continuation of their education is vital. The healthcare facility will have teachers and tutors on staff. For siblings staying at the facility, there could be

an opportunity to enlist the services of supply teachers in the area. There is also an opportunity to interact with Floradale Public School for educational events such as pageants, fundraising events, buddy reading programs, and the musical choir; all which create an extended community. These concepts were adapted from the program at Bloorview Kids Rehab where able bodied children from the community interact with patients at the hospital through various summer art programs to provide a sense of community.

Often families with a sick child have additional young children that require day care. This can create added stress on the parents who want to spend time with both their sick and healthy children. By providing limited childcare services for siblings, parents are able to balance their time and eliminate some of the stress of the situation.

Floradale Parkview Manors Seniors Residence has the potential to be linked with the new facility through a variety of different activities. The seniors could be involved through volunteering, gardening, baking, storytelling, and acting as temporary “grandparents” for the sick children. For those seniors who lack the mobility, children staying at the oncology facility and considered to be in good-health would be able to visit the seniors’ residence throughout the year. The children could share afternoon snacks, put on performances, play games, and spend time with the elders. Through these interactions and activities, the seniors will be able to remain mentally fit. It is often said that illness and growing old can be two very lonely experiences if you do not have someone with whom to spend your time. Creating activities and opportunities for the seniors and children to interact and form a common bond would be beneficial to both groups. Experience has shown that interaction between seniors and children is mutually beneficial.

Although not every visitor to the children’s oncology facility will be religious or spiritual, it is important that the patients, their families, and the healthcare workers have the opportunity to reflect, meditate, or pray in a safe and private place. A chapel is provided for those who wish to reflect indoors. The gardens will offer various quiet places for reflection and solitude. The Floradale Mennonite Church, Central View Mennonite Church, and other local worship communities

can also provide sanctuaries or spiritual support systems to the visitors and their families.

Strong community connections are important to the proposal because they allow the patients and their families the opportunity to spend time with others not connected to the facility and maintain as normal a life as possible. These connections allow patients and their families the opportunity to choose whether or not they want to take advantage of these connections.

"A hospital should lie open, not encased by high walls. The garden should be directly connected to the hospital, or even more so, surround it. Because a view from the window into blooming and happy scenes will invigorate the patient, also a nearby garden encourages patients to take a walk…The plantings, therefore, should wind along dry paths, which offer benches and chair…A hospital garden should have everything to enjoy nature and to promote a healthy life. It should help forget weakness and worries, and encourage a positive outlook… The spaces between could have beautiful lawns and colourful flower beds…Noisy brooks could run through flowery fields, and happy waterfalls could reach your ear through shadowy bushes. Many plants with strengthening aromas could be grouped together. Many singing birds will be attracted by the shade, peace, and freedom. And their songs will rejoice many weak hearts (Hirschfield, quoted in Warner, 1994; p. 30)," (Cooper Marcus, Clare and Marni Barnes 1999: 12).

The added healthcare facility and increased population in Floradale requires additional services to be introduced into the community to meet the changing needs. The close proximity to the surrounding farms provides an opportunity for the facility to use local produce, meats, cheeses, and baked goods. The close proximity will allow the facility to closely monitor and maintain a fresh food supply to ensure that there is minimum waste. The normal mark-ups will also be reduced because the middle-man is eliminated. Although the healthcare facility will take over some of the farm land, there will be an opportunity for the existing farmers to target the needs of the facility, and benefit financially. The facility will also give back to the community through new services, programs, and job creation.

Studies by Roger S. Ulrich (1984) and others have found that patients with exposure to nature or gardens have healed quicker, have required less pain medication, and had fewer complaints while recovering than those who did not have this opportunity. In order to create a positive healing experience, a variety of gardens will be provided throughout the grounds. The gardens have been inspired by those found at CNIB, Bloorview Kids Rehab, and Good Samaritan Regional Medical Center.

"We know that after contact with nature, our immune system works better, hormones that promote healing are activated, neuropeptides that ease pain are produced, and we simply and immediately feel better," (Gerlach-Spriggs et al. 1998: 41).

The gardens will provide patients, families, visitors, staff members, and members of the community opportunities

for quiet contemplation, exploration, and to experience the sounds and smells of nature. These spaces will offer gentle winding paths for physiotherapy and rehabilitation as well as different features and seating options for the visitors. For those bedridden patients, views to gardens or to the natural landscape will be provided. These activities and interaction with nature will create a positive distraction from the stresses associated with being at the children's healthcare facility and will provide regenerative healing opportunities.

The paediatric oncology facility will not only provide medical services and medical clinics to the community but will also include patient and family services aimed at reducing anxieties and offering comfort and support during this difficult time. Interaction with other families experiencing the same things, counseling, and the opportunity to continue many everyday activities will prove beneficial. The site will also allow for camp-like opportunities inspired by Camp Trillium. For example, swimming, canoeing, biking, and short nature walks will be available to patients who are pre-approved. The activities will be supervised by trained medical professionals and volunteers to ensure the children are safe and healthy. Patients will be able to take part in these activities as much as their illness allows after being given the go-ahead by their medical caregivers. Parents and siblings will also have the opportunity to participate to create a family experience. The design and associated program provide a sense of normalcy in the lives of the patients and their families.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THE DESIGN

"Like a town square, the lobby serves as an organizing element: collecting people, providing a gathering place, and offering ready access to resources, from the gift shop and resource center to translation services and social workers. As children and families are the heart of the community, lobbies are the heart of the hospital, welcoming all who come there and making an indelible and uplifting first impression," (Plappert, John J. and team from Karlsberger I in Komiske 2005: 35).

The proposed facility is pushed back on the chosen site and is located adjacent to the wooded area surrounding Woolwich Reservoir. Care was taken to situate the building outside the flood plain as illustrated on the site plan (drawing A2-0). Access to the site is from Highway 21 (Arthur Street North). The access road is located adjacent to the existing farm house and barn in an attempt to keep the existing buildings. The proposed facility would take up a portion of two farms and as a result, the property would need to be severed and the property lines adjusted.

Research has shown that there is a demand for a paediatric oncology facility in Waterloo Region. The facility would not only serve Waterloo Region but also Dufferin-Wellington County and the additional catchment area of the POGO satellite clinic at Grand River Hospital. Based on the regional cancer statistics, the proposed facility would more than adequately meet the needs of today but would also be able to accommodate any increases in future cancer cases without being overburdened.

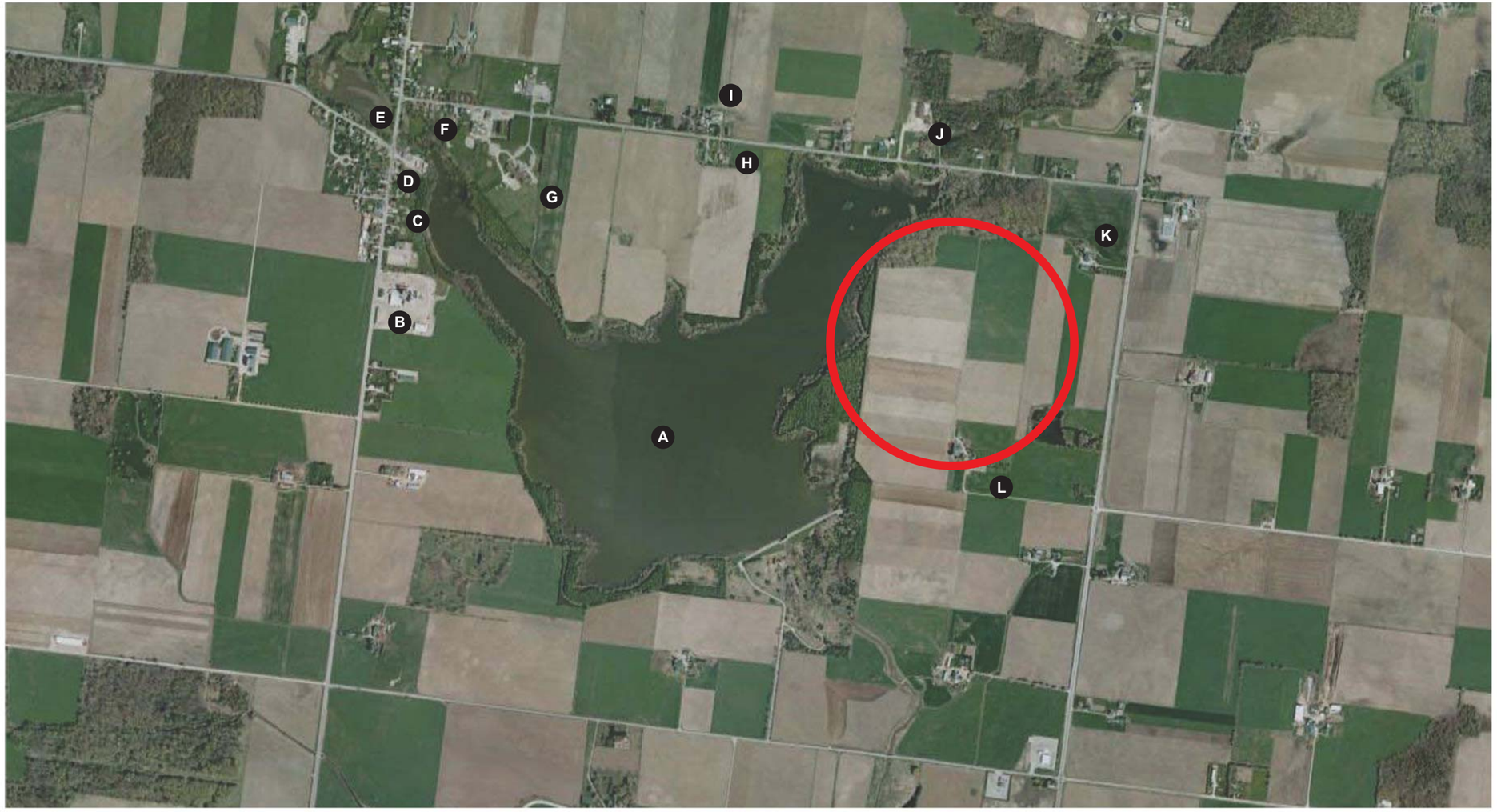
The size of the proposed facility is optimal as it is not so large that the users feel lost, yet it is small enough that it can still feel homelike. The patient wings are approximately the same size as small schools which will help provide a community like atmosphere for the patients, their families, and the staff. The idea of creating smaller treatment units or communities was influenced by the Walter C. Mackenzie Health Science Centre. The patient wing size would allow patients and family members to get to know one another during their stay. Although the proposed healthcare facility

Figure 3.18
(left) Front Entrance
Author's Rendering

would be able to accommodate increased cases of cancer, if the facility needs to expand in the future, the patient wings have been designed so that additional patient rooms can be added by removing the Sitting Areas located at the west end of the wing, extending the corridor, and adding additional patient rooms and nurse stations.

The proposed paediatric oncology building is essentially a one storey facility with a small second floor. A main feature in the building design is the central circulation spine which runs off of the lobby area on the first floor. This design element was influenced by the central circulation spine and “the braid” at Bay Park Community Hospital. Common services are located off of this main spine to help simplify wayfinding and circulation. The two patient wings and hospice wing are also situated off the central circulation spine. For the most part, the proposed layout is an adaptation of a double loaded plan, common in the 1900’s, which allows for optimal views and access to the natural environment and also provides an opportunity for natural lighting and ventilation. In the corridors, clerestory windows have been provided in order to provide natural lighting as well as an opportunity for users to see the sky outside. Skylights have also been provided at various locations to introduce natural light inside the building and also help maintain the vegetation inside.

The second floor has a short circulation spine off the lobby area and provides access to treatment and administration spaces. The second floor is open to the lobby below and offers views of the living wall. The treatment space is an adaptation of the compact square plan, introduced in the 1950’s. The proposal situates treatment spaces around the outside to allow for maximum views and daylighting. The nurse station and service spaces are located in the middle for access and observation.



(ABOVE) AERIAL OF SITE
N.T.S.

A Woolwich Reservoir

C The Crystal View Mennonite Church

E Old Fire Department

G Floradale Parkview Manors

I Floradale Public School

K Farm

B The Floradale Feed Mill Ltd.

D Garage and Gas Station

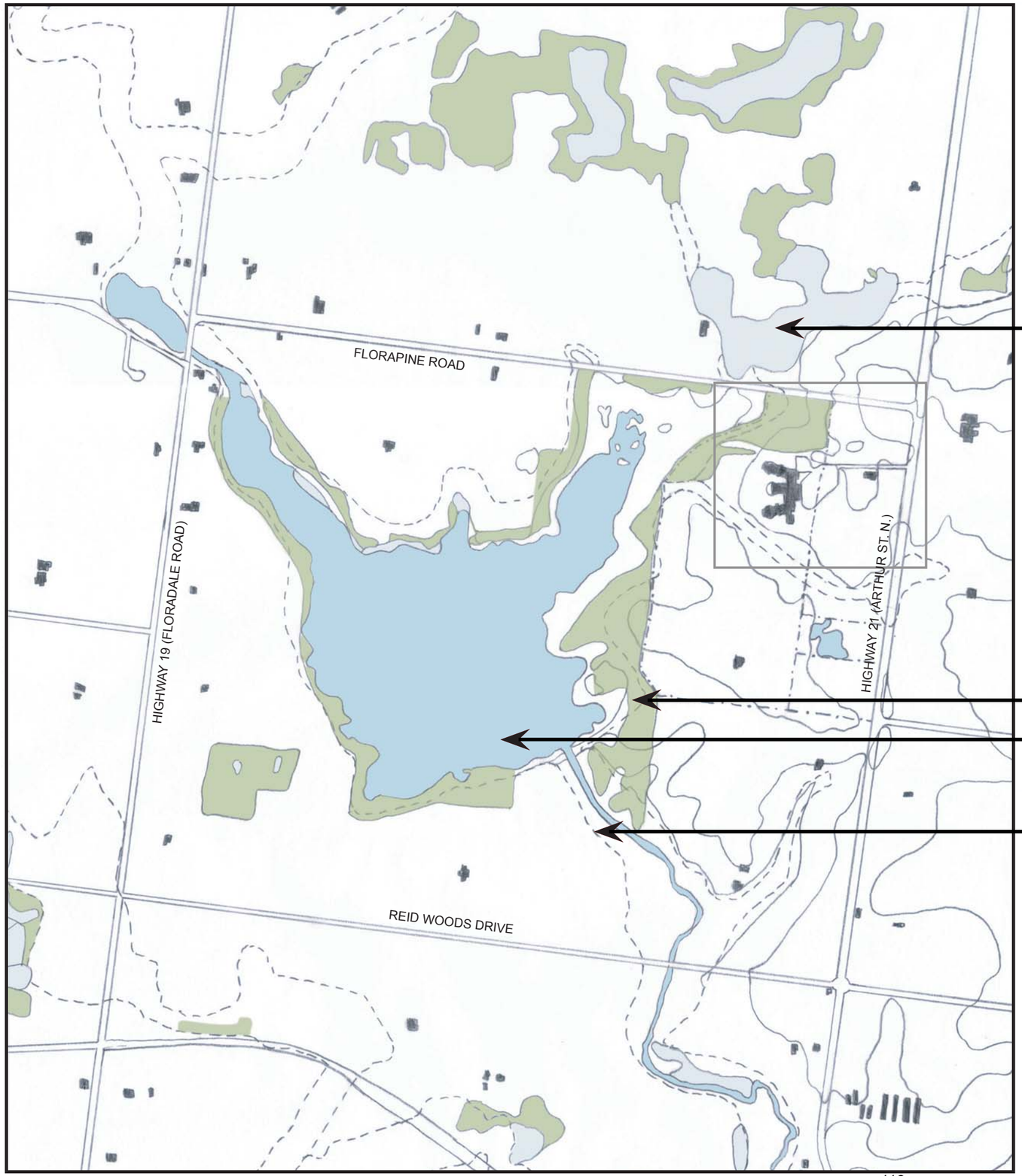
F Floradale Mennonite Church

H Fire Department

J Pigeon Farm

L Farm

(TOP LEFT) A1-0 SITUATION PLAN
N.T.S.

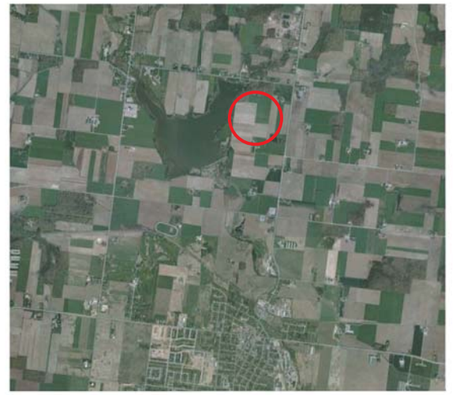


WETLAND

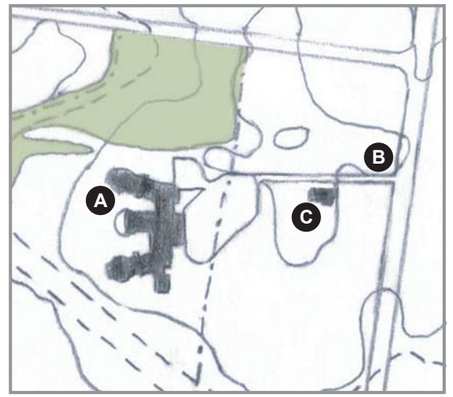
WOODED AREA
OR FOREST

WOOLWICH RESERVOIR

FLOOD PLAIN - MAY 2006
(SHOWN DASHED)



(ABOVE) AERIAL OF SITE
N.T.S.

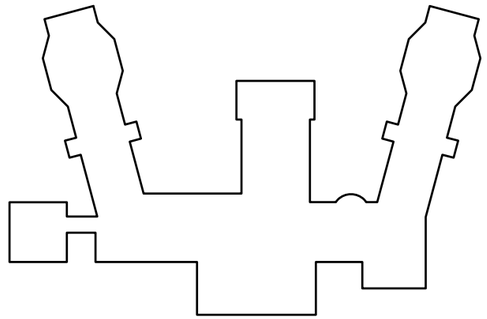


(ABOVE) ACCESS PLAN
1:10,000

ACCESS PLAN LEGEND:

- A PROPOSED PAEDIATRIC ONCOLOGY FACILITY
- B ACCESS TO SITE
- C EXISTING FARM BUILDINGS TO REMAIN

(LEFT) A2-0 SITE PLAN
1:15,000



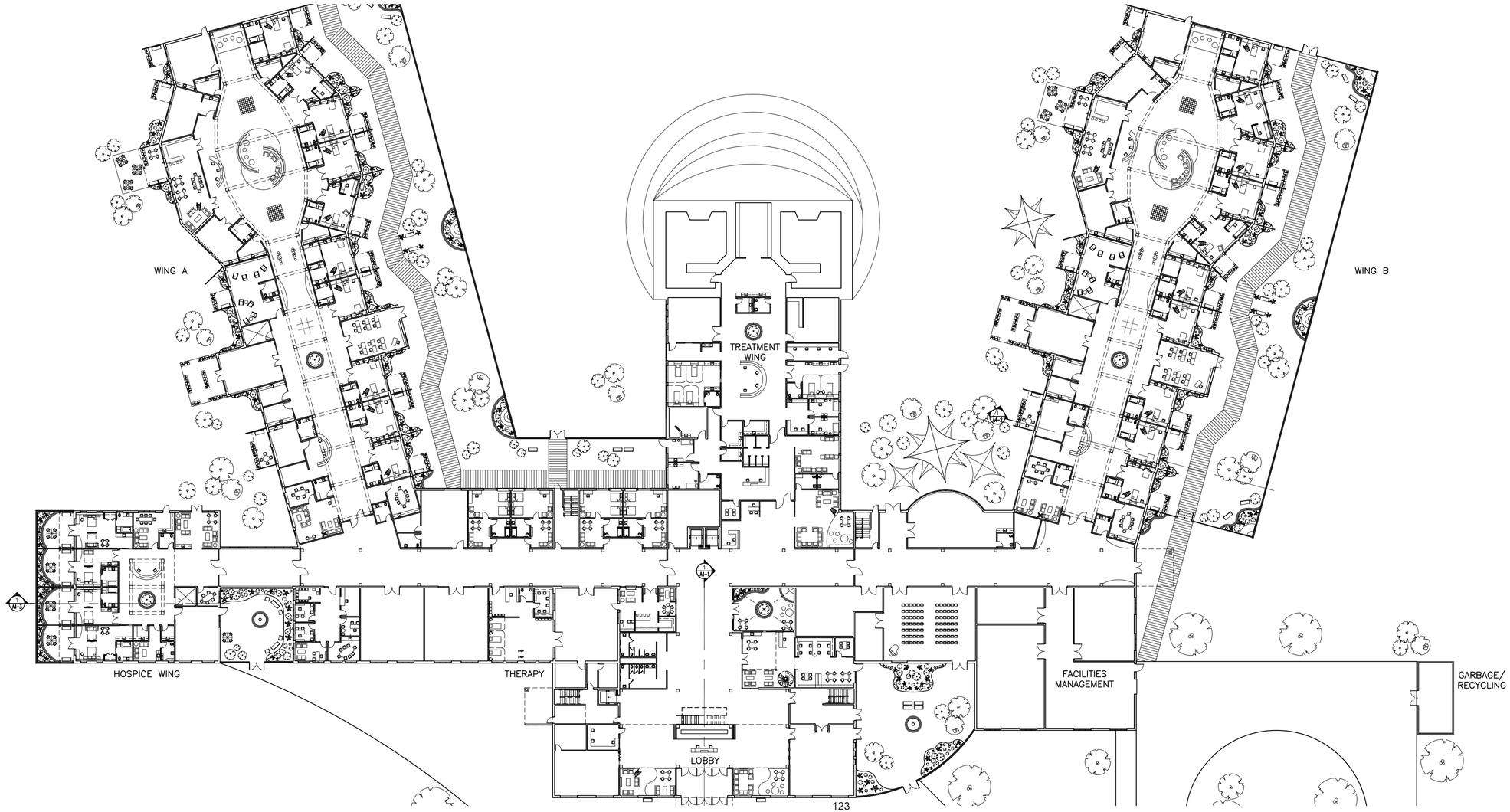
KEY PLAN
N.T.S.

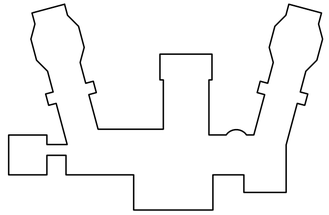
SITE PLAN LEGEND

1. WING A
2. HOSPICE WING
3. THERAPY
4. LOBBY
5. TREATMENT AREA
6. WING B
7. FACILITIES MANAGEMENT
8. PATIENT DROP–OFF
9. ACCESSIBLE AND RESERVED PARKING
10. PARKING
11. DOCTOR PARKING
12. CARPOOL PARKING
13. OVERFLOW PARKING AREA
14. LOADING AREA
15. GARBAGE/RECYCLING
16. BICYCLE STORAGE
17. DESIGNATED SMOKING AREA
18. EXISTING PROPERTY LINE (REFER TO DRAWING A2–0)

▲ ENTRANCE/EXIT

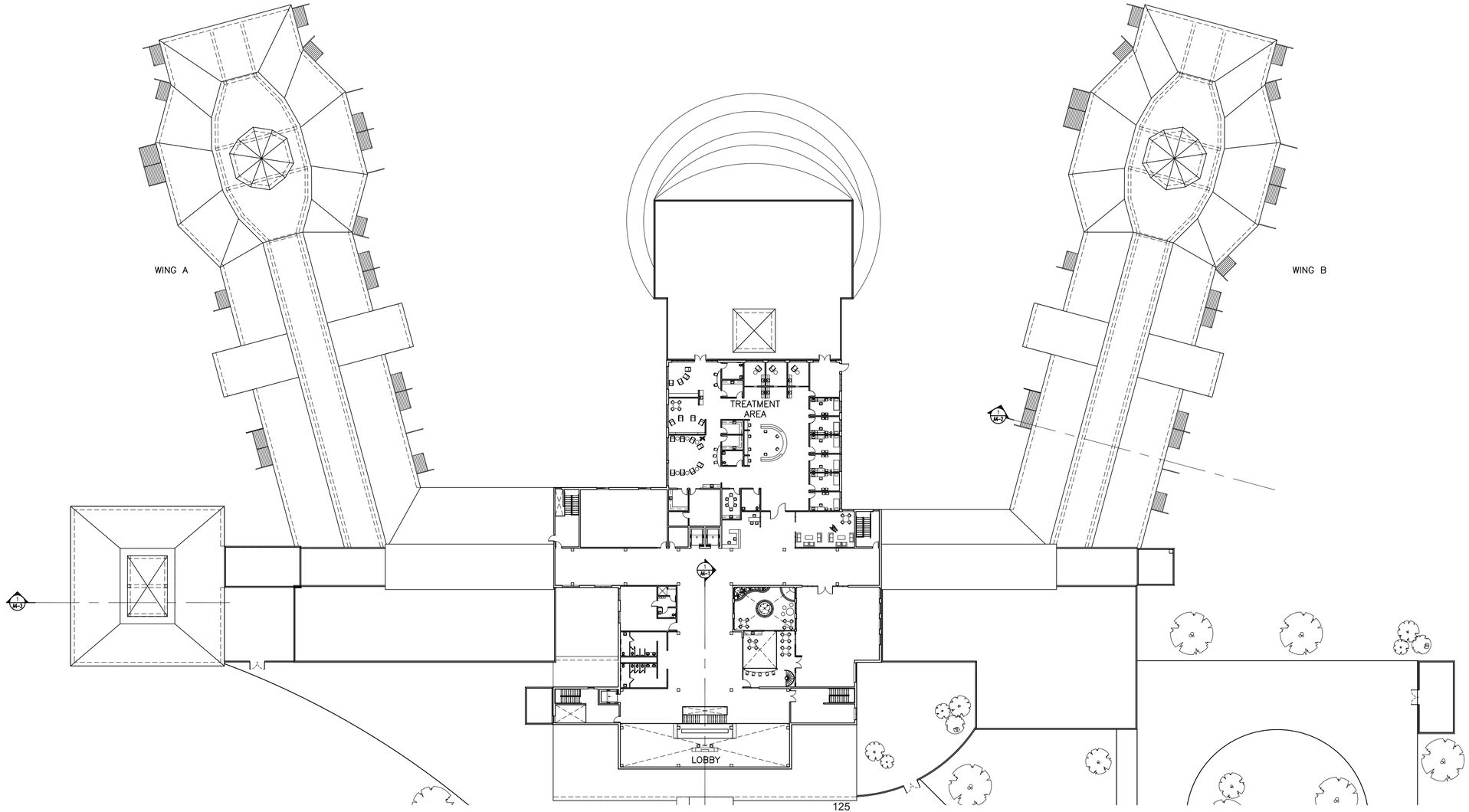
(LEFT) A2-1 SITE PLAN
1:1000

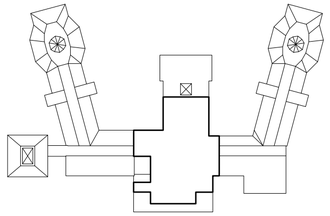




KEY PLAN
N.T.S.

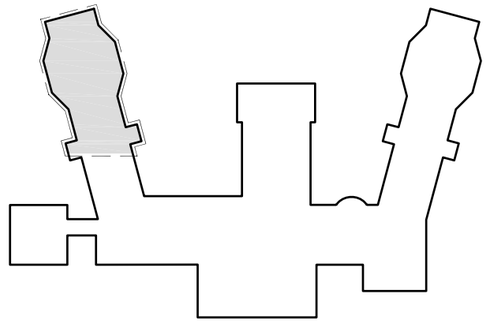
(LEFT) A2-2 GROUND FLOOR PLAN
1:500





KEY PLAN
N.T.S.

(LEFT) A2-3 SECOND FLOOR PLAN
1:500

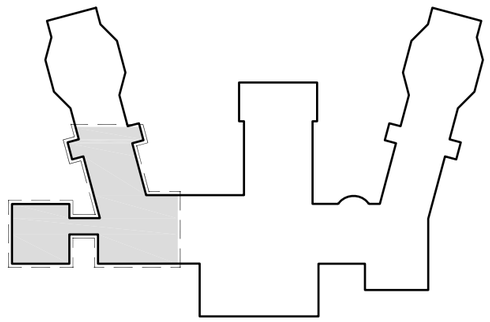


KEY PLAN
N.T.S.

ROOM LEGEND

1. PATIENT ROOM
2. PATIENT ROOM (ISOLATION)
3. SOILED ROOM
4. CLASSROOM
5. LOUNGE
6. NURSES' STATION
7. CLEAN ROOM
8. GARDEN THERAPY
9. SHOWER ROOM
10. TREATMENT ROOM
11. WASHROOM
12. PLAYROOM/ MULTI–MEDIA RM
13. FAMILY ROOM
14. TEEN'S ROOM
15. QUIET ROOM
16. SITTING AREA
17. NURSES' BREAK ROOM
18. STRETCHER ALCOVE
19. MEETING ROOM
20. INFORMATION
21. WAITING AREA
22. CORRIDOR PLAY AREA
23. DISPLAY CASE
24. HOSPICE ROOM
25. HOSPICE COURTYARD
26. COUNSELING SERVICES
27. MECHANICAL RM
28. PHARMACY
29. PHYSIOTHERAPY
30. OUTDOOR COURTYARD
31. COFFEE SHOP
32. STORAGE
33. LABORATORY
34. FAMILY SLEEP ROOMS
35. EXIT STAIR
36. ELEVATOR
37. ELEVATOR MACHINE ROOM
38. MEN'S WR
39. WOMEN'S WR
40. SECURITY
41. RETAIL SERVICES
42. ENTRANCE
43. LOBBY
44. LIVING WALL
45. CHAPEL
46. RESOURCE LIBRARY
47. INNER COURTYARD
48. MULTI–PURPOSE ROOM
49. MORGUE
50. FOOD SERVICES
51. LAUNDRY
52. SHIPPING AND RECEIVING
53. REGISTRATION
54. CHILDCARE
55. JAN. CLOSET
56. CHANGE ROOMS
57. GOWNED WAITING
58. ULTRASOUND RM
59. MOLD ROOM
60. X–RAY
61. RECOVERY ROOM
62. SCRUB SINK
63. MINOR SURGERY
64. LINEAR ACCELERATOR
65. CONTROL ROOM
66. SIMULAROR/CT ROOM
67. CHARTING
68. PRE–OP
69. EXAM ROOM
70. STAFF WASHROOM
71. HANDWASHING STATION
72. COVERED PLAY AREA
73. BOARDWALK
74. PATIENT GARDENS
75. OUTDOOR STORAGE
76. GARDEN WALL

(LEFT) A2-4 GROUND FLOOR PLAN - WING A
1:250



KEY PLAN
N.T.S.

ROOM LEGEND

1. PATIENT ROOM
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59. MOLD ROOM
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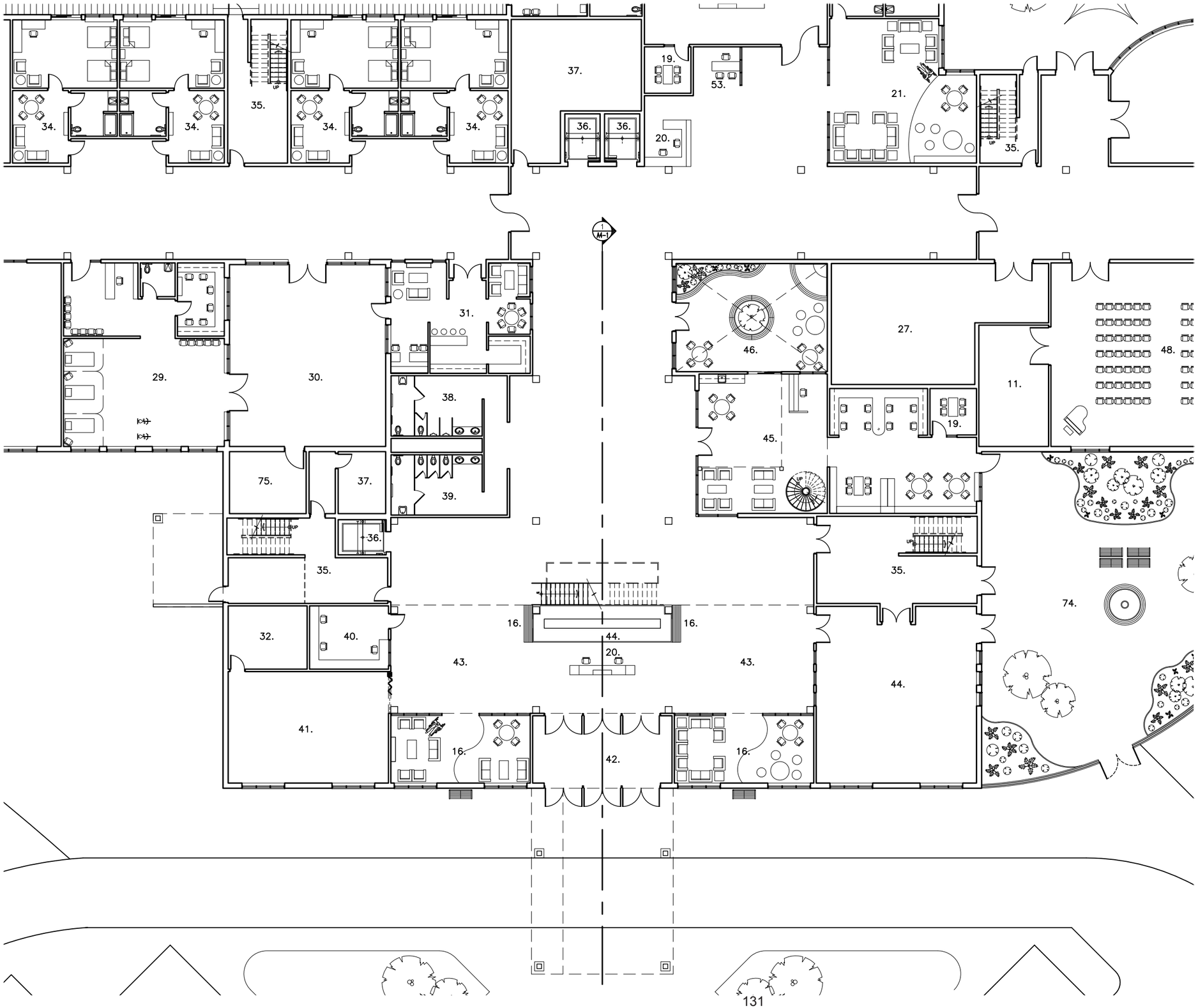
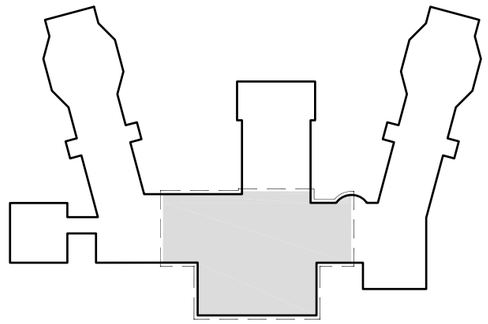
65. CONTROL ROOM
66. SIMULAROR/CT ROOM
67. CHARTING
68. PRE–OP
69. EXAM ROOM
70. STAFF WASHROOM
71. HANDWASHING STATION
72. COVERED PLAY AREA
73. BOARDWALK
74. PATIENT GARDENS
75. OUTDOOR STORAGE
76. GARDEN WALL

(LEFT) A2-5 GROUND FLOOR PLAN - HOSPICE WING
1:250





KEY PLAN
N.T.S.

ROOM LEGEND

1. PATIENT ROOM
2. PATIENT ROOM (ISOLATION)
3. SOILED ROOM
4. CLASSROOM
5. LOUNGE
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20. INFORMATION
21. WAITING AREA
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23. DISPLAY CASE
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32. STORAGE
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34. FAMILY SLEEP ROOMS
35. EXIT STAIR
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37. ELEVATOR MACHINE ROOM
38. MEN'S WR
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40. SECURITY
41. RETAIL SERVICES
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43. LOBBY
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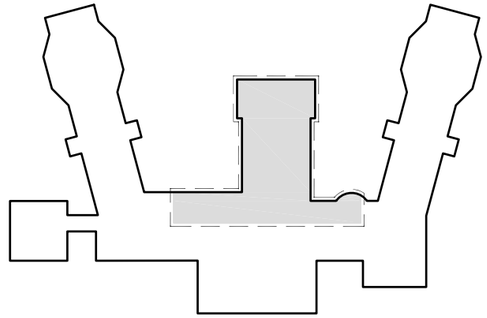
66. SIMULAROR/CT ROOM
67. CHARTING
68. PRE–OP
69. EXAM ROOM
70. STAFF WASHROOM
71. HANDWASHING STATION
72. COVERED PLAY AREA
73. BOARDWALK
74. PATIENT GARDENS
75. OUTDOOR STORAGE
76. GARDEN WALL

(LEFT) A2-6 GROUND FLOOR PLAN - LOBBY AND THERAPY
1:250



KEY PLAN
N.T.S.

ROOM LEGEND

1. PATIENT ROOM
2. PATIENT ROOM (ISOLATION)
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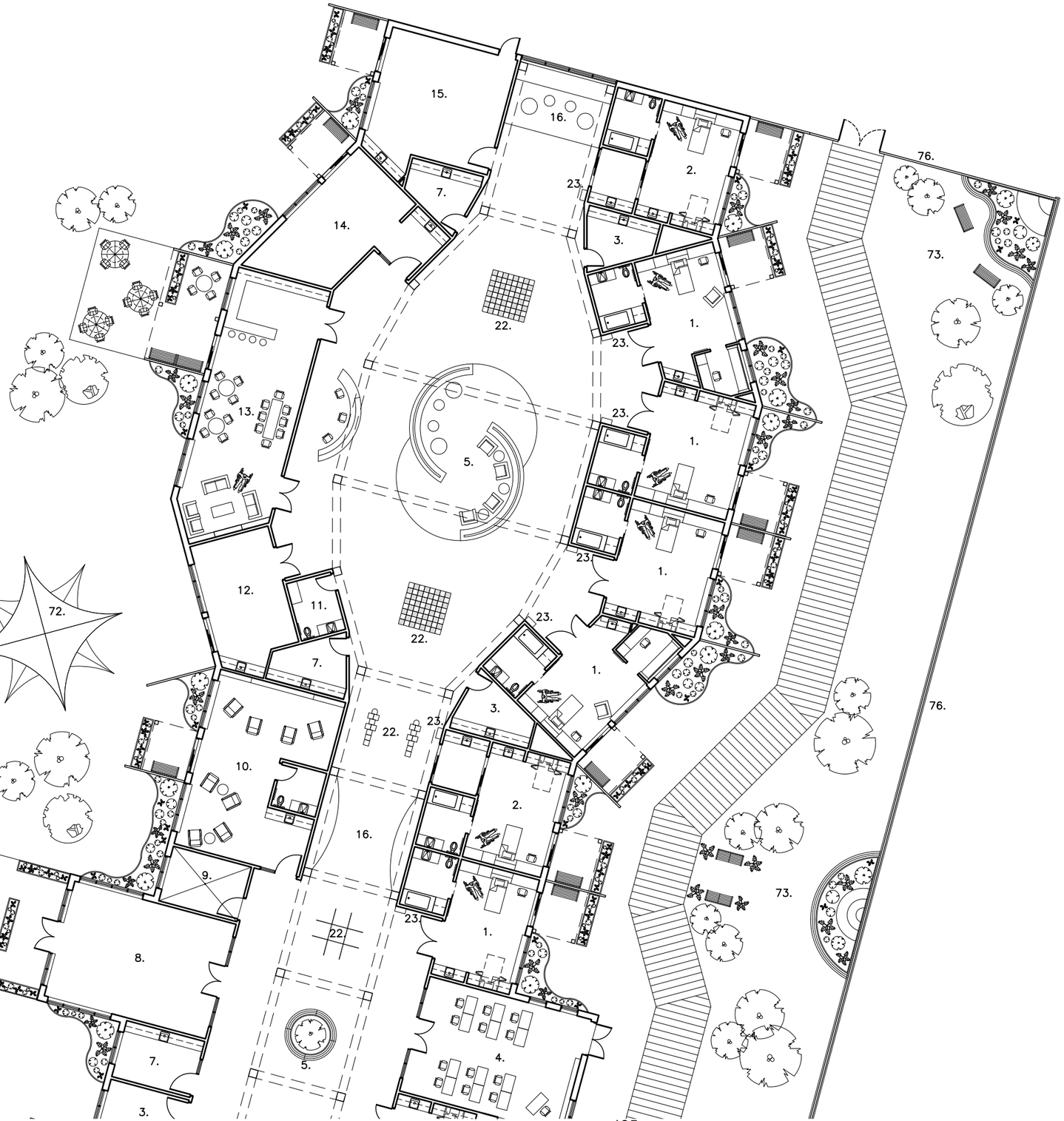
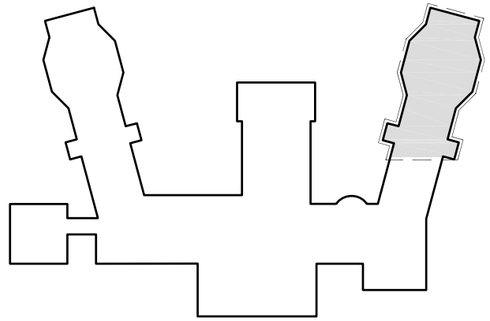
68. PRE–OP
69. EXAM ROOM
70. STAFF WASHROOM
71. HANDWASHING STATION
72. COVERED PLAY AREA
73. BOARDWALK
74. PATIENT GARDENS
75. OUTDOOR STORAGE
76. GARDEN WALL

(LEFT) A2-7 GROUND FLOOR PLAN - TREATMENT WING 1:250





KEY PLAN
N.T.S.

ROOM LEGEND

1. PATIENT ROOM
2. PATIENT ROOM (ISOLATION)
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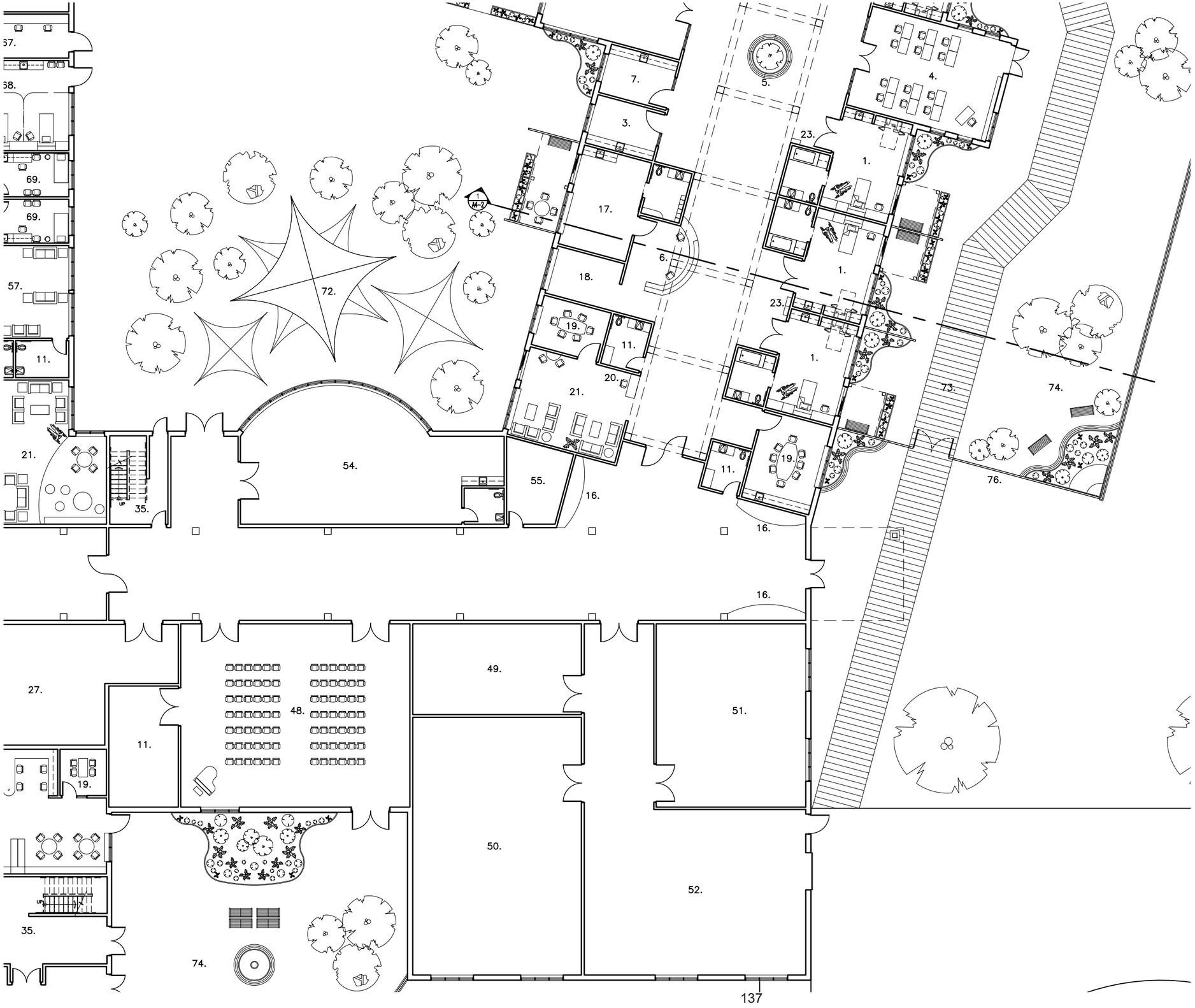
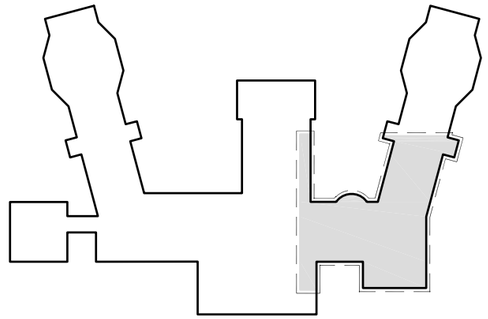
70. STAFF WASHROOM
71. HANDWASHING STATION
72. COVERED PLAY AREA
73. BOARDWALK
74. PATIENT GARDENS
75. OUTDOOR STORAGE
76. GARDEN WALL

(LEFT) A2-8 GROUND FLOOR PLAN - WING B
1:250





KEY PLAN
N.T.S.

ROOM LEGEND

1. PATIENT ROOM
2. PATIENT ROOM (ISOLATION)
3. SOILED ROOM
4. CLASSROOM
5. LOUNGE
6. NURSES' STATION
7. CLEAN ROOM
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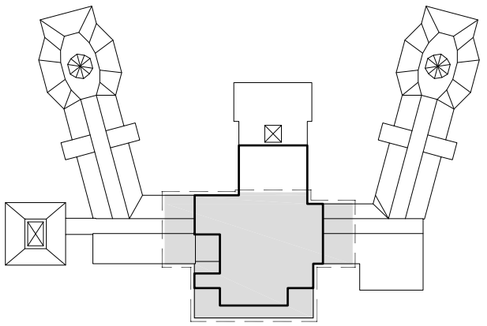
67. CHARTING
68. PRE-OP
69. EXAM ROOM
70. STAFF WASHROOM
71. HANDWASHING STATION
72. COVERED PLAY AREA
73. BOARDWALK
74. PATIENT GARDENS
75. OUTDOOR STORAGE
76. GARDEN WALL

(LEFT) A2-9 GROUND FLOOR PLAN - LOBBY & FACILITIES MANAGEMENT
1:250

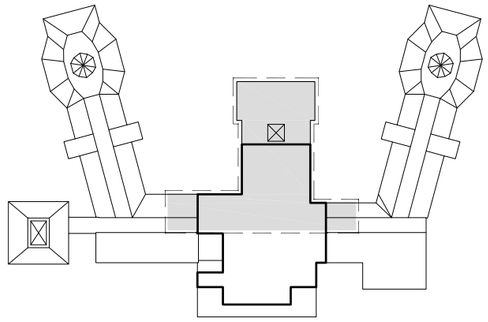


KEY PLAN
N.T.S.

ROOM LEGEND

1. OPEN TO BELOW
2. EXIT STAIR
3. ELEVATOR
4. MEN'S WR
5. WOMEN'S WR
6. LIVING WALL
7. RESOURCE LIBRARY
8. ADMINISTRATION OFFICE
9. WAITING AREA
10. INFORMATION
11. REGISTRATION
12. JANITOR'S CLOSET
13. DOCTORS OFFICES/ POGO SATELLITE OFFICE
14. STAFF LOUNGE
15. EXAM ROOM
16. CONSULTING ROOM
17. INDIVIDUAL TREATMENT ROOM
18. WASHROOM
19. PREP ROOM
20. OPEN TREATMENT ROOM #1
21. OPEN TREATMENT ROOM #2
22. PLAY AREA
23. CHARTING
24. SOILED ROOM
25. CLEAN ROOM
26. STAFF WASHROOM
27. NOURISHMENT
28. STORAGE ROOM
29. MEETING ROOM
30. NURSE'S STATION
31. HANDWASHING STATION
32. GREEN ROOF
33. ROOF
34. SLOPED TERRAIN
35. CANOPY

(LEFT) A2-10 SECOND FLOOR PLAN - LOBBY AREA
1:250

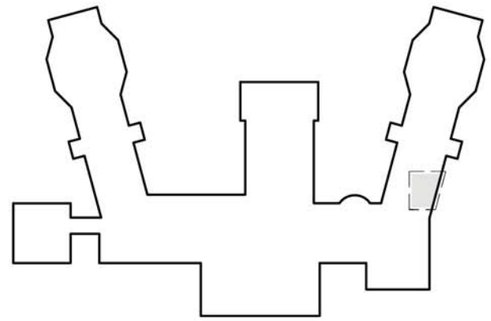


KEY PLAN
N.T.S.

ROOM LEGEND

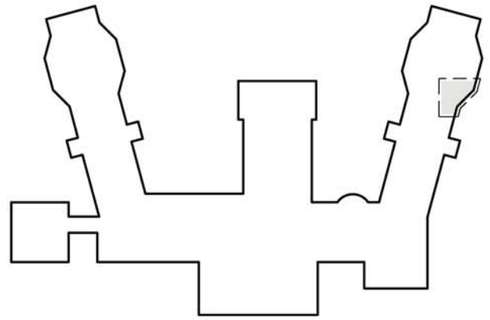
1. OPEN TO BELOW
2. EXIT STAIR
3. ELEVATOR
4. MEN'S WR
5. WOMEN'S WR
6. LIVING WALL
7. RESOURCE LIBRARY
8. ADMINISTRATION OFFICE
9. WAITING AREA
10. INFORMATION
11. REGISTRATION
12. JANITOR'S CLOSET
13. DOCTORS OFFICES/ POGO SATELLITE OFFICE
14. STAFF LOUNGE
15. EXAM ROOM
16. CONSULTING ROOM
17. INDIVIDUAL TREATMENT ROOM
18. WASHROOM
19. PREP ROOM
20. OPEN TREATMENT ROOM #1
21. OPEN TREATMENT ROOM #2
22. PLAY AREA
23. CHARTING
24. SOILED ROOM
25. CLEAN ROOM
26. STAFF WASHROOM
27. NOURISHMENT
28. STORAGE ROOM
29. MEETING ROOM
30. NURSE'S STATION
31. HANDWASHING STATION
32. GREEN ROOF
33. ROOF
34. SLOPED TERRAIN
35. CANOPY

(LEFT) A2-11 SECOND FLOOR PLAN - TREATMENT AREA
1:250



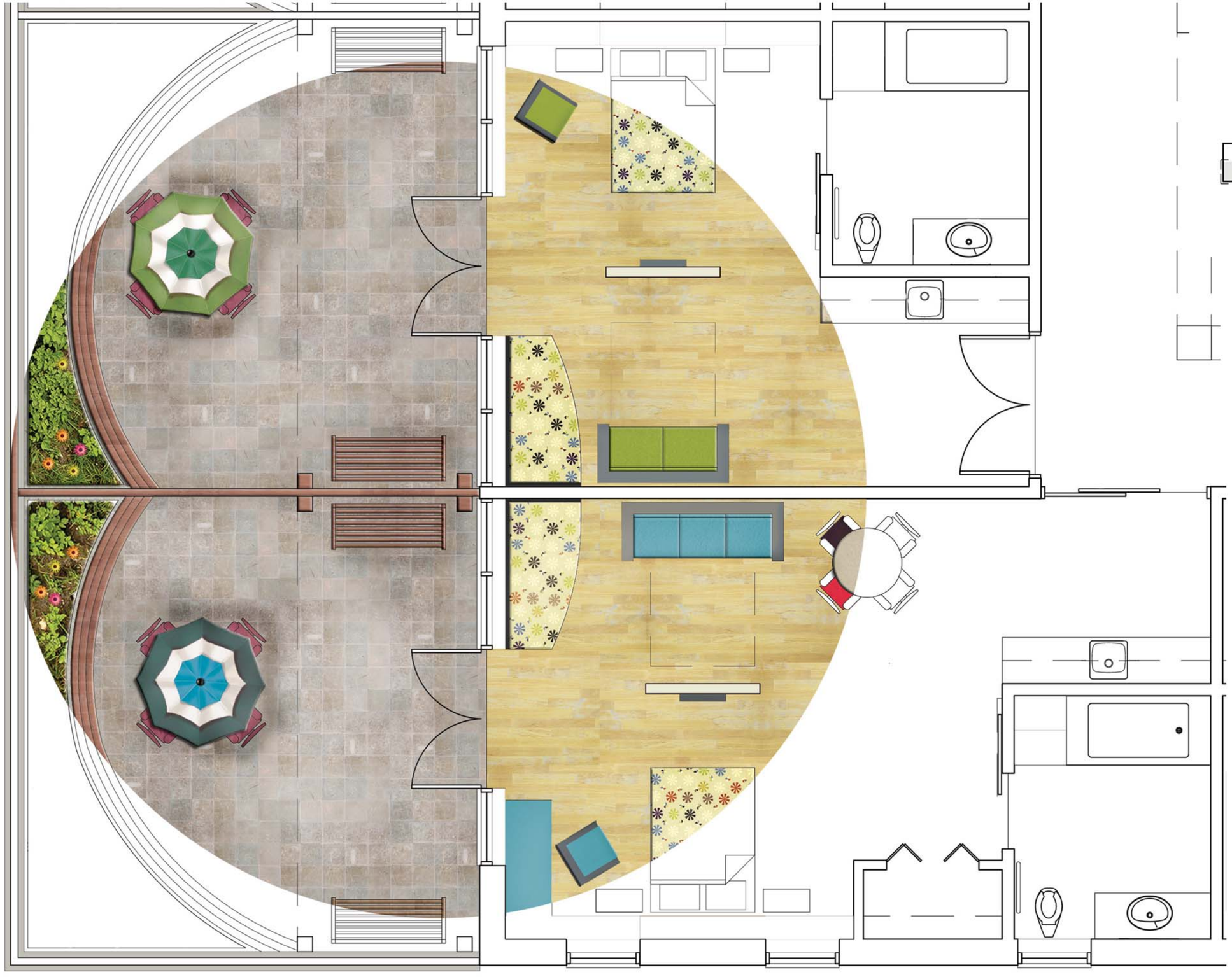
KEY PLAN
N.T.S.

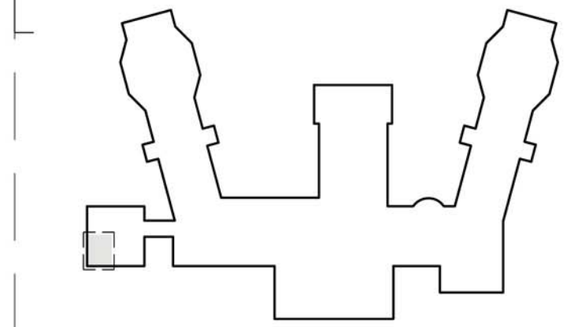
(LEFT) A2-12 TYPICAL PATIENT ROOM
1:50



KEY PLAN
N.T.S.

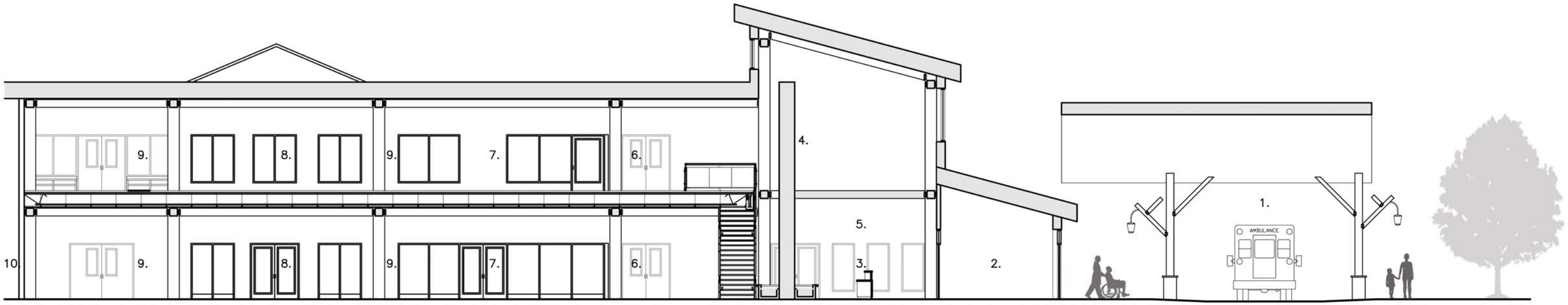
(LEFT) A2-13 TYPICAL ADOLESCENT PATIENT ROOM
1:50





KEY PLAN
N.T.S.

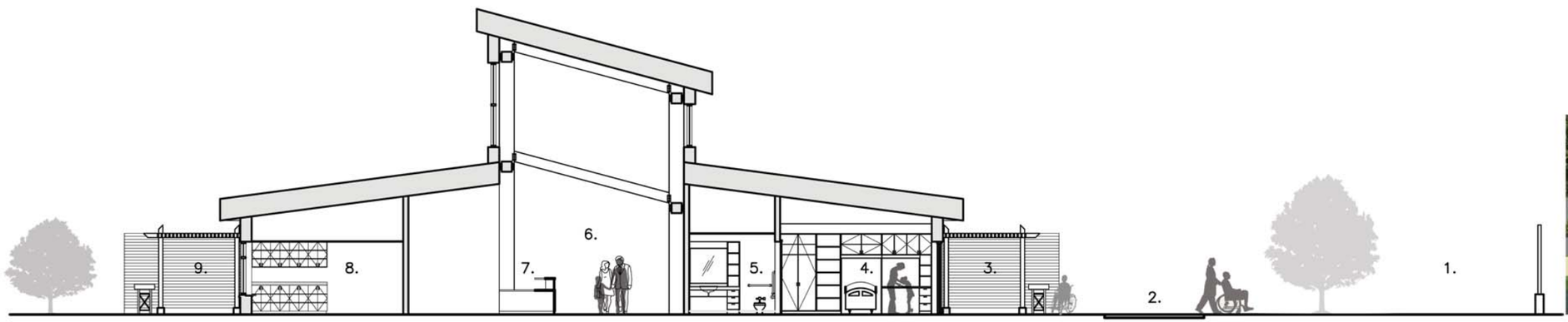
(LEFT) A2-14 TYPICAL HOSPICE PATIENT ROOM
1:50



LEGEND

1. PATIENT DROP–OFF
2. ENTRANCE
3. LOBBY
4. LIVING WALL
5. CHAPEL BEYOND
6. EXIT STAIR BEYOND
7. REFERENCE LIBRARY BEYOND
8. INNER COURTYARD BEYOND
9. CORRIDOR
10. ELEVATOR

(ABOVE) A4-1 SECTION THROUGH LOBBY
1:150



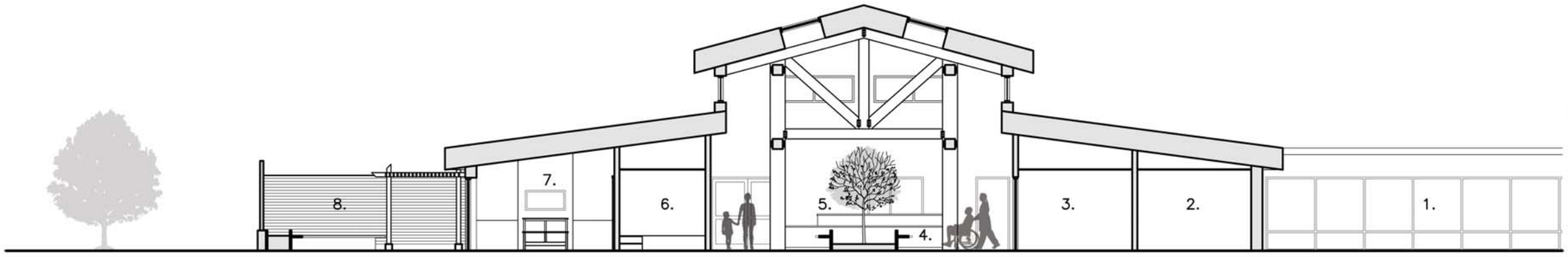
(ABOVE) PATIENT ROOM PERSPECTIVE
(GARDEN TOWARDS PATIENT ROOM)
N.T.S.

(ABOVE) PATIENT ROOM PERSPECTIVE
(LOOKING OUT TO PATIENT GARDENS)
N.T.S.

LEGEND

1. PATIENT GARDENS
2. BOARDWALK
3. PATIENT OUTDOOR SPACE
4. PATIENT ROOM
5. PATIENT WASHROOM
6. CORRIDOR
7. NURSE'S STATION
8. NURSE'S BREAK ROOM
9. NURSE'S OUTDOOR AREA

(LEFT) A4-2 SECTION THROUGH PATIENT ROOM AND
NURSE'S BREAK ROOM
1:150



(ABOVE) HOSPICE PATIENT ROOM PERSPECTIVE
(LOOKING OUT TO PRIVATE GARDEN)
N.T.S.

(ABOVE) HOSPICE PATIENT ROOM PERSPECTIVE
(PRIVATE GARDEN TOWARDS PATIENT ROOM)
N.T.S.

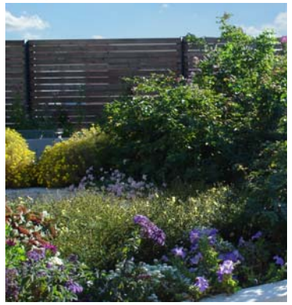
LEGEND

1. HOSPICE COURTYARD
2. MEETING ROOM
3. SHOWER ROOM
4. LOUNGE
5. NURSES'S STATION
6. PATIENT WASHROOM
7. HOSPICE ROOM
8. PATIENT'S PRIVATE GARDEN

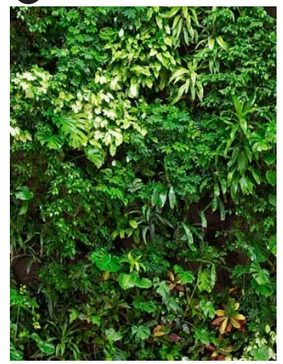
(LEFT) A4-3 SECTION THROUGH HOSPICE PATIENT ROOM
AND CORRIDOR
1:150

C PATIENT GARDENS

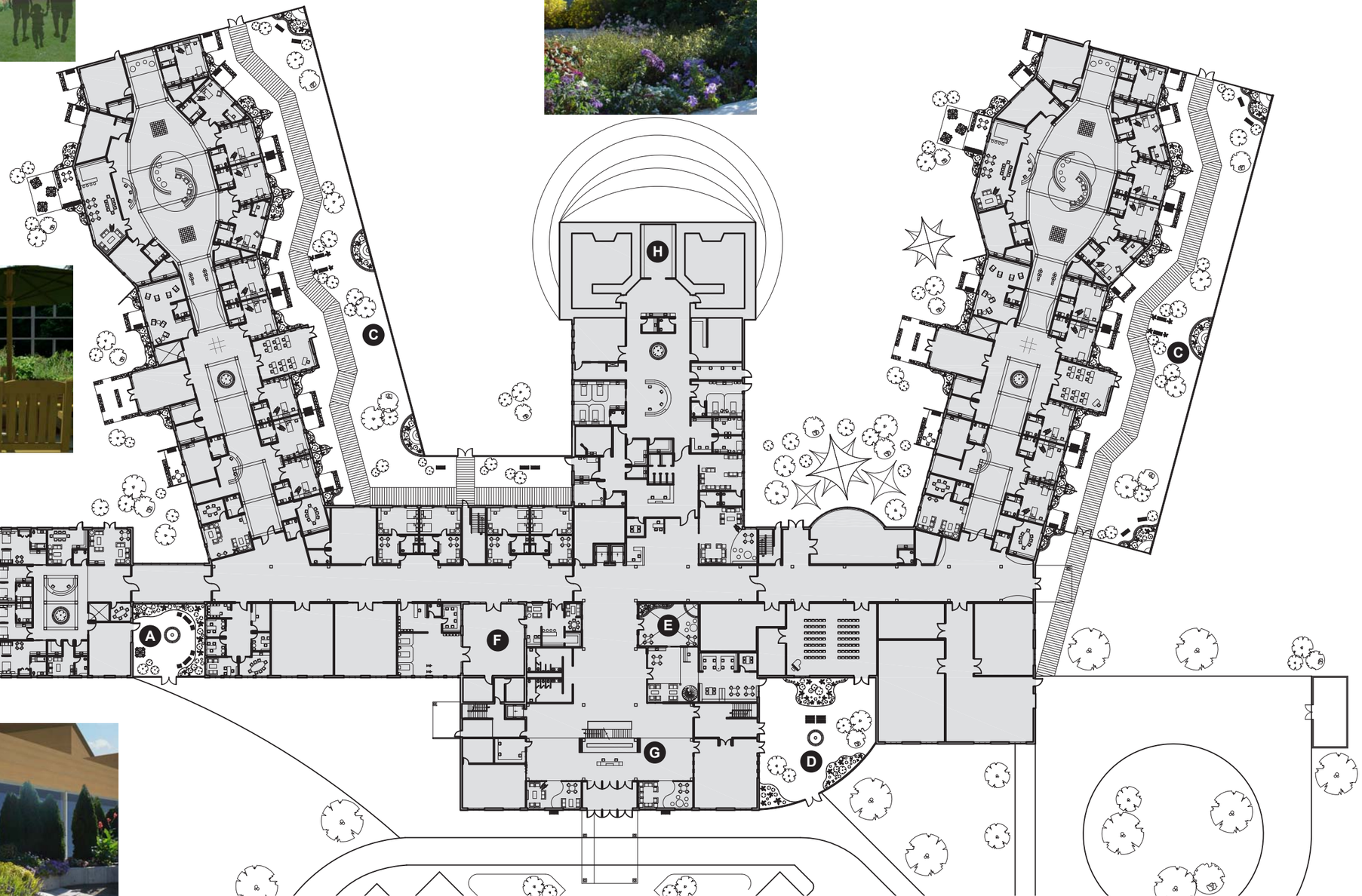
D COMMON GARDEN

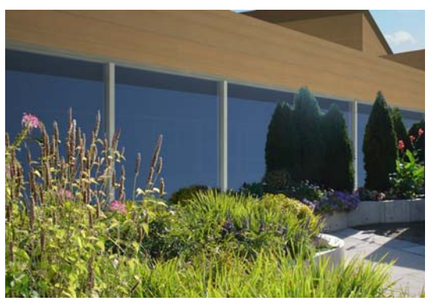


G LIVING WALL



B PRIVATE HOSPICE GARDEN





A HOSPICE GARDEN

LEGEND:

A HOSPICE GARDEN

B PRIVATE HOSPICE GARDEN

C PATIENT GARDENS

D COMMON GARDEN

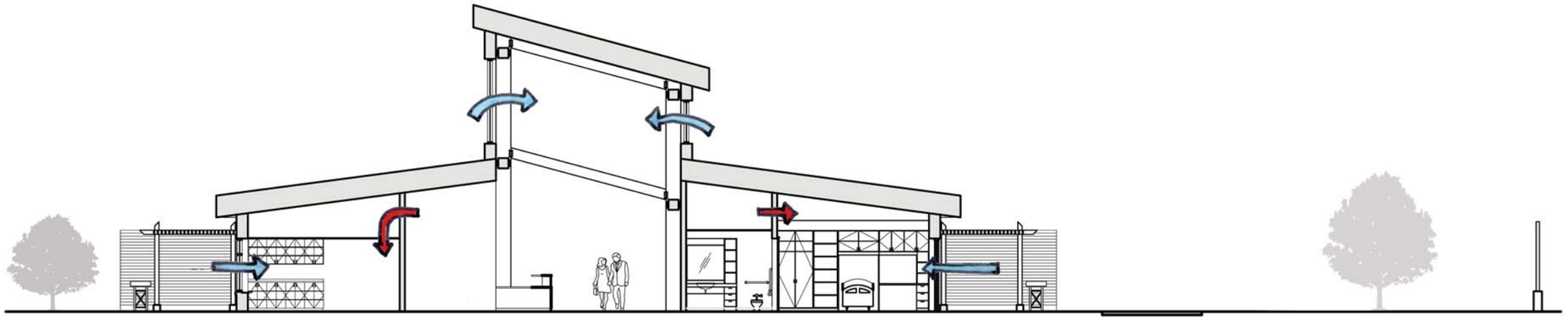
E INDOOR COURTYARD

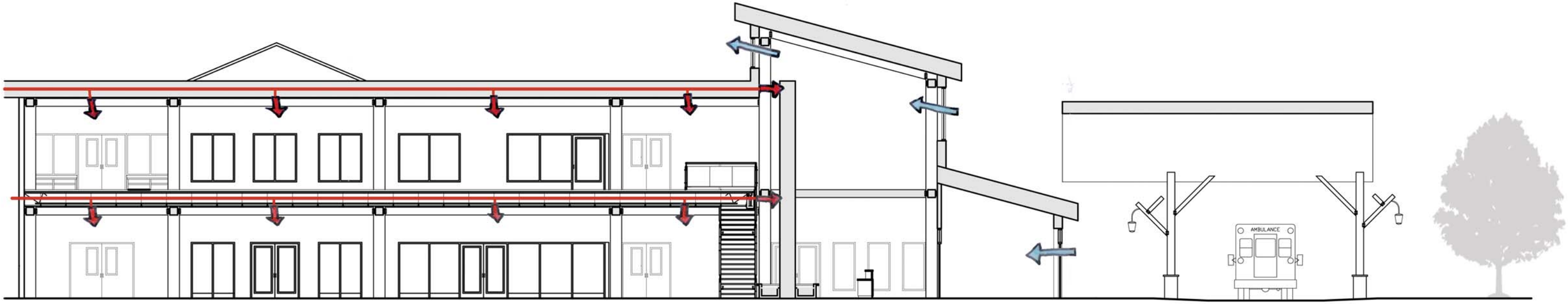
F THERAPY GARDENS

G LIVING WALL

H GREEN ROOF (ABOVE)

A8-1 DIAGRAM OF GREEN SPACES
GROUND FLOOR
N.T.S.





LEGEND

NATURAL VENTILATION

MECHANICAL VENTILATION

(TOP) VENTILATION DIAGRAM AT PATIENT ROOM AND
NURSE'S BREAK ROOM
(BOTTOM) VENTILATION DIAGRAM AT LOBBY

A8-2 VENTILATION DIAGRAMS
N.T.S.

Lobby and Information Desk

Coming to a hospital or a healthcare facility can be a traumatic and stressful experience for the ill child and their family. The trip can often be confusing. Therefore, information services, way finding, and signage are important elements for visitors.

When patients and visitors approach the healthcare facility, they are drawn towards the entrance canopy. Three double doors are located at the front entrance - two sets at adult height, and the middle double doors at a reduced height for children. Once inside, the first thing patients and visitors see is the reception desk and living wall in the center of the lobby. The Delft Montessori School by architect Herman Hertzberger inspired the design of the lobby area. He softened the threshold from the outside to inside and designed the lobby to be a place for children to be welcomed and parents to interact with one another. The central reception desk allows visitors to be welcomed as soon as they arrive. The desk has built-in lower seating areas on either side, a feature that allows younger children to be part of the conversation and not feel left out. Nature is brought inside the paediatric oncology facility by the living wall. Not only is the living wall a natural art form, it also helps to improve the air quality within the building. It is the first thing patients see when they enter the facility, and the last thing they see before they leave. Since the lobby is a double height space, children are able to experience the living wall at ground level as well as from the second floor. Benches are incorporated into the planter surrounding the great wall, and not only offer seating options but also places where parents can get to know one another while enjoying the natural feature. Natural light streams in from the clerestory windows and illuminates the plants.

A central staircase behind the living wall takes those visitors who are mobile to the second floor. This stairwell provides another opportunity to explore the living wall as one makes the climb to the treatment and administration area.

Washrooms, exit stairwells, storage, and a security office are also located within or directly off the lobby to meet the user’s needs. An elevator located in the south-west corner

of the lobby provides barrier free access to the second floor where the treatment and administrative services are located. Two additional elevators are located at the end of the lobby corridor (behind the living wall).

Two small waiting areas flank the entrance and provide different seating options for the users. Although both spaces contain a play area, the size varies based on the waiting area. The waiting area to the left of the entrance is geared towards the older population. A central fireplace is surrounded by oversized chairs. A small play space, complete with child sized furniture, looks out into the lobby. The waiting area on the right contains a centralized seating area with a larger play area off to the side that can be monitored by waiting parents. Large windows that extend within a foot of the floor allow small children to see outside. The waiting areas also provide a place for parents to get to know one another, a concept that Hertzberger incorporated into his designs.

Gift Shop

The lobby also contains a small gift shop that will serve the healthcare facility as well as the surrounding community. Along with gift items, flowers, clothing, books, magazines, local preservatives, and baked goods could also be sold here. Not only would local farmers benefit from the sales but any profits would then be turned back to the facility for upkeep and future expansion.

Spiritual Services

The Chapel is located opposite the gift shop. The location allows for a quiet place where patients and families can wait for visitors as well as a private place for prayer, meditation, or reflection. Since it is located off the lobby, it could be open 24 hours a day, 7 days a week, and still be monitored. The Chapel opens to a garden shared by the Chapel, Library, and Multipurpose Room. This private garden inspired by the gardens found at CNIB and Good Samaritan Regional Medical Centre, contains fragrant flowers and plants that will attract butterflies and birds and add to the relaxing environment.

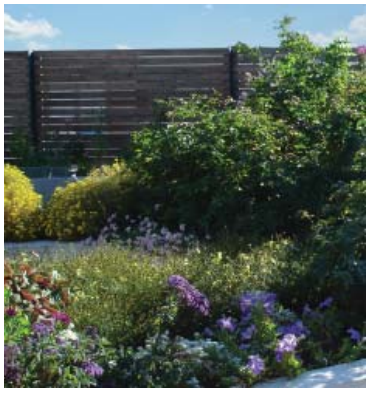


Figure 3.19
(above) Example of Fragrance Garden adjacent to Resource Library and Multipurpose Room
Author's Rendering

The Family Resource Library and Indoor Courtyard

The Family Resource Library is also located off of the lobby, behind the central staircase, for easy access. It will serve the patients, their families, staff, and the community. The library offers a variety of spaces (both inside and in the adjacent garden) for reading, research, and staying in touch with the outside world. A business centre complete with modern technology allows parents to work offsite and children to stay in touch with their friends back home. Part of the library is a double height space with workstations that overlook the first floor. The layout provides a light, airy feeling as well as allows light to filter in from above. Access to the second floor from within the Library is granted through a circular staircase which reduces the amount of space required to travel between the floors.

An indoor courtyard opens off the Library and the facility's central corridor. The courtyard is made up of small gardens with plants chosen to survive in an indoor environment. A water feature provides relaxing sounds that echo within the space. A central tree provides vertical dimension within the space, while a circular bench which wraps around the tree, offers seating in the courtyard. Other seating choices include small café style tables with chairs, round stools that can be moved within the space for added flexibility, and benches that follow the gardens. A smooth cobblestone-type floor allows for wheelchairs to maneuver in the space but also helps to bring the outside in with the choice of materials. A glass skylight roof protects the space from the elements but allows light to filter in.

Coffee Shop

A small coffee shop, located directly across from the indoor courtyard, with access off the north/south corridor, offers a place to grab a drink or a bite to eat. A variety of seating options are available for individuals or larger groups. For example, one room contains a fireplace with oversized armchairs for an intimate environment, while another space is made up of typical restaurant style tables and chairs. The oversized arm chairs also allow a small child to curl up with a parent or sibling. In general, the coffee shop is a place where families or individuals can meet with others who are

going through similar experiences. The space also offers an opportunity to get away from the medical side of the facility. The coffee shop looks out into a small outdoor courtyard that is also shared with the physiotherapy department. Small tables and benches are located throughout the courtyard for a variety of seating options both for the coffee shop patrons and for those undergoing treatment from the physiotherapy department.

Medical, Patient, and Support Services

Various medical services are provided in the paediatric oncology facility including Physiotherapy, Laboratory, Counseling Services, and a Pharmacy. These four services are located on the first floor off the central north/south corridor for easy access. All spaces have large windows whenever possible to provide maximum daylight and allow for maximum views outside to the gardens or the natural environment.

Childhood illness affects not only the child but also the entire family. For this reason, a variety of counseling services will be available to the child and their families. These services will be offered to inpatients, outpatients, and the community. The office will be made up of psychologists, grief counselors, social workers, and support staff.

Other services and spaces include a multipurpose room that can be used by the facility or rented out to the public as a revenue generator, a childcare space, food services, laundry, shipping and receiving, and the morgue. With the exception of the morgue, all spaces have large windows that allow for light to enter the space and also provide views to the outdoors. Outside the childcare space are covered tent-like play areas which allow children who are sensitive to light to play outside without having to worry about sun exposure. Trees also surround the play structures, adding additional shade to the area.

A loading dock has been provided on the north side of the facility to accommodate deliveries. A bike storage area is located adjacent to the loading dock which provides a safe place to for staff to lock up their bicycles if they ride to work. Garbage, recycling, and composting areas are

located outside the loading area, away from the public's view. Compost produced onsite will be used in the gardens and for the garden therapy program.

The administration offices are located on the second floor, adjacent to the upper level of the library and overlook the inner courtyard. Large windows provide natural light to the space. The staff lounge is also situated on the second floor and overlooks the outdoor courtyard.

Public washrooms are located across from the library and central stair on both levels for increased access.

Building Services

With any facility of this size, mechanical spaces are required for HVAC (Heating, Ventilating, and Air Conditioning), and other mechanical services. In order to reduce the distance for the HVAC system, two mechanical rooms have been created (one on the north side and one on the south side of the building). Each mechanical room will feed one wing. The lobby and the treatment wings will be split by the two.

Family Sleep Rooms

In order to create a family-centered healthcare-facility, it is important that the family is involved in all aspects of the care. For this reason, family members may spend extended periods of time at the facility. Many parents will also spend the night, especially if they are from out of town. Every patient room has a place for one or both parents to spend the night as is typical in many renovated children's hospitals. Four family rooms have been provided to accommodate larger families or families with children that are not inpatients but need to revisit the facility for periodic checkups. Bloorview Kids Rehab provided reference for incorporating family accommodations into the design. The family sleep rooms are located off the north/south corridor, across from the coffee shop and physiotherapy. Each room contains a small sitting area with couches, a table and television, a full size washroom, and a separate sleeping room complete with two queen size beds, small sitting area, and a desk. Access to the outdoors is provided by sliding doors from the sleeping room.

Patient Wings

The paediatric oncology facility contains two patient wings that are structured by school grades. The northern wing is designed for children from birth to grade five while the southern wing accommodates adolescents from grade six up to and including eighteen year olds. Both wings are similar in layout and contain ten patient rooms (two of which are for isolation). Although there is segregation between the age groups, it was done in a positive way. It provides an opportunity for children similar in age and points in life to interact with one another. The wings are differentiated by colour. Blues have been assigned as the accent colour for the northern wing and greens for the southern wing. These colours also assist in wayfinding and act as visual clues. A staff member can direct patients or visitors by instructing them to follow the green or blue colours and associated signage. Accent walls would be offset by natural tones. Views to the outside which have been provided at numerous areas within the building, not just in the patient wings, also help with wayfinding and aid in orientating users.

At the entrance to the wing is an information desk operated by a volunteer. A waiting area is also situated here, complete with small play area, meeting rooms that can be used for consultations or therapy, and a public barrier free washroom.

Two nurse's stations are located on the patient wing. The decentralized stations help with security, decrease travel distance, and help with reducing noise. A nurse's break room is located off one nurse station. A small covered patio, complete with bench, and table and chair provides a place where staff can go to be outside.

Clean rooms, soiled rooms, storage spaces, and stretcher alcoves are located throughout the facility for improved access. Public washrooms and a shower room for patients are also provided.

A garden therapy room or greenhouse is located on the south side of the wing to take advantage of the natural light. Accessible planter boxes also continue outside.

A classroom is located directly across from the garden therapy room. This space will accommodate approximately twelve students, a teacher, and tutors as required. Access is provided from the classroom to the outdoors for opportunities to bring lessons outside.

Lounges or places of interaction are located throughout the wing. Directly outside the classroom and garden therapy room (framed by the large wood columns) is an indoor tree with circular bench. This spot will not only serve the adjacent spaces but it also brings the natural environment inside and helps break up the long corridor. Benches are also located in the corridor outside the treatment rooms and at the end of the wing, outside the quiet room. A large lounge is located in the center of the octagonal wing, across from the nurse's station. Two skewed, curved bookshelves and wood walls help define the space. They create a sense of privacy but do not completely separate the lounge from the rest of the corridor. A flooring change further defines the area. Bookshelves will contain reading and reference materials that can be enjoyed by all. A variety of seating options are available to users including seating for children, stools, and oversized arm chairs for added comfort. The oversized chairs would provide an opportunity for a parent and a small child to comfortably fit in one of the chairs to share a storybook. The clerestory windows in the octagon roof allow light to filter into this space, and provide a pleasant environment.

Throughout the corridor, a series of playground, chalk-style games are imprinted on the floor and create a child friendly environment. Life-sized tic-tac-toes, checkers, and chess boards provide opportunities for interaction between patients and families. Hopscotch offers an opportunity for exercise. The opportunity for spontaneous acts and encounters is an idea derived from a variety of Herman Hertzberger's school designs. In the proposed design, corridor walls would contain various murals depicting outdoor scenes and nature as well as whiteboards in the shape of trees and plants for children to express their creativity, and to help bring natural elements inside. Art display areas will also be situated throughout the corridor and common spaces to display the children's art, another idea that was inspired by Hertzberger's school designs. Etchings or transfers would be applied to glazing

to provide privacy and graphically bring the outdoors in. As the sun shines through a window containing a graphic representation (i.e. flower, bird, or butterfly), the image would be transferred onto the adjacent wall or floor, which would in turn create added interest in the space. Large glulam beams and columns, sloped ceilings and roofs, and clerestory windows add interest to the space and help set the building apart from other healthcare facilities.

Figure 3.20
(above) Patient Corridor at 2 pm on June 21 at 1220 mm (8 year old eye height)
Author's Rendering

Figure 3.21
(below) Patient Corridor at 9 am on December 21 at 1220 mm (8 year old eye height)
Author's Rendering

Since the paediatric oncology facility will act as a home away from home for many families, certain amenities are provided. Bloorview Kids Rehab provided insight into designing common spaces that will be used by all. A family

room contains a large kitchen that families are able to use, as well as a dining area and small sitting area with fireplace, and built-in bookshelves for games, books, and similar items. An outdoor eating area is also provided. A playroom/multi-media room provides a place where children and families can play with toys, watch movies, or play video games. The teen's room provides a space where older children can get away, have some privacy, and maintain some of their independence. An outdoor patio is also provided. A quiet room offers a place for prayer, contemplation, and meditation. Access to the outdoors and a covered terrace is also provided.

Children undergoing chemotherapy have the opportunity to receive their treatment within the patient wing. Unfortunately treatment can sometimes be associated with fear, sickness, and pain. For this reason, chemotherapy should never take place within a child's room. Therefore, a treatment room has been provided with two spaces and options for receiving chemotherapy. A small group treatment area accommodates four recliner chairs that are positioned in a semi-circle for conversation. The arrangement and room design also allows the child to enjoy views to the outdoors. A garden has been situated outside the window to provide a depth of landscaped and natural views and adds interest to the space and can help reduce stress, lower pressure, and increase positive feelings, as found by researchers Ulrich and Honeyman (from York 2001). A second play area allows children to watch television or play video games to offer a distraction while undergoing treatment. Again, large windows have been provided in this space to provide daylight and offer views to the outside.

The Patient Room

As Asa S. Bacon discussed in 1920, single-bed rooms help reduce infections spread by other patients and allow for easier disinfection of a room once the patient has been discharged. Single rooms offer more privacy, safety, and allow the patient to rest undisturbed. Individual patient rooms will also allow for a family-centered approach to healthcare. In addition, they provide patient control of the space. Medical errors are reduced in private rooms as background noise is decreased and patients are rarely moved. Singe rooms also allow for

three types of dedicated spaces: patient zone, family zone, and caregiver zone (designed for medical staff).

Figure 3.22
(above) View of typical patient room towards washroom at 1220 mm (8 year old eye height)
Author's Rendering

Two styles of patient rooms have been included in the design. The concepts behind the rooms are still the same but the family zone changes slightly (refer to drawings A2-12 and A2-13). The proposed single patient rooms offer patient, family, and caregiver zones as was inspired by *Greening the Patient Experience* by Anshen + Allen (2008 and 2009 exhibits). The patient zone allows for views to the outside. Sliding glass doors permit the patient to be wheeled out onto the private terrace. Built-in millwork at the headwall provides various storage options, a place to hide medical gasses out of view, and a work surface for patients. It also helps reduce the institutional look of the space. Patients spend a large amount of time staring at the ceiling in their room. The sloped ceilings provide an interesting feature in the room. This feature also allows for unconventional lighting in the patient rooms including suspended fixtures, pot lights, and wall sconces which provide greater lighting control in the space. The large patient washrooms allow caregivers to assist the child when needed. Steps to the bathtub also allow for smaller children to climb into the tub with little assistance and provide a sense of independence. Extra room is provided around the bathtub for sitting. Storage is provided in the washrooms for both the patient's and the family's toiletries. Since the patient rooms could accommodate a wide age range of children, all fixtures

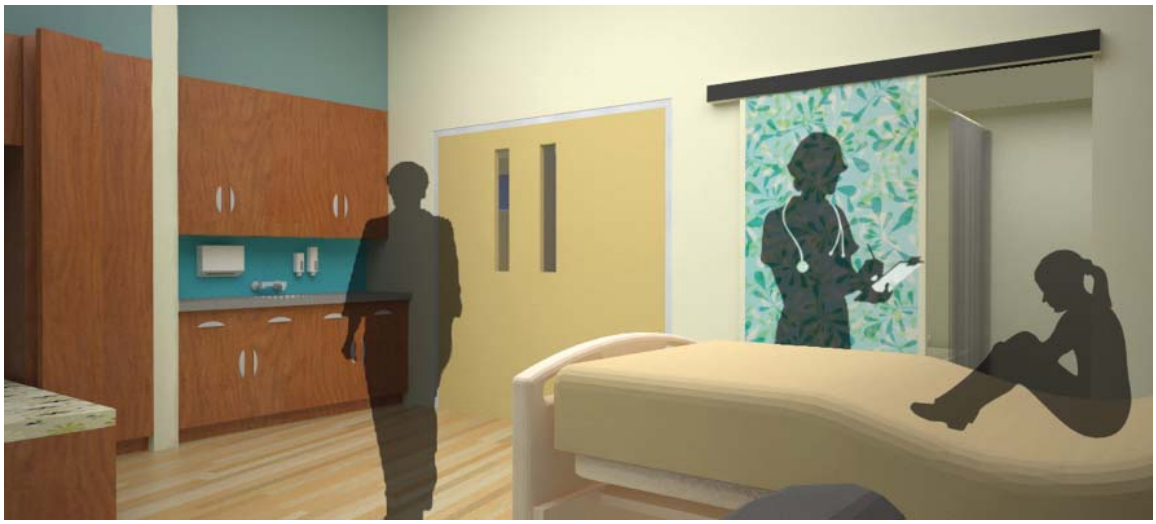


Figure 3.23
(above) View of typical patient room towards staff zone at 1220 mm (8 year old eye height)
Author's Rendering

and counters have still been designed at standard heights. However, in order to accommodate small children, a set of moveable steps would be provided in each patient room to provide independence for smaller children. The sliding door into the washroom also requires less strength to open and also helps to reduce patient falls and was inspired by the patient washroom doors at Bloorview Kids Rehab.

The family friendly patient zone for the typical patient room (refer to drawing A2-12) includes a pull-down bed, hidden away in a millwork wall, privacy curtains, and ample storage. This space allows a family member to stay with the child while the larger room size, also gives them some of their own space.

The second type of patient room, referred to as typical adolescent patient room (refer to drawing A2-13) could accommodate a variety of patient situations including older children who might not have a parent staying over, a patient who requires a little more privacy, or a patient who has a larger family and would require additional space. The family zone was inspired by the Anshen + Allen designs in 2008 and 2009 and consists of a desk complete with storage, and a sleeping or lounging area. The oversized built in sofa has a hidden mattress that can be pulled out to create a trundle-bed like sleeping area that would be able to accommodate one or more family members.

In both types of rooms, the caregiver zone is located at the entrance to the patient room, adjacent to the family zone. This location allows for hand washing as soon as a staff member enters the space. Lockable millwork cabinets provide storage space for medical supplies and medications. Hand sanitizer stations are located throughout the room, as well as the remainder of the facility for added hygiene. A privacy curtain would be located between the caregiver zone and the entrance into the patient zone to provide additional privacy.

In the four isolation rooms (two per wing), the caregiver zone has been expanded. The entrance vestibule room contains lockable millwork cabinets for medical supplies and medication as well as a hand washing area. A second caregiver zone adjacent to the family zone contains a second millwork area that can contain additional supplies needed within the room and also has a hand washing sink.

Outside each patient room is a small display case that the child and family can personalize by adding pictures, toys, and items that provide insight into their lives outside of the oncology facility. This idea was inspired by Herman Hertzberger's belief that it is important for children to display things that they have made. Hertzberger created display cases outside classrooms in the Delft Montessori School that give insight into what is going on inside the class and also act as transitions to the classroom.

Views and access to the outdoors are two important design principles that were informed by research conducted by Roger S. Ulrich and Mary Honeyman. Exposure to nature lowers a person's anxiety levels the quickest. Large windows in the patient rooms allow for daylighting and also help maximize the views to the gardens and natural environment, which can help to distract a patient. The large windows that extend within a foot of the floor allow smaller children to see outside without having to climb on something. The deeper window sill also provides a place where children can sit, play, or set up their possessions. The patient rooms were also designed so that a child or a parent lying in bed can simply turn his or her head and observe nature. Each view would be slightly different depending on the room but the intention would be the same. The position of the window mullions should allow

"We know that after contact with nature, our immune system works better, hormones that promote healing are activated, neuropeptides that ease pain are produced, and we simply and immediately feel better," (Gerlach-Spriggs et al. 1998: 41).

for an unobstructed view throughout at least one portion of the window no matter what the person's age or height.

Figure 3.24
(above) View from bed of typical patient room looking towards garden at 4 pm on June 21
Author's Rendering

Child friendly materials were chosen not just for the individual patient rooms but for the entire facility. Materials would be durable, easy to maintain, and easy to clean. For example, wood floors, linoleum, high pressure laminate, wood, solid surfacing countertops, ceramic and glass tiles, and Crypton® fabrics would stand up to the users and can be easily cleaned. Wherever possible, bright colours would be chosen to add interest to the space. The chosen materials are clean, but not clinical. Since the majority of healthcare facilities are not renovated for a substantial period of time due to funding concerns, care would need to be taken to ensure materials are not easily dated. Colour can be added to walls, fabrics, cubicle curtains, and countertops that can easily be replaced overtime and with wear. There is also an opportunity for colour and interest to be added to the patient rooms with sheets, blankets, and pillows as well as patient's possessions.

Each patient room has an outdoor covered patio that not only helps with shading within the room but also allows a patient to venture outside and still be protected from the sun. Patients can be wheeled out in their bed or in a wheelchair to enjoy the gardens and the natural environment. For additional protection, ivy or vines could be grown on the pergola. Each private patio also contains a planter box that

Figure 3.25
(above) View toward patient rooms
Author's Rendering

is wheelchair accessible. By providing a planter box for every room, each patient or family is given the opportunity to create and maintain their own small garden, a concept derived from the garden therapy programs at Homewood Health Centre in Guelph as well as research on garden therapy.

Since security is an important issue in healthcare facilities, certain measures must be taken to ensure patient, staff, and visitor safety. A garden wall is provided outside the patient rooms at both wings. The wall is made of a combination of stone, wrought iron, and wood to provide security, but still allow for views to the natural environment, and to provide an opportunity for plant growth. Staff members will have control over the lockable gates to ensure safety of the patients, visitors, and staff members.

Plants, trees, and gardens have been situated at various locations between the patient rooms and the garden wall to add interest to the space, create views, and increase user enjoyment. Grass areas provide soft play spaces for children while trees provide shade for the users. Water features add pleasant sounds to the space, while a variety of benches located throughout the gated area provide seating options for the users.

Treatment Spaces

The proposed paediatric oncology facility would become the new POGO (Pediatric Oncology Group of Ontario) clinic location and existing services in Waterloo Region would be expanded upon. A shuttle service could be set up between Grand River Hospital and the new paediatric facility to reduce the number of families that need to drive to Floradale. This would in turn cut the costs endured by families for travel as well as reduce the amount of pollution caused by driving to Floradale.

Doctor's offices and the POGO Satellite Office are located on the second floor, overlooking the adolescent patient gardens. The diagnostic imaging and surgery unit is located on the first floor between the two patient wings, while the chemotherapy treatment area is located directly above this on the second floor.

Receiving treatment for cancer can be a very stressful experience. If it is one of the first treatments, patients and families will most likely have a number of questions and uncertainties may arise. It is therefore important to make the experience as stress free as possible. When a patient approaches the diagnostic imaging and surgery unit, the first thing they will see is an information desk. This information centre serves all of the first floor but specifically offers information for the treatment unit. It will be staffed by volunteers and staff members who will welcome patients and families, answer their questions, and provide direction. A registration desk for the diagnostic imaging and surgery unit is located behind the information desk. A large waiting area contains various intimate seating options, a play area for children, complete with child-sized furniture, public washroom, and large windows that offer views to the outside. Patients will wait in the space before their treatment and larger families will remain here while the child is undergoing treatment. Large arm chairs provide a comfortable environment for those waiting.

Once a child is called into the unit, they will be directed to the change rooms and then wait in the gowned waiting area. Large windows in the waiting area allow for the child to enjoy the outdoors while they are waiting to be called.

The treatment unit is broken down into two areas. The first area contains a central nursing station, ultrasound room, mold room, x-ray room, barrier free washroom, clean and soiled rooms, and a meeting room for consultations. These rooms support less invasive procedures. The second area contains rooms for more invasive procedures such as surgery and radiation therapy. Depending on the type of testing or treatment a child must receive, they could visit one or both of these areas in one day.

Two exam rooms provide a place for patients to be examined before or after a procedure. A charting area outside the rooms provides a space for doctors and nurses to complete charting. Although the focus of this facility would be on chemotherapy and radiation, the facility also contains an operating room for minor surgeries, and as a result, a pre-op room and recovery room are required. The space also includes a simulator/CT room for medical imaging. Two linear accelerator rooms are provided with a shared control room to provide radiation therapy. Storage spaces, clean and soiled rooms, a staff washroom, and a staff work room are also located within the unit. A central nurses' station allows for nurses to monitor the different spaces.

A skylight offers natural light into the corridor while an indoor tree complete with a circular bench provides a waiting area for both children and parents and adds a green quality to the space. The greenery can help reduce anxiety as well as lower blood pressure as was found by researchers Ulrich and Honeyman. Wherever possible, windows have been introduced in the spaces for natural light and to provide views out to the natural and the built environments.

The chemotherapy treatment unit is located on the second floor. As with the treatment wing on the first floor, an information desk is situated adjacent to the elevators to welcome patients, their families, and visitors, while at the same time helping to reduce their stress. Behind the information desk is the registration area. A large waiting area is located across from the registration area with a variety of seating options and play area for children.

Inside the chemotherapy treatment unit are 6 private exam rooms where a child could be examined before or

after a procedure. Each room contains windows which allow the entrance of natural light. The unit provides a variety of different options for receiving chemotherapy treatment. Three individual treatment rooms allow for privacy during therapy and offer views of the green roof. Open treatment room one offers a group style treatment. This space has room for 8 children to receive treatment at once. The recliner chairs are positioned in a semi-circle for conversation but also allow the child to enjoy the views outside. Open treatment room two is smaller and can accommodate 4 children who prefer smaller groups. Again, the chair position provides views outside to the grounds, the natural environment, and the green roof. The final treatment space is the play area. This room is comprised of activity tables and an entertainment area which allows children to play video games or watch movies while receiving their treatment. Support spaces on the unit include prep rooms, storage rooms, nourishment area, clean and soiled rooms, and barrier free washrooms. A large consulting room and a smaller meeting room provide different space options for meetings. A central nurse's station allows for monitoring of the exam rooms, individual treatment rooms, and access in and out of the unit. Charting areas are located in a few different spots for increased access.

The Hospice Unit

Unfortunately not all children with cancer will survive. The overall survival rate of paediatric cancer is 80% (POGONIS 2009). The hospice unit services children with terminal cancer and their families. Located at the south side of the facility, past counseling services, a glass walkway flanked by an outdoor courtyard provides access to the unit. Similar to the patient room corridors, etchings or transfers are positioned on the glass to provide privacy and graphically bring the outdoors in.

A waiting area with access to the outdoors is situated at the entrance to the hospice unit. A variety of seating options are available, as well as a small play space that children can use while they are waiting. A public washroom is located adjacent to this space.

A small meeting room is located across from the waiting area

that will provide space for family meetings and consultations with medical staff.

Glulam beams and columns, sloped ceilings and roofs, and clerestory windows add interest to the space and provide a lodge like environment. A central nurse's station is located in the common area and provides complete observation of the space. An indoor tree, complete with plantings and circular bench, opposite the nurse's station, provides a natural element within the space as well as offers a seating option outside of the patient rooms. The year-round greenery will not only add interest to the space but will also help reduce anxiety, lower blood pressure, and reduce stress as previously discussed under the treatment spaces section. Skylights and clerestory windows have been incorporated in the common area to provide the required light for the greenery as well as to brighten up the space.

Other rooms include a clean room, soiled room, shower room, nurse break room, and family room. The family room contains a small kitchen that families can use while staying at the facility. A dining area and small seating area are also provided. This space offers families a scenery change from the patient rooms.

A quiet room offers a place for prayer, quiet contemplation, and meditation. The larger room also provides opportunity for spiritual services. A private gated courtyard/garden is

Figure 3.26
(left) Hospice Garden
Author's Rendering

located off the quiet room. Fragrant gardens which were inspired by the CNIB gardens contain plants that will attract butterflies and birds are situated along the perimeter of the building. Benches are positioned around the garden's edges, while a table is located near the building. A water feature is located in the center of the courtyard for both visual and audible enjoyment. Trees situated in the southeast corner of the courtyard provide vertical interest to the space as well as a protected seating option.

Four hospice rooms are provided on the unit. Similar to the standard patient rooms located throughout the facility, each room offers three dedicated spaces: a patient zone, a caregiver zone, and a family zone as was inspired by *Greening the Patient Experience* by Anshen + Allen (2008 and 2009).

Figure 3.27
(above) View of hospice patient room at staff zone looking towards patient and family zones on June 21 at 12 pm Taken at 1220 mm (8 year old eye height)
Author's Rendering

The caregiver zone is located at the entrance to the room. Millwork is provided with a sink to remind caregivers to wash their hands when entering the space. Lockable cupboards provide storage for medications and medical supplies.

The patient zone does not contain a typical hospital bed; instead, a queen bed is provided for added comfort and allows visitors to sit closer to the child. Medical gases are hidden within the drywall wall behind the headboard (access is provided from the side) and was also inspired

by Anshen + Allen's proposal in 2009. Millwork and/or closets provide storage space for clothing and personal possessions. The washroom contains a sliding door which requires less strength to open and also helps to reduce the number of patient falls. This type of door was inspired by the patient washroom doors at Bloorview Kids Rehab. The large washrooms allow caregivers to assist the child when needed, while steps to the bathtub provide smaller children with a sense of independence. Extra room is also provided around the tub for sitting. Ample storage in the washroom provides a place for both the child's and the family's toiletries. The sloped ceilings are an interesting feature in the room and allow for unconventional lighting including suspended fixtures, pot lights, and wall sconces which provide greater lighting control in the space. A four foot high wall visually separates the patient zone from the family zone and also provides a space for the television.

Figure 3.28
(below) View from bed towards family zone and private hospice garden on June 21 at 12 pm
Author's Rendering

The family zone contains a pull-out couch, a bench that can be used for sleeping, and in rooms where there is enough space, a small table with chairs.

Each room contains large windows and double doors that open onto a private garden. The private gardens are large enough that a patient can be rolled outside in a wheelchair but small enough that a parent can spend time outdoors and still hear if their child calls out. A covered patio provides shading outside and for the patient room. Raised gardens

Figure 3.29
(above) View of hospice patient room from private garden on June 21 at 2 pm.
Taken at 1220 mm (8 year old eye height)
Author's Rendering

complete the area with a continuous bench running along the security wall. This wall is made up of stone and wrought iron, similar to the wall found outside the patient rooms. Ivy style plants can be grown on the wall for added privacy. Two fixed benches and a small dining table are also provided in each private garden for added comfort.

Figure 3.30
(above) Private Hospice Garden on June 21 at 12 pm
Author's Rendering

“GREEN” / SUSTAINABLE DESIGN

The purpose of a healthcare facility is to assess, treat, and heal its patients. Such a facility should be designed to encourage recovery. Even though the project was not a LEED design, the *Green Guide for Health Care* (2005) acted as a resource for the proposal. This manual is an adaption of the LEED system that was specifically tailored to hospital construction, where the building is not necessarily new. The guide is organized into construction credits and operations credits. The guide suggests various items that can help to create a sustainable design. The following comments address significant points of the manual as they apply to this proposal.

Construction Credits:

Integrated Design (ID):

The first section contains two prerequisite credits related to integrated design. The proposed project would need to have an integrated design team made up of the users, all design disciplines, constructors, facility managers, and operations personnel. In the early stages of the project, an environmental health mission statement and program needs to be created that works with the proposed facility’s design program.

Sustainable Sites (SS):

The second section of the manual includes items such as erosion and sedimentation control, site selection, alternative transportation, site disturbance, stormwater management,

heat island effect, light pollution reduction, connection to the natural world, and community contaminant.

During construction, care would be taken to lessen the negative effects on water and air quality. For example, permanent seeding, mulching, and silt fencing are strategies that could be employed. It would also be vital to minimize excessive ground disturbance and important to protect existing vegetation surrounding the new facility.

The chosen rural site is located adjacent to land cared for by the Grand River Conservation Authority. The Woolwich Reservoir helps maintain watershed management in Waterloo Region. Although the chosen site takes up a portion of two farms, the surrounding area can still remain as farmland. In order to reduce possible future pesticide contamination on the healthcare site, it could be possible that the surrounding farms implement organic farming practices.

The credits related to development density and brown field remediation do not apply to the proposed project. Although the site is not a brownfield, if pesticide contamination is a concern because the land was originally used as farmland, a site remediation plan and clean up could be implemented. For example, pump-and-treat[1] and land farming[2] could be used. Plant selection strategies could also be incorporated in order to absorb and filter out pollutants.

As Floradale is a rural community, it is not on a public transportation line. In order to reduce the vehicle traffic to the proposed paediatric oncology facility, a shuttle bus service would be created that would bring patients, families, staff, and visitors from Grand River Hospital in Kitchener to the new facility. Since Grand River Hospital is on the Grand River Transit (GRT) Line, those using the shuttle bus service could either drive to Grand River and park, or take local transportation.

Local staff members who choose to bike to work will be able to store their bikes in one of the outdoor bike racks located near Shipping and Receiving. Bicycle storage would be provided for at least 3% of the peak building day shift staff.

1 Refer to glossary for definition of pump-and-treat.
2 Refer to glossary for definition of land farming.

One staff shower and change area has been provided on the second floor in the Staff Lounge. (This credit requires one shower per 8 cyclists.)

Since the proposed paediatric oncology facility is small, it is not practical to provide alternative fueling stations on site. The shuttle bus could be fuelled by alternative means at a local fuelling station.

The Woolwich Zoning By-Law requires 1 parking space for every 4 beds, plus 1 parking space for every 4 employees. Based on the number of beds, only 6 parking spaces are required for the patients. Since no standard nursing staff-to-patient ratios exist and every hospital implements their own standards of care, it is difficult to determine how many staff members would be employed by the hospital. As a result, the parking spaces were estimated. Adequate parking has been provided including barrier free, reserved spaces for deliveries, doctor's parking, general parking, and overflow parking. Even though a shuttle bus service would be implemented that would take patients, families, visitors, and staff from the new facility to Grand River Hospital in Kitchener, there would most likely be a need for more parking spaces than what the zoning by-law requires as a minimum. The facility would serve children from Waterloo Region, Dufferin-Wellington County, and possibly surrounding communities and as a result, additional parking has been added to meet this potential need.

During construction, care would be taken to reduce the disturbance of earthwork and vegetation around the perimeter of the building as well as disturbance for any related roads, parking areas, walkways, and associated site services. Native plants and grasses would be planted on site that would be able to survive in the climate.

The building was designed so that the majority of rooms were located on the ground floor in order for the users to have direct access to the outdoors. Therefore, the credit for Reduced Site Disturbance: Development Footprint does not apply to the proposed project.

Green Roofs will help promote infiltration and help maintain stormwater flows. Stormwater run-off will be harvested

at various locations throughout the facility and used for landscape irrigation. Alternative surfaces including green roofs and pervious paving, as well as nonstructural practices such as bio-swales, will help reduce imperviousness and support infiltration.

In order to reduce the heat island effect, light coloured, high-albedo pavement with a solar reflectance index (SRI) of at least 30 for at least 30% of the site's hardscapes including parking areas, walkways, and roads would be used. Plantings on the parking islands would also provide partial shading in the parking areas. To reduce the heat island effect for roofs, a portion of the roofs are green (vegetated). Flat roofs would be highly reflective (Energy Star Compliant) and a high emissivity roofing material would be used.

Although some exterior lighting is required on the site for safety at night, exterior lights would be carefully designed and placed to reduce the light pollution at night. Lighting located near the ground will help light up paths so the surrounding outdoor space could still be used at night. Lights placed strategically in the gardens will also highlight certain areas. Lighting would be zoned and controlled to allow for the entrance and access pathways from the parking lot to be lit at night. Limited night time lighting would also be provided for a small employee parking area, a small visitor parking area, pedestrian walkways, and circulation routes.

With the intention of connecting users to the natural world, a variety of respite places have been provided to connect healthcare patients, visitors, and staff to the natural environment. A large amount of rooms have direct access to the outdoors. Gardens are located both on-grade and on rooftops. Staff members also have access to private patios off of the Nurse's Break Rooms located in both of the patient wings. Greenhouses and interior courtyards allow access to gardens throughout the year so they can be enjoyed by all. Places of respite also include family consultation/meeting rooms, lounges, the coffee shop, the chapel, resource library, and staff rooms.

In order to minimize building airborne effluents and environmental, safety, and health impacts to site and neighbours, scrubbers and filters could be installed on

boilers and generators. Fuels with low sulfur content could be burned or bio-diesel fuels could be burned instead of fossil fuels. Further decisions about the mechanical systems would be made by a mechanical engineer.

Since the adjacent Woolwich Reservoir is part of the watershed management system for Waterloo Region, it is vital that ground water is not contaminated by the proposed healthcare facility. All storage facilities would include provisions to prevent spills and leakage from contaminating aquifers and stormwater. As the site is located in a climate that receives a large amount of snow, it is practical to have solid surfaced parking lots to aid in winter maintenance and snow removal. As a result, pollution from cars collects on the pavement and is flushed away with rain. Since there would be no sewers serving the site, bioswales could help collect and filter run-off from the parking lot before it is released into the watershed.

Water Efficiency (WE)

The third section looks at different ways for the facility to use water efficiently and reduce the use of potable water for equipment cooling and irrigation.

In order to eliminate potable water used for equipment cooling, closed-loop cooling water would be used for equipment cooling.

Rainwater would also be collected at various locations throughout the site and used for irrigation. There is also a possibility for grey water ponds on site that could be used for irrigation. Where possible, native, low maintenance plants would be used that will not require extensive care and would be able to survive in the Canadian climate. A high-efficiency irrigation system could also be used in specific areas requiring greater attention. The system would include moisture sensors and programmable clock timers.

Except for the initial watering to establish plants, captured rain and recycled site water would be used to eliminate all potable water consumption for site irrigation. Native landscaping would also noticeably lower irrigation.

Installing ultra-low flow fixtures and waterless urinals would help reduce wastewater volumes. Grey water could also be used for irrigation and toilet water. There would also be a possibility of installing a living machine in the facility. Although one has not been designed in this proposal, it would be possible to convert one of the greenhouse/garden therapy spaces into a space that could house a living machine. Since chemotherapy drugs would be used to treat some patients on site, select washrooms would most likely be chosen to connect to the living machine.

Occupant sensor controls could also be installed in public washrooms to help reduce potable water use. Storm water or grey water can be used for toilet flushing. Water-efficient shower heads, water-saving faucet aerators, and electric sensor faucets would be useful in reducing potable water. Dual flush toilets could also be installed in various areas as a way to reduce water usage.

In order to achieve the credit for Process Water Use Reduction and Verification, ongoing accountability and optimization of building water consumption performance would be required over time. To achieve the credit, the facility would first need to be constructed.

To receive the credit for Process Water Use Reduction: Low or No Use Building System Equipment, the architect would need to work with a mechanical engineer to specify equipment with low or no usage of potable water.

Energy & Atmosphere (EA)

In order to achieve the majority of the credits in this section, it is essential to involve both electrical and mechanical engineers in the design decisions. However, various general statements can be made for the Energy and Atmosphere Section.

- Natural Ventilation (refer to diagrams on drawing A8-2) as well as day-lighting help reduce energy consumption and costs.
- Separate HVAC zones can be designed for one and two-shift occupancies.

- Individual controlled areas can also help reduce energy consumption and costs as well as help to improve user satisfaction.
- Solar panels or wind turbines can produce power that can help offset consumption from the grid.
- Geothermal heating and cooling could also be used for the proposed facility.
- In order to reduce energy consumption by using efficient medical and other equipment, it would be recommended that the proposed facility purchase computers, related electronics, and office equipment that have the Energy Star label. Where possible, mechanical equipment that is Energy Star qualified should also be purchased if it meets the user's needs.

Materials & Resources (MR)

The following section looks at recycling, eliminating hazardous materials, and reducing waste and material consumption.

In order to reduce the amount of waste sent to landfills, a recycling program would be implemented to recycle newsprint, paper, corrugated cardboard, glass, plastics, metals, fluorescent lamps, and batteries. A composting program would also be implemented to benefit the gardens.

Stand alone mercury-containing building products would be eliminated. Mercury discharge would be reduced. It is important to work with both the mechanical and electrical engineers prior to, and during product specification, to eliminate mercury in the proposed facility.

The credits in the MR section related to building reuse do not apply because the proposed building will be new construction.

In order to divert construction materials from the landfill and incineration, excess non-hazardous construction materials will either be salvaged or recycled wherever possible. This also includes donating excessive materials that can be reused to Habitat for Humanity.

Prior to actual construction, it would also be important to implement site and materials management practices during construction to minimize undesirable impacts on adjacent neighbouring. For example, a site access plan complete with staging areas, access roads, and construction parking located within the final footprint of the building and associated parking areas would ensure that there was minimal site disruption during construction. It would also be possible to coordinate delivery and scheduled installation dates to reduce packaging and the need to store items on site for a long period of time. The coordination of deliveries can also reduce the amount of waste or recyclable materials stored on site. To eliminate possible ground water contamination, it would be vital to implement practices for proper disposal of waste materials including concrete truck wash out, tool cleaning, and painter clean-up. The best way to inform construction staff on environmental issues is to educate them through an environmental training program.

It is also important to reduce air and noise pollution from vehicles and construction equipment during the construction process.

The proposed design incorporates a number of wood elements including flooring, posts, beams, and paneling for the ceilings. Not only would reclaimed wood add additional character to the building but it will also reduce the demand for virgin materials, thus reducing waste. A local architectural salvage company in Waterloo would provide an excellent starting place for reclaimed wood that could be used in the proposed facility.

Another way to reduce the processing of virgin materials is to specify building products that incorporate recycled content. It would also be important to use materials that can be recycled at the end of their life cycle. For example, many carpets contain recycled content and manufacturers will often take back carpet free of charge to be recycled once it has reached the end of its life in the building.

Using products that are extracted and manufactured regionally is important not only because it supports the use of indigenous resources but it also reduces the environmental impacts caused by transportation. Care would be taken to

ensure that specified materials met the regional criteria. It would also be an option to use local wood that was milled nearby which would help stimulate the local economy.

Rapidly renewable materials would also be used in the proposed facility. For example linoleum flooring would be used in a variety of places throughout the facility. Straw and wheat board would also be a possible solution for millwork pieces located in various parts of the facility.

Where it would not be possible to use reclaimed wood, products would be specified that are certified in accordance with the Forest Stewardship Council's Principles and Criteria in order to encourage environmentally responsible forest management.

Along with using salvaged building materials, furniture and medical furniture can also be reused where applicable. Various furniture dealers have started to emerge that purchase office furniture coming off a lease or from companies that are no longer in business. The furniture is fixed up, and resold for a reduced price, therefore, reducing the amount of usable furniture that ends up in a landfill. Various furniture manufacturers have also implemented take back programs in the last number of years. The programs will take back furniture that has reached the end of its life cycle and recycle it in one way or another.

Materials that can be recycled at the end of their life-cycle would also be considered for this facility. For example, many carpet, and textile manufacturers will take back their products to be recycled once a product is considered to have reached the end of its life. The materials are broken down and recycled back into a similar or a completely different product.

Environmental Quality

This section incorporates a wide range of topics related to environmental quality including indoor air quality performance, ventilation effectiveness, choice of low emitting materials, controllability of systems, daylighting and views, and the acoustic environments.

One way to improve the environmental quality is by reducing the air contaminates that off gas and can potentially be harmful to the users. Materials, adhesives, sealants, and coatings chosen for the facility would have low volatile organic compound (VOC) content. For example, paints and stains containing no VOC's would be used throughout the facility. Care would also be taken when specifying carpet and resilient flooring to ensure it was not harmful to the users. Wood flooring, ceramic tiles, linoleum and carpet with low VOC's would be used. Millwork would be created from formaldehyde-free materials. When choosing materials, it is also important to look at the cleaning and maintenance procedures. Materials would be chosen that could easily be cleaned and maintained, therefore cutting down on cleaning products required and decreasing time required for facility upkeep.

The living wall and indoor plantings located throughout the building help clean the air and improve indoor air quality. No pesticides would be used inside or in the surrounding grounds in order to maintain an organic approach to gardening.

Another way to improve environmental quality and avoid exposure of users to potentially hazardous outdoor soils and pollutants is to provide grilles that will collect debris from shoes at the front entrance. The grilles will be removable so that the lower pit can be easily cleaned. Also, all air intakes need to be located in appropriate locations away from loading areas, entrances, and designated smoking areas to reduce the pollutants entering into the supply air.

In order to increase user satisfaction, individual controls for heating and lighting would be provided in each patient room that could be adjusted by the patient and their family in order to meet their needs. Common rooms, nurse break rooms, and treatment areas would also have individual controls that could be adjusted by the users. When a space is not in use, lights could be turned off and the heat or air conditioning turned down in order to reduce energy consumption.

Daylighting and views was a central idea in the design. The majority of spaces contain windows, clerestory windows, or skylights and due to the building plan, many spaces have direct access to the outdoors. When a patient is lying in bed,

they can simply turn their head to see the natural landscape and the gardens outside. Shading pergolas have been provided outside each patient room to reduce the direct sun light on a patient and also provide an outdoor shaded area that can be enjoyed by the child, their family, and visitors. Not only does daylighting increase the environmental quality, it also helps reduce the energy consumption in the building.

Reducing noise levels is also important to increase user satisfaction and provide a positive healing environment. According to an article by Basel Jurdy in 2008, entitled *For patients, silence is golden*, the AIA is going to amend their guidelines for the sound transmission class (STC) rating in hospitals in 2010. The new guidelines would call for a STC rating of 45 for walls between patient rooms. Based on the typical steel stud and gypsum wall construction assigned to the patient rooms and the majority of public spaces in the proposed design, the walls would have a STC rating in excess of 55. Masonry walls surrounding stairwells and mechanical rooms would be grouted solid and covered with one layer of drywall on each side for aesthetics. These walls would have a STC rating exceeding 51.

Operations Credits:

The following credits related to operations and maintenance were developed by *The Green Guide for Health Care* (2005) to assist the facility in developing a sustainable design program. As the credits in this section can only be achieved for a building that is constructed, only certain credits will be discussed.

Integrated Operations

Many of the credits in this section are related to integrated operations, maintenance procedures, staff training, and air quality. One credit of importance is tobacco smoke control. Since smoking has been linked to cancer, it is important to keep it away from the building and the patients. Therefore, a designated smoking area has been located more than 50 feet away from entrances, operable windows, disabled parking, and locations where occupants would come into contact with tobacco smoke when occupying, entering and leaving a building. The area is located near Facilities

Management (refer to drawing A2-0 for site plan).

Transportation Operations

Since the proposed site is not located near a bus route, a shuttle service would be set up between Grand River Hospital and the new facility to reduce the number of patients, families, staff, and visitors that would need to drive to Floradale, therefore minimizing pollution. It would be possible to purchase a bus that used a type of alternative fuel. Carpooling programs could also be set up with staff members. A designated preferred parking area has also been incorporated into the design for those who participate in the carpooling program.

Energy Efficiency

The energy efficiency credits include commissioning, energy performance, ozone protection, on-site and off-site renewable energy, energy efficient equipment, refrigerant selection, metering, and emission reduction reporting. An electrical and mechanical engineer would assist with specifying systems that if properly maintained could meet the credit requirements in this section. As with the other operations credits, the majority of these credits would be applied after the proposed facility was constructed.

Water Conservation

The water conservation credits include monitoring and maintaining water efficiency both inside and outside the building. Measures taken to conserve water have already been discussed in the water efficiency section under construction credits. Under this section, these measures would require upkeep and monitoring to ensure that the water consumption remains efficient.

Chemical Management

This section also relates in part to the construction credit section and includes preventing airborne releases, leaks and spills, occupational exposure to hazardous chemicals, and reducing pharmaceutical waste into the septic system. Various safety measures would be put in place and would

also require constant monitoring to ensure there were no potential risks.

Waste Management

The waste management credits incorporate conducting waste audits, reducing solid waste that ends up in landfills and incinerators, reducing medical waste, and reducing food waste. The proposed recycling and composting programs for the new facility were discussed under the Material and Resources section in the Construction Credits portion. In order to achieve the operation credits, these proposed programs would need to be implemented and monitored to ensure they were functioning properly. Through monitoring, additional practices could be implemented as applicable to reduce the amount of waste generated by the facility. It could also be beneficial to set up a committee containing various staff members to receive their input on different ways to reduce waste or improve the recycling programs.

Environmental Services

For the proposed facility to function in the way it was intended, it is important for a management plan to be established and properly maintained that includes, but is not limited to plantings, animal and vegetation control, landscape waste, irrigation management, snow removal, cleaning and maintaining the building exterior, and exterior painting and stain. In the previous sections, the organic gardens were discussed including plantings and irrigation methods. Organic fertilizers can be used several times a year to maintain plantings. The use of mulching mowers will reduce yard waste, fertilizer needs, and water consumption by retaining of organic matter. Excessive grass clippings can also be used for the composting program. Instead of heavily salting walkways and parking lots, sand could be used, reducing the potential groundwater pollution.

As previously stated, materials would be specified that were durable and could be easily maintained and cleaned. Non-toxic and least-toxic sustainable maintenance products could be used in order to reduce the negative impacts on the indoor air quality in the building and also reduce exposure to toxic cleaning materials.

Environmentally Preferable Purchasing

This section includes everything from food, food security, janitorial paper and disposable products, electronics, medical supplies with toxic agents, furniture, and products that enhance building indoor air quality.

Food plays an important part in the healing process. Therefore, food for the facility would be purchased that not only supports the local farmers but is also grown and processed in a safe way. This would include purchasing organic, drug free food whenever possible. There is also a possibility of selling preserves and baked goods from local farmers in the gift shop.

In public washrooms that require paper products, hands-free dispensers would be installed to limit paper portions. Paper towels and toilet paper could also have some recycled content and be purchased on large rolls whenever possible to reduce packaging and excessive rolls. Energy efficient hand dryers would also be located in public washrooms to give users a choice between air drying and using paper products.

Janitorial supplies such as paper products and garbage bags could also have recycled content.

When purchasing electronics, it is important for the facility to consider manufacturers that take back their products at the end-of-life as well as products that can be recycled to reduce the amount of waste that ends up in the landfill.

Reducing hazardous materials including mercury, DEHP, and natural rubber latex is also something that the proposed healthcare facility should be concerned with. DEHP (Di Ethyl Hexyl Phthalate) is used as a plasticizer in products containing PVC such as tubing, IV, and PVC gloves and can be harmful to patients because it is a reproductive toxicant. There has been an increase in allergic reactions to latex, specifically healthcare workers, and as a result, alternatives to latex should be provided for staff and patients who may have sensitivity or an allergy. This can include substituting latex gloves for nitrile gloves, and Mylar balloons instead of latex balloons.

SUMMARY

The proposal incorporates the design principles outlined at the beginning of Chapter three which were derived from completing a literature review, researching precedent studies, and through various site visits.

The design develops a connection to the natural environment while at the same time brings nature inside through a series of innovative moves. The living wall, interior courtyard, garden therapy program, large windows, and indoor trees and plantings are just a few examples that allow this connection to be achieved.

Sloped ceilings, clerestory windows, glulam columns and beams, and larger patient rooms create an interesting atmosphere, and provide open air spaces reminiscent of a lodge-like setting.

Various child-friendly design elements were incorporated into the proposal including sidewalk games like hopscotch and chess, as well as outdoor covered play areas that allow children the freedom to play outside without having to worry about sun exposure. These positive distractions help children to be children and temporarily forget about their illness.

The proposal also incorporates spaces for interaction between patients, families, and visitors. A series of lounges located in the corridors outside patient rooms offer places for a parent to go when their child is resting. As well, outdoor gardens provide areas for chance encounters. Patient display cabinets also illustrate a sense of community by

allowing patients and families to share special interests and information about themselves with others.

Even though the project was not a LEED design, a variety of green choices were implemented into the proposal to create a space that encourages healing. *The Green Guide for Healthcare* (2005) served as a reference for these design choices.

The proposed design and program expands on the existing paediatric medical services in Waterloo Region, and together with the existing Grand River Regional Cancer Centre, provides comprehensive cancer care to all age groups.

CONCLUSION AND REFLECTIONS

The purpose of this thesis was to explore the relationship between healthcare facilities and both the built and natural environments as they relate to the healing and recovery process. Community connection was also an important factor in the thesis. The final goal was to propose a design for a paediatric oncology facility in Waterloo Region.

The approach was to complete a historical review, research a variety of precedent studies, and undertake site visits to various healthcare facilities. From this approach, a number of design principals were formed that were applied to the design of a paediatric oncology facility. This type of facility was chosen for a number of reasons, including the lack of advanced paediatric cancer treatment in Waterloo Region, the intent for children with cancer to lead as normal of lives as possible, and the survival rate of children conquering cancer.

Chapter 1 consisted of a historical examination which explored the history of the hospital, oncology, paediatric healthcare, gardening therapy, and nature as a healer. This examination provided an insight into the existing healthcare system and its advancements, treatment options (traditional and holistic), and the challenges associated with healthcare architecture. The research also helped inform the proposed facility floor plan. The lessons learned from the historical examination were then applied to form a series of design principals identified in Chapter 3. Alternative healing practices were also explored to gain a better understanding of holistic approaches to healthcare. The link between pesticides and increased cases of cancer was also examined

as the proposed site will be located in an agricultural area of Waterloo Region where pesticide use could be common.

Chapter 2 included an investigation of healthcare architectural precedent studies and building for children through examining a variety of school projects. The majority of the precedent studies provided examples of buildings or spaces that incorporated the natural environment into the design. Including the community was another common factor in the precedents. These examples also aided in defining a number of design principals as well as helping to influence the proposed program and design discussed in Chapter 3.

Chapter 3 defined a list of design principles and strategies that were then applied to the proposed design of a paediatric oncology facility in Waterloo Region to create a project that incorporates both the built and natural environments in the healing process. The intent is that the design principles can be applied to future healthcare projects either singularly or in a combination with one another. This chapter also offered information on the site and the proposed patients to provide a greater foundation for the design proposal. The proposed program and design were also explained in detail.

As with any research, certain limitations of work are inevitable. Healthcare architecture is an extensive and very specialized area of design. For the purpose of this thesis, a general overview of the topics related to the proposal was acquired. General decisions and assumptions were made for areas of healthcare that required specialized knowledge or intense research. The research for this proposal was also limited to the current studies available that illustrated a relationship between the natural environment and the healing process.

As the topic of creating healing environments that embrace the natural world becomes more accepted in the healthcare and design communities, additional studies and proposals are being completed. The amount of research and studies available has increased significantly over the last number of years and will continue to do so in the future as architects, hospitals, and healthcare providers recognize the importance of creating healing environments.

Since the healthcare system in Canada is publically funded, the budget will often influence the design intentions. It is important to think of healthcare architecture as a long term investment.

Most hospitals are located in heavily developed downtown areas, surrounded by other buildings and parking lots; often, without much vegetation. This proposal offers a unique approach to selecting a healthcare site. The site for the proposed paediatric oncology facility is in a rural area, currently being used for farmland. The site provides access to the natural environment as well as opportunity for recreational activities on the adjacent trails and reservoir. The site also offers protection from future heavy development allowing for the facility to still remain connected to the local community but also providing some separation from the hectic city life.

The general layout of the plan will aid in the healing process. The double loaded patient wings not only provide increased access to the outdoors and a view to nature but also allows for daylighting and natural ventilation. Many existing hospitals do not even provide their patients with operable windows. Instead, large HVAC equipment constantly provides air to the rooms. Often, the only way a patient can get fresh air is by venturing down an elevator, through the lobby, and outside. For weak patients, this task is not even manageable and they are forced to reside in their room. The proposed design allows for the sliding glass doors to be opened, and a patient wheeled outside in a wheelchair or in their bed.

The floor plan layout provides opportunity for daylighting. With the exception of some of the service spaces, medical support spaces (i.e. storage areas, clean room, etc.), and the washrooms, all spaces have natural light, either via a window, clerestory window, or skylight; thereby helping to create a pleasant atmosphere for the users and also cutting down on some of the energy costs.

The size of proposed facility will be able to accommodate current and future medical needs in the catchment area, yet the size is not too large that it feels overwhelming to a patient, family member, or visitor. The patient wing is approximately the same size as a small school, providing

opportunity for social interactions and for the users to get to know one another.

Coming to a healthcare facility can be a stressful experience. Many hospitals feel like mazes and require extensive signage to direct someone to the correct area so they do not get lost. The proposal offers a simple layout with a main circulation spine and different colours for the patient wings (corresponding to age group). These design elements help with wayfinding and circulation and also reduce stresses associated with feeling lost within a space.

When designing the facility, I constantly asked the question: What would I want the child to have? The question offers many answers. Some of these included: a personal space that they can call their own, places for play, places to interact with one another, quiet places, the choice to go outside, the opportunity for normal childhood experiences, and the opportunity to have their family present during a difficult time.

As a result, all patient rooms are single, allowing the child to have control over the space and the ability to personalize it. Having their own room can also provide a sense of stability or certainty in an otherwise uncontrollable situation. The ability to have control over a space would also increase user satisfaction. The large patient rooms allow for a parent to stay with the child and also provide ample space for extra visitors. The open floor space also provides a play area for the child within the room.

The patient wings have been arranged by age group, similar to a school situation in order to provide opportunity for interactions with children in the same age range and at the same places in life. This idea provides a unique approach to patient wings as most healthcare facilities do not separate other than by adult and child. The patient wing corridors also provide an area for play which could be particularly useful in the winter months when one does not want to venture outside. Having the same chalk style playground games on both wings stems from the idea that although the patients may be of a similar age, they could have younger or older family members. As a result, the different style of games will accommodate a wide range of users.

The various healing gardens add interest to both the indoor and outdoor spaces and also provide opportunities for exploration, reflection, meditation, shelter, and play. Having exposure to nature can lower a person's blood pressure, reduce stress, and help to calm them. Recreational activities can also benefit a person physically, mentally, and emotionally. A variety of different types of gardens have been provided which allows the user to choose a space that meets their needs.

Moving the existing POGO Satellite Clinic from Grand River Hospital to the new facility will also allow for the expansion of current services being offered. The new facility will be able to complete initial diagnosis and treatment, as well as continuing care so the child does not need to travel to Hamilton, London, or Toronto, except in the case of a major surgery.

Developing a connection to the existing community, including the local school, retirement home, and various places of worship provides the patient and their family members a sense of normalcy in a very stressful time. With these community connections in place, it is up to the individuals whether or not they choose to take advantage of these opportunities. For many people at the facility, having the opportunity to interact with people outside the healthcare facility could be viewed as a positive distraction to their current situation.

The design of the facility also offers places that the local community can use. For example, the chapel and resource library could be used individually while the multipurpose room provides the opportunity for larger community gatherings and could be rented out for private functions.

Hopefully a cure for cancer will be found in our lifetime. Until then, it is important that we as designers strive to create healing environments that offer a connection to the natural world and assist with the healing process. It is essential to understand that the healing process involves curing the body, soul, and mind. The design should provide a warm and welcoming environment that is patient orientated but also community friendly. All these factors need to be considered and incorporated into the design process if we are to create

a positive healing environment.

Based on the research undertaken, this proposal is one solution to providing a well programmed and holistic healing environment. It is important to keep an open mind, to forget about what healthcare was, and imagine what it can be. As designers we have been given the tools to make a difference. It is our responsibility to use them.

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GLOSSARY

Chemotherapy

The information from this section was obtained from the Canadian Cancer Society's document found in Canadian Cancer Society 2006 unless otherwise noted.

"Chemotherapy drugs slow or even stop the cancer cells from growing, multiplying or spreading to other parts of your body," (Canadian Cancer Society 2008b).

"Chemotherapy is a powerful treatment affecting the whole body, so healthy cells can also be damaged. This damage to healthy cells causes side effects. The damage is mostly temporary and the healthy cells will repair themselves," (Canadian Cancer Society 2008b).

Chemotherapy treatments can take place at a cancer clinic, at a hospital, at home, or in a doctor's office. Most people undergo chemotherapy treatment as outpatients.

Depending on the type of chemotherapy, chemotherapy drugs can be taken orally or by injection. The oral form is available in a liquid, pill, or capsule. Injection is used when the chemotherapy drugs need to go directly into the bloodstream. Injections can be given at a doctor's office or in a clinic. The type of chemotherapy treatment

differs depending on the type of cancer.

Side effects can include flu-like symptoms, hair loss, skin irritations, dry mouth, dry throat and dry nostrils, dry eyes, mouth sores, change in appetite, nausea and vomiting, diarrhea, constipation, infections, bleeding or bruising, anaemia, fatigue, changes in the bladder, kidney and urinary tract, swelling or puffiness, change in muscles and nerves, anxiety, change in sleep patterns, change in memory and concentration, and fertility problems.

Land farming

This process adds contaminated soil to uncontaminated soil in order to reduce the percentage of contaminates in the soil.

Pump-and-treat

This method of remediation pumps contaminated groundwater from the ground, treats it, and then releases it. The type of treatment and pumping system depend on the type of site and contaminants present.

Radiation

“Radiation therapy is the use of a certain type of energy (radiation) from x-rays, gamma rays, electrons and other sources to destroy cancer cells. This treatment can also be referred to as radiotherapy, x-ray therapy or irradiation,” (Canadian Cancer Society 2008d).

“Radiation in high doses destroys cells in the area being treated by damaging the DNA in their genes, making it impossible for them to grow and divide. During radiation therapy, both cancer cells (which are growing in an uncontrolled way) and healthy cells are affected, but most healthy cells can repair themselves afterwards,” (Canadian Cancer Society 2008d).

Side effects of radiation can include anxiety or depression, change in appetite, fatigue, hair loss and skin changes in the treatment area, and changes in sleep patterns (Canadian Cancer Society 2005).

Snoezelen Room

A Snoezelen Room can either be used to calm or stimulate individuals. The room is designed to stimulate the senses by using a variety of methods including fiber optics, lighting effects, music or sounds, tactile surfaces, and scents.

Universally Accessible

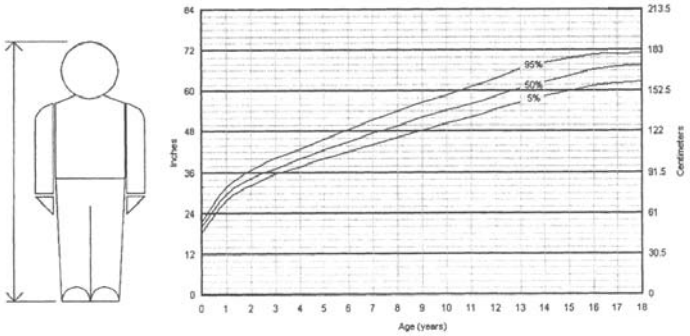
Universally accessible refers to designing a space that can be accessed by all. The design does not discriminate against disabled and able-bodied individuals.

APPENDICES

APPENDIX A Anthropometric Measurements of Children

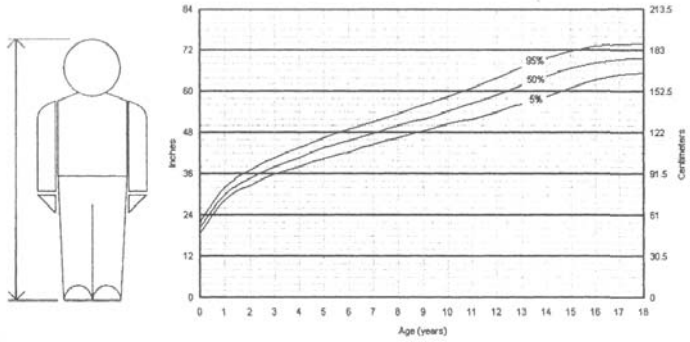
When designing a children's facility, it is important to have an understanding of average children's measurements to make sure they are able to use their own building. Since the proposed paediatric oncology facility will serve children from infancy to the age of eighteen, a balance must be maintained between children's dimensions and adult dimensions. The following diagrams are from *Design Standards for Children's Environments* by Linda Cain Ruth, 2000. These diagrams were referenced on numerous occasions during the design process, especially those relating to average children's eye height in order to have an understanding of the space from the child's point of view. If the proposal were to be built, these diagrams would also prove useful when figuring out the particular details related to the space (i.e. children's millwork, purchasing furniture, storage spaces, signage height, etc.).

Height (Including Infant Length) - Boys and Girls

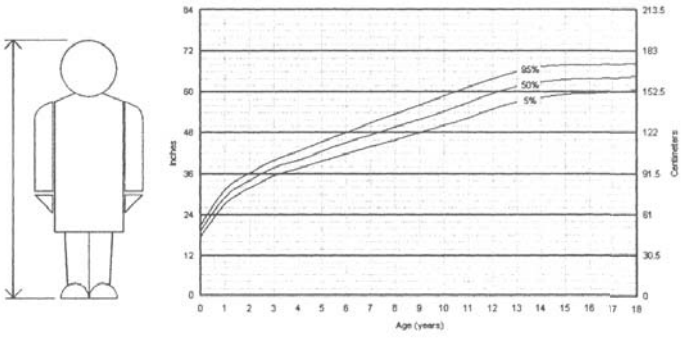


This chart may also be used to determine the height of a high shelf, because these are typically mounted at approximately the same height as the top of the head.

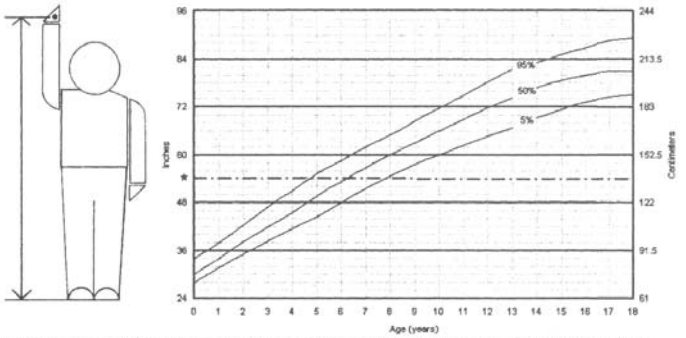
Height (Including Infant Length) - Boys



Height (Including Infant Length) - Girls

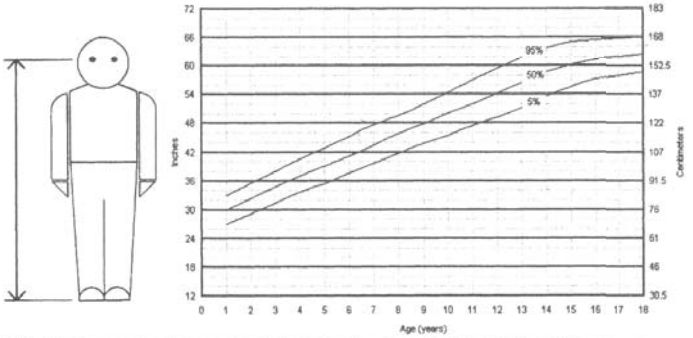


Vertical Reach to Grip



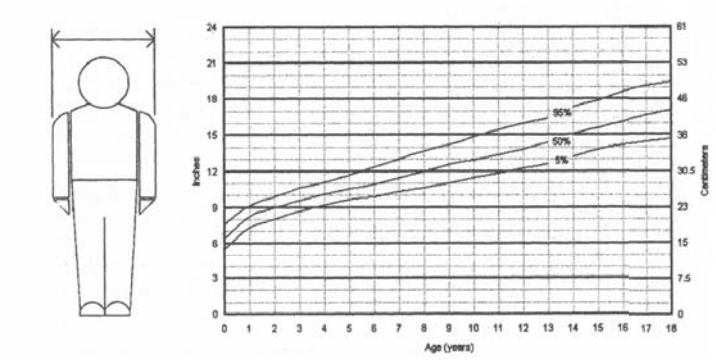
* This is the maximum height at which elements may be mounted and still meet ADA accessibility standards for adults.

Standing Eye Level

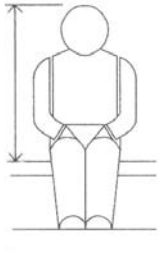


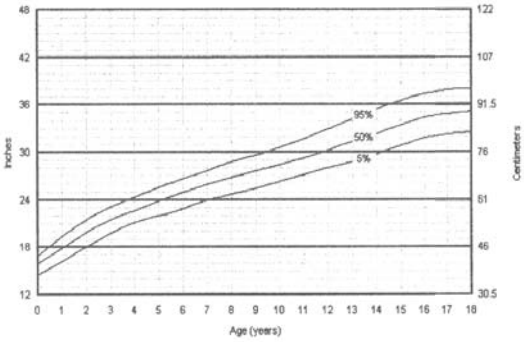
This chart may also be used to determine the mounting height for clothes hooks and rods, because these items are typically mounted approximately at eye level.

Shoulder Width

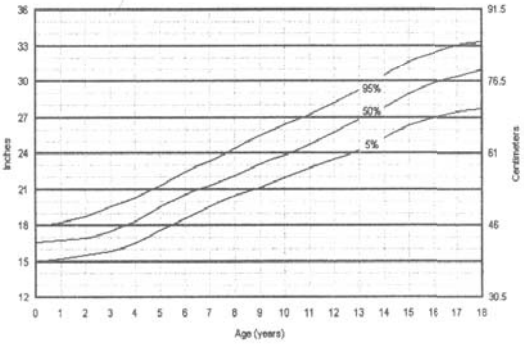


Seated Height

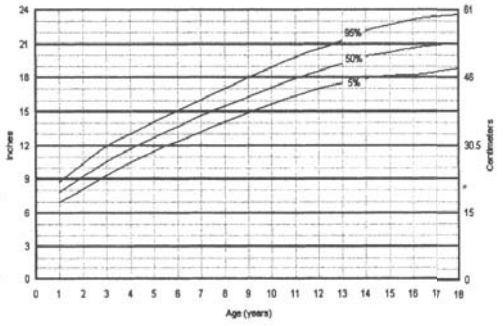




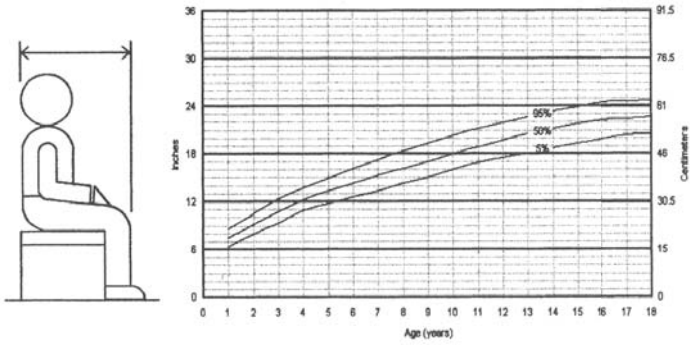
Seated Eye Level



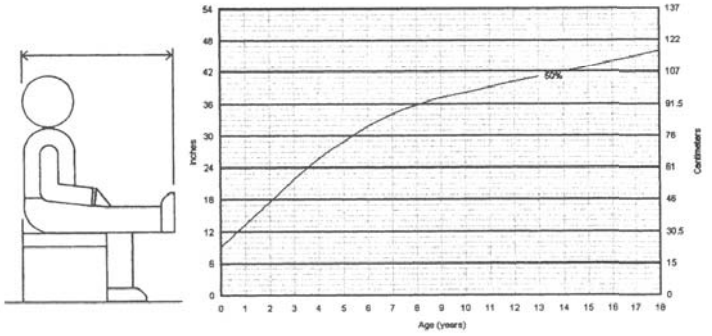
Seated Knee Height



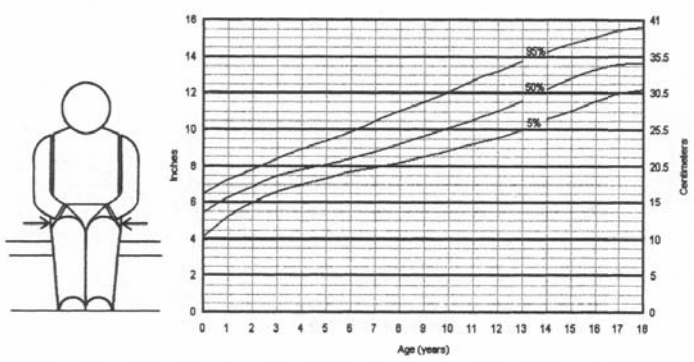
Seated Back-to-Knee Length



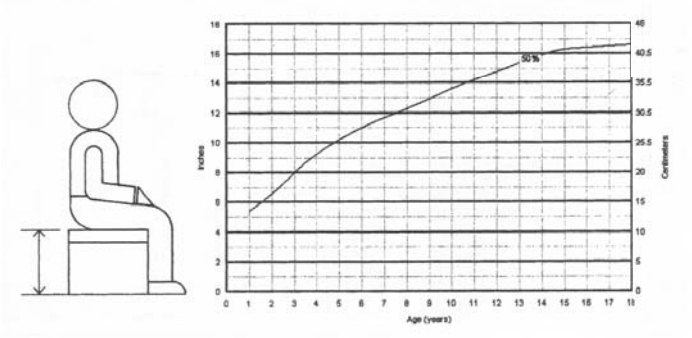
Seated Back-to-Sole Length



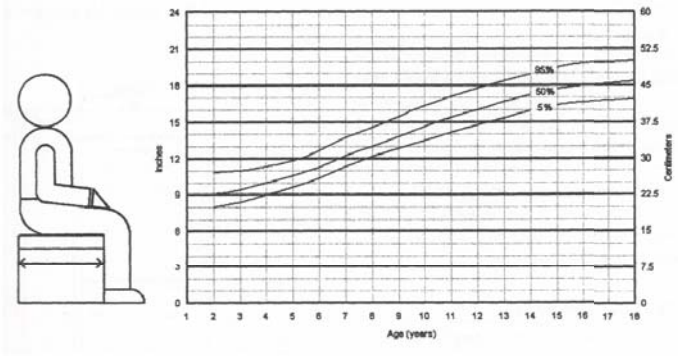
Seat Width



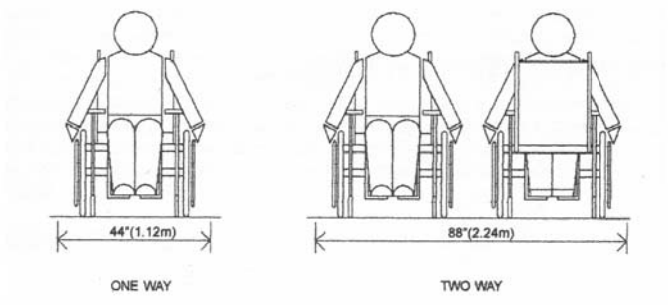
Seat Height



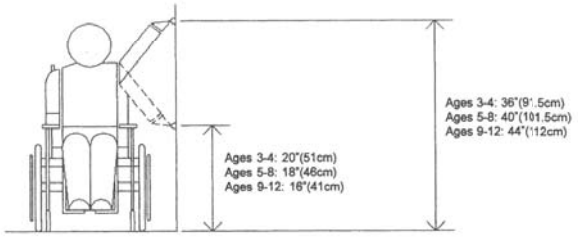
Seat Depth



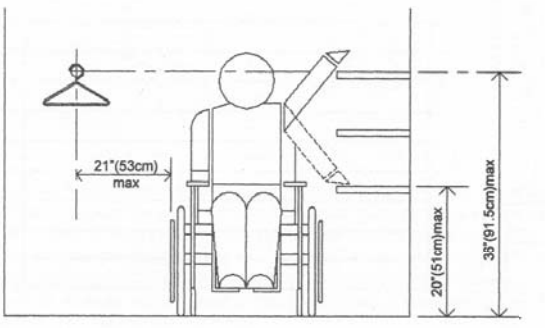
Minimum Clear Widths for Accessible Passageways and Routes



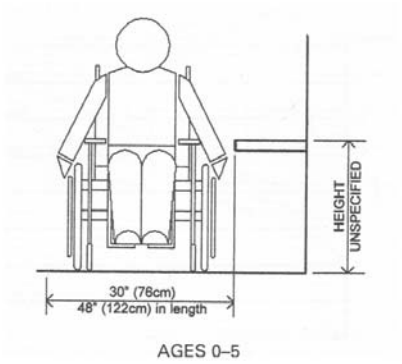
Accessible High and Low Reach to Grip - Forward and Side



Accessible Storage

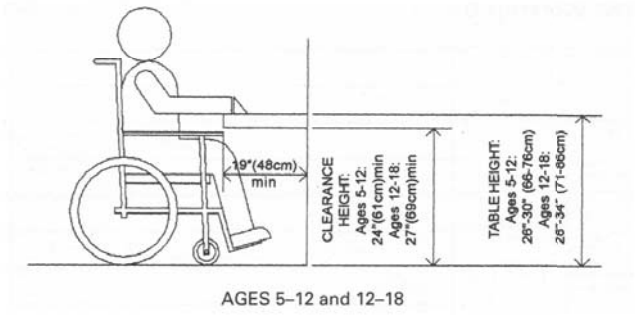


Accessible Tables



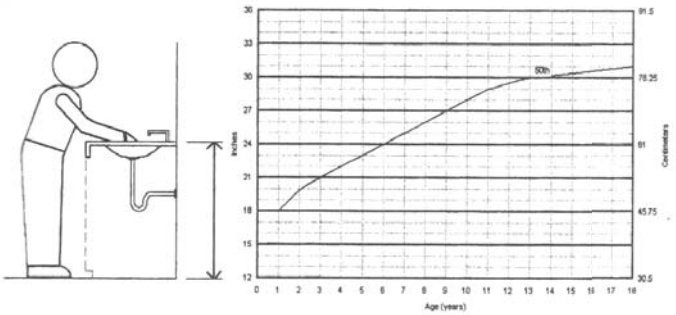
AGES 0–5

Accessible Tables

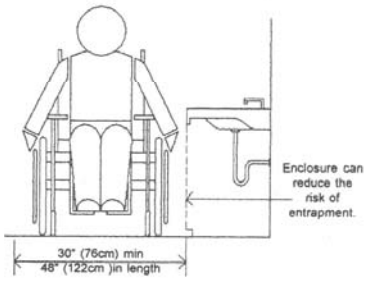


AGES 5–12 and 12–18

Sink Height

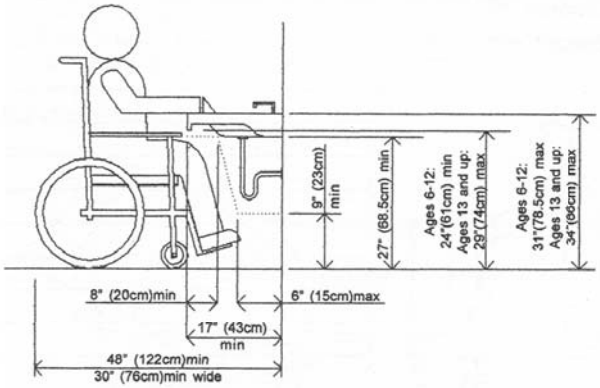


Accessible Sink Height



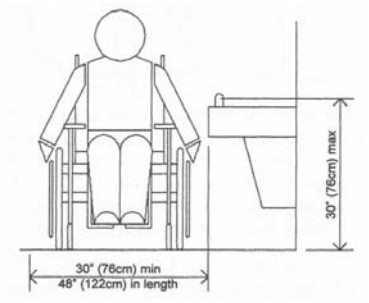
AGES 0–5

Accessible Sink Height

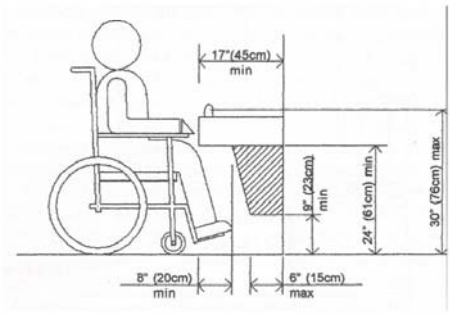


AGES 6–12 AND 13–18

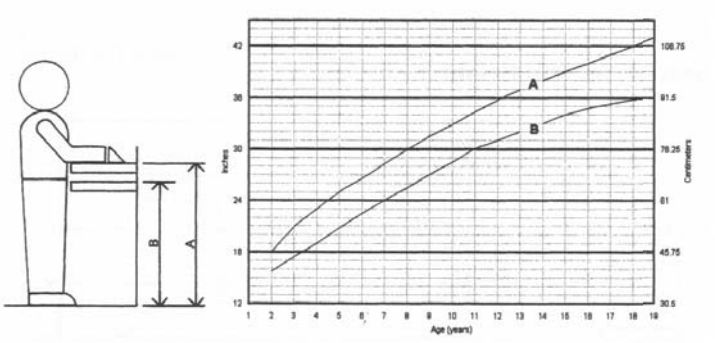
Accessible Water Fountains (Parallel Approach)



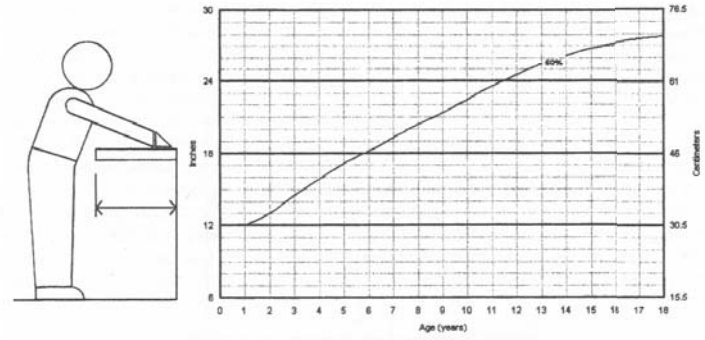
Accessible Water Fountains (Forward Approach)



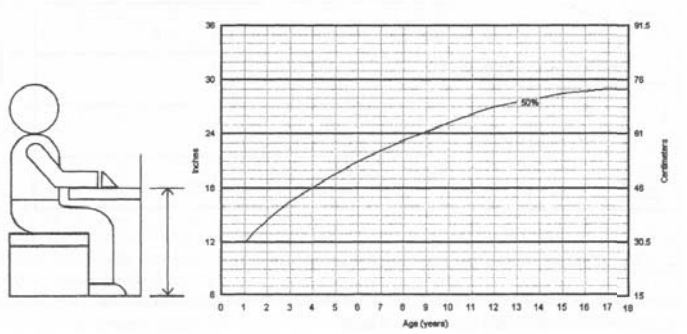
Standing Worktop Heights



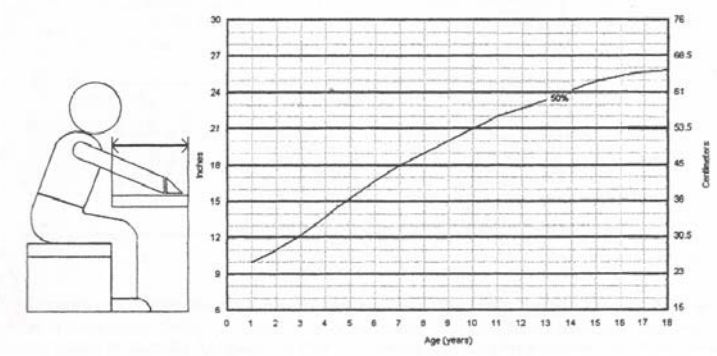
Standing Worktop Depth



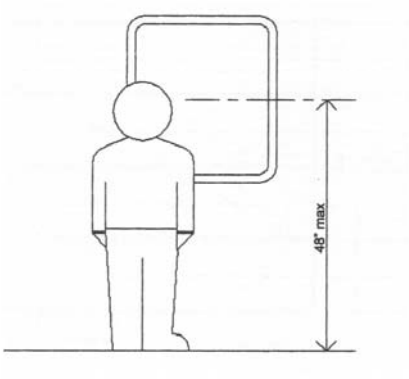
Seated Worktop Height



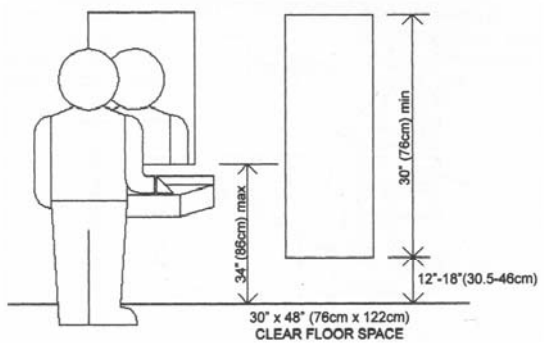
Seated Worktop Depth



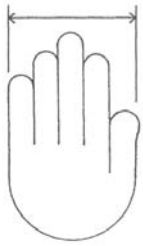
Signage

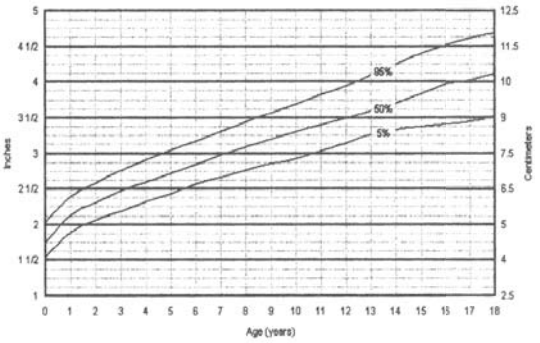


Mirrors

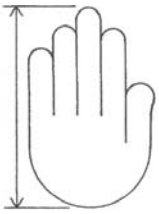


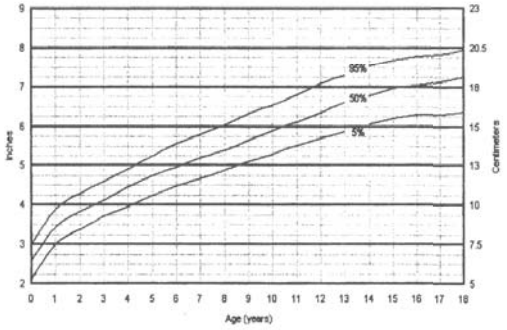
Hand Width



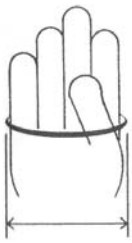


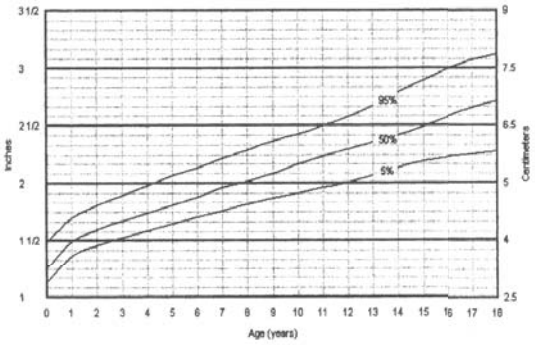
Hand Length



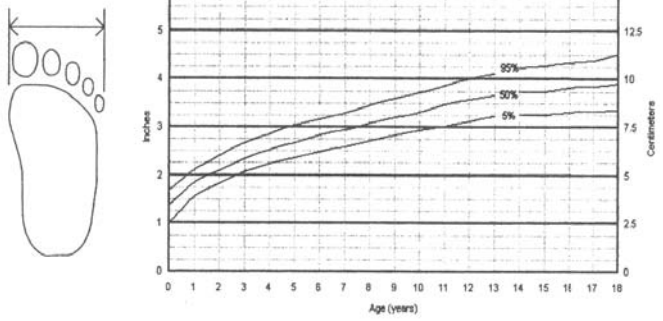


Diameter of Minimum Hand Clerance

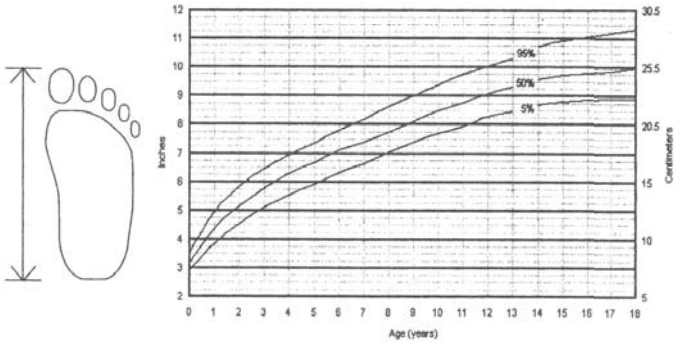




Foot Width



Foot Length



APPENDIX B Development of Abilities and Perceptions in Young Children: A Brief Overview

When designing a children's facility, it is important to have an understanding of children's abilities and developmental stages. The following information is taken from Ruth 2000.

"Obviously, each child is a unique individual, and developmental progress will occur at different times. Some children will progress more quickly in one area and not as quickly in another. There will also be variations among cultures. Different environments tend to strongly impact development in all areas," (Ruth. 2000: 245).

The following is a guide detailing the development of abilities and perceptions in young children:

Birth to 3 months

- Visually follows moving objects
- Reaches toward but misses objects
- Grasps rattles
- Cannot discern fine detail of objects.
- Shows a visual preference for the human face at close range
- Begins to smile
- Listens to voices and coos
- Sustains social contact

3 – 6 months

- Reaches and grasps objects and brings them to mouth
- Sits with support
- Laughs out loud

- Shows displeasure if social contact is broken
- Has difficulty tolerating separation from mother or primary caregiver
- Can distinguish colour in a manner similar to an adult's
- Perceives distances as being close or far

6 – 9 months
- Rolls over
- Transfers objects from hand to hand
- Sits alone
- Babbles
- Enjoys looking in mirror

9 – 12 months
- Crawls
- Pulls to standing position
- Stands alone
- Walks alone
- Responds to name
- Plays peek-a-boo and pat-a-cake
- Waves bye-bye
- Repeats consonant sounds (mama, dada)

12 – 15 months
- Crawls up stairs
- Descends stairs by crawling backward or sliding while in seated postion
- Plays "catch the ball" and "hide and seek"
- Indicates desires and needs by pointing
- Gives hugs
- Can identify location of sounds
- Can say a few words
- Can follow simple commands
- Can name simple objects (e.g. ball, dog, and so forth)

15 – 18 months
- Feeds self
- Runs stiffly
- Sits on small chair
- Walks up stairs with one hand held
- Explores everything (e.g. drawers, wastebaskets, etc.)

- Seeks help when in trouble
- May complain when wet or soiled
- Imitates scribbling
- Knows up to 50 words
- Names pictures
- Identifies one or more parts of the body

18 – 21 months

- Can jump in place
- Begins running
- Walks up a few steps alone
- Walks down stairs with help

2 years

- Runs well
- Walks a greater distance, but at a slow pace
- Walks up and down stairs, unaided, one step at a time
- Opens doors
- Climbs on furniture
- Likes to fill, dump, and throw
- Sand, rock, and water play are enjoyed
- Dramatic play (imitating adult roles) begins
- Can use a variety of simple outdoor play equipment
- Actively works to maintain a close proximity [20 ft (6 m)] to mother or primary caregiver
- Enjoys being with other children and will play alongside them, but not with them (parallel play)
- Listens to stories with pictures
- Vision is comparable to an adult's
- Develops spatial awareness (e.g. inside/outside, top/bottom, font/back, and so forth)
- Puts three words together (noun, verb, subject)

3 years

- Rides tricycles
- Washes hands
- Can jump a distance of 15 to 24 inches (38.1 to 60.1 cm)
- Climbs stairs alternating feet
- Can stand momentarily on one foot
- Combines playthings (sand and water, miniature cars and blocks)
- Accepting of temporary absence of mother or primary

caregiver when familiar people are present
- Plays in small groups of two to three children for brief periods of time
- Increasingly able to wait for a play turn
- Will put toys away with some supervision
- Helps in dressing
- Can count up to three objects
- Grammar is close to adult's speech

4 years
- Can hop on one foot
- Can jump a distance of 24 to 33 inches (61 to 83.8 cm)
- Goes down stairs alternating feet, if supported
- Throws ball overhand
- Can use scissors to cut out pictures
- Climbs well
- Performs stunts
- Plays in small group for longer periods of time
- Can go to toilet alone
- Can tell a story

5 years
- Skips
- Can make a running jump of 28 to 38 inches (71.1 to 96.5 cm)
- Can walk down stairs alternating feet, unsupported
- Requires less intense supervision
- Can run and climb with sureness
- Shows interest in roller skates
- Builds complicated three-dimensional structure that combine several materials
- Extensive role playing
- Recognizes specific landmarks, but does not understand geographic relationships between them
- Play groups increase to five and six and will last longer
- Friendships are stronger
- Dresses and undresses without help
- Thinks that own point of view is the only one

6 – 8 years
- Roller skates
- Rides bicycles

- Swims
- Can play games requiring considerable motor coordination, such as hopscotch and football
- Can play games with rules, such as board games and card games
- Can hop into small squares with accuracy
- Plays organized games
- Understands geographic relationships of landmarks
- Begins collections of various types
- Play cooperatively with others
- Understands that others may have differing points of view

8 – 10 years

- Can jump vertically 8 ½" to 10" (21.6 to 25.4 cm)
- Can throw a ball between 40 to 70 ft (12.2 and 21.3 m)
- Can run approximately 17 ft (5.2 m) per second

10 – 12 years

- Can complete a standard broad jump between 4 ½ and 5 ft (1.4 and 1.5 m)
- Standing high jump of 3 ft (91.4 cm) is possible
- Gils become temporary taller than boys
- Can take into account several different points of view

Jain Malkin writes about creating healing environments for special patient population in Hospital Interior Architecture. The following information is from Malkin 1992: 133.

Special Needs

"Children needs vary depending on their ages as well as on their illnesses or disabilities. The following discussion outlines a number of general needs of children at various developmental stages and then focuses on the special needs of children in long-term care facilities, rehabilitation units, and psychiatric settings," (Malkin 1992: 133).

Developmental Stages

Infants (0-12 months)

Babies at this stage do well if their basic needs for food, warmth, safety, and hygiene are met and if they are provided with stimulating sensory experiences. Their well-being depends on familiar activities, and they seem to do well even if these activities are provided by unfamiliar people. Rocking meets an infant's needs for warmth, sensory contact, rhythmic motion, and possibly even auditory stimulation if the parent or caregiver sings or talks to the infant. Infants in a neonatal intensive care unit, however, have very special needs, which are detailed in chapter 10.

Toddlers and Preschoolers (1-6 years)

The needs of toddlers and preschoolers are different from those of infants. They need:

- Direct visual supervision by nursing staff
- A safe environment
- Opportunities for safe climbing
- Appropriate scale: variations in ceiling heights and changes in levels (if possible) to allow a child to feel big and an adult to appear small by contrast
- Low sinks, toilets, and clothing hooks
- Provisions for self-care
- Raised play areas for children in wheelchairs and on gurneys
- Adequate stimulation in the environments
- Glazed doors (glass panel) at toddler's height to avoid hitting an unseen child on blind side of door when it is opened

Grade School Children (6-12 years)

School-aged children need:

- Opportunities to acquire and exercise cognitive and motor skills
- A hospital classroom with space for gurneys and wheelchairs
- A soundproof music practice room
- Outdoor play areas
- A group dining area

- Shared bedrooms for up to four children with space near each bed for school projects
- Opportunities for self-care
- Opportunities for socialization with peers
- A kitchenette to enable patents to prepare snacks and treats
- Special features such as a library from which to select books, a greenhouse where a child may select a live plant to care for, or a place to select a small, ‘nonallergenic’ animal (e.g., turtle, fish, gerbil, ant farm) to take back to the child’s room to care for.

Adolescents (12-18 years)

In a hospital adolescents need:

- A choice of room accommodations
- Privacy in their room, when desired
- Vanity areas for grooming
- A telephone near their bed
- Space for personal possessions and visitors; an opportunity to decorated the room with posters and express their own identities
- A teen sanctuary for activities unsupervised by adults
- A dayroom for studying, with a nearby kitchenette for preparing snacks
- Classrooms with an electronic learning environment

APPENDIX C Paediatric Oncology Statistics in Waterloo County and Dufferin-Wellington County

Comparison of Types of Cancer in Waterloo County and Dufferin-Wellington County (2000-2008)

Type of Cancer	Waterloo County	No. Children	Dufferin-Wellington County	No. Children
Leukemia	27%	4.86	38%	26.22
Lymphoma and Reticuloendothelial Neoplasms	17%	3.06	18%	12.42
Central Nervous System (Brain Tumors)	22%	3.96	18%	12.42
Sympathetic & Allied Nervous Systes Tumors	11%	1.98	10%	6.90
Kidney Tumors	4%	0.72	2%	1.38
Liver Tumors	1%	0.18	0%	0.00
Gonadal and Germ Cell Tumors	2%	0.36	2%	1.38
Bone Tumors	7%	1.26	7%	4.83
Soft Tissue Sarcomas	5%	0.90	3%	2.07
Melanoma, Malignant Non-CNS) /Miscellaneous, NOS	4%	0.72	2%	1.38
	100% 18 children	18.00	100% 69 children	69.00

TABLE 1.5: Comparison Chart of Types of Childhood Cancer in Waterloo Region and Dufferin-Wellington County
Source: POGONIS 2009

APPENDIX D Vegetation and the Design of Outdoor Spaces

The following information is from Larson, Jean M. and Mary Hockenberry Meyer 2006: 18-20.

Plants That Provide Fragrance or Smell

Annuals
Chocolate cosmos (Cosmos atrosanguineus)
Heliotrope (Heliotropium arborescens)
Herbs
Marigold (Tagetes spp.)
Pansy (Viola wittrockaina)
Sweet alyssum (Lobularia maritime)

Vines
Moonflower (Ipomoea alba)
Sweet pea (Lathyrus odoratus)
Trumpet honeysuckle (Lonicera sempervirens)

Perennials
Lily of the valley (Convallaria majalis)
Peony (Paeonia lactifora)

Bulbs
Hyacinth (Hyacinthus orientalis)
Lily (Lilium spp.)

Shrubs
Lilac (Syringa vulgaris)
Rose (Rose spp.)

Trees
Apples (Malus spp.)
Balsam fir (Abies balsamea)
Littleleaf linden (Tilia cordata)

Plants That Are Interesting to Feel or Touch

Annuals
Dusty miller (Senecio cineraria)
Fountain grass (Pennisetum spp.)
Rose-scented geranium (Pennisetum spp.)

Perennials
Lamb's ears (Stachys byzantina)
Silver mound Artemisia (Artemisia schmidtiana 'Silver Mound')

Trees
Amur chokecherry (Prunus maackii)
River birch (Betula nigra)
Bur oak (Quercus macrocarpa)
White pine (Pinus strobus)

Plants with Auditory Features or Sounds

Trees
Evergreens
Aspen

Tall Grasses
Panicum
Miscanthus

Other Natural Sounds to Enjoy

Plants that attract pollinators provide additional sensory stimulation.

Buzzing Bees
Bumble bees
Honeybees
Mason bees

Environments that provide food, water, shelter and space for birds will encourage them to stay in the area. Water features or constructed mini-wetlands can also attract a variety of birds and insects. Singing birds, rain and thunder, fountains and waterfalls as well as wind chimes can create natural sounds that are enjoyed by users.

Editable Plants

Not all plants are editable. When designing a garden, it is important to be aware of toxic plants and to avoid plants with stickers and thorns. Fruits, vegetables and herbs can be incorporated into the garden.

Fast Growing Vegetables
Lettuce
Swiss chard
Spinach

Herb Suggestions
Rosemary
Basil
Mint

Linda Cain Ruth suggests nontoxic garden plants, hedges and bushes to incorporate into children's environments. The following information is from Ruth 2000: 84-85).

Vegetation

Nontoxic Garden Plants
Aster (Callistephus)
Begonia
Fuchsia
Forget-me-not (Myosotis)
Geranium (Pelargonium)
Gloxinia (Sinningia speciosa)
Hollyhock (Althaea)
Impatiens
Lily – Easter (Lilium longiflorum)
Lily – Tiger (Lilium tigrina)
Petunia
Phlox
Rose

Snapdragon (Antirrhinum)

Nontoxic Hedges and Bushes
False spirea (Astilbe)
Hawthorne/haws (Crataegus)
Honeysuckle – all species (Lonicera)
Lilac (Syringa)
Mock orange (Philadelphus, pittosporum tobira)
Spirea (Spirea japonica)
Lily of the valley (Convallaria)