PRACTITIONERS AND CAREGIVERS VIEWS ON IMPROVING THE BUILT ENVIRONMENT OF PAEDIATRIC ONCOLOGY FACILITIES:

TOWARDS A HOLISTIC DESIGN FOR A PAEDIATRIC ONCOLOGY UNIT, PIETERMARITZBURG

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Dissertation submitted in partial fulfillment of the requirements for the degree of Master of Architecture to the School of Community Development and the Built Environment University of Kwazulu-Natal Pietermaritzburg, South Africa, November 2016

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10 October 2016

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DEDICATION I

This dissertation is dedicated to my family, especially my parents. My parents, Mr Antonio Silva and Mrs Custodia Silva, through their generosity and support, have given me the opportunity to complete my architectural studies,

“There can be no keener revelation of a society’s soul than the way in which it treats its children.”

Nelson R Mandela (Department of Health, 2008)

ABSTRACT I

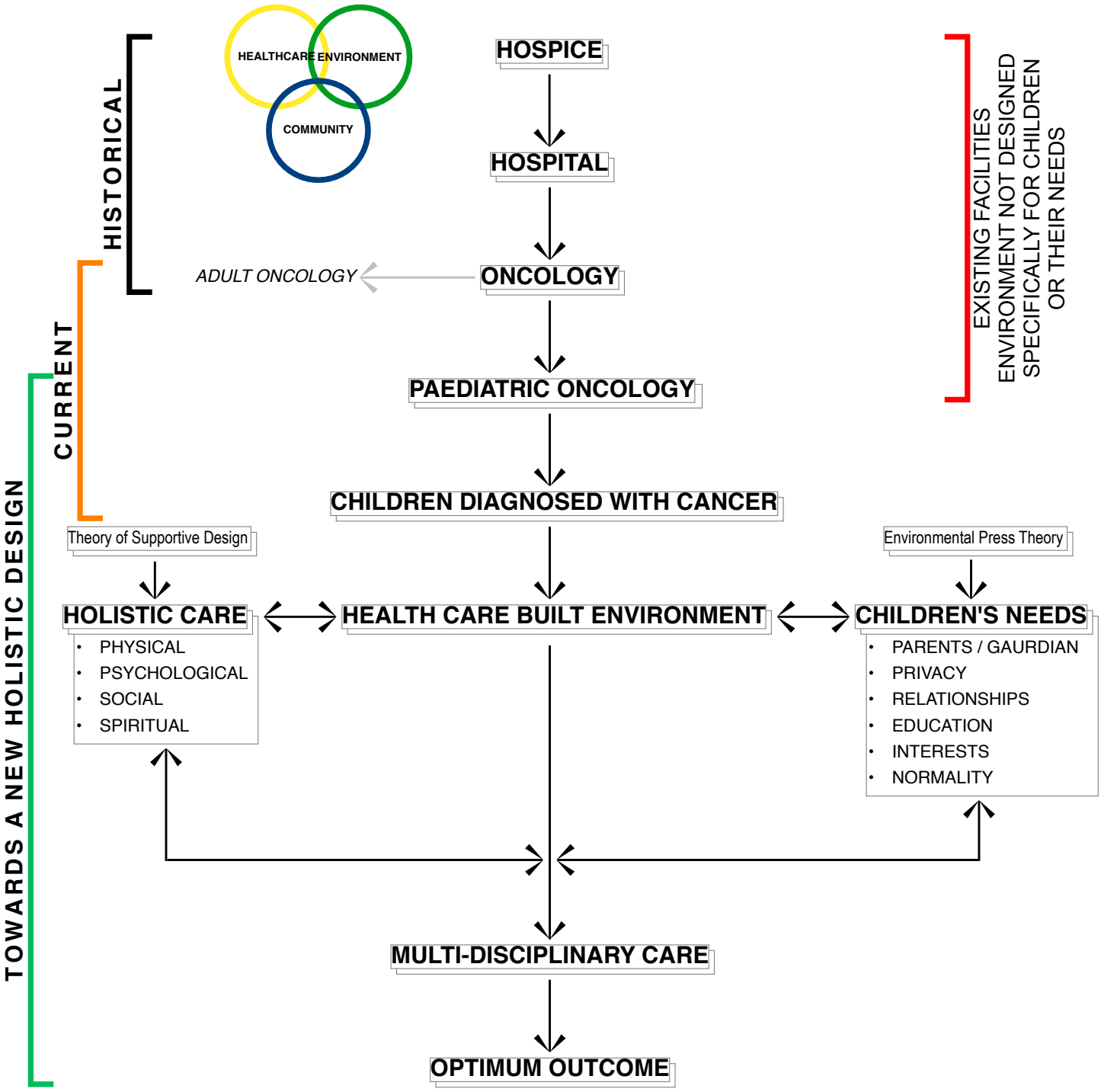
This study examines the architectural essence of a built environment design, which may positively contribute towards the effective treatment of paediatric oncology patients. The design of the built environment may affect an occupant in various ways - physically, psychologically, socially, and spiritually. Attention to the built environment design is thus merited because paediatric oncology patients are vulnerable – not only are there difficulties associated with this specific illness, but there is a link between these difficulties and quality infrastructure for paediatric oncology patients. The material from built environments for healthy children may contribute to the design of a new holistic paediatric oncology, according to latest academic research.

The healthcare environment has improved vastly in the past few decades. Academics have underscored that although there have been advances in design and healthcare, the design of built environments for children with cancer is an area that still requires further attention. Children are the ultimate end-users of the paediatric oncology built environment, but research is difficult as this is a sensitive patient group. Current design considerations in the paediatric oncology environment are based on adult research, but these are ultimately not suited to the needs of paediatric oncology patients.

Modern insights into healthcare deviate from the pathogenic approach to the concept of the holistic healthcare model, of which the latter focuses on the whole needs of the patient and no longer only the physical. The holistic approach moves away from the institutional to a ‘home-like’ designed built environment which promotes holistic healing.

This study intends to research and establish an understanding of the needs of the paediatric oncology population to develop a new design typology based on the patients’ needs. Observations and assessments are conducted to identify the advantages and disadvantages of the current facilities. This study includes research conducted by means of interviews with professionals and caregivers, a review of the existing literature on the subject matter, through case studies, and precedent examples. The results of the research inform a set of principles and criteria for the design of a new paediatric oncology typology in Pietermaritzburg.

Practitioners and care givers views on improving the built environment of paediatric oncology facilities, towards a new design for a Paediatric Oncology Unit, Pietermaritzburg



Research Mind Map (Author, 2016)

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CHAPTER 1

1.0 | INTRODUCTION

1.1.1 | BACKGROUND

The modern day healthcare infrastructure, now synonymous with medical healing, has not always been so. Spiritual healing was all that was provided by early hospitals. Current medical knowledge of hygiene principles, micro organisms, and cross contamination hazards were not known at the time. Today's modern institutions have been built on the back of technology and scientific breakthroughs which now allow us to recuperate. The high demand on the hospitals means that efforts are focused in streamlining the healing of patients. The burden on the hospitals may be attributed to multiple and complex factors such as: the large influx of people in search of a better life to the urban centres; restricted funding of governmental institutions; and well-funded private healthcare, which is too exorbitant for the average citizen. Modern hospitals focus on factors that cause disease - the pathogenic approach concept to providing care - but Towery (2012) states that ideal health is achieved by "addressing the root causes of unhealthiness", that is treating the pathology together with the psycho-emotional aspects. A new perspective in healthcare at the end of the 20th century maintained that it was no longer sufficient to only focus on the patients' physical needs, but that the holistic treatment of a patient was just as important.

Research has been conducted, and theories and frameworks have been investigated when considering the design of the healthcare built environments for children. Research such as Salutogenesis and therapeutic design was seminal to the Theory of Supportive Design (Towery 2012). The application of this theory means that the built environment needs to help patients recover, promoting patient convalescence and increasing hope. The contribution of the environment to reduce the stresses involved with diagnosis, treatment, and hospitalisation of paediatric oncology patients. The Theory of Supportive Design is pertinent as research of the design of the built environment has mostly been done for adults. It suggests that the primary focus in this research paper should focus on children admitted for cancer in paediatric oncology facilities, and therefore emphasises that a suitable design is one that considers the end-user. Age Environmental Press Theory explains how different age groups perceive space and environment differently. Both theories complement each other by helping us to envisage an ideal built environment which promotes healing – one that is not stressful to patients, and one that is designed for the specific age group of the patients.

A challenge with any research involving children is due to their immature cognitive development which will affect the quality of the feedback. McCuskey Shepley (2000) highlighted that both sick children and healthy children have very similar preferences for their built environments. This similarity will assist designers towards the holistic needs of paediatric oncology patients. It is suggested that, in general, researching children's needs will provide solutions towards a holistic design for a healthcare environment. As to this study, research is conducted for children who are suffering from cancer.

Ferrell, Dow and Grant (1995) highlight that there are four factors which constitute holistic healing for children with cancer: the provision of physical, psychological, social, and spiritual wellness needs.

The findings of this investigation, which are situated within the holistic framework of healing – incorporating the four factors described above of physical, psychological, social, and spiritual - are extremely important in the creation of a new paediatric oncology unit typology design.

1.1.2 I MOTIVATION AND JUSTIFICATION FOR THE STUDY

Children in healthcare receive limited resources, specifically for cancer patients. In some private hospitals in South Africa, children who suffer from cancer often share the oncology operation facilities with adults. In South African government hospitals, there are limited facilities and limited budgets. There is therefore a need to challenge the current healthcare model, which only addresses physical illness and fails to address the psychological, social, and spiritual issues and difficulties that a patient may face. Chronic illness affects the patient for years, therefore the facilities need to be designed with the patient in mind to provide an environment which assists in the patient healing as a whole. To understand the holistic needs of children, existing academic literature and case studies are used to demonstrate that children have different sets of needs in terms of built environments, and that they perceive space differently compared to their adult counterparts (McCuskey Shepley, 2000).

This research critically reviews the issues, limitations, and advantages of current paediatric healthcare facilities as they relate to the four factors which make up holistic healing (physical, psychological, social, and spiritual). The academic literature emphasises the importance of not only providing a place to cure illness,but also the importance of addressing the holistic needs of the human being to aid in the comfort and the recovery from chronic illness (Ferrell et al., 1991). This study is thus justified by the idea that a wide field of research from allied child-based disciplines may be successfully combined to contribute towards a new typology, that is, a holistic built environment for paediatric oncology patients. Ultimately, the design of a new paediatric oncology is intended to promote better care and convalescence for patients.

1.2 I DEFINITION OF THE PROBLEM, AIMS & OBJECTIVES

1.2.1 I DEFINITION OF TERMS

The following are some of the key terms that are used throughout this research. Defining these key words and terms allows for a better understanding of their meaning, and prevents misinterpretation of relevant concepts.

BUILT ENVIRONMENT: This refers to the physical environment which surrounds the patient. This includes the floor, walls, and ceiling, and further includes both man-made or machine-made structures that envelop the patient. Components of the built environment include the lighting, décor, size and physical layout of spaces, colour schemes, and ceiling height.

CAREGIVER: The patient's parents are considered to be natural caregivers (Nicholson, Clarke. 2007). A caregiver may also refer to a person that has been appointed by the child's parents or the state to assist in the provision of care for a child in the parents absence.

CHILDCARE: Healthcare provided to children or paediatric patients by healthcare professionals who work together to aid in the healing process and to minimise stress, fear, anxiety, and suffering of patients, and their respective families (Nicholson, Clarke. 2007).

CHRONIC ILLNESS: Any disorder or illness that persists for a long period (longer than three months) which requires a change in the patient's lifestyle and management of the illness. This may affect the patient's physical, emotional, intellectual, vocational, social, or spiritual functioning.

EMOTIONAL MATURITY: The stage at which a child acts and behaves responsibly, evidencing the ability to contribute toward his/her own or others' wellbeing. (Nicholson, Clarke, 2007).

HOLISTIC HEALING: The healing of the patient as a whole, which includes the physical, psychological, social, and spiritual aspects of the patient's healing. The concept incorporates the patient's physical state and beyond. Holistic healing acknowledges that, in some cases, a physical illness may be non-physical. Holistic healing is a concept that life may be approached from various aspects, including physical, emotional, mental, and spiritual (National Cancer Institute, 2015).

HEALTH: The state of complete physical, psychological, and social wellbeing of a patient; not only the absence of disease or infirmity (Nicholson, Clarke, 2007).

HEALTHCARE ENVIRONMENT: A healthcare institution where ill patients are given diagnoses, advice, and treatment (Nicholson, Clarke, 2007).

MEDICAL PRACTITIONER OR PRACTITIONER: A qualified person who works as a doctor or nurse in a hospital or in private practice.

MULTIDISCIPLINARY CARE: A group of professionals from healthcare disciplines who offer different but complementary expertise. The multidisciplinary team works together to deliver "comprehensive healthcare" intent on "providing the best possible outcome for the physical and psychosocial needs of a patient and their carers" (The RACGP, 2016).

ONCOLOGY: The field of medicine that is devoted to cancer. Clinical oncology comprises three primary disciplines: medical oncology (the treatment of cancer with medicine, including chemotherapy), surgical oncology (the surgical aspects of cancer, including biopsy, staging, and surgical resection of tumours), and radiation oncology (the treatment of cancer with therapeutic radiation) (World Health Organisation, 2016).

PAEDIATRIC: The area of medicine that is specific with regard to the health of infants, children, and adolescents; focusing on their growth and development, and their opportunity to develop to their full potential till adulthood. This encompasses the diagnosis, treatment, and research of children (World Health Organisation, 2016).

PAEDIATRIC AGE: The World Health Organisation (2016) explains that paediatric patients are aged between 0 years and 19 years, but within South Africa, the paediatric age range is not yet defined. According to the Department of Health (DOH), a paediatric patient falls between the ages of 0 years and 14 years inclusive (Department of Health, 2008). Therefore, patients who turn 15 are then transferred to adult facilities. This is a source of stress for patients between 15 years and 18 years of age.

PALLIATIVE CARE: The improvement of the quality of life of patients and their families who are faced with life-threatening illness. The aims of palliative care are the prevention and relief of suffering. Best-practice palliative care includes the early identification of life-threating illness; meeting impeccable standards of assessment; and the treatment of pain, be they physical, psychosocial, and/or spiritual (World Health Organisation, 2016).

PHYSICAL WELLNESS: The patient's physical body, at optimal health and full functioning (Ferrell et al., 1991).

PSYCHOLOGICAL WELLNESS: The patient's good mental health, including psychological constructs such as control, anxiety, depression, enjoyment, pain distress, happiness, fear, attention, and overall perception of quality of life (Ferrell et al., 1991).

SOCIAL WELLNESS: The patient's ability to interrelate with others in social situations, such as family, romantic relationships, public appearances, and being by oneself (Ferrell et al., 1991).

SPIRITUAL WELLNESS: The patient's connection to the spiritual realm - religiosity, transcendence, hopefulness, and uncertainty(Ferrell et al., 1991).

STERILE: An empty white built environment with no, or minimal, content. Sterile may also refer to a medically clean surface, free from microorganisms or other living organisms, and therefore totally clean.

OPERATIONAL FUNCTIONALITY: The ability to provide patient care without obstructions and without compromise. For example, to institute effective infection control measures and provide quality medical care.

ONCOLOGY UNIT VERSUS ONCOLOGY CENTRE

ONCOLOGY UNIT: A unit of a hospital that provides oncological care. This unit is usually attached to a district hospital, and shares services to minimise duplication of facilities

ONCOLOGY FACILITY: A facility that provides oncological care, separate from a district hospital and which can operate independently.

1.2.2 I DEFINITION OF THE PROBLEM

Progress has been made in healthcare design, and new regulations have been implemented. Advancements have been made in better diagnoses and treatment methods. These advances have positively influenced the effectiveness and efficiency in the treatment of patients' illnesses. Advances in healthcare design are predominately based on research for the built environments for adults - the 'one size fit all' is oft thought to be sufficient in healthcare design. This is clearly not the case, as children are smaller in physical size, have less cognitive ability, and are growing emotionally. It is thus not surprising that children may perceive space differently to adults, and that these perceptions may be due to the factors described above and have different needs to that of adults. Few studies in healthcare design take cognisance of children, especially children who suffer from cancer. Olds (2001) and Alexander (1977) state that all children, no matter their individual levels of health, share similar preferences for the built environment and maintain their child characteristics.

The considerations above may inform the design of facilities for children with cancer. A child with cancer has normal psychosocial developmental needs in addition to the needs of a cancer patient (McCuskey Shepley, 2000). The allied disciplines may unite to assist in the design a healthcare facility for children with cancer that caters to the holistic needs of the patient. The results of this study assist to understand the design of new healthcare built environment typology, that is inclusive of holistic design principles. In understanding the underlying principles that define holistic design, the built environment may provide a level of comfort and holistic care that is specific to paediatric oncology patients.

1.2.3 I AIM

The fundamental aim of this study is consider the physical, psychological, social and spiritual wellness criteria defined in the holistic design principle. To establish architectural principles to achieving a design that caters to the needs of the patient. Towards a design that is conducive, engaging and promotes holistic healing in paediatric oncology facilities.

1.2.4 I OBJECTIVES

Taking into account the fours elements of holistic design, the built environment is evaluated in how the needs of paediatric oncology patients are met.

Objectives are to:

1. to understand the needs for a paediatric oncology unit in order to provide holistic care for children,

2. to acknowledge the key metaphysical needs of children undergoing cancer treatment, and to acknowledge their dependency on caregivers and family,

3. to understand the significance of the needs of the paediatric oncology patient in relation to the designed built environment that are considered pertinent for their treatment and recovery,

4. to learn from existing hospital environments and there conduciveness to the holistic healing of children from precedent and case studies,

5. to review case studies of existing paediatric oncology units to identify and evaluate the issues encountered in existing typologies, that may contribute towards holistic designs, and

6. to use the academic literature to generate architectural principles and design guidelines towards a new paediatric oncology unit design.

1.3 I SETTING OUT OF THE SCOPE

1.3.1 I LIMITATIONS AND DELIMITATIONS

Limitations and delimitations incorporate the use of the holistic principles to assess existing hospital environments with regard to performance. Performance is considered to be the fulfillment of the holistic needs of the patient.

1.3.2 I STATING THE ASSUMPTIONS

There are various assumptions of this research, one of which are that the evaluated hospitals mentioned in the case studies do not fulfil the four factors identified by the researcher, and thereby do not adhere to the holistic principle. The issues highlighted in the selected case studies serve to highlight that a new design approach to paediatric oncology built environments is needed.

This research assumes that the hospital is the foremost place of healing for children with cancer. The four factors of the holistic principle positively contribute towards patient healing as paediatric oncology patients experience greater comfort and wellbeing in these facilities.

1.3.3 I KEY QUESTION

How may the principles of holistic healing improve the design of the built environment, and what is appropriate for the provision of patient treatment, healing and comfort in the paediatric oncology unit ?

To answer this question, the researcher dissects the question into six secondary questions related to the principles and factors of holistic design. It is shown how these factors may be used to assist in the design of a new paediatric oncology built environment.

1.3.4 I SECONDARY QUESTIONS

1. How can a paediatric oncology unit built environment be designed holistically to cater for the needs of children ?

2. What architectural solutions are proposed by academics, practitioners, and caregivers to improve paediatric oncology facilities to meet the holistic needs of children receiving oncological treatment ?

3. What does the academic literature suggest about a successful paediatric oncology unit design that promotes holistic healing for patients ?

4. What are the metaphysical needs of children that may inform a new paediatric oncology unit design that promotes holistic care ?

5. To what degree does the built environment influence patients' psychosocial wellbeing ?

6. How may architectural design address patients social issues within the built environment ?

7. How may built environment design affect patients' social behaviour ?

1.4 I THEORETICAL AND CONCEPTUAL FRAMEWORK

1.4.1 I INTRODUCTION

Literature on the holistic concept, the following theories and concepts were selected to address the holistic design principles, defined as the physical, psychological, social, and spiritual dimensions of the human being may inform the design of a new built environment which caters to the treatment of paediatric oncology patients and as human beings. Furthermore, academic literature is reviewed about holistic theories and concepts.

1.4.2 I THEORIES

1.4.2.1 I AGE ENVIRONMENTAL PRESS THEORY

Dr Mortimer Powell Lawton developed the Age Environmental Press Theory. This theory contributes significantly to the understanding that patients of different ages experience their surroundings differently. The research demonstrates that the senses of human beings are heightened between the ages of five years and 14 years, and then wanes later in life. It is furthermore supported by McCuskey Shepley (2000) and Ghazali (2013) that adults have a different experience of an environment to children.

1.4.2.2 I SUPPORTIVE DESIGN THEORY

The Theory of Supportive Design, developed by Dr Roger Ulrich, states that healthcare facilities should be designed to assist patients to deal with the stress of being a patient, particularly for chronic illnesses (Ulrich, 1997; Williams, 2000). Dr Ulrich notes that stress does not cause disease, however patients that are frequently stressed will be susceptible to a compromised immune system which leaves the patients further compromised (Ulrich, 1997). A built environment that cater to a patients needs may reduce patient stress levels of which may, in turn, promote immune systems of the individuals that are already under stress. This may promote recovery and increase overall comfort (Ulrich, 1997). Supportive design theory is further discussed in Chapter Three.

1.4.3 I CONCEPTUAL FRAMEWORK

1.4.3.1 I HOLISTIC CARE DESIGN

The definition of healing care is simply that the whole condition of a patient is taken into account in the healing process. In contrast to ‘curing’, which is the primary objective in current hospital models. The aim of holistic design, is to propose a design that focuses not only physical healing but the psychological, social, and spiritual. Perception is a psychological construct that demonstrates a direct relationship between healing and the physical environment. This concept of holistic wellness is corroborated by the Age Environmental Press Theory and Supportive Design theories mentioned above. Ultimately, the paediatric population are more sensitive than their adult counterparts in their perception of the environment (Ozcan, 2006). This increased sensitivity speaks to patients who have not yet developed adult coping mechanisms to cope with stress in an unfamiliar environment. The holistic care framework of the built environment suggests that the quality of paediatric facilities integrate this rationale as it may have a positive influence on the healing and the comfort of paediatric oncology patients. The conceptual framework of holistic care design is discussed further in Chapter Two.

1.5 I RESEARCH METHOD AND MATERIAL

1.5.1 I RESEARCH METHOD

This study employs a qualitative method, which includes interviews with medical practitioners, and interviews with caregivers of children with cancer. Medical practitioners and caregivers are able to observe children within hospital facilities around the clock as they are permitted unrestricted access to the patients. Knowledge from practitioners and caregivers provide invaluable insight into the holistic needs of children during the hospitalisation period.

This study includes existing government paediatric oncology facilities, to compare their respective approaches to the provision of healthcare to patients. Comparisons may highlight possible contrasts, if any. The following facilities are selected on the criterion that these are where children with cancer are treated: Grey's Hospital, Pietermaritzburg (a governmental institution), Inkosi Albert Luthuli Hospital (a governmental institution).

The size of the sample in this study is to select a minimum of six participants from three paediatric oncology facilities. The participation of the practitioners and caregivers depend on availability and informed consent criteria prior to participating in the study. Interviews and observations are used as the method of data collection within the respective health institutions.

- Observations are conducted at these existing facilities as they are currently being used to treat children with cancer.
- Identify any current issues in the built environment, and to highlight potential improvements to these facilities to improve children's comfort, recovery, and healing.

An evaluation of current facilities includes an assessment of the physical environment, physiological, spiritual, and the social needs of the patients. An assessment of the built environment generates performance data which is used to inform how the built environment may be improved to promote healing, and thereby provide comfort to children and their families.

The gathered information may be used to assist in a conceptual design of a new built environment which promotes healing and comfort for children and their families, and optimises professionals' ability to provide improved medical care.

1.5.2 I PRIMARY DATA

Primary data is information that is gathered first-hand, through the direct interaction with practitioners, nurses, and caregivers at the selected hospitals. Interviews are conducted with architects which specialise in healthcare design for children.

Practitioners, nurses, and caregivers that are selected for the interviews are directly involved in the treatment and provision of care to paediatric oncology patients. The participants may provide insight into the needs of paediatric oncology patients of which the researcher may not be cognisant. Case studies contribute a considerable portion of the primary data that is analysed in the later chapters of this dissertation. New information gained from these primary data findings may be tested against the secondary data sourced from academic literature on holistic design in paediatric oncology. The information gathered from interviews may assist towards a holistic healthcare design for children with cancer. Chapter Six explains the selection and analysis of the case studies and the interviews.

1.5.2.1 I CASE STUDIES

The case studies included those in need of existing paediatric oncology healthcare facilities. The benefits of case studies that are local make the gathered data pertinent and useful to similar facilities in the same locale. The following two case studies met the selection criteria:

1. **Grey's Hospital I Pietermaritzburg (Government)**
2. **Inkosi Albert Luthuli Hospital I Durban (Government)**

1.5.2.2 I QUALITATIVE INTERVIEWS

The data gathered via interviews are supported by the observations of the case studies. Qualitative interviews provide first-hand data of any critical observations deduced by the researcher. It is acknowledged in the literature that not enough has been done in the design of the built environment to cater to the holistic needs of children as patients and as human beings. The qualitative method provides a detailed analysis of the interactions of children with cancer within the built environment of a paediatric oncology unit. These are communicated as experiences of patients on a daily basis from the perspective of practitioners, nurses, and caregivers. The format of the interviews are attached in the appendices. There is a relationship between the built environment and the provision of holistic care to patients. The questions are devised from the conceptual and the theoretical

framework. The aim is to provide insight into the proposed paediatric oncology typology design. The participants provide healthcare to paediatric oncology patients, and have unfettered access to the patients. In this way, the designer more fully understands the holistic needs of children with cancer.

1.5.3 I SECONDARY DATA

Secondary data sourced from the academic literature is used to support the conceptual and theoretical approaches. The discussion centres on the contribution of the built environment towards the holistic needs of children with cancer. One of these factors is that children, especially children with cancer, are more sensitive than adults to the built environment. This, amongst others, are considerations in providing an ideal healing environment for the end-user.

1.5.3.1 I PRECEDENT STUDIES

Precedent studies are selected from both existing local and international healthcare facilities. The criteria for the healthcare facilities were different. This was done to ensure that the respective frameworks were discussed in their entirety. Two precedent studies – the Maggie Cancer Centre, West London and Robin Children's Hospice - were selected to link to the previously identified frameworks. These case studies illustrate some of the holistic design concepts in the theoretical and conceptual frameworks.

1.5.4 I RESEARCH MATERIAL

Besides the qualitative interview, the source material include various media: books, periodicals, academic papers by various authors, videos, movies, television broadcasts, and social media, and includes raw data from precedent and case studies. Mostly, the interviewees are the architects of the respective case studies. A variety of source material is explored to provide fair comment about the research problem. The source material takes the form of hard copies and soft copies, including images, photographs, and sketches.

CHAPTER I 2

2.0 | THEORETICAL FRAMEWORK

2.0.1 | AGE ENVIRONMENTAL PRESS THEORY

The Environmental Press Theory, presented by gerontologist Dr Mortimer Powell Lawton (1985) is a theoretical framework to understand persons' ability to adapt to their environment as per age differences. Environmental Press Theory focuses on the interaction between two sets of variables - the 'person', or 'competency' variable and the environmental (press) variable (Lawton, 1985). This theory explores the relationship between the experiences of those along an age continuum and the interactions of these individuals with their surroundings/environments on the physical, cognitive, and emotional levels (Lichtenberg, 2000). The variable of the individual is identified as: The "physical and functional health, cognitive and affective functioning, and quality of life, including the sense of efficacy or mastery" of someone (Lichtenberg, 2000:549-556). This is an individual's level of competence and the demands of the environment which influence the functioning of the individual (Lichtenberg, 2000; McCuskey Shepley, 2000). This theory may be described as the patients' ability to adapt to the healthcare environment. This adaptation is considered to be a person's ability to maintain the most normal level of functioning in a particular environment as possible (Lichtenberg, 2000).

This theory has relevance to adults, but academics have asserted that it may be equally pertinent to children (McCuskey Shepley, 2000). The research shows that human beings' senses (or perceptions) are heightened between the ages of five years and 14 years of age and then wanes as later in life. The theory suggests that the same built environment is perceptually different for adults as opposed to children (McCuskey Shepley, 2000; Ghazali, 2015; Wagenaar, 2006).

The research further suggests that people are more stressed when they are ill, and are therefore unable to cope with negative attributes of the built environment. Should adults demonstrate a compromised ability to deal with the negative attributes of the physical environment when ill, then children may be more vulnerable to the same condition (McCuskey Shepley, 2000).

As children have greater sensitivity to the built environment than adults, their responses are different. Hence, it is reasonable to state that it is not possible to generalise results from adult studies to that of the paediatric oncology built environment. The sensory mechanisms that are different in children versus adults include visual acuity, colour perceptions, and the

ability to adjust to darkness and scale. The ability to perceive the built environment is less developed than adults, “the ability to induce foreground reversals in wireframe cubes and susceptibility to illusion regarding line length” (McCuskey Shepley, 2000:25-39). Day (2007) provides insight into how children perceive their environment. Day (2007) provides insight into the perceptions of children within their environment. Day (2007) highlights that children experience space differently to adults. For example, an adult may see single functional room whereas a child sees a room composed of five different places: a centre, plus four corners (Day, 2007). It is discussed below that this theory may influence the design of the built environment.

The current limitations of paediatric oncology built environments mean that the holistic needs of children with cancer are not catered for. Paediatric oncology units have been designed within the physical envelope of the existing hospital and therefore physically limited. South African state regulations, such as the South African Government Design Guidelines for Health Facilities (R158) do not encourage new hospital designs to incorporate holistic principles, and that they therefore continue promoting the current pathogenic models. Models that focus on the physical aspect of the illness.

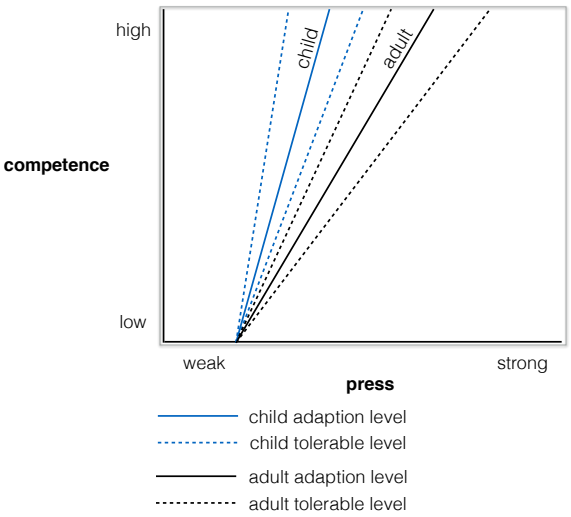


Fig | 1 : Application of Age Environmental Press Theory to Children's Needs (McCuskey Shepley, 2000).

The Environmental Press Theory suggests that it is critical for the end-user’s needs to be considered at all times, especially with regards to children. It is been shown that adults and children have very different sets of needs and requirements, both physically and psychologically. The environmental needs of children should be carefully considered, and the physical attributes of the environment have should correlate with the patients’ ability to use them. If this balance is unhinged, there is the risk that the environment alienates the patient and may potentially be a source of stress. The patients’ frustration would exhibit itself as an inability to engage with the built environment. In existing paediatric oncology facilities, there is no patient-centred approach. Healthcare designs in current facilities follows the premise that the adult-based models serve the purpose for children. The Environmental Press Theory suggests otherwise.

2.0.2 I SUPPORTIVE DESIGN THEORY

Dr Roger Ulrich's Theory of Supportive Design states that patients deal with stress during hospitalisation, and that therefore healthcare facilities should be designed to suit the end-user needs (Ulrich, 1997; Williams, 2000). Ulrich (1997) noted that although stress does not cause disease, patients who are stressed are at risk of a compromised immune system, and that this subjects the patients' bodies to easy infections (Ulrich, 1997). Lowering patient stress through a built environment that caters to the occupant's needs, assists in the patients ability to cope with hospitalisation. The principles of the theory are that the holistic healing environmental designs help patients cope with stress and that the environment has a positive influence on the healing process of patients (Ulrich, 1997).

Supportive Design Theory suggests that stressful or negative elements in the built environment need to be identified and removed. Elements may be added to the built environment to enrich it so that the built environment may promote a reduction in stress. These may also promote a calming influence, coping mechanisms in the patient, and overall healing (Ulrich, 1997).

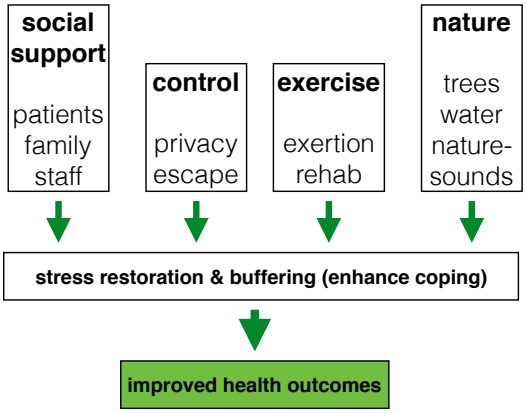


Fig I 2 : Ulrich's Theory of Supportive Design, proposes the following four stress coping mechanisms to reduce stress and assist patients to cope (Ulrich. 2000).

The Theory of Supportive Design follows a distinct set of principles, or guidelines, which specify that supportive healthcare built environments should:

- foster control and foster privacy,
- promote social support,
- and provide access to nature, and other positive distractions.

2.0.3 I CONTROL

Control refers to the patients "real or perceived influence their situations" (Ulrich, 1997: 3). Research shows that human beings desire to have control their physical environment. Ulrich (1997) states that the feeling of being in control is a critical factor which affects the stress levels and health conditions of patients. Ulrich (1997) shows that patients who do not have

the feeling of control over their environments tend to suffer from various conditional stressors. In paediatric oncology built environments, the sense of control is further compromised by "poorly designed, unsupportive healthcare environments that, for example, are noisy, deny visual privacy, force bedridden patients to stare at glaring ceiling lights, and present way-finding difficulties" (Ulrich, 1997: 7).

It is important that the provision of actual or perceived elements which alleviate stressors are considered in the design of the paediatric oncology built environment (Ulrich, 1997; 2000). This research is considered significant as it investigates a specifically-designed healthcare environment which caters to the needs of children. This may enhance children's feelings of control, reduce their experienced stress, and promote holistic healing.

2.0.4 I SOCIAL

Social support refers to the emotional support and assistance that a patient receives from others. Research into multiple scenarios reveals that patients who receive more social support experience less stress and better health as opposed to patients who are socially isolated. The built environment design may be a tool to reduce stress, and promote social interaction (Ulrich, 1997; 2000).

An example of the promotion of social support for paediatric patients is to provide a healthcare built environment that allows families and friends to give support to the patient in specifically designed areas. An example of such may be an adaptable waiting area with adjustable seating elements; a view of nature with seating which promotes socialisation of family, friends and the patient; and the provision of accommodation for the parents of the patient to remain near by (Ulrich, 1997; 2000). Another example may be the encouragement of play within the built environment, so that patients feel more comforted.

2.0.5 I NATURE AND POSITIVE DISTRACTIONS

Positive distractions refer to environmental social conditions within the built environment that influence the psychological state of the patient in a positive way, and reduce stress (Ulrich, 2000). Dr Roger Ulrich concludes that human beings have a tendency to respond positively to certain environmental conditions such as trees, flowers, and water in nature (Ulrich, 1997; Ulrich, 2000). Dr Ulrich's (1986) Supportive Design Theory shows us that patients in hospital who had bedside fenestration and looked out over a natural scene "recovered better than patients with a window that overlooked a brick wall" (Ulrich, 2000: 49).

Patients whose windows look out onto a natural scene were able to recover faster, and they require less medication for pain according to Dr Ulrich (2000). Windows with views have a positive effect, reducing patient stress and increasing patient healing, and adding to the ability of the patient to cope (Ulrich, 2000). The research suggests that gardens have a positive effect on patients, and that they reduce stress efficiently "if they contain green or relatively verdant foliage, flowers, non-turbulent water, park-like qualities (grassy spaces with scattered trees), and compatible nature sound (birds, water, breezes)" (Ulrich, 2000: 56).



Fig I 3 : Boston's Massachusetts Childrens Hospital Lunder Building - Patient ward with nature views to reduce stress and assist patients ability to cope (Pinterest, 2016).

Access to gardens is a positive quality of the built environment, "*nature window views for patient rooms, waiting areas, and staff spaces; an aquarium in a high-stress waiting area; an atrium with greenery and a fountain; and calming nature art mounted where bedridden patients can readily see it"* (Ulrich, 1997: 6). Views of nature not only benefit one's physical healing, but may contribute positively on patients social, psychological and spiritual wellbeing and contribute towards the healing process. Supportive design theory substantiates the objectives set out in the conceptual framework, towards a new design of a holistic healing environment in paediatric oncology facility.



Fig I 4 : Melbourne's Royal Children's Hospital - Patient ward with nature views and natural light into ward, creating a healing environment assisting in stress reduction and positively affect patients ability to cope (Goad, 2016).

The above may summarised as follows:

- Existing local paediatric oncology unit designs do not conform to the holistic principles described above.
- International organisations design focus towards holistic principles.
- Theoretical and conceptual frameworks complement each other towards promoting holistic healing.

2.1 I CONCEPTUAL FRAMEWORK

2.1.0 I HOLISTIC CARE DESIGN

2.1.1 I THE BEGINNINGS OF HOLISTIC CARE

Holistic healing is most effective when the whole patient is cared for, rather than a narrow focus on the physical illness, body parts, or symptoms. Holistic health is the state of balance and not just simply an absence of the illness. It highlights that there is an interconnection between the mind, body, spirit, and the environment. The aim of holistic care is to provide the patient with a built environment that caters to the patient's holistic wellbeing. Some ancient healing traditions, such as in Asia circa 3,000 BC, emphasise the particular importance of living a healthy way of life in harmony with nature (Walter, 1999). Socrates, in the fourth century BC, warned against the treatment of only one part of the body "for the part can never be well unless the whole is well" (Walter, 1999: 233). In the 1920s, Jan Christiaan Smuts' holism is a theory that a means of seeing living things as "entities greater than and different from the sum of their parts". Walter (1999: 233) explains that it was in the 1970s that the term holistic became common parlance. Health organisations, such as WHO (The World Health Organisation), recognise that the current trends in healthcare focus on a pathogenic treatment model and that holistic care is the ideal model. These organisations claim that the pathogenic approach is insufficient for patient needs.

2.1.2 I PRINCIPLES OF HOLISTIC HEALTH

Holistic health is consequently intricately connected to the principles of nature mentioned previously, and that the whole is made up of interdependent parts (Walter, 1999). The Earth is made up of various interdependent systems for life to flourish and survive, and these cannot be separated. The same idea applies to people who are comprised of interdependent parts: the physical, psychological, social, and spiritual (Walter, 1999; Ghazali, 2010). When one of these parts are not functioning optimally, it has an effect on the whole.

The environment contributes to the patients' comfort and also to the patients' potential accelerated healing. The concept is that the built environment connects with the patient, and the patient connects to the built environment. The four parts or components mentioned above constitute a holistic wellness design, and all are interconnected – they are not found in isolation; however the physical aspect is the constant in the majority of cases.

The quality of the design and its manifestation in the physical play a significant role in the determination, engagement, and success of the particular space or facility for its specific function (Day, 2007). The physical environment may be designed in a manner that satisfies the child's physical needs and also allows for their psychological, social, and spiritual needs.Day (2007) states, it is possible that a space may permit for more than one component, that is not only the patient's physical needs. A children's play area may for example, satisfy the physical needs of child play while a child's psychological needs are also developed. Through play, the child's cognitive senses are developed. Play is also a natural child's way that the child experiences happiness (or spiritual wellness). Furthermore, the child's social needs are catered for in designated space where other children play. This encourages socialisation and social support amongst other beings (Day, 2007).

The person is a physical, psychological, social and spiritual being. The parts overlap and cannot be separated.

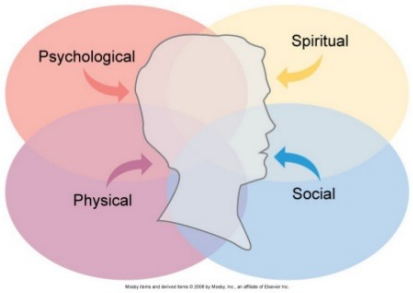


Fig I 5 : The four Holistic Components that make up the whole of a patient (Pintrest, 2011).

The provision of a space that caters to the child's specific needs helps them to feel more comfortable, and this may reduce the stress of the unfamiliarity of the hospital, and the act of play is a coping mechanism to deal with the hardships involved in the treatment of cancer.

2.1.3 I REASONS FOR HOLISTIC WELLNESS DESIGN

The incorporation of holistic wellness principles into the design of healthcare environments, specifically that of paediatric oncology facilities, are imperative towards improving healthcare facilities for children. Current facilities do not completely fulfill the criteria required for holistic healing, as they focus mainly on the physical aspect of patient care. The holistic design approach improves healing outcomes and it intends to nurture the needs of children with cancer. Such needs include:

- the reduction of patient stress,
- the importance of the relationship between child and parent,
- continuation of a child's education,
- social development and play,
- encouragement of interaction and participation,

- increased patient comfort,
- promotion of holistic healing,
- environments which engage its patients.

The provision of facilities that promote healing may help to increase the rate of the patient's recovery. The knowledge from holistic wellness design principles may be effectively and beneficially incorporated, which may assist the architect's decision-making to best meet the needs of paediatric oncology patients.

Architects and designers need to continue challenging themselves, to improve and enhance built environment designs to better suit the patients' needs. Research in collaboration with healthcare practitioners (and caregivers) are critical to cater to the needs of the patient. Mcleod (2007) highlights Maslow's Hierarchy of Needs, infrastructure is one of the most basic needs of children before needs are met at higher levels.

Holistic wellness design continues to grow in practice. Both international and national health organisations, and policy makers, contend that holistic designs are the best models for healthcare. Holistic design is recognised as a positive contributor towards the improvement of the quality of paediatric oncology facility designs which cater to the needs of the patient.

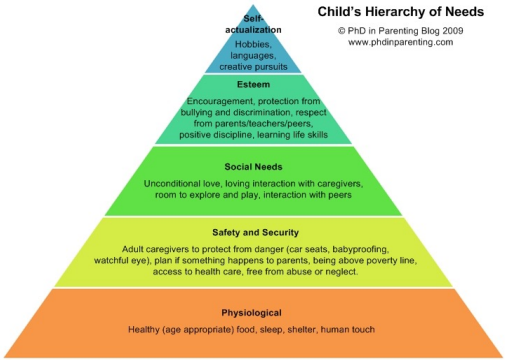


Fig I 6 : Children's Needs Pyramid - Maslow's Hierarchy of Needs (PHD in Parenting, 2011).

2.1.4 I HOLISTIC WELLNESS DESIGN IN PAEDIATRIC ONCOLOGY

Whereas studies exist for hospital environments for children with general conditions, only a few studies exist for the field of oncology. Knowledge and information from research which supports holistic healing may cater to the needs of children with cancer (Day, 2007; McCuskey Shepley, 2000). The incidence of cancer in children is increasing, therefore it is important to focus on the provision of quality oncology facilities that accommodate these children's specific needs for healing and comfort.

CHAPTER I 3

3.0 I LITERATURE REVIEW

Healthcare designs have come a long way in the last few decades, having built on prior knowledge, scientific breakthroughs, and the development of current research. This chapter looks at allied fields of healthcare, and childcare designs such as kindergartens and schools, which assist in the support of the holistic healing principles in the built environment for paediatric oncology. Ultimately, studies are explored that promote the idea that the built environment may assist healing. Academic literature for allied childcare models and other studies of childcare may lend support to the design of a new paediatric oncology built environment design.

3.1 I HOSPITALS: A HISTORY PRE 1900s

Originally, hospitals were places of charity for the ill, homeless, and the elderly (Wall, 1998). Centuries ago, hospitals (or what may be thought of as hospices in today's terms), had very humble and basic beginnings. Domus Dei, also known as the Hospital of Saint Nicholas in Southern England in the 13th Century, was the first of such places to provide care and healthcare. Domus Dei granted housing for the ill, the homeless, and the elderly on their death bed. People were treated for illnesses which would be simple to treat with today's medicine, and they would come to these early hospitals to die. Staff had little or no knowledge of adequate sterilisation practices, germs, cross-contamination, or even medicine. These hospices became the fertile grounds for the spread of diseases, sickness, and eventually death. In the early years, nursing was supported by the church's outreach to the less fortunate (Wall, 1998). The church played its part in providing care to the ill by providing comfort and ministry to the ill and needy (Wall, 1998). The church's role in providing care was consistent in South Africa - missionaries provided such care at the Castle of Good Hope in Cape Town (Van Heerden, 2016).



Fig I 7 : Domus Dei or also known as the Hospital of Saint Nicholas - built 1912 (British Towns and Villages, 2016).

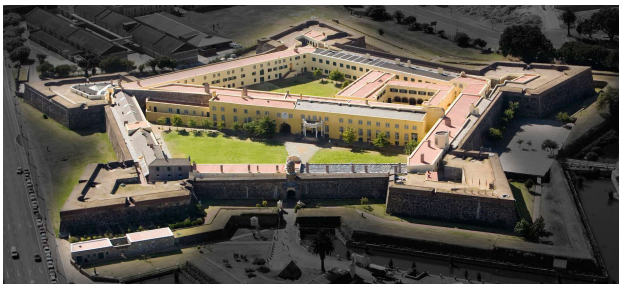


Fig I 8 : Castle of Good Hope, provided first hospice care in South Africa - built 1666 (Castle of Good Hope, 2015).

3.2 I MODERN HOSPITALS POST 1900'S



Fig I 9 : Hospital Ward comparison- Pre 1900 vs Modern(Scott-Mumby, 2015).

Hospitals in the mid 20th century have made tremendous progress from earlier models (pre-1900's). The Renaissance revitalised medicine and the progress to medicine in the times of the Industrial Revolution were significant, for example, the practices of Florence Nightingale. Therefore, the efficiency of hospitals improved. Hospitals became a place where people no longer went to die, but instead became places where physical recovery was possible. Hospitals evolved and expanded and diversified to include specialised functions while operating as one facility for the provision of care to patients. Patients became able to receive the best care possible. In the 1960s, hospitals reintegrated palliative care and hospice (Clark, 2007).

These services were reincorporated to help the patient suffering from a chronic illnesses, and making provision for that patient's psychosocial needs. Progress was not only made in the physical environment and practice, but in the improvement of the quality of human care by practitioners and nurses. Whereas the focus of current hospitals have been pathogenic (treatment of disease and injury), the holistic approach focuses on factors which promote total health and wellbeing (Van Heerden, 2016).

Some academics suggest that hospitals are largely economically centred, and have become similar to the early pre-1900s hospitals, when the holistic needs of patients were unmet. More recently, architects and healthcare providers are exploring comfort-based models of healing that may inspire future hospital built environments to serve the holistic needs of patients. Collaborations, such as the Center for Health Design, bring together professionals for the common goal of improving the healthcare environments around the world to provide holistic care to patients. This initiative is commensurate with the objectives of the conceptual and theoretical frameworks in this research.

Modern medicine and recent knowledge does not mean that people are treated holsitcally (Ferrell, Dow & Grant, 1995). The advances in healthcare environments have been primarily aimed at adults, resulting in design developments that are inappropriately applied to environments for children 'one size fits all' idea.

3.3 | CURRENT PAEDIATRIC ONCOLOGY FACILITIES IN SOUTH AFRICA



Fig | 10 : Red Cross War Memorial Children Hospital - Cape Town, South Africa - built 1956 (Alamy, 2015).

Paediatric oncology in South Africa is a relatively new field in the medical discipline. Further to this, the history of this field has not been documented very well. The field of paediatric oncology was one that branched off from the main field of oncology (McCuskey Shepley, 2000). The first paediatric oncology unit in South Africa was started in Cape Town by Professor Cyril Karabus at the Red Cross Children's Hospital in 1970. It was started in a section of an established ward. It was not until 1980 that a separate dedicated unit was created, which was the former outpatient facility of the hospital. In 2006, the current paediatric oncology unit was opened with the aid of Lotto funds (Van Heerden, 2016).

In the rest of South Africa, paediatric oncology units had similar beginnings, where previously used sections of the hospitals were sectioned off and converted to wards dedicated to children with cancer. Other examples of hospitals that had similar origins include: Tygerberg Hospital Paediatric Oncology Facility, which was started by Professor Hesslinge in 1975, the Johannesburg unit, which was started by Doctor Richard Conn in 1978 and Durban, which was initiated by Doctor Naidoo in the early 1980s (Van Heerden, 2016). During the 1970s, the Bloemfontein unit was started by Professor David Stones. The Pretoria unit was started by Professor Marianna Kruger in 1987 at Kalafong Hospital with a dedicated Paediatric Oncology Unit (Van Heerden, 2016).

Before the development of paediatric oncology field of medicine, children were treated by adult oncologists and radio-oncologists with little success, resulting in paediatric doctors

specialising in oncology and the field of medicine being formalised (Van Heerden, 2016). This brought about facilities that were designed for the treatment of paediatric cancer, to address the physical aspect of the illness. However current hospital designs do not cater for the patients' psychological, social, and spiritual needs, which together promote holistic healing.

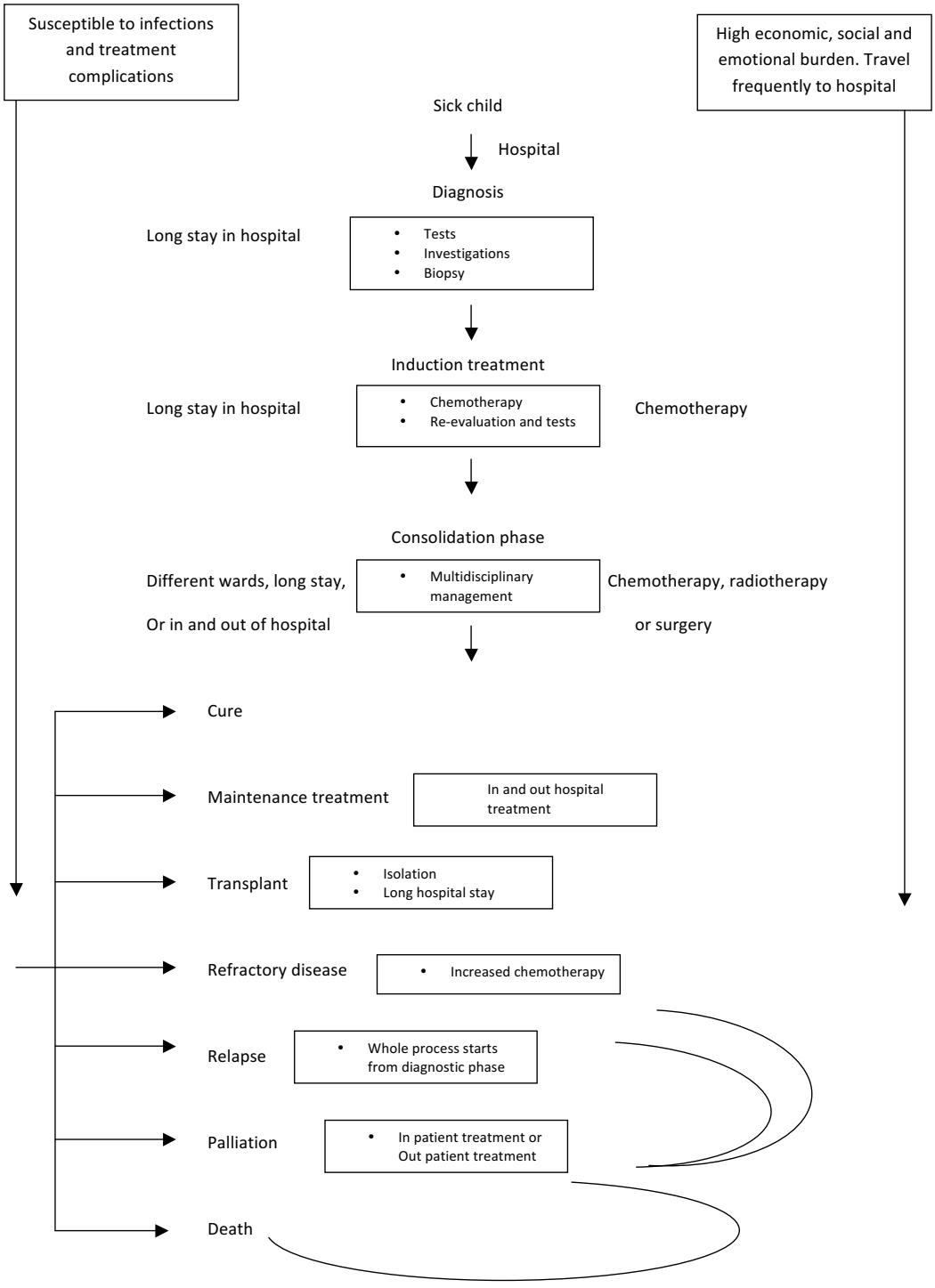


Fig I 11 : illustrating treatment process and the stressors for the child (Van Heerden, Author, 2016).

3.4 | CHALLENGES FACING CURRENT PAEDIATRIC ONCOLOGY ENVIRONMENTS

McCuskey Shepley (2000) reiterates that not enough has been done worldwide in the provision of holistically designed paediatric oncology facilities. Asserting that although there is progress in general, few facilities are designed for children in healthcare, even less for cancer patients (McCuskey Shepley, 2000). Facilities in South Africa were not initially designed for providing cancer care to children. Identifying that existing built infrastructure is not ideally suited to meet the holistic needs of paediatric patients. This creates difficulty to provide a facility that is focused specifically for the end user, and provide holistic healing.

3.5 | PAEDIATRIC ONCOLOGY PATIENTS

The architect may benefit from an understanding of paediatric patients and their needs, interests, and behaviour within the hospital environment. This may assist them to design a built environment specifically for the holistic healing of patients. The goal is to create a built environment for the patient that promotes physical engagement, reduction of stressors, psychological growth, increased social interaction, and spiritual upliftment (Leeman, 2002). The design of the built environment is to help patients cope with hospitalisation and treatment process. According to literature on the experience of patients, a positive engagement with the built environment can help to reduce environmental stressors, and promote healing.

3.6 I CHALLENGES FACING CHILDREN WITH HOSPITALISATION

The experience of hospitalisation is, for any person, a stressful experience. Environmental stressors potentially originate from the relationship between the patient and their environment as well as the interaction between others in their surroundings. This provides the basis for the ability or inability to cope with stress with the event. Illness is the first point of stress, and the environment may further contribute to patient stress. The unfamiliarity and complexity of hospital built environments may indeed be stressful for children who are still growing emotionally.

Hospitalisation brings with it many physical and psychological demands. Such demands on a patient may be due to the unfamiliar spaces, painful procedures and treatments, and their detachment from family, friends, and the normality of life (Ulrich, 1997). Issues such as privacy and noise may also be stressful attributes within the built environment (Ulrich, 1997). As discussed earlier, the Supportive Design Theory suggests that stressor elements may impact significantly on the patients' recovery (Ulrich, 1997). These effects of stress may prolong periods of hospitalisation, as they contribute to higher blood pressures, depression, elevated heart rates, and may result in the need for more medication (Ulrich, 1997). Although stress does not directly contribute to mortality in patients, it does add to the morbidity by interfering with normal physiological processes essential for recovery and improved health (Ulrich, 1997).

The psychological effects of stress may cause patients to perceive emotions of helplessness, anxiety, depression, and they may experience a decreased self-esteem (Ulrich, 1997). These emotional stressors may negatively affect a patient's wellness, and may reduce the effictiveness of the treatment process (Ulrich, 1997). Research of pain perception in paediatric patients shows that patients' perceptions are directly related to the perceived stressors encountered in the built environment such as anxiety and fear (Ulrich, 1997).

The prospect of hospitalisation for children brings with it the likelihood of separation from parents, siblings, friends and familiar surroundings, and the prospect of treatment that may be frightening and painful (Lambert, 2013). Steps need to be taken to avoid stress, as this may cause behavioural changes that may result in lasting harm to the development of the personality of the child (Lambert, 2013). The built environment of hospitals evokes children's emotional response such as fear, sadness, anger, anxiety, fright, loneliness and

homesickness, which can have an effect on the patients' physical and psychological wellness (Lambert, 2013). A potential outcome of psychological regression is social and/or motor deficiencies, such as the soiling of sheets, bedwetting, and tantrums (Karriem-Norwood, Web MD, 2015).

Briggs (1966) states that it is essential for the health of the patients that they should be treated in an environment that is friendly, intimate, and allows for a fostering mother-child relationship. It is the relationship between mother and child that provides comfort and security in the developmental years. This includes the child's relationship with the father, siblings, and friends; all those who provide the social backdrop of the child's character mental stability (Briggs, 1966).

The particular sensitivity of children, and possible maternal separation are potential sources of stress in the built environment. Designers and architects should closely deliberate the inclusion of age appropriate design concepts. To ensure that a holistic environment caters to the child's levels of comfort, two ideas are presented in the literature - the provision of overnight facilities for parents to spend time with their child, and a recreational space to promote social and psychological development (Lambert, 2013). The ability for younger children to tolerate their mothers' absence increases with age (Briggs, 1966). Researchers argue that the built environment needs to be able to stimulate the child, and needs to focus on patients' healing.

Other challenges that paediatric oncology patients may encounter are:

- coming into contact with strangers,
- unusual/different routines,
- changes in eating patterns and food,
- new environments,
- adapting to a diagnosis
- potential families who are emotionally unstable,
- prolonged admissions,
- the prospect of death,
- anxiety with the loss of function and control,
- changes in body composition and appearance, that is, hair falling out
- identity reevaluations, and
- dealing with future potential infertility.

3.7 | THE DEVELOPMENT CHILDREN

Childhood may be defined as the period in life of rapid physical, psychological, and social change; the period of life between infant and adult. As children grow, they develop physical and social skills. The rapid rate of these changes during this period of development is critical to their ultimate maturity, and their physical, psychological, social, and spiritual health. The child's cognitive ability is, at this stage, different to that of adults. The rest of the body, too, is still in the phase of development (McLeod, 2015). It is important to understand that during this phase of development the child is highly sensitive, and that they are realising who they are themselves, including their bodies (McLeod, 2015). It is crucial that paediatric patients experience a degree of normality during hospitalisation and treatment, to encourage continued social interaction and development.

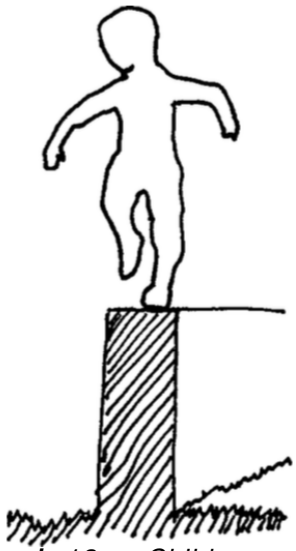


Fig | 12 : Children perceive elements differently to adults, for example a wall is boundary to demarcate space, whereas a child sees, walls are for walking along or bouncing a ball (Day, 2007).

Day (2007) states that the child's psychosocial wellbeing is critical to their development and the prospect of healing. He highlights that children have fewer cognitive abilities to those of adults (Day, 2007). These cognitive differences have a bearing on childrens' perceptions of space as compared to adults which further reinforces the application of the Age Environmental Press Theory.

It is explained in Olds (2007) that children experience their world in the here and now, colour, light, sound, smell, touch, texture, volume, movement, form and rhythm". This perception of space explains why the lack of control of some of these factors can become a source of stress for patients, as mentioned in the Theory of Supportive Design, and that they should be taken into account when providing a space for patients.

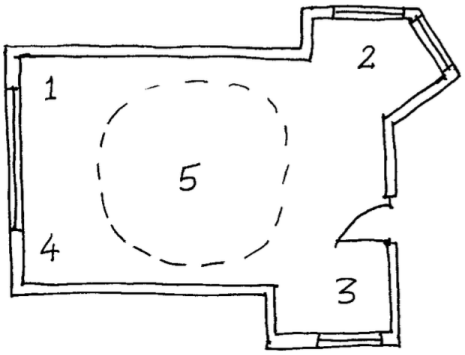


Fig | 14 : Children perceive a room not as a singular function as do adults, instead a room consisting of five different spaces (Day, 2007).

Children perceive space and its elements in a naturally creative way, and although adults have a greater understanding of the environment, children are natural explorers (Day, 2007). The anthropometrics of a child play a part in how space and environments are perceived. Children are lower in physical height, so their eyes shrinks the boundaries of the space; therefore a child's space is different to that of adults (Day, 2007). The author claims that the "*smaller relative scale, reach and range make places (small, when revisited as an adult) feel huge. Their spatial consciousness is also different*" (Day, 2007: 5).

Two suggestions that contribute to the design of the built environment are: to harness and capture children's natural creativity, and to make the environment homely so that patients find it appealing and comforting. Academics explain that environments with minimalist designs may appeal to adults with their clarity and calmness, but that they do not cater to the child's senses (Day, 2007; Ulrich, 1997). Healthcare built environments are often minimalist, as they are sterile and under-stimulating, may have an adverse effect on children (Day. 2007).

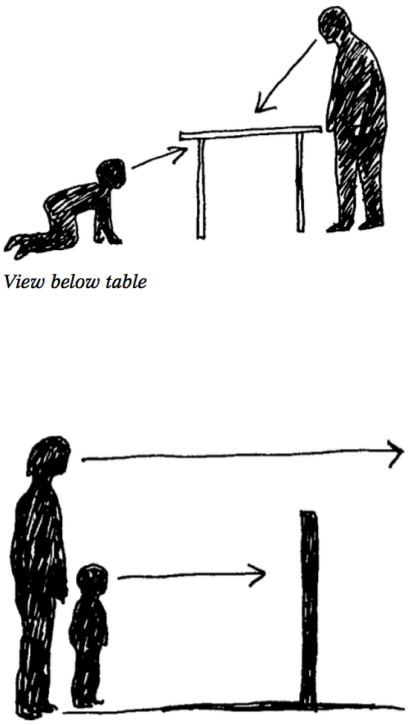


Fig | 15 : Children and adults also experience places differently (Day, 2007).

CHAPTER | 4

4.0 I HOLISTIC DESIGN

The healthcare built environment's effect on patients is of academic interest, as evidenced in the work of (amongst others) Ulrich, Mclucsky, and Ghazaldi. Olds (2001) suggests that positive environments for children may increase comfort and reduce stress, and therefore promote holistic wellness. Day (2007) suggests that there is a strong link between visual stimuli and patient emotions. Identifying that the aesthetic and architectural qualities of the built environment is more than just the notion of liking, it has been a proven contributor to affecting mood and the healing of patients. These factors may be very pertinent to architects, in particular for those designing paediatric oncology facilities. McCurry et al. (2009) highlights that the aesthetic qualities of images and art may have a stress-reduction effect on the patient, and architectural form and space may have a similar effect.

Although visual stimulation may be interpreted subjectively, the architect is required to establish design elements that may cater to the perceptions of a wide range of occupants. Day (2007) suggests that the design should provide an increased degree of control over the built environment for the occupant. An example, as suggested by Day (2007), is a nature-setting in a public space, and ward designs which induce a common positive quality - that is the inclusion of public spaces and ward designs that promote a connection to nature. A holistic design of the built environment is often considered as an architectural response that may promote healing and positive distraction for the patient. Negative elements are wards with no fenestration, which increase a negative feel (perhaps of confinement) for its occupants.

Dovey (1985) states that the concept of the homely setting has received more attention in hospital design as it provides a holistic comfort to cancer patients. The Maggie Foundation has a similar approach to healthcare design, specifically for those suffering with cancer. This organisation, created by Charles and Maggie Jencks, aims for the creation of a holistic healing environment which provides the best care possible for people with cancer in a homely setting. Charles Jencks, the founder of the Maggie Foundation, acknowledges that the architecture does not replace chemotherapy, but he argues that it definitely makes a positive difference to the lives of cancer patients (Jenecks et al, 2010). The concept of the architectural designs he describes focus on the ability of the buildings to assist in patient care and healing.

4.1 I THE BUILT ENVIRONMENT AND PATIENT HEALING

Silav Ultkan (2012) states that the effectiveness of the environment and its ability to have a positive effect on patients holistic wellness, and depends on how the environment caters to the specific needs of the patient. An ideal environment that has a positive effect on healing in paediatric oncology patients is one that focuses on specific needs of the end user (Silav Ultkan, 2012).

Silav Ultkan (2012) states that designs may be considered holistic if they contribute to patient healing. These include the reduction of: blood pressure, stress, recovery time, and pain. The holistic design plays a role in helping the patient to cope and also provides support to patients' families (Silav Ultkan, 2012; Ulrich, 1987). A positive architectural design that considers the end user, by identifying the challenges, and needs of the patient (Sfandyarifard, 2000). There are various exterior and interior design considerations that the architect considers for the holistic built environment. These are described in more detail below.

4.1.1 I PERCEPTION OF SPACE

Alexander (1977) states that the use of spatial gestures in the built environment, such as the use of open-ended corridors to frame views of nature may help to create therapeutic space for its occupants. The use of spatial gestures provide patients with the option of choice, control to go and sit in these areas. Patients are encouraged to visit these intimate spaces, to meditate or socialise. This is important for patients with chronic illnesses such as cancer, as hospital stays are indeterminate. Spaces for reflection may abet the physical, psychological, and spiritual healing of the patient, and may reduce patient stress. The spatial gestures mentioned above normalise the built environment and reduce the standard institutional characteristics of a hospital. The inclusion of these small volumes, with views to nature, create a positive distraction for patients and help the latter to cope, and to reduce stress. Jenecks et al. (2010) aver that the designed spaces for reflection have a restorative effect on the psychological health of the patient. This researcher suggests that the quality of the environment – panoramas and views of nature – may be a positive contributing factor to the social, psychological, and spiritual wellbeing of the patient.

4.1.2 I PROPORTION AND SCALE

Olds (2001) highlights the influence of scale, proportion, and colour, which may have a psychological effect on patients. Function-dependent, large volumes and small spaces can be used to promote certain moods and responses from patients. Olds (2001) and Alexander (1997) suggest that lower ceilings create a more intimate space, and promotes social interaction. The use of high ceilings should be considered for functions for large numbers of patients such as common areas. Jenecks et al. (2010) suggests that high ceiling spaces may be used for therapy where groups of patients are encouraged to open up (as in psychotherapy), play, or to socialise. The use of a large volume reduces the feeling of pressure and claustrophobia, in contrast to a space with a smaller volume. The use of smaller volumes may be used in areas which have more privacy. These areas are ideal for social intimacy, such as between patients and family.

Olds (2001) describes that kindergartens are a good example of this idea of proportions and scale put into practice. The large volume of the classroom is conducive for the class to meet, and the alcove, or bays on the outer edges of the main volume space, encourages intimate social activities for two or more children. McCuskey Shepley (2000), argues that many modern healthcare buildings for children do not respond to the age, or scale, of the patient. These buildings may be intimidating for young cancer patients, and may have an adverse effect on the patient - the space may appear uninviting and visually domineering. In a built environment that caters to patients with cancer, this is a pertinent factor.

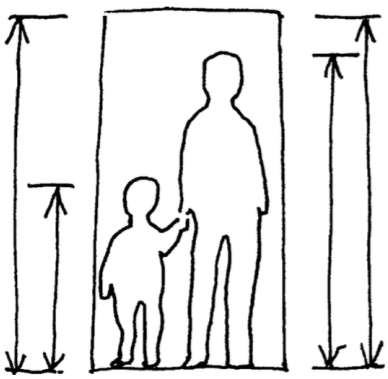


Fig I 13 : The built environment should be considered from a child's scale and not from that of an adult, as they have differing physical needs (Day, 2007).

4.2 I INSTITUTIONAL HEALTHCARE BUILT ENVIRONMENTS

Current healthcare environments are considered to be cold, sterile, and unwelcoming for paediatric patients. There is a need to consider the design of paediatric oncology facilities from the patient's point of view, and this design may then promote the efficiency of the built environment design for holistic care. Although cancer is a physical ailment, its treatment impacts an individual in many other ways: psychologically, socially, and spiritually. Should the patient be unhappy with the built environment, this may negatively affect recovery. The

character of institutional environments is dull. Dull refers to colour, but also material finishes, furniture, long corridors, and lack of views; and an overall lack of comfort and aesthetic appeal.

4.2.1 I FAMILIARITY AND NORMALITY

Olds (2001) points out that patients show positive responses to visual stimulation and spatial arrangements that are familiar. Olds (2001) states that there is a definite link between the patients' preferences and what is familiar. Familiarity is pertinent to the introduction of normality within the built environment design. Normality may reduce the experience of healthcare environments as institutions, reducing stressing effects on patients. This is discussed in detail further in this chapter.



Fig I 16 : Maggie Centre - West London , provides a home like environment, to promote patient comfort and remove the preconception of a hospital environment. Patients sit at a dinning table in the common area, creating an informal setting for waiting or promoting social engagement (Jenecks et al., 2010).

Architects and healthcare professionals consider the 'home-like' environment as suitable, and moreover, ideal for a paediatric oncology built environment. The outcomes of various studies show the importance a built environment design that offers the patient a degree of familiarity, which has a positive effect on patients, which reduce their comfort and stress levels. Pakdaman (2015) describes the experience of a comfortable home environment as the instillation of the sense of hope and confidence amongst the patients and visitors. This, he claims, is what happens when 'home-like' spaces are created within the healthcare settings. Dovey (1985) describes the idea of home as the relationship between occupants and their environment. The home is an emotional place where the "*relationship between dwellers and their dwelling places*" are meaningful (Dovey, 1985: 84).

The current 'institutional' hospital environment are sterile space, and unfamiliar to patients and their families. It is therefore considered by professionals to be detrimental to the mindset of the patient (Pakdaman, 2015). The attitudes of those who design paediatric oncology environments is to move away from the 'institutional' look-and-feel as much as possible without affecting the healthcare providers' ability to provide operational care (Pakdaman, 2015). For patients to be receptive to treatment, they need to be comfortable and relaxed in

their surroundings (Pakdaman, 2015). Therefore, the need to normalise the built environment is critical to the effectiveness of the provision of care and healing for the patient. It is not only a positive design that helps the patient heal, but the avoidance of the negative. Current institutions are unwelcoming and sterile, and they this built environment is overbearing and overwhelming for patients and visitors alike. These environments may be major contributors to patient stress, which negatively affect their healing process.

Jenecks et al. (2010) highlights that the Maggie Centre in London, is designed in such a way that is creates a calm and conducive healing environment. It is a home-like environment for the provision of care, creates a warm place where patients may sit around the kitchen and dinning table.This idea dismantles the concept of institutional healthcare towards; A home-like environment is designed where a patient may obtain treatment and may be able to heal without the experience that the hospital facility is a sterile institutional hospital. Neethling (2016) adds that the 'home-like' built environment design is beneficial to the patients' healing and comfort, as it creates a welcoming, warm, and safe environment.



Fig | 17 : Maggie Centre - Gloucestershire, The built environment provides patients with warm and friendly environment with home like characteristics. Patient lounges are open and flow into each other, resembling a dinning room flowing into a lounge. The environment promotes comfort, social and psychological wellness (Jenecks et al, 2010).



Fig | 18 : Maggie Centre - Gloucestershire, building is earthy, warm and has welcoming aesthetic appeal to visitors or patients, in stark contrast to existing sterile and overbearing hospitals and clinics (Jenecks et al, 2010).

4.3 I CONTROL OVER THE ENVIRONMENT

Control may be described as, namely: control itself, privacy, and autonomy. Olds (2001) suggests that some patients prefer to occupy private rooms, to be able to close the door, and have access to private ablutions. Olds (2001) identifies that teenage adolescents prefer their wards be a place of retreat, treatment, privacy, relaxation, and procedures. Teenage adolescents would like their wards to be customised to their particular liking – they want familiarity and a feeling of ownership of their space.



Fig I 19 : Maggie Centre - Gloucestershire, provides alcoves for patients, giving opportunities for patients to have their own space, without being completely isolated from the group spaces (Jenecks et al, 2010).

Olds (2001) identifies that elder paediatric patients in the later teens, in the later teens, require more autonomy, as they are more sophisticated cognitively than the younger paediatric populations. Day (2007) explains that the latter population have the ability to communicate their experiences and feelings without complete dependence on their parents or other adults. Palmer et al. (2004) describe that the sense of control and autonomy as a psychological component that affects the development of the patient's self-esteem and identity. This reinforces the idea that the design needs to provide the patient with a sense of control over the environment, which allows for reduced patient stress and is therefore crucial in the patient's healing. Palmer et al. (2004) state that a contributing factor for the paediatric oncology patients' demand for privacy is due to their self-conscious appearance of the effects of the illness and the impact of treatment.



Fig I 20 : Maggie Centre - Gloucestershire, provides smaller lounges for patients with views to nature.Providing choice for a multitude of differing social interactions within a therapeutic built environment (Jenecks et al, 2010).

The studies suggest that the common institutional design with large multi bed wards is not considered conducive to the needs of the patient. The need for patient privacy and the creation of a sense of

ownership of space assists in reducing patient stress and promotes healing. Ownership is therefore the adaptiability or customisability of the space with 'home-like' elements which simulate normality. Ulrich (1987) and McCuskey Shepley (2000) agree that a holistically designed built environment, which considers the patient's needs, may reduce stress and provide balance in a positive way, thereby increasing the rate of healing. Ulrich (1987) states that a built environment not specifically designed specifically for the paediatric population and over (or under) stimulates may have an adverse effect on the patient's healing and comfort.

4.3.1 I PRIVACY

Privacy is a critical component in most hospital environments, moreover for paediatric oncology facilities. Patients and their parents require privacy from others, staff, public, and visitors. Privacy is a very difficult matter to solve because of the operational demands of such a design, such as the requirements of staff to observe patients, which is balanced with the patient's need for control.

Pakdaman (2015) states that the degree of the necessity for privacy may vary along a age continuum, dependent on the nature of the situation and/or the temperament of the patient. There are instances where little privacy may be an issue, as with the scenario when parents or visitors occupy the same environment. For example, a patient may have visitors, and this should not compromise the other patients's privacy. The lack of privacy in this example, may be a great source of stress for both the patient and parents, and these stresses may be detrimental to patient healing and comfort. Perhaps the design considerations for paediatric oncology facilities should be considered in terms of a privacy hierarchy, from the most public to the most private spaces. Dovey (1985) suggests that this hierarchy may be described as dialects of the home and journey, the route from the private of the individual realm out into the public communal realm.

Pakdaman (2015) suggests that there is a gradual transition from the private realm to the public realm. This is pertinent as it takes into account a holistic built environment which balances holistically the patient's need for privacy and communal social interaction. An example is the transition from the public realm of the entrance, reception area, and family spaces, of the hospital to the in-between spaces that provide a buffer, then onwards and into the private realms of the consulting rooms, treatment rooms, wards, bathrooms, and communal patient areas. Dovey (1985) highlights the importance of the relationship of realms and how they link to one another.

Alexander (1977) suggests that for communal sleeping spaces an alcove of a common space may allow the child to experience privacy within a communal setting. This concept may be beneficial, as patients usually visit their loved ones in open wards, with no means to define personal or private space (Alexander, 1977). Spatial gestures assist patients to define and personalise their personal domains. Alexander (1977: 829) suggests that spaces are not the same for groups as for individuals - he says "*no homogenous room, of homogenous height, can serve a group of people well.*"

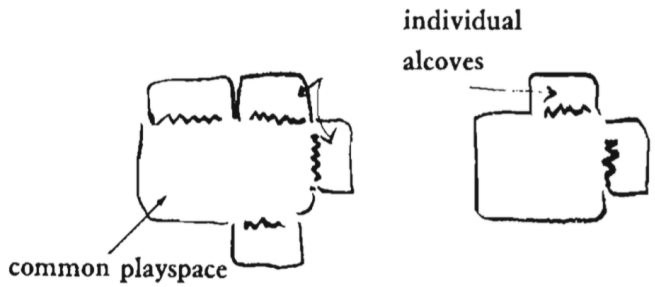


Fig | 21 : Addressing the individual and the group : Link between Personal sleeping space to communal space (Alexander, 1977).

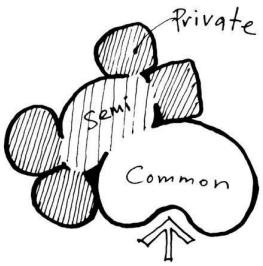


Fig | 22 : Gradients from public to private (Alexander, 1977).

4.3.2 | PLACE FOR REFLECTION AND SPIRITUAL HEALING

Olds (2001) and Day (2007) state that there are various architectural design solutions that may assist healing and promote the comfort in healthcare built environments. In particular, patients with chronic illnesses, such as paediatric oncology patients, require help with healing and comfort. Spaces for reflection may assist in the physical, psychological, and spiritual healing of the patient, and reduce patient stress. These spatial qualities provide a sense of security and accessibility for patients, especially when they need to recuperate from the demands of the period of hospitalisation period (Jenecks et al., 2010). Spaces for reflection allow patients to get away, to relax, to be alone, and to spend time with friends or family members. The places of reflection may be accessed by the patient when they so need, affording the patient control, autonomy, and the choice to move to such a place. The patient who experiences a sense of control is more engaged with and enjoys more quality of life during the hospitalisation. This, in turn, promotes healing and betters the self-esteem of the patient.

Day (2007) highlights that these spaces for reflection provide patients not only with a place to get away, but that these places facilitate happiness. Jenecks et al. (2010) indicates that designed spaces for reflection have a restorative effect on the psychological health of the patient. These spaces are often naturally well-lit, and may include water features - the noise

from water may also promote the patient's happiness and healing. Day (2007) states that vehicle, pedestrian, and industry traffic are not desirable as views whereas Jenecks et al. (2010) counters this perspective. The latter claims that limited views of the urban fabric of daily life may be a welcome distraction for the patient. Restorative spaces provide patients with an emotional link to a physical space that may give them solace; spaces that provide patients with social and emotional wellness.

4.4 I ENVIRONMENT FOR HEALING AND COMFORT

Bingham (2016) suggests that the patient's positive attitude contributes to better care and treatment. The patient's mood and attitude are influenced by the qualities of the built environment. Bingham (2016) states that there are difficulties in the provision of care and comfort to the patient within an 'institutional' built environment, which does not support the patient. needs.



Fig I 23 : Bear Cottage Children's Hospice, Manly, Australia - Activity tree house - Provides choice for patients social activities in a therapeutic environment (Verderber, 2003).

Olds (2001) suggests the design of the built environment have the ability to define outdoor spaces (green spaces), and that circulation within the interior taking place on the outer edge of this green periphery. This design concept of the green periphery is critical as it provides the patient with a positive distraction, and suggests to the patient that there is freedom beyond the confines of the hospital. The benefits of such an approach reduces the internal, double loaded circulation that is artificially lit and narrow. The spatial gestures (off main circulation pathways) may promote social interaction with small volume spaces facing the natural views. These transitional spatial gestures may be beneficial as they permit patients to use these spaces for reflection, meditation, restoration, or just to take a break from confines of the ward. The qualities of these spaces created, that are naturally lit and with views to nature, provide patients with a positive environment that it is beneficial to their comfort and their holistic healing.

Van Heerden (2016) states that either direct or visual access to a green space may be beneficial to the psychological and spiritual wellbeing of the patient, and may be used as a positive distraction to help the patient coping with the stress of hospitalisation. Day (2007) suggests that green spaces at the entrance of the hospital facility create links, and dialogue between the public and private realms. Green spaces help to grade a built environment. This design concept is relevant, as it deinstitutionalises the formality of the healthcare built environment.



Fig I 24 : External covered circulation

4.4.1 I PATIENT ACCESS TO NATURE VIEWS OF NATURE

A view of nature from within the built environment is an important factor to be taken into consideration by designers of holistic designed healthcare facilities. Academics and other key authors contend that a view of nature may be a positive contributor towards patient psychological and spiritual healing and wellness.



Fig I 25 : Internal patient spaces that have visual links to external green spaces are conducive to healing, than spaces that no connection (Jenecks et al., 2010).

Ulrich's (1997) Theory of Supportive Design discusses the positive impact of the hospital built environment on patients. His research supports other academics' opinions that the effect of natural views for hospitalised patients is beneficial to their recovery. The research shows that patients' healing and comfort are accelerated if they have access to views of nature, and depending on less medical pain relief. Current healthcare facilities feature fenestration to the exterior, little consideration is given to the patient's physical scale, and they are therefore unable to experience the view as they are not tall enough to look out. Views of nature are

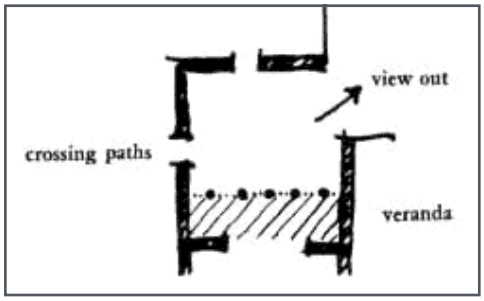


Fig I 26 : Controlled external green space defined by building, allows to express a sense of openness (Alexander, 1977).

important in the consideration of a holistic healthcare built environmental design, which aids the patient to cope with the stresses of treatment and hospitalisation.

As suggested by Bingham (2016) to create a design that allows all its occupants to access to views of nature, suggesting a building design that has a narrow cross-sectional form. The courtyards design with covered circulation running the perimeter of the courtyard would be ideal, as the covered circulation space serves as 'in-between' spaces between the interior and the exterior of the building. This design concept is discussed by Dutch Architect, Aldo van Eyck, in the use of in-between spaces as a way to transition between two opposites - such as internal and external - in a manner that is considerate and sensitive. The design directly responds to the child with cancer's particular sensitivities. Narrow floor plates in the designs may allow for better natural lighting to enter the building, and positively effect the mood of the patients mood. This narrow plan design ensures that patients are never far from a visual link to the outdoors.

4.4.2 I LIGHTING

The benefits of natural lighting and its contribution to patient healing are well documented. Alexander (1977) suggests that one window may not be enough, and that light on two sides of every room is ideal. Two windows in a room allows a sensitive transition between brightness from the darkest spot in the room to the brighter outdoors, and avoids the overexposure of bright light. Alexander (1977) states that natural lighting is beneficial as it promotes a social atmosphere. The patient may intuitively perceive these well-lit spaces as calm and friendly. These lighting considerations not only create social environments, but may create a restorative and healing environment for children and their families. Natural lighting needs to be considered together with the building's orientation, to avoid negative spatial experiences. For example, habitable spaces are usually orientated in a northward direction; east and south to a lesser degree; whereas house stores and similar rooms which are not occupied for extended periods of time are orientated westward.



Fig I 27 : Jenecks et al, 2010).



Fig I 28 : Jenecks et al, 2010).

Alexander (1977) and McCurry et al. (2009) agree that natural lighting is calming, and has curative properties, befitting a place for recovery and respite. Natural lighting encompasses more than mere physical illumination; it has a positive psychological effect on its occupants. A well-lit room may be perceived as a larger space, and this reduces the perception of confinement. In addition, orientation of the design is considered by the designer, as it contributes towards deinstitutionalising the healthcare setting. In other words, the hospital built environment becomes a welcoming, friendly, and familiar space for paediatric oncology patients.

4.4.3 I SOCIAL SUPPORT

Oswalt (2010) claims that it is critical for the patient to socialise within the healthcare built environment design. Holistic healthcare design identifies social interaction as an important component for paediatric oncology patients. Designers consider the provision of spaces that take into account the needs of the patient. Oswalt (2010) mentions that social healing is encouraged – family and friend support may contribute positively towards patients' comfort and overall healing. Oswalt (2010) explains that socialisation has a positive effect on the development of the patient's self-esteem, the reduction of patient stress, and the alleviation of perceived pain. Olds (2001) and Day (2007) agree that spaces for children that are aesthetically engaging may promote calm and comfort which, in turn, encourages socialisation. This caters to the patients' psychological, social, and spiritual wellbeing.

A sense of community in the hospital built environment is essential to provide support to the children with cancer. The design needs to promote healthy social relationships as a major factor in the patient's development, recovery, and healing. Paediatric oncology patients, in particular, need to develop healthy social relationships due to their long periods of hospitalisation. In addition, primary caregivers, such as mothers, spend extended periods of time in the hospital, and therfore should be considered. The patients' primary caregivers have something in common with other mothers, and are positioned to be able to support one another if needed. Van Heerden (2016) suggests that there is the need to consider the provision of overnight facilities for the patients' parents, to alleviate stress when the child and his/her primary caregiver are separated.

Oncology treatment is a lengthy process, with an intense and painful treatment process. Over the length of time that the patient is hospitalised, socialisation is encouraged. These social interactions between patients create a sense of belonging, and provide a form of

comfort. These informal social interactions help patients to mitigate stress, as they do not see themselves alone during the hospitalisation. This is also applicable for the parents of cancer patients, as bonds form in desperate situations, and due to shared commonalities. Socialisation between patients is vital to the social and psychological development of the child, and as a method to reduce stress and assist in the patients ability to cope. The built environment design needs to facilitate the opportunity for informal social interaction between patients and their affected families. For example, the circulation spaces such as corridors, may provide the opportunity for social interactions. Alexander (1977) suggests the use of alcoves or spatial gestures that may provide and promote such informal interactions.

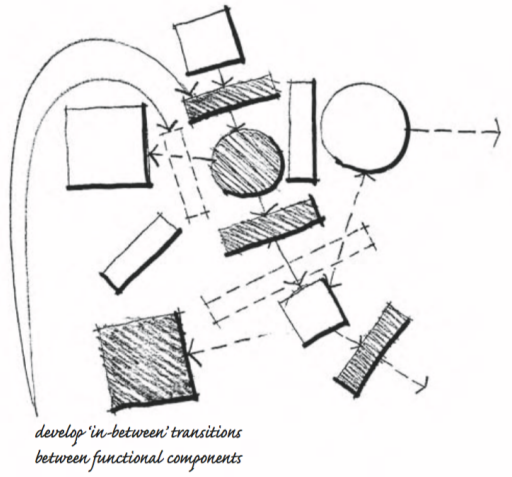


Fig I 29 : illustrating in-between spaces between functional components (Verderber, 2003).

1.) Central space **2.)** Decentralised space and reduced size. **3.)** Decentralised by displacing the axis. **4.)** The combination of the three suggesting diagonal movement.

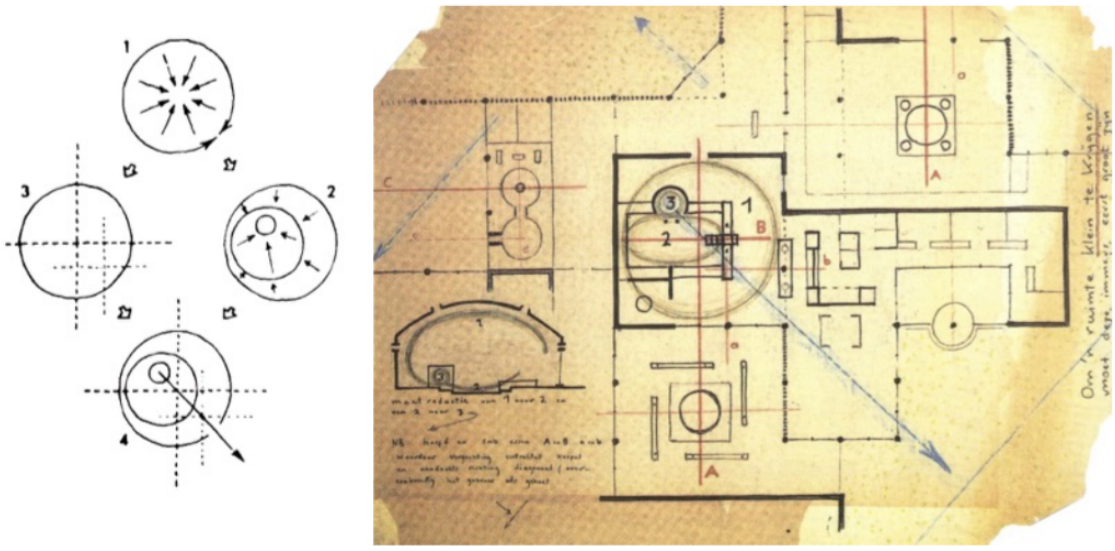


Fig I 30 : Spatial Plan: The idea to reconcile the centralised plan and decentralised in the overall design, the design of smaller functions within a larger space. van Eyck combined the capacity to generate centers of several axes that are crossed to emphasise movement (Miguel, 2015).

Aldo van Eyck (Orphanage)

Christopher Alexander

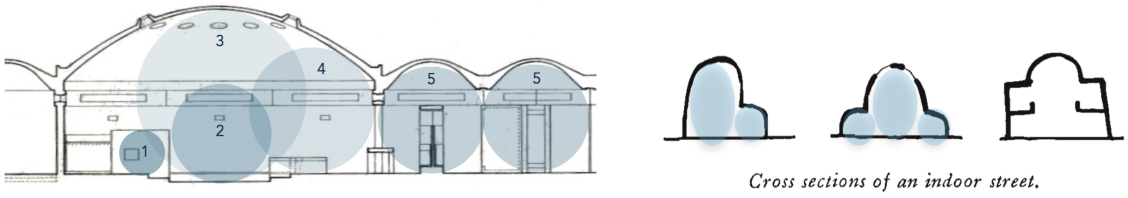


Fig I 31 & 32 : Volumes: Similarities between Aldo van Eyck (Orphanage) and Christopher Alexander: using differing volumes that encourage different levels of interaction, distinguishing public and private realms, however linked spatially together (Miguel, 2015).

Alexanders' suggestions (1977) are in contrast to the designs of existing paediatric oncology built environments, with long double loaded corridors which do not allow for this informal social interaction to happen. Double loaded corridors do not allow for in between zones, between one function to another.

The design of the facility is more than a check box of the minimum requirements of functional treatment. The hospital built design needs to encompass flexibility for informal functions too, thereby minimising institutional controlled environment. Spatial arrangements of play areas, patient lounges, and family spaces may link visually, and perhaps be a direct connection to courtyards. Together, these spaces not only promote social interactivity, but provide an environment that is conducive to social, psychological, and spiritual healing. These spaces and their qualities not only address the patients' needs for social development, but assist them to cope with a prolonged hospitalisation. The idea mentioned in this section is more along spatial needs than design, but should be considered in the design.

4.5 | THE PATIENT WITHIN THE BUILT ENVIRONMENT

The promotion of patient social interaction within the built hospital environment is not straight forward, indeed, it is complex. Paediatric oncology patients are traumatised by hospitalisation. Especially in the first few days of hospitalisation, paediatric oncology patients experience long bouts of separation from their primary caregivers/mothers, they are in an environment which is unfamiliar and intimidating, and the other children are strangers. The patient, as a consequence, may be expectedly shy.

The 'home-like' environment may create a welcoming and inviting space for patients who enter the healthcare facility. Architects such as Aldo van Eyck identify the importance of the properties of the 'home'. Miguel (2015: 2) cites van Eyck, who says: "Make of each house a small city, and of each city a large house". This statement acknowledges the patterns in everyday human life, which allow for spontaneity, and discourages the separation of spaces and functions that are clearly defined boundaries. Van Eyck, rather, acknowledges the relationships between different spaces and functions. Van Eyck's idea is to treat large buildings as a collection of smaller components, and the smaller components simultaneously make up the larger whole. Di Palma et al. (2008) cites Aldo van Eyck who makes reference to observations of the designs of other modern architects of their lack of "in between" spaces. Van Eyck states "Architects have left no cracks and crevices this time" (Miguel, 2015: 2). Van Eyck in Di Palma et al. (2008) suggests that we look at space in terms of

nature, scale, the relation of one space to another. Aldo van Eyck places much attention on the importance of spaces between the spaces. Van Eyck in Di Palma et al. (2008) calls this type of in-between space an “internal street” - a space where the occupants have the choice of being somewhere ‘in-between’ the public and private. It is understood, in this way, that the patient does not need a make forced choice between the private and the public (Miguel, 2015).

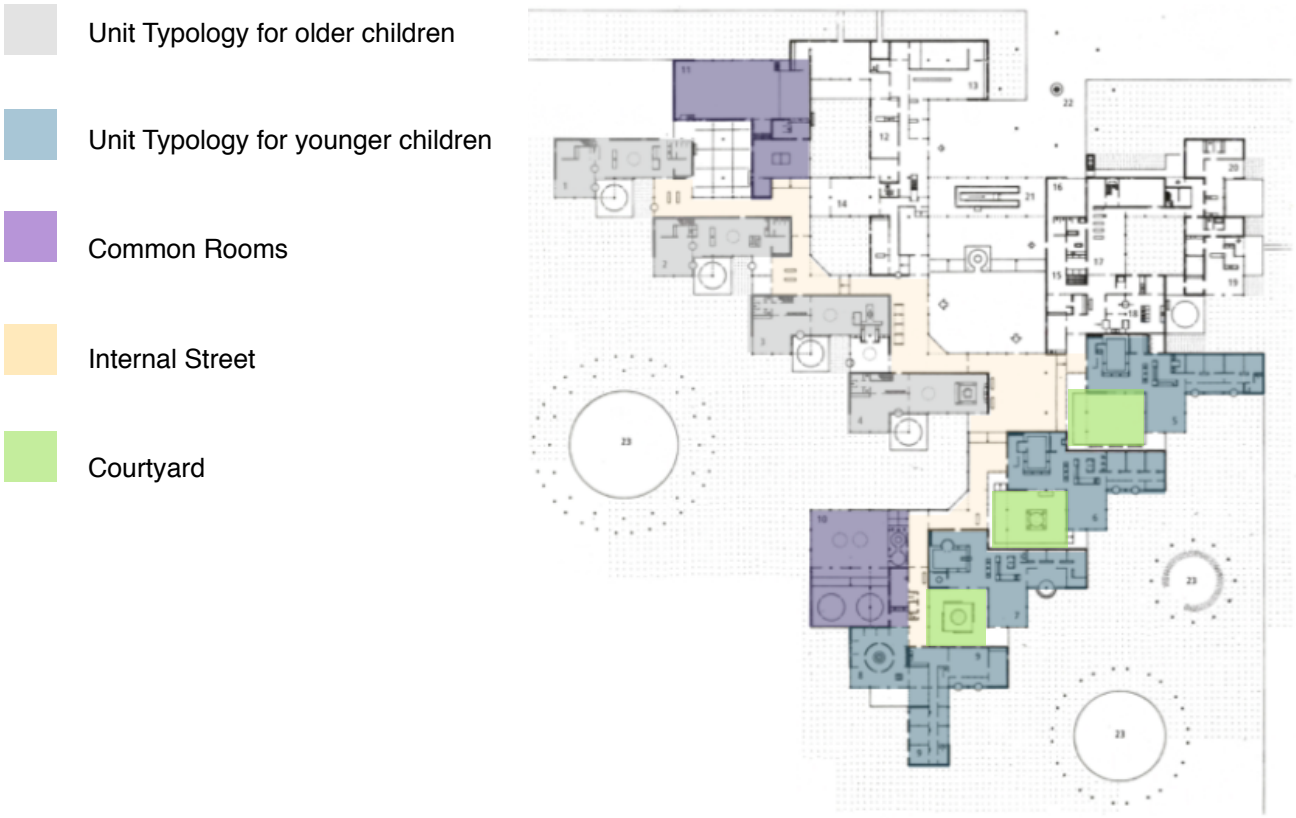


Fig I 33: Aldo van Eyck: Orphanage Plan: highlighting the relationships and transitions between the private space, public internal street, public internal square and to the exterior (Miguel, 2015).

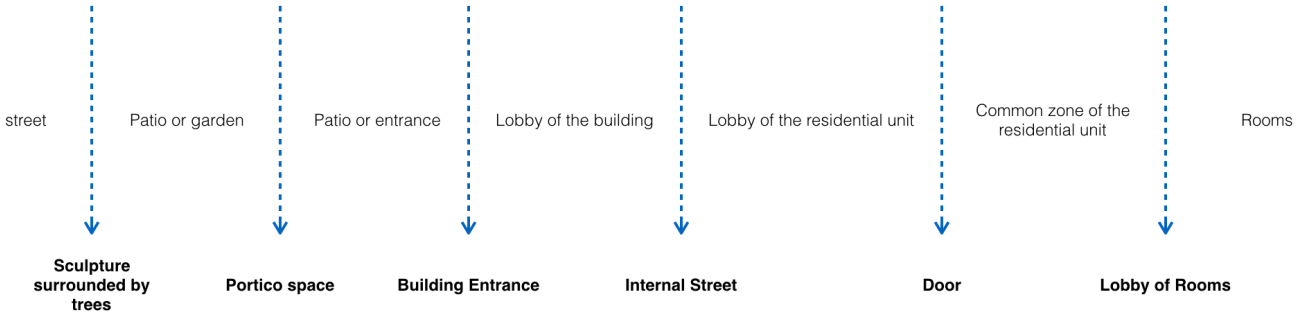


Fig I 34 : Aldo van Eyck concept: relation to the spaces from the most public to most private: Orphanage (Miguel, 2015).

The orphanage in Amsterdam designed by van Eyck in the Netherlands, puts emphasis on the user’s needs (both individuals and group). This emphasises van Eyck’s idea of

reciprocity through architecture - uniting the needs of the two (Miguel, 2015). The design of this orphanage is pertinent to this research as it deals with a compromised population and links this to a theoretical foundation of design. Van Eyck explains that the circulation spaces are essential living spaces in their own right, and are often neglected of their full potential. Too often, the sole purpose of this space is to traverse from one space to another (Di Palma et al., 2008). If common spaces open onto the "internal street", this encourages social interaction, and as occupants move from one space of the built environment to another space, it creates chance encounters between the occupants. Di Palma et al. (2008: 64) references van Eyck's and Hertzberger's views of the communal area as an "internal square" where communal activities take place and social events occur which promote psychological, social wellness and support.



Fig | 35 : Transition space from the exterior to internal environment. Gradual change from one to another (Alexander, 1977).

In the South African context, communal spaces in built environments offer the patient and the patient's family the opportunity for cultural or religious needs to be met. These spaces provide an area that cater's to the individual's or to the group's emotional and spiritual needs. Cultural or religious needs include prayer gatherings, or perhaps a communal gatherings of friends and family.

Van Eyck caters to both the group and the individual, and achieves this in living areas in dispersed arrangement, and links them by an "internal street". The design for the orphanage is a "house and city; a city-like house and a house-like city", as cited in Di Palma et al. (2008: 37). Van Eyck's orphanage considers the sensitive nature of the occupants, and this is evident in the manner in which the building is entered - entering the building is a gradual transition from the exterior to the interior and vice versa. The architect acknowledges the susceptibility of the occupant is to stress, especially if the occupant is exposed to a blunt transition upon arrival (Di Palma et al., 2008). Sensitivity to occupants is an idea shared by Alexander (1977) who states that it is necessary for a graceful transition between the arrival and the interior, suggestive that entry courts or bending paths may create such psychological movements. Van Eyck addresses the sensitivity of occupants to an orphanage by designing a soft transition from exterior to interior. Existing paediatric oncology facilities are starkly

contrasted to van Eyck's design, as the transition from exterior to interior is abrupt and is insensitive to the patients' vulnerability. The culmination is an intimidating hospital built environment. The paediatric oncology patients are similarly intimidated by groups, and are apprehensive about entering the hospital. Assisting the patients upon arrival as much as possible, is an essential step from the patients initial arrival to the healing process.

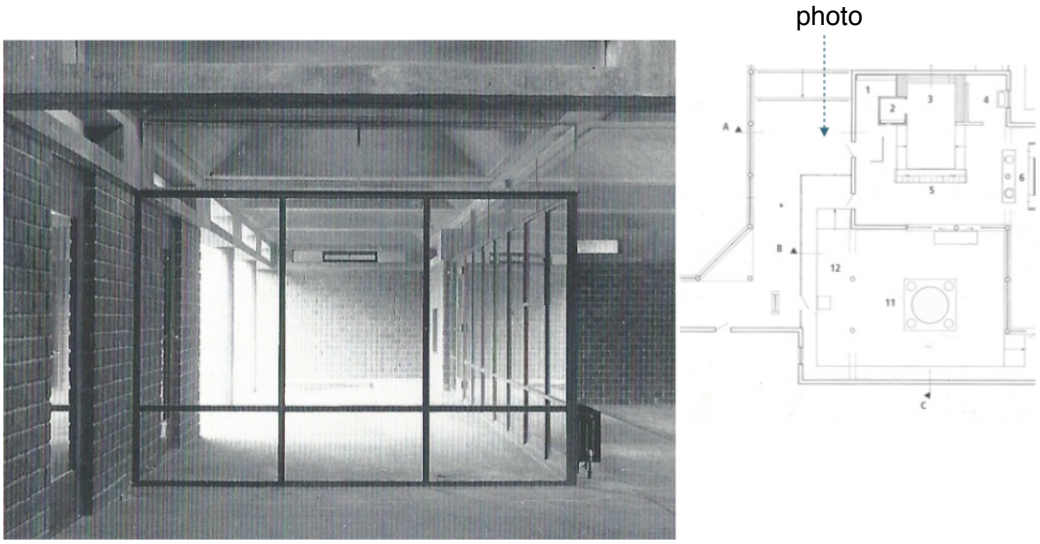


Fig I 36: Plan and photo: highlighting the sensitivity to the transition (in-between space) from the external to the internal space (Miguel, 2015).

4.6 I EDUCATION

McCuskey Shepley (2000) and Olds (2001) state that during the hospitalisation period a degree of normality and familiarity is to be maintained. Periods of hospitalisation and cancer treatment recovery may disrupt the child's schooling and education. This then affects the psychological evolution of the patient. The absence of education may have a deleterious effect on relationships when the patient eventually returns to school - social relationships between patient and peers may be broken as peers may have moved to higher grades, while patients are kept behind.

4.7 I CONCLUSION

The research puts emphasis on a link to nature. Nature provides visual stimulation for the patient, as well as the creation of a serene environment that promotes patient healing and comfort. The link to nature provides patients with a sense of peace, to promote the patient's spiritual and psychological wellbeing. This is intended to break down the current formality of the institutional built environment.

Studies covered by Day (2007) show the link between the psychological impact of built environment on patients. McCuskey Shepley (2000) suggests that architects be cognisant of their designs on the physical, psychological, social, and spiritual perceptions of the end-user. An architect who takes into consideration the above may create a holistic healing experience for the patient - a design that is responsive, and which fully acknowledges the patient's needs.

Although the built environment does not directly heal the patient, it may help the patient to cope with the stress of the illness, and the rigours of hospitalisation. Ultimately, this provides the patient with the foundations for effective treatment and holistic healing. Current designs satisfy the perquisites for functionality to provide care, McCuskey Shepley (2000) states that current models are clinical, institutional, and unfriendly. A holistic approach is a proposal of a built environmental unit which is welcoming and encouraging, and which allows patients to feel relaxed and comfortable. Architecture is a language that communicates the sensitive nature of caregiving, and provides the patient with reassurance and safety; it communicates that hospitals are places of healing. The holistic built environment hospital design provides for the needs of the patient, while operational functionality (for example, infection control, visual supervision, and patient security) is maintained.

CHAPTER I 5

5.0 I PRECEDENT STUDIES

5.1 I INTRODUCTION

This chapter looks at precedent studies; the selected projects are based on the key issues discussed in the previous chapter. The studies serve the purpose of identifying the user's needs as an individual and part of the collective. The projects selected for the study are not necessarily the identical typology to the proposed paediatric oncology unit. Project selection was based on their architectural relevance and response to the needs of the end-user.

The two projects identified for this precedent study, represent differing typologies, which will lend towards a proposed new paediatric oncology unit design.

1. The Maggie Centre in West London, United Kingdom, is an ideal example of a deinstitutionalised facility which creates a familiar environment for its occupants.

2. Robin House Children Hospice, Scotland, United Kingdom, as an example of a facility for children with chronic illnesses and highlights a design philosophy that takes the end-user into account.

The intention of the selected precedents is to test the theories and concepts mentioned in this research, to assist the design of a new paediatric oncology typology.

5.2 I PRECEDENT STUDY 1 : MAGGIE CENTRE, CHARING HOSPITAL



Fig I 37: Maggie Centre (Roger, Stirk, Harbour & Partners, 2009).

LOCATION

London, United Kingdom

PROJECT DESCRIPTION

Maggie Centre, West London was designed by Rogers Stirk Harbour + Partners Architects

The Maggie Centre for Cancer in London, UK. It is a prototypical architectural example, as it represents a shift in design approach for healthcare built environments. The centre is a showcase of forward thinking in architectural design, as the architects were primarily with the needs of patients with cancer. The Maggie Centre demonstrates the move away from the pathogenic approach towards a holistic care model. The design addresses the critical issues of the current clinical healthcare built environments. Although the Maggie Centre may be small in scale, the design principles conceived by the architects make it exceptional and significant to this study. The design intention of this centre was the creation of a “welcoming building that places people first, increases human connectedness and makes visitors feel valued.” (Roger, Stirk, Harbour & Partners, 2009).

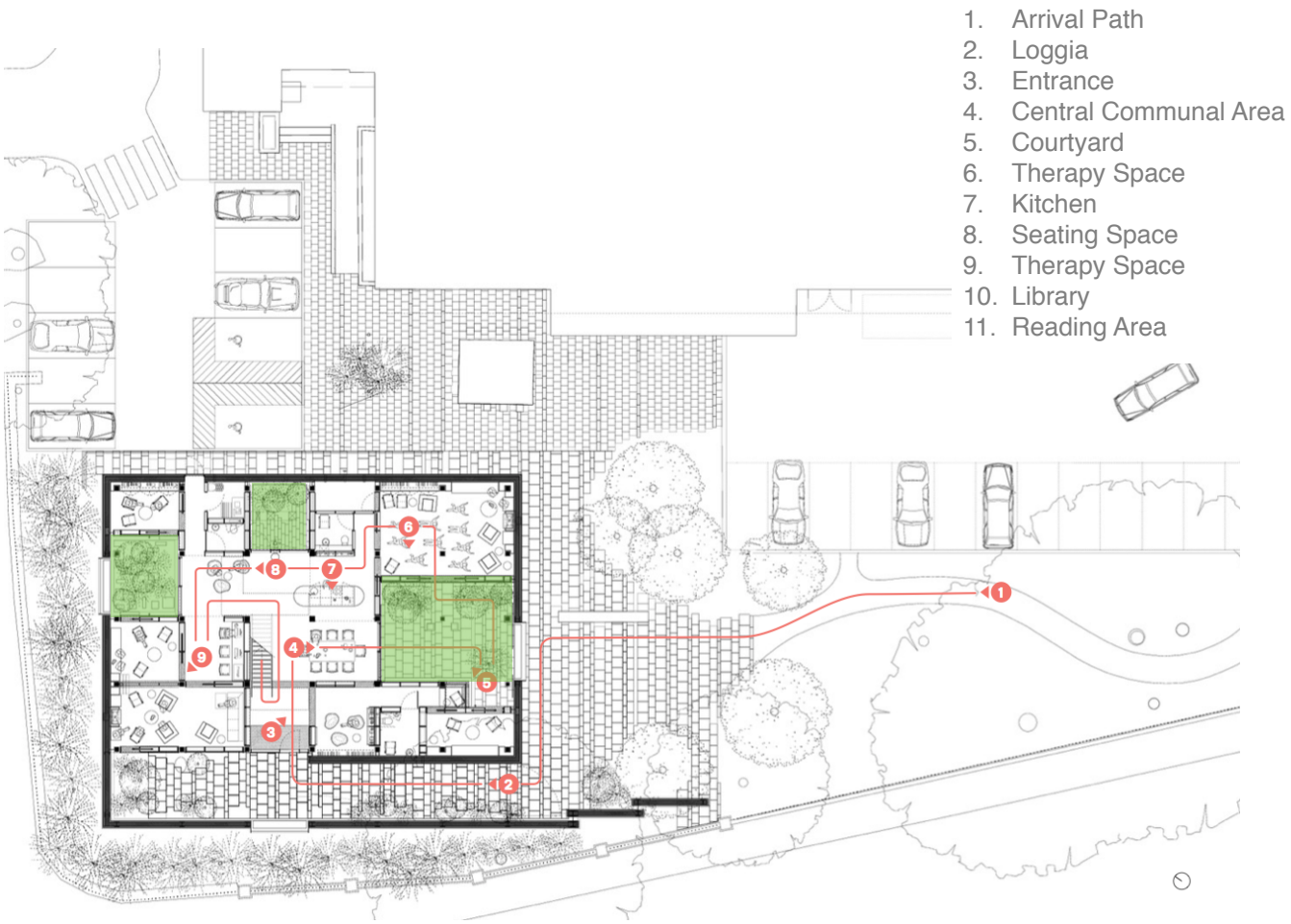


Fig | 38 : Maggie Centre Plan (Roger, Stirk, Harbour & Partners, 2009).

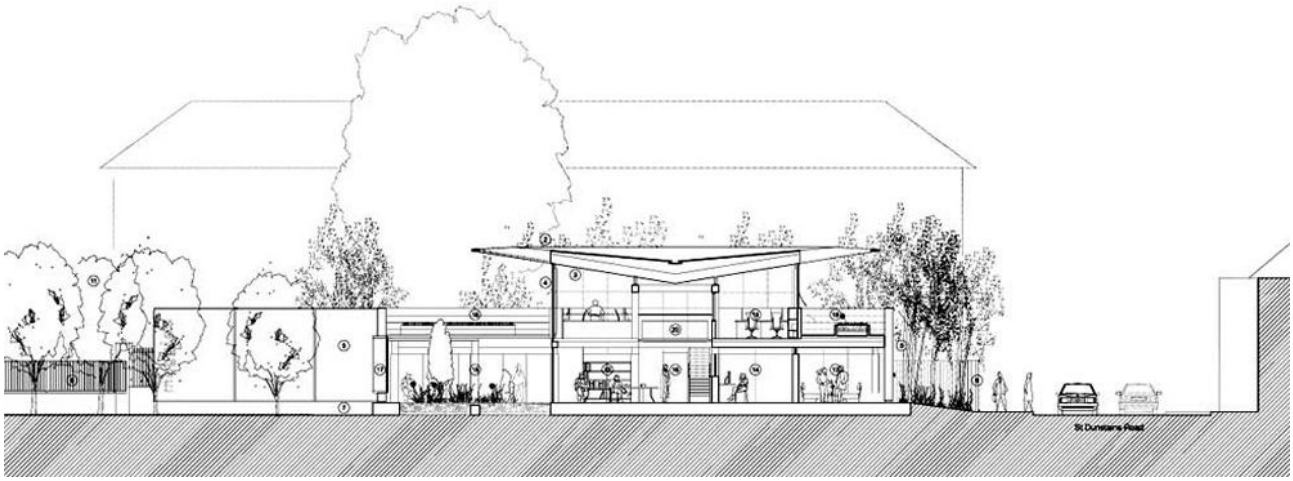


Fig | 39 : Maggie Centre Section - Differing scale and volumes to mitigate the sense of confinement (Roger Stirk, Harbour, & Partners, 2009).

5.2.1 I DEINSTITUTIONALISING THE HEALTHCARE BUILT ENVIRONMENT

Jenecks et al. (2010) and Downing et al.(2014) emphasise the need to create an environment that is functional and sensitive. They claim that the social requirements of the occupant must manifest thoughtfully and creatively in the design. The design highlights the move away from the pathogenic approach, where importance is on the medicine, and less so on holistic therapy. The built environment is a ‘home-like’ space, which represents a degree of normality, and becomes less of an institution. Jenecks et al. (2010) state that the familiarity and normality of the setting provides a friendly feel to the built environment and promotes healing. The architects of the Maggie Centre employ a similar principle to Aldo van Eyck’s concept of the “in-between" spaces, which links different functions. The circulation spaces provide a transitional function, but also provide social opportunities, such as seating and pause spaces. This theory serves to soften the boundaries between functions, as clearly defined boundaries are unwanted characteristics common in current institutional hospitals.

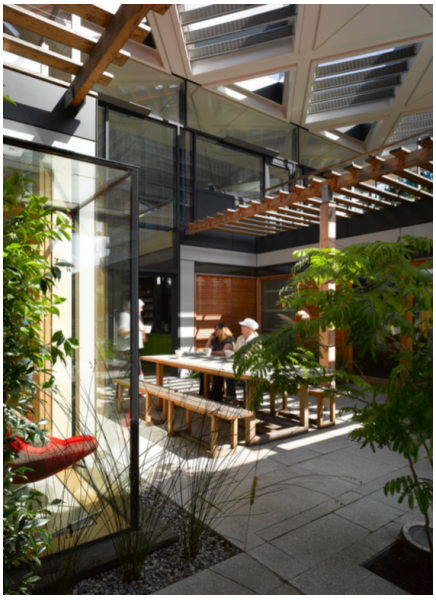


Fig I 40 : Maggie Centre - The use of natural settings to encourage social interaction or reflection in the external courtyards (Roger Stirk, Harbour, & Partners, 2009).

5.2.2 I HOLISTIC HEALING BUILT ENVIRONMENT

The Maggie Centre design allows for functional spaces within the environment to link to nature, maximising the potential for healing in a therapeutic setting. This creates an ideal setting for the healing of the patient, healing, and creates comfort for the family. The design instils feelings of belonging and hope for the patient, which is comforting. The architecture is combined with a pallet of carefully selected materials to provide patients with a tactile built environment. The finishes are true, that is, they provide a soft aesthetic to the environment. The functional spaces take advantage of views via large windows to the external green spaces, which allows sunlight to wash into the interior – this creates a soft and calming effect. The architects’ choice of colour - bright orange walls - creates uplifting and comfortable spaces. Naturally well-lit open spaces and transitional walls provide a flexible space to accommodate intimate chats or group sessions.



Fig I 41 : Maggie Centre - The use of dinning room table as the centre of the facility, a common place for informal interaction to be encouraged over a meal or a drink, using a warm, welcoming colour and material pallets (Roger, Stirk, Harbour & Partners, 2009).

5.2.3 I BUILT ENVIRONMENTS ROLE IN ENCOURAGING SOCIAL INTERACTION

Cancer patients' carry the burden of chronic illness – this means that they suffer both physically and psychologically. Long and stressful hospitalisation is taxing on them. The Maggie Centre is an example of a setting where social, psychological, and spiritual healing occurs; a place where people that suffer from cancer may be inspired to recover through social interaction.



The architects of the Maggie Centre sought to promote social interaction by linking spaces visually. The architects' use of transparency, balconies, kitchen/dining-like meeting spaces, and ample seating opportunities are provided to maximise social interaction. The volume and quality spaces are designed to create a positive mood and to encourage social interaction. The intimate places have lower ceilings whereas group function areas have higher ceilings. This makes us consider Christopher Alexander mentioned above. The courtyard allows for social interaction to occur

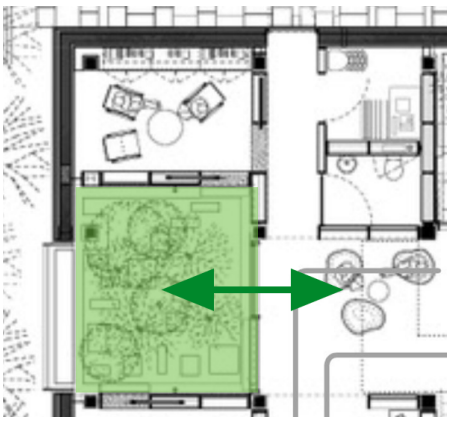


Fig I 42 & 43: Maggie Centre - intimate spaces connected to nature throughs visual link to internal green courtyards (Roger, Stirk, Harbour & Partners, 2009).

outside, in a nature setting, while the outside and inside are still visually connected. The kitchen/dining-like meeting spaces are hubs for social activity, such as socialising at meals or having refreshments. The kitchen and dinning space is the heart of the of centre design, where groups can meet, this hub links to intimate or group functions.



Fig I 44 : Maggie Centre - intimate spaces connected to nature through visual link to external green courtyards (Roger, Stirk, Harbour & Partners, 2009).

5.2.4 I CONNECTING INSIDE AND THE OUTSIDE SPACES

The architects acknowledge the importance of nature and its positive psychological effects. The design of the Maggie Centre emphasises functional spaces and its links to nature. Group function rooms are located on ground floor with a visual link to the external garden, to create a positive visual effect. The first floor are for more intimate spaces such as offices, reading or library areas, and meditation spaces. These spaces look out at the trees at canopy level. The function of these spaces relate to their position above the garden, as a more secluded feel makes for more intimate functions. The large fenestration allows for sunlight to illuminate the subdued spaces, to create a warm, comfortable, and stimulating environment. It is beneficial to allow a link between the natural exterior and interior, as it promotes patient psychological and spiritual healing.



Fig I 45: Maggie Centre - Group rooms with higher volumes connected to nature through visual link to external courtyards (Roger, Stirk, Harbour & Partners, 2009).

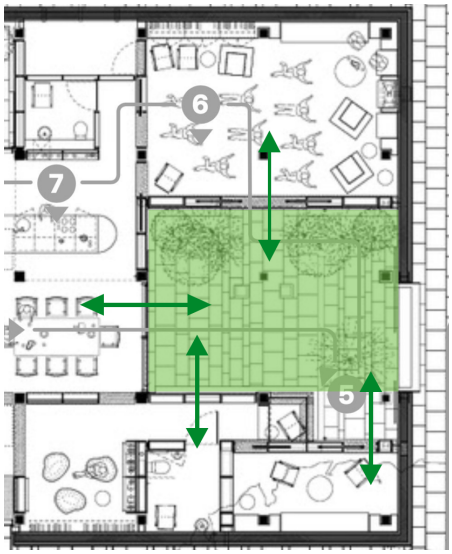


Fig I 46 : Maggie Centre - linking nature to the internal spaces (Original Plan edited by author, 2009).

5.3 I PRECEDENT STUDY 2 : ROBIN HOUSE CHILDREN'S HOSPICE CENTRE



Fig I 47: Robin House - (Verderber et al., 2003).

LOCATION

Glasgow, United Kingdom

PROJECT DESCRIPTION

Robin House Children Hospice, Glasgow, was designed by Gareth Hoskins Architects

The Robin House Children's Hospice is an appropriate example of a built environment for chronically ill patients. The building highlights the architect's sensitivity to the design, to cater for the patient needs and the vital role the parent plays in their lives. The design, creates a modern but warm welcoming and engaging environment, reducing the sense of confinement for patients. The home like concept used in the design assists in incorporating the role of the parent in the life of the patient. The building mitigates the intuitional perception, not only by the external aesthetic but in the manner the internal space is experienced.

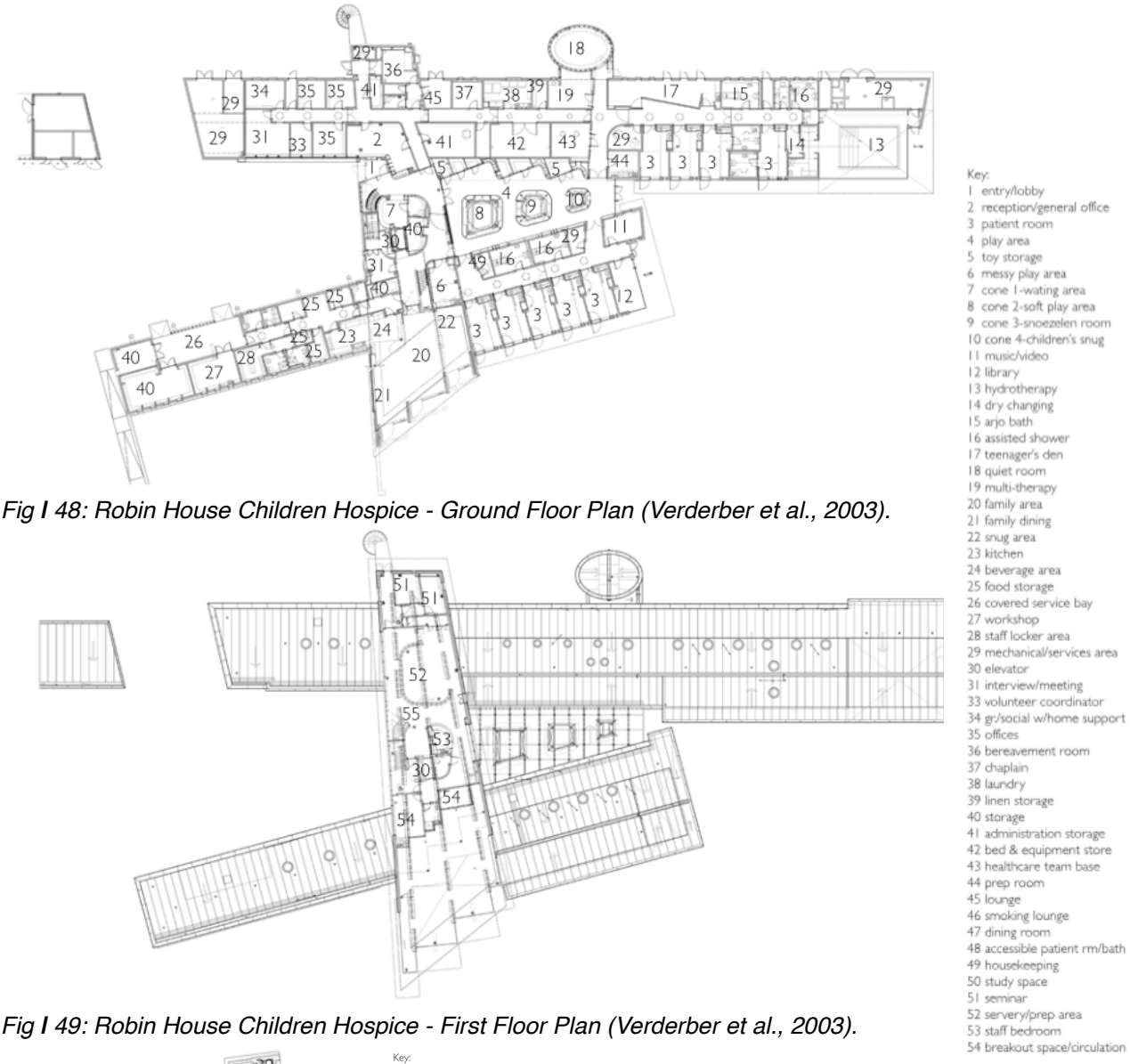


Fig I 48: Robin House Children Hospice - Ground Floor Plan (Verderber et al., 2003).

Fig I 49: Robin House Children Hospice - First Floor Plan (Verderber et al., 2003).

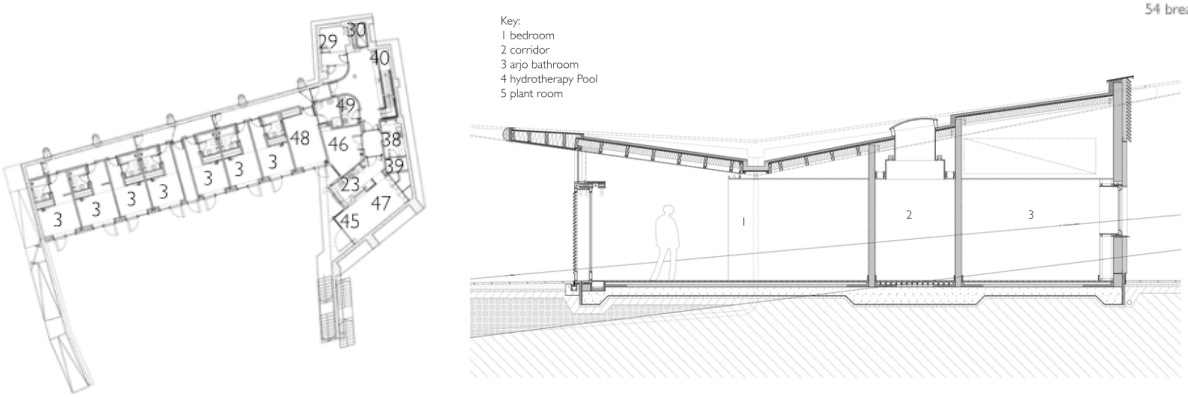


Fig I 50 & 51 : Robin House Children Hospice - Third Floor Plan & Section through ward (Verderber et al., 2003).

5.3.1 I ENCOURAGING A CHILD'S DEVELOPMENT

Olds (2001) emphasises that an engaging space is critical in environmental design, to promote education and play. The Robin House Hospice demonstrates the architects'

consideration of children's growth and development. The hospice features a warm and inviting communal play area. The play area has a glass roof which so that the space is lit by warm natural light - natural lighting positively affects people's emotions and is thus beneficial. The design is engaging – there are creative elements too. One creative element is the bright coloured cone-shaped rooms in the communal area and, and another is the wavy ceiling and roof. This playful architecture acknowledges the end-user, and the design elements contribute towards a conducive environment which engages the patient. The playful aesthetic of the built environment is welcoming for patients on arrival, and so they are generally more open to treatment.

5.3.2 I PROVIDING A SENSE OF FREEDOM AND CHOICE



Fig I 52: Robin House - smaller volume spaces connected to larger volume encourages intimate social interaction. Space is naturally lit creating a warm and welcoming interior (Verderber et al., 2003).

For most chronic healthcare facilities, the architect endeavours to find a balance between the patient's sense of control and the operational requirements. The element of control is mitigated by the architect through the use of transparency, which allows for a sense of freedom and provides visual links between spaces and occupants. The main entrance is transparent, which contrasts with the current entrances at institutional hospitals. The openness provides a sense of freedom for patients, and permits the staff to monitor patients. Aldo van Eyck suggests that scale and volume are other design considerations for a delicate and sensitive group of occupants. The Robin House Hospice is 'home-like' in its scale, with a light and low roof that creates a feeling of freedom, and minimises a sense of confinement. The architects consider the sensitivity of the occupant group, and emphasis is placed on the sense of scale. The use of creative elements, such as the wavy ceiling and roof, and coloured volumetric forms are playful and engaging, and not intimidating for the end-user.

5.3.3 I THE IMPORTANCE OF THE RELATIONSHIP BETWEEN CHILD AND PARENT

In paediatric facilities, architects must cater to both childrens' needs and parents' needs. Alexander (1977) suggests that the use of spatial gestures, off circulation spaces, or large volumes, may encourage smaller and more intimate activities. The communal/play area at Robin House is an example of this. The design incorporates alcoves off the central communal area, which are smaller scaled volumes, to create intimate spaces. These spaces encourage parent and child social interaction. The architects design the space to be used by both parent and child. An example of such is the family area, just off from the dining area. The spaces are open, clear and visually linked to nature, and reduce the feeling of confinement. The family spaces are not rigid, and therefore permit a sense of control. The space may be manoeuvred to suit the childrens' and parents' needs.



Fig I 53: Robin House - intimate spaces connected to nature through visual link to the outside - Large volumed space to encourage large group interaction with openings, reducing the perception of confinement (Verderber et al., 2003).

The design of functions in the family area are intentionally arranged, similar to that of a home. The kitchen, dining and family spaces adjoin, suggestive of a primary caregiver's role in the kitchen in the preparation of meals or drinks, while children wait in the family areas. The overlapping spatial design allows the patient the experience of normality and familiarity.

5.3.4 I ACCOMMODATING THE CONTRASTING NEEDS OF THE USER: CHOICE AND CONTROL

The architects' design for the Robin House Children's Hospice share many theoretical design concepts with Aldo Van Eyck. The design incorporates the 'public square' concept - the design has a central communal play area where group activities and social events take place and where all circulation spaces lead. The communal spaces cater to the collective activities of the patients, and provide a space where patients and parents may interact in a stimulating environment. The wavy walls of the communal space create smaller volumes of space off the main communal area, and this allows for more intimate activities to take place. It may even provide a place of solace. There are three brightly coloured cone-shaped rooms punched into the main communal space; a snooze room; a soft-toy room; and a snoezelen room. The cones are sanctuaries for children - they provide a safe place for children who

feel that they need a little more privacy from the larger group. This allows the public square to function at differing social levels, for both the collective and the individual.

The dining, kitchen, and family areas are articulated differently by way of architectural elements - the wavy ceiling with fenestration infill panels allow dappled, naturally warm light into the kitchen and dining area space below. A 'home-like' spatial environment is emphasised. The relationship between kitchen and dining spaces in a larger volume lead into larger openings in the outside world, encouraging patients to socialise at meal times, similar to that of a home. Communal spaces are connected to the exterior via framed views. This is similar to the work of Aldo van Eyck, who connects the interior and the exterior as a means to reduce occupant stress.



Fig I 54: Robin House Plan - connection between spaces, from the public communal, dinner, family, to the private snug area and the bedrooms and providing the option for a separated quiet space (Verderber et al., 2003).

5.4 I CONCLUSION

The precedent examples explain architectural principles of the healthcare environment which focus on the needs of the children. The precedent cases illustrate the architects' consciousness of and sensitivity towards paediatric patients in their design approaches. Although the precedents have differing typologies, they both exhibit a unique response to needs of patients. The precedent examples are both found in the Northern Hemisphere, and it is highlighted that these buildings respond specifically to their geographical climates. In South Africa, such responses would not be ideal, and therefore a different approach may be explored to respond to the local climate.

CHAPTER | 6

6.0 | CASE STUDIES

6.1 | INTRODUCTION

The case studies are evaluations of existing paediatric oncology facilities, and cover the key principles mentioned in Chapter Three. This research assesses the efficiency of the built environment by addressing the fundamental elements of holistic healing.

In South Africa, there are inadequate examples of paediatric oncology typologies available; no purposely-built typologies have been constructed. As highlighted, in the history of paediatric oncology typologies in South Africa, the facilities that are in use today have come about due to the transformation and adaption of existing built infrastructure. This does not allow the researcher the ability to critique the architectural response on the subject. A further challenge is that the proposed typology is a new facility, one that provides holistic care within an environment that considers the end-user.

Despite the examples not representing the typology that is to be ultimately proposed. The study examples show that current facilities may be assessed based on this research. Assessment was conducted on-site: the built environment was analysed complemented by staff interviews from the respective hospitals.

6.2 I GREYS HOSPITAL, PIETERMARTIZURG



Fig I 56: Grey's Hospital Entrance (Google Maps, 2016).

6.2.1 I A BACKGROUND

Grey's Hospital in Pietermaritzburg has very modest beginnings. In the 1850s, due to the influx of British settlers, there was a need for medical care in Pietermaritzburg (Department of Health, 1996). The institution went through different phases of development, and finally became an advanced establishment, in its form and equipment (Gorny, 1988). The last major development to the modern hospital was designed in the 1960s and 1970s by FGG Architects in Durban.

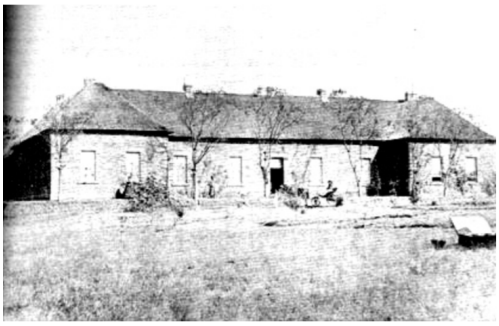


Fig I 57: Grey's Hospital 1867 (Gorny. 1988).

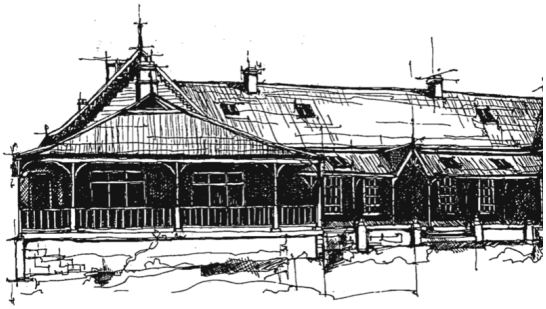


Fig I 58: Grey's Hospital 1920 (Gorny. 1988).

6.2.2 I LOCATION AND DESIGN



Fig I 59: Grey's Hospital Location Map (Apple Maps, 2016).



Fig I 60: Grey's Hospital Location Map (Apple Maps, 2016).

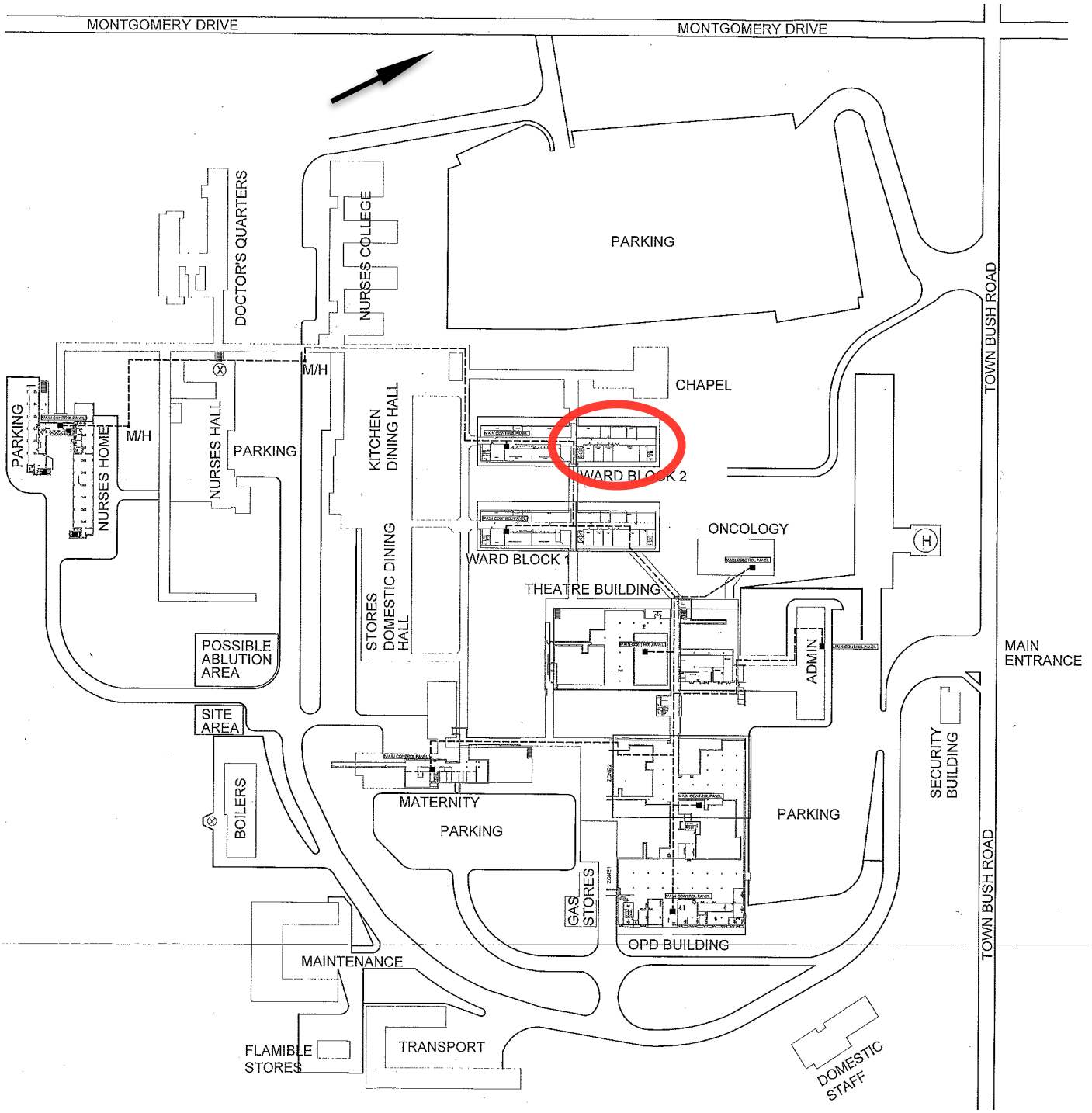


Fig I 61: Grey's Hospital Site Plan (FGG Architects, 2016)

Grey's Hospital is located in Pietermirtzburg, roughly 82 kilometres from Durban. The hospital is situated 1km from Pietermaritzburg's city centre, on the corner of Town Bush Road and Montgomery Drive, and is in close proximity to the N3 highway. The hospital's facilities include: medical, administration, boiler house, stores and residential.

6.2.3 I DEINSTITUTIONALISING AND FAMILIARISING THE HEALTHCARE BUILT ENVIRONMENT

Throughout this research, there is an emphasis on the provision of a holistic healing environment, one that humane, familiar, and normal for the patient – a 'home-like' environment. Grey's Hospital's needs shifted, as documented in Chapter Four, but the holistic environment approach was not considered. Emphasis was placed on treating the physical illness rather than the on other elements of holistic healing. The built environment which houses the current paediatric oncology facility is a converted adult general ward. Therefore, the design of the built environment is not intended to be used as a paediatric oncology unit.



Fig I 62: External View of Grey's Hospital - Pietermaritzburg (Author, 2016)

The architectural language is not conducive to the creation of a friendly and welcoming environment. It creates, instead, an intimidating and unwelcoming appearance. The building has an institutional appearance, and this may have an adverse psychological effect on the current patients. Patients who also arrive at the facility may experience an adverse psychological effect because of the structure's exterior.



Fig I 63: External View of Grey's Hospital Paediatric Oncology Facility - Pietermaritzburg (Author, 2016)

Doctor One states that the hospital design's internally is unsuccessful in its response to the operational functions, and the creation of a welcoming environment, such as the arrival of new patients. The arrival of the patient in the waiting area of the hospital patients come through admissions, and this is unwelcoming and daunting for a sick child. The waiting space area is used for patients of all ages, seated in a large open space with rows of plastic chairs. The area has no fenestration besides the double glass door at

the entrance and is completely illuminated by artificial lighting. The spatial quality of the space is gloomy because of the lack of natural lighting. There are no openings to the exterior environment. The introduction of openings to the exterior may improve the quality of the internal space, allowing warm natural lighting to filter into the interior, giving occupants a view. Openings to nature may provide a welcome distraction from the long waiting times experienced by patients, and this may create an uplifting environment. Furthermore, the volume characteristics of the waiting area may be reconsidered in terms of the scale of the space and its function. Olds (2001) describes that a larger volume is ideal in spaces where a large group of people assembles - this reduces the sense of confinement and is conducive to social interaction. Nurse Two suggests that children have their own dedicated entrance, rather than a shared entrance with adults, as children and their families find it distressing to see adults who are ill.

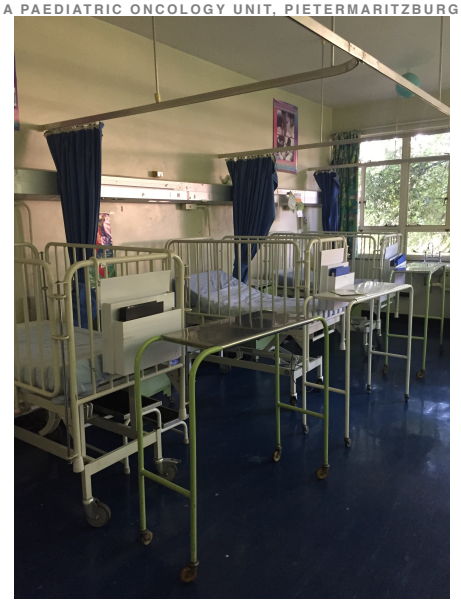


Fig | 64: Grey's Hospital Paediatric Oncology ward - Institutional Sterile ward built environment (Author, 2016)

The circulation in the two paediatric oncology floors are long, narrow, double loaded, and institutionally set out. The wards include isolation, ICU, and general. The circulation is unarticulated, and spaces are clearly functional. This adds to the 'institutional' perception of the facility. Circulation spaces are used to move from one space to the next. Aldo van Eyck states that the 'in-between' space provides a unique opportunity to reduce the formality and to deinstitutionalise the built environment. Doctor One states that the staff acknowledge that the sterile environment is not conducive for patient healing and have attempted to mitigate the institutional characteristics by introducing colour into the spaces. The use of murals and patient art humanise and personalise the internal spaces, to provide relief, and to create a friendlier and more engaging environment. It is described above that the



Fig | 65: Grey's Hospital Paediatric Oncology ward - gloomy double loaded circulation space, interior lacks natural lighting (Author, 2016)

hospital built environment is to encourage inspiration and provide patient comfort, to promote a positive attitude to healing, to encourage social interaction. However, at Grey's Hospital, the patient journey from arrival to treatment is not conducive towards holistic healing.

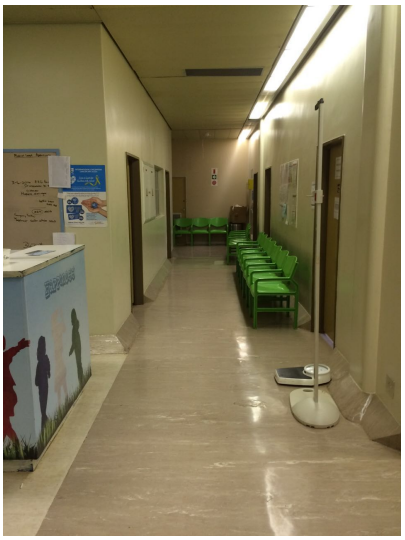


Fig I 67: Patient Waiting Area in general patient circulation space, lack of patient privacy awaiting treatment (Author, 2016)

6.2.4 I PROMOTING HOLISTIC HEALING IN THE BUILT ENVIRONMENT

There is little doubt that the current built environment design only fulfils the minimal physical needs of the patient and that it is not a 'holistic healing environment'.There are various limitations in the existing built environment design, that make it unfeasible to cater for the holistic needs of the cancer patient mentioned in this research.



Fig I 68: Treatment Room opens directly onto the circulation space illustrated on fig. 65 (Author, 2016)

Treatment rooms are on the ground floor, and the patient waiting area is located in the middle of a general circulation corridor. The corridor is used by visitors, and other patients and staff use this to access other parts in the hospital. The corridor is a narrow and uncomfortable space for patients to wait for a potentially painful and stressful treatment, and other people file past. The quality of space is sterile and void of any comforting elements that may stimulate or engage the mind of a child. McCuskey Shepley (2000) describes environmental Press theory, and how children respond more negatively than adults to under stimulation or sterile environmental conditions. Analysis of the design and its qualities, and the application of the findings using the Environmental Press theory, the researcher concludes that the current design may not be an ideal environment for the treatment of children.

The spatial qualities of the circulation space are gloomy,

lit entirely by artificial lighting, with no fenestration to the exterior. Van Eyck's concept of the 'in between' space or Christopher Alexander's 'spatial gesture' may make a difference to this environment, to create a smaller space off the circulation – a comforting space where patients may wait without feeling intimidated by having other people walk through. The space may not only mitigate patient psychological stress, but it may assist in the promotion of comfort. Openings to nature outside, provides natural lighting into the interior spaces, to create a warm and welcoming space.



Fig I 69: Entrance to paediatric oncology facility (Author, 2016)

Ulrich (1997) suggests that positive distractions help to diminish the stressors of the 'institutional' built environment, for example, views to nature, or spaces that may encourage social interaction. To allow natural lighting into the building helps to create an environment which may assist the patients to more comfortable and to relax.

The current built environment was transformed from a previous adult ward, and due to the existing spatial constraints, the facility was not able to be designed for children who needed additional space. The hospital's institutional design is based firmly in the pathogenic model, with its main aim to treat the patients' illnesses. Little attention is placed on holistic needs. The patients' diminutive scale is not been taken into consideration as the ward is physically unchanged from its previous function for adults.

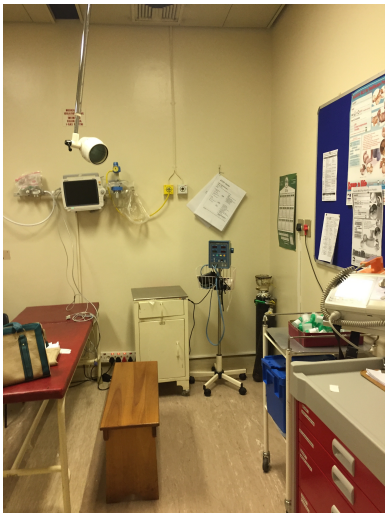


Fig I 70: Institutional Sterile treatment room, lack of openings, disconnected from exterior (Author, 2016).

The institutional perception of the design is furthered by the choices of aesthetics. beige painted walls and dark blue vinyl flooring - this creates a dull interior and may negatively affect the patient experience. This is further amplified by artificially lit circulation spaces due to the double loaded corridor space. The ward spaces are minimal, and fail to communicate the calmness that ought to be associated to a

therapeutic environment. Wards aesthetics have been improved, though, with the addition of cartoon murals that provide visual stimulation and respite from the sterile environment. Spatially, the design is disconnected from the patient's needs, unable to satisfy the natural needs of children. The child's behaviour, that is, playfulness and creativity, is stifled by the current built environment and its institutional nature, which restricts the patients' movement.

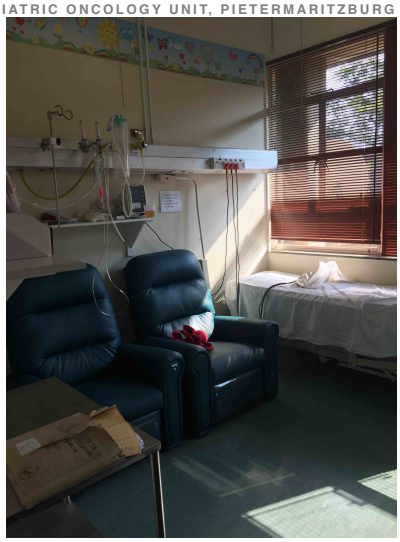


Fig I 71: Treatment room in ward facility (Author, 2016).

6.2.5 I ENCOURAGING SOCIAL INTERACTION

Doctor Two describes the paediatric oncology facility design as failing to acknowledge the social practices of the occupants. The facility's institutional planning characteristics, functional and compartmentalised spaces are connected via an unarticulated double loaded circulation corridor. Doctor One explains that, during the day, patients have only two options available to them: to be in the ward or to be in the narrow circulation corridor. The current scenario versus the van Eyck's concept - the Amsterdam orphanage - are starkly contrasted. The latter have bedrooms which open up onto an internal street, or an internal square, where occupants may play. This allows the child to experience more engagement and control over their privacy and their social world - a visual and auditory link is maintained between the internal and external spaces.

Grey's Hospital floor layout plan is rigid, clearly defined, and detached from one function to another, off a narrow central circulation spine. The planning, and the restrictive layout, accentuates the feeling of confinement for the patient. Thus, there are little spaces for chance social interaction. Doctor One states that socialisation within the facility is restricted to the ward or the narrow corridor, and is not ideal for social activity as there is high staff traffic.

Patients may be hospitalised for extended periods of time, and are confined to the facility for the duration of their stay, either for health reasons, or because of the limited space. The patients' daily routine has little activity in it between treatments; they may stay in their beds or wander the corridors. Patients have a likelihood of getting bored within the current spatially restrictive built environment, and this may impact both the social and psychological wellness of the patient. However, a solution in the guise of Aldo van Eyck's concept of

private spaces which opens up to a communal space may allow for a safe setting to encourage social interaction, and to promote play.

The planning layout of the facility imposes structure on the behaviour of the patients, and this may set back the patient's social and psychological wellbeing. Dovey (1985) states that the built environment should have a sense of normality, which promotes the normal behaviour of children, as opposed to imposing control. This is congruent with Dr Roger Ulrich and the Theory of Supportive Design, as the environment promotes natural patient behaviour, and helps patients to cope and heal. Nurse One and Nurse Two say that the limited space provided for social exchange for patients and parents, who often spend large amounts of time with their children, have little option but to sit in the chair at the bedside, or a bench along the wall in the artificially lit narrow corridor. Burke et al. (2015) suggests the use of linear seating is not conducive and limits social interaction. A person sitting on a long bench with people on either side may only socialise with the person directly on either side. Caregiver One suggests that space is needed for parents and patients that makes social interaction conducive. Circular seats may allow for greater choice, and may present freedom for socialisation. The issue further reinforces the need for ‘in-between’ spaces, as described by Aldo van Eyck, to facilitate choices within the built environment for social interaction. The suggested functionality could be considered within the greater communal space, and this allows parents a place to socialise and maintain a visual and audible link to their child.

Caregiver One claims that Grey’s Hospital has no recreational space for the patients - the wards or the corridors are the only available space for social activities. Play is a critical component in the development of a child, and social skills are developed from the play interaction. Van Eyck's concept of the communal area volume is a large volume which may house smaller spaces with different functions within the greater volume of space. Perhaps this approach may be ideal for a recreational area linked to the seating area and the private realm. This approach would address not only the social, psychological, and spiritual needs of the patient, but also the patient’s safety. Alexander (1977) suggests that an intimate attitude towards the volume and scale of space may promote playful behaviour.

6.2.6 I CONNECTING INSIDE AND THE OUTSIDE SPACES

The hospital blocks have been designed around green courtyards with grassy areas with trees and palms. The built environment design does not take full advantage of the pleasing green space, which is an invaluable asset to promote healing. The double loaded corridor creates a tunnel through the facility, negating views, and separates the building from the green areas. The green space can only be seen if a person is close enough to the windows in the wards that overlook the courtyard. The built environment does not connect the internal environment to the potential natural therapeutic setting. Perhaps allowing for 'in-between' spaces; places for pause and reflection which connect to an external environment may connect the interior and external environment. Day (2007) and Alexander (1977) state that there are many positive benefits that windows overlooking nature produce. Windows, by means of alcoves and spatial gestures, open the internal space to views of nature, and allow warm natural lighting into the gloomy interior. This may have a positive effect on the psychological and spiritual wellbeing of patients and other occupants.

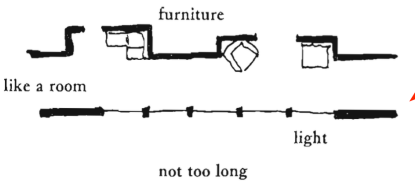


Fig I 74: Alcoves can provide opportunities for spontaneous social activity (Day, 2007).



Fig I 75: Green Courtyards (Author, 2016).



Fig I 76: Green Courtyards (Author, 2016).

The deep patient wards situated off the central corridors have fenestration facing onto the green courtyard. The design of the ward presents a few challenges to the quality of the space as each ward has eight beds, with eight chairs for parents respectively. Although the architect was unsuccessful at addressing the connection between the internal space and nature (through the use of large openings which allow views of the external green space), the patients in beds do have decent views of nature as the wards have depth. However, those patients closer to the door have no view of the outside.Possibly smaller wards, with fewer patients per room, may allow all

patients a better vista of the outside. This may also allow natural lighting into the ward. The link to nature between internal and external space requires significant attention in the design of a hospital built environment.



Fig I 77: Green Courtyards between Ward Block 1 and Ward Block 2 (Author, 2016).

The existing courtyards are fully enclosed, and not fully accessible. The green courtyards may be used for patients in the security of the built environment, under staff supervision. The circulation corridors around the green spaces have the potential to be converted to an arcade, acting as an 'in-between' space as it is "partly outside and partly inside" (Alexander, 1977: 561). The proposed arcade 'in-between' space may soften the transition from exterior to the internal, as emphasised in van Eyck's work, to highlight the sensitivity of the environment as it relates to its compromised occupants.

In respect to the original architects' design, this may need extensive modification. The adult ward design would be totally modified to cater to the treatment of paediatric cancer. The designed spaces should accommodate the necessary functions to provide oncological treatment. The restrictions of the existing built form make it extremely difficult to implement the ideal comprehensive healing design considerations mentioned in this research.

6.3 I INKOSI ALBERT LUTHLI HOSPITAL, DURBAN



Fig I 78: Inkosi Albert Luthuli Hospital (Apple Maps. 2013)

6.3.1 I A BACKGROUND

Inkosi Albert Luthuli Hospital was originally designed as an academic hospital of 1,000 beds in 1987, largely due to the deteriorating state of the King Edward Hospital. The hospital project was abandoned and then later restarted in 1996. The initial brief for the design was changed from 1,000 beds to 846 beds and the hospital was changed from an academic hospital to a tertiary referral hospital. The hospital was designed for the Department of Health, and executed by Department of Public Works. The hospital became a Public Private Partnership (PPP), the private company named Impilo Consortium. This is the first joint venture between private and public partnership healthcare in South Africa.



Fig I 79: Inkosi Albert Luthuli Hospital view of Block A,B,C & D (BFBA .2016)

6.3.2 I LOCATION AND DESIGN

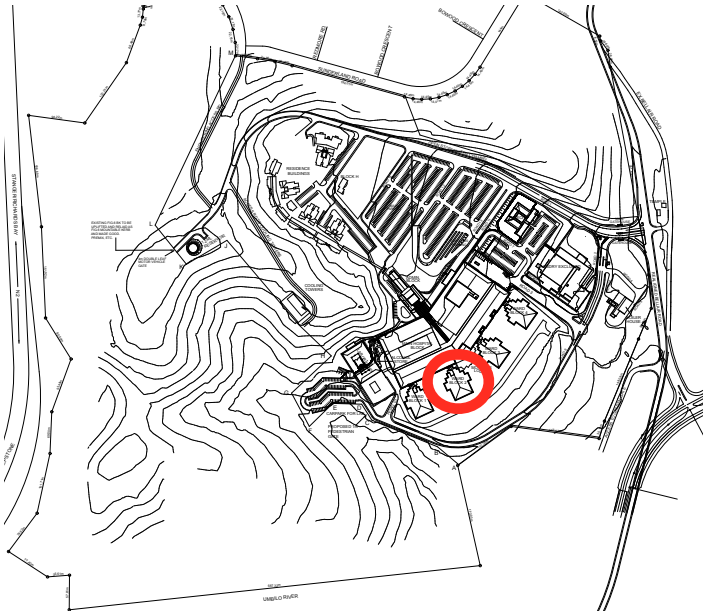


Fig I 80: IALH Site Plan (FGG Architects. 2016)

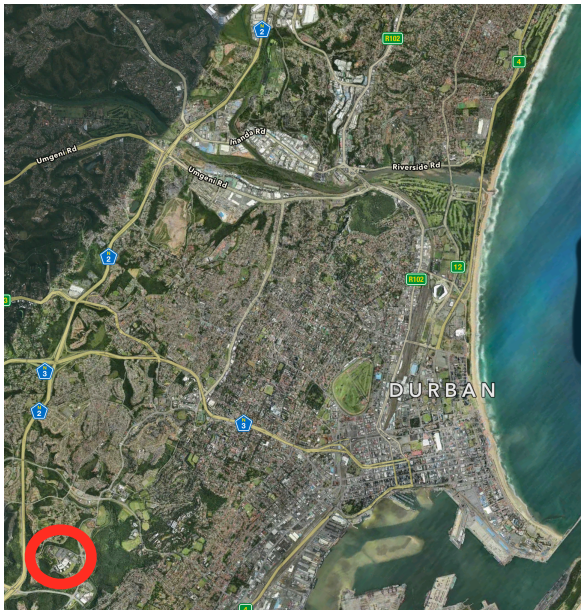


Fig I 81: IALH Location Map (Apple Maps. 2016)

The Inkosi Albert Luthuli Hospital (IALH) is located at 6.3 kilometers, on the outskirts of the city of Durban. The the time of construction, IALH was the largest and the most modern hospital in Southern Africa. The hospital site is situated in the Cato Manor on a site of 800,000 square meters. It is made up of many buildings, such as residential buildings, the administration block, a laundry, a crèche, a laboratory building and the main hospital building.

The design of the hospital includes four levels and makes use of the slope. The entrance to the hospital building is at level three. Inkosi Albert Luthuli Hospital is similar to Grey's Hospital in Pietermaritzburg in that it was built in the 1980s, and shares a similar Brutalist architectural style. Although the exterior has similarities with Grey's the internal design, this is where the similarities between the two hospitals end. At IALH, a conscious design emphasis is placed on providing patients with a modern healing environment.

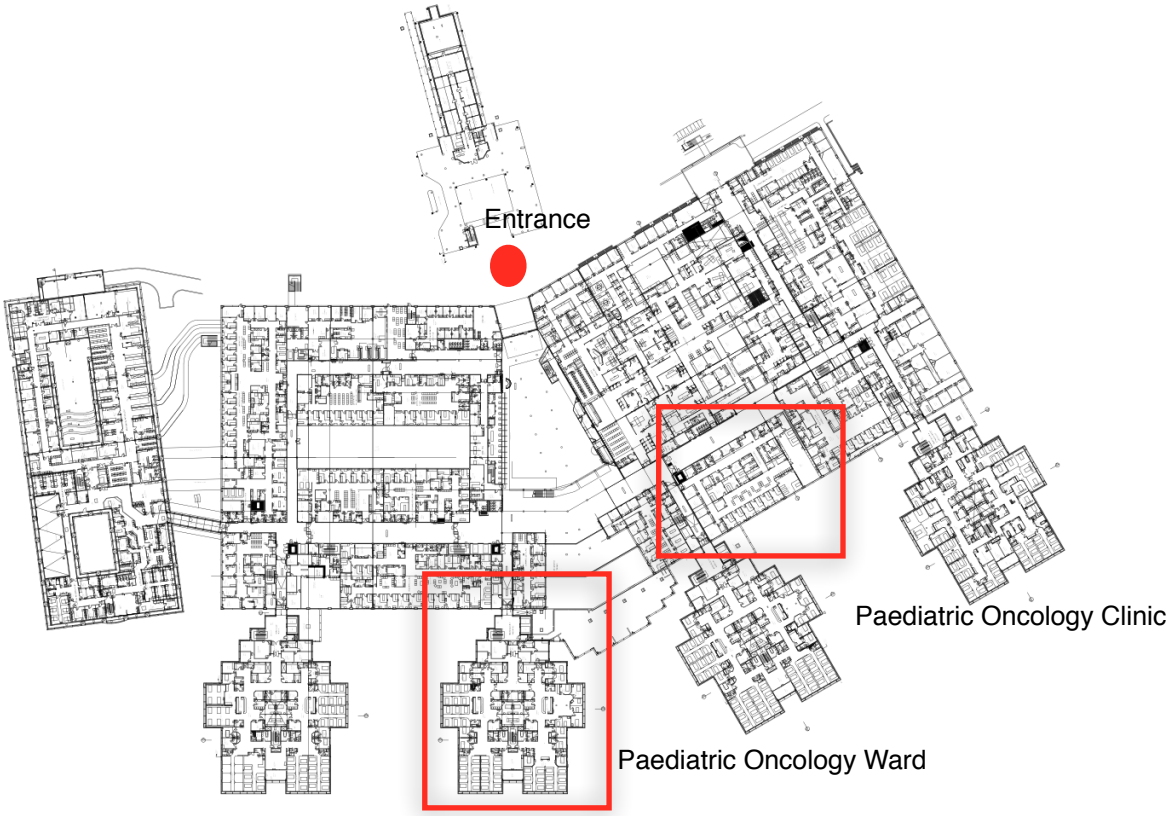
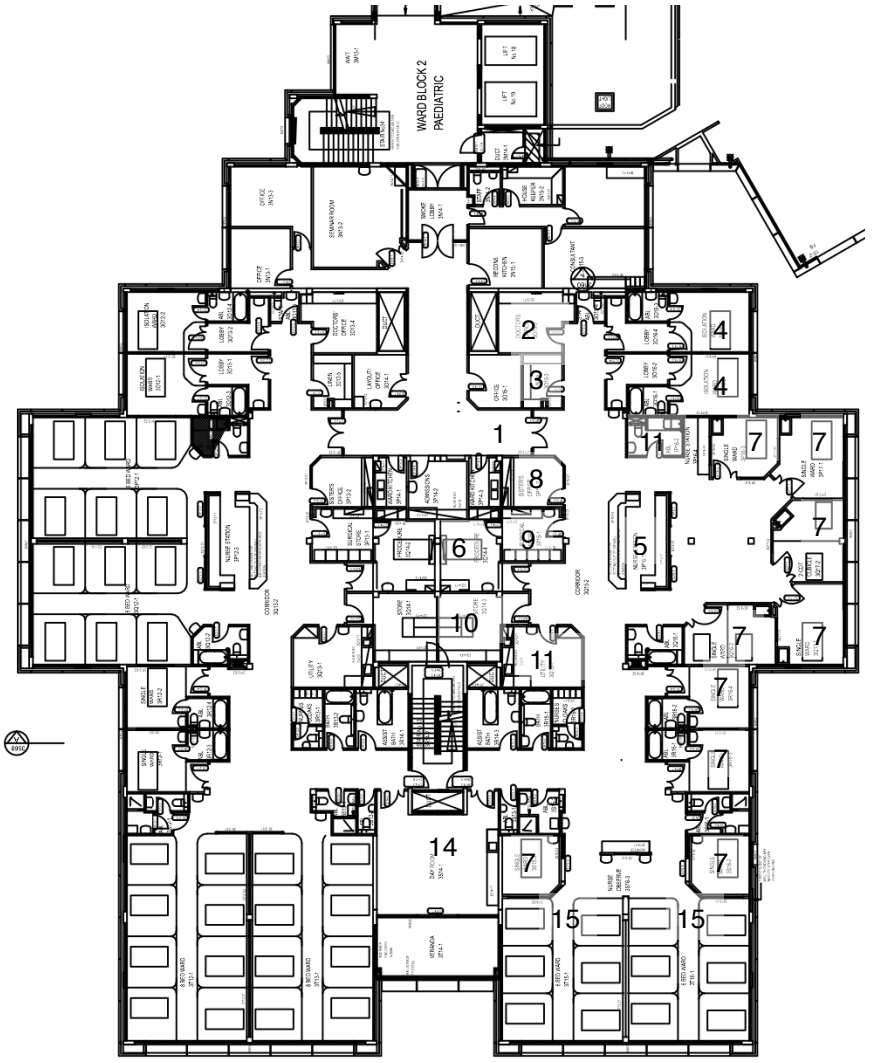


Fig I 82: IALCH Plan (FGG, 2016).



1. Entrance
2. Doctors Office
3. Linen Room
4. Isolation Ward
5. Nurses Station
6. Procedure Room
7. Single Bed Wards
8. Sisters Office
9. Surgical Store
10. Utility Store
11. WC
12. Bathroom
13. Storeroom
14. Playroom

Fig I 83: IALCH Paediatric Oncology Ward Plan (FGG, 2016).

6.3.3 I PROVIDING A SENSE OF FREEDOM AND CHOICE

Although Inkosi Albert Luthuli Hospital design highlights a slight shift by the architects approach to healthcare design, it is still fundamentally institutional. The architects did endeavour, however, to place importance on the qualities of the built environment and its finishes, and its role in creating a calm therapeutic built environment (Bingham, 2016).

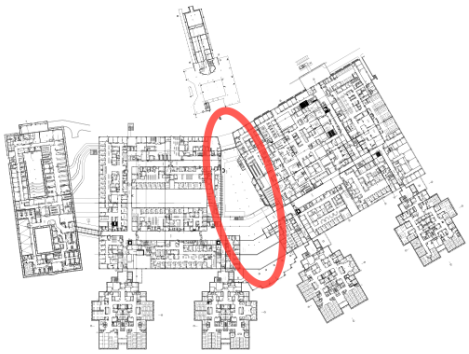


Fig I 84: IALCH Entrance Lobby (FGG, 2016).

The shift in approach may be seen in the hospital lobby design, where patients and visitors alike gain entry to the hospital. The lobby space is illuminated by natural light through a skylight in the spine, and this creates a warm and inviting space. The use of the skylight in this public space follows Christopher Alexander's (1977) principles. Alexander (1977) states that by creating spaces of differing light, it encourages people to instinctively walk towards the light, and suggests movement.



Fig I 85: IALCH Admin - Lobby (FGG, 2016).



Fig I 86: IALCH Entrance Skylight (FGG, 2016).

Different lighting creates spaces and encourages different social activities within them. Alexander (1977) states that these elements may assist in navigation through a building to spaces of importance, such as seating, entrances, or places of beauty. The lobby makes use of various volumes to promote different social activities. The spine of the lobby has a greater volume and is naturally lit, to promote faster circulation of large pedestrian traffic. The spaces off the spine are the coffee shop, the administration area, and the waiting area. These spaces are lower in volume, and less bright than the spine, which encourage slower movement, more social interaction, and provide a sense of security and safety. The spatial qualities provide an ideal setting for parents to bring their children to get away from the mundane patient wards. Patients, however, are are not allowed to leave the paediatric oncology facility due to their compromised immune systems. Therefore, the paediatric oncology facility may have a similar design to that of the entrance

of the hospital, which may giving them the choice to get away from the confinement of the ward.

The building's design confines patients to the interior built environment, as there are no outdoor spaces. Perhaps a reconsideration of the controlled green spaces may be beneficial, to allow the patients a sense of freedom, while being supervised by staff in a controlled setting. The current design lacks any engagement with the natural environment, and seems to be an island on a green site. Perhaps the design should engage with the natural setting, to provide additional options and choice. This may create spaces for reflection which may assist in the physical, psychological, and spiritual healing of the patient, and thereby assist in the overall reduction of patient stress. In sum, the use of physical and visual access to the natural outdoors creates a therapeutic environment for all occupants within the built environment, contributing not only as a visual stimulation, but assists in the healing of the patients.

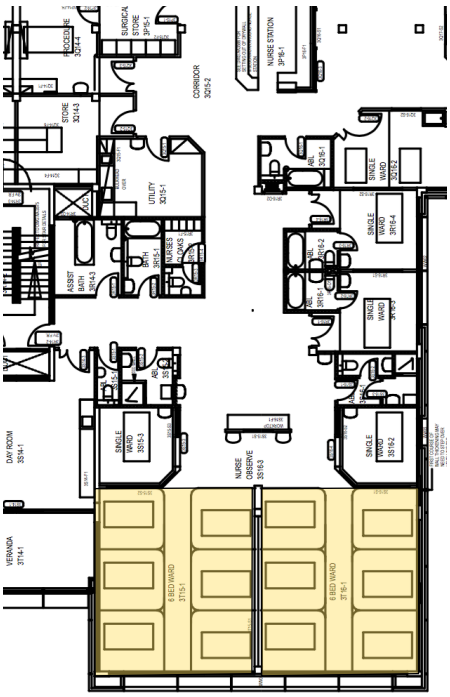


Fig I 87: Open Plan 6 Bed Ward (FGG, 2016).

The six bed ward, with its deep open plan design, allows each bed area enough space for patient visits, and operational treatments. The design allows sufficient space around each patient without encroachment on the personal space of the neighbouring patients. However, the design allows for very little patient autonomy and privacy - patient privacy is only achieved if the others patents are not present, and this is never the case. The design not only lacks space for the individual, but also provides no communal space that cater for group social interaction.

Albert Luthuli Hospital planning shares some similarities with Grey's Hospital, as both built environments are defined clearly by their function, and they are compartmentalised from one other in an institutional manner. Both hospitals are demonstrations of a lack of 'in-between' spaces and both are limited by way of patients' lack of choice and freedom within the built environment. Doctor One states that patients often spend time looking out the windows of the wards that overlook a green valley as a form of distraction. Patients are often bored due to lack of engagement, and there are few options for play within the built environment. The

built environment itself is not conducive to this, nor conducive for patient healing. Although there are views to nature on the third floor, there is a disconnection between the built environment and nature, as there is only a link between the interior to the exterior, but no engagement between the two. Miguel (2015) cites Aldo van Eyck's views that the built environment is needed to connect to both interior and exterior and vice versa. However, currently, the facility is limited in terms of its ability to directly engage with the natural environment, as nature is only on the third floor of the hospital. However, currently, the facility is limited in terms of its ability to engage with the surrounding natural environment, as the unit is on the third floor.

6.3.4 I PROMOTING RELATIONSHIP BETWEEN CHILD AND PARENT

Doctor Three and Nurse Two state that the role of the parent during hospitalisation of the child is paramount. However, the built environment fails to acknowledge this significant relationship between patient and parent during the treatment and recovery process. Parents are afforded a chair by the bedside of the patient, where they may sit or be at rest. In consideration of the role of the parent, and the amount of time that the parent spends in the hospital, further attention is needed in the provision of options for parents. The needs of parents need to be taken into consideration in the design of a healthcare environment for children who have prolonged hospitalisation periods. Briggs (1966) states that there is a strong social bond between mother and child, especially for younger children. Accommodation facilities for parents may be beneficial, as they reduce not only traveling time, but the time that the parent and child are separated from each other. The benefit of these considerations for parents, mean that the patient's stress levels are reduced. Mothers assist patients to cope with the challenges of treatment and hospitalisation.



Fig I 88: Entrance Foyer to paediatric oncology ward, upon entry it is possible to see patients in wards, very little privacy is afforded to patients from people that gain access into ward (Author, 2016).

6.3.5 I ACCOMMODATING THE CONTRASTING NEEDS OF THE USER: CHOICE AND CONTROL

The built environment design does not allow the patient much autonomy, choice, or privacy. This is especially the case as patients feel that there is no privacy when visitors enter the facility. An example is the planning of the entrance and the wards within the hospital. The patients' privacy is not borne in mind when the hospital is planned. Although access to the facility is granted for visitors, the privacy of patients ought not to be compromised.



Fig I 88: Entrance - Nurses Station and patient ward behind (FGG, 2016).

At the entrance to the facility, it is immediately possible to see patients and parents in the wards or in their beds. Paediatric oncology patients are a sensitive population group, yet the built environment does not consider that the patients and relatives have the right to confidentiality and privacy. Patients and parents have no option but to occupy these exposed spaces, as there is no other alternative space for privacy. The wards are open-plan, and they provide beds for six patients (and parents) respectively, however the design provides the patient with no other choice for a alternative space or choice. Privacy in the wards is challenging as the privacy of one patient is dependent on whether there is someone else in the ward, but this is always the case. The lack of options within the built environment for the individual, or the group, may have a negative impact on the social interaction of the patient. There is currently no option within the built environment that caters to the various social needs of the patient. The public and private relationships are not ideally suited to the needs of the occupants as it has a negative effect on patient comfort and wellbeing.



Fig I 89: Six Bed open plan patient ward (FGG, 2016).

Aldo van Eyck's principle of the 'in-between' space acknowledges that the separation of spaces should be diffused. Van Eyck shares many similarities with

Alexander's 'transition space', which prepares a person for a change, from one function to another or from one place to another. Perhaps the introduction of 'in-between' spaces may assist in the gradation of the public realm to the private realm. This concept is pertinent to consider in the design of a facility, and acknowledges that although patients are hospitalised, they have a right to a degree of privacy. It is borne in mind, however, that due to the sensitive nature of their illness, the staff should always be in visual contact with the patient.

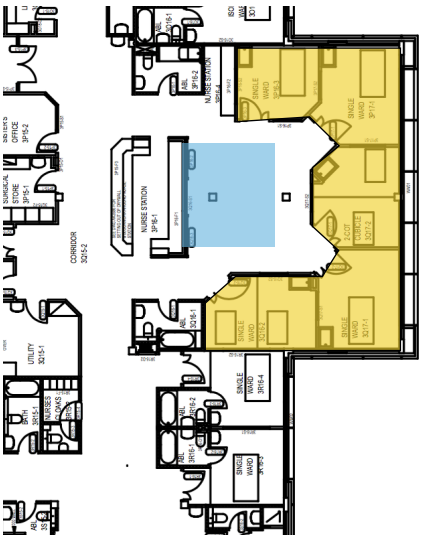


Fig I 90: 1 Bed wards around open square (FGG, 2016).

The consideration of 'in-between' spaces may have multiple positive effects on the spatial experience for patients. 'In-between' spaces provide transitions between the public realms and the private realms, and add to a patient's privacy. They reduce the sense of a clearly defined and structured environment, a move away from the 'institutional' hospital. The principles of transition avoid strictly separated functions, and instead propose a gradual transition from one to another.



Fig I 91: View of Cato Manor Valley (Author, 2016).

Doctor One highlights that patients are often bored due to the lack of an engaging setting and the lack of options within the built environment. The patient therefore has two choices available to them – stay in their beds in the ward, or congregate up and down the length of the circulation space between the beds. The patient has limited options available to them to make a decision about their social activities within the facility. The idea of 'in-between' spaces, not only provide alternative spaces for patients away from the beds, but also encourage social interaction amongst patients. This, allows the patients with a sense of choice and autonomy within the built environment. The concept of spatial gestures not only provides patients with a sense of choice, but also reinforces their right to a degree of privacy.

The single patient ward situated behind the nurses station are arranged in a common open space. The spatial arrangement shares similarities to a small degree with Aldo van Eyck's orphanage internal square. Unfortunately, in contrast to the social internal square of the orphanage, the single patient ward is empty and encourages no activity. This space is a lost opportunity. It may be used to improve social interaction or it may simply be space for patients to get away from the ward. The design allows for children in their rooms to remain connected visually and auditory to the communal space, and still maintain control of their privacy. This space may be used in a similar way to the example, as it does not affect the operations of the facility. Although this may improve the issues of patient social constraints, privacy, and patient connectedness within the built environment, it is not ideal. The indoor environment lacks a connection to the outdoors, and there is a disconnection from the sweeping views of nature in the Cato Manor valley. The current built environment design has no engagement with the natural environment, nor is it beneficial properties to the patient as the optimal use of space is missed.

The recreational area between the two wards, is occasionally used by the CHOC Foundation for two-hour play sessions with patients. The space is accessed through double doors from either ward, furthering the idea of clear defined spaces according to function, which enhances the institutional perception. The playroom should perhaps not be isolated from other habitable spaces such as the wards, instead linked via 'in-between' spaces, for example, a seating area, subtly transitioning from one function to another. In addition to the transition of functions, enabling patients or parents with another choice within the design.

The playroom with its nature scene painted on the walls, large openings to views of the valley outside. In an attempt to create a welcoming, therapeutic environment and engaging space for patients. The design provides no connections between its functional spaces and its social spaces, creating a sense of disconnect. In contrast, in van Eyck's orphanage, the play and social areas are open – a celebration of the social behaviour of the patient, where interaction and participation are encouraged. All facets of the built environment are linked, as opposed to the connection of functions in an isolated circulation space.

The design provides insufficient opportunities for the need for children to be engaged in varied social activities. Day (2007) states that the play environment should not only cater to a group of children, but should allow for smaller and intimate social exchanges to occur, promoting the individual patient's perception of choice. Day (2007) states that the use of alcoves and bay window seats create smaller spaces, allowing for intimate social activity to

occur away from the communal group space within the same room. This idea addresses the varying social and psychological needs of patients, in a group or as individuals.

The playroom murals provide visual stimulation for patients, and a welcome positive distraction; however, the spatial design remains rigid and provides few options. The quality of the space, such as its monotonous volume, continues throughout the space. There is no variance to the overhead plane, which adds to the institutional feel of the environment. This is in comparison to van Eyck's and Alexander's idea of articulating volumes, as articulating volumes promote different social practices. For example, the use of larger volumes for patient group areas reduce the perception of confinement whereas smaller volumes provide the sense of security and safety. Smaller volumes also promote more intimate social activities, as for the interactions between a primary caregiver and child. The articulation of volumes may encourage social activities, and psychologically provide the patient with a sense of choice and self-determination within the space..

Articulated volumes define functions or spaces spatially - they allow spaces and functions to transition and flow gradually while remaining interconnected. In contrast to the current designs, which are rigidly defined, articulated volumes may mitigate the institutionally perceived built environment design. Architects should acknowledge that patients in a hospital have structured routines during their hospitalisation. To alleviate boredom, the built environment design should encourage patients to choose from a range of options, rather than a choice which is imposed on the patient.

6.4 I SUMMARY

In both cases above, the holistic approach was not included in the design. The government hospitals were designed to meet the physical requirements of patients, and do not their holistic needs. Existing facilities were designed to only provide treatment of the illness itself, and to offer other basic functions. The environmental qualities of current hospitals have resulted in institutional hospital designs, which are spatiality rigid and controlling of occupants' behaviour. The designs have minimal connection between the natural external and the interior environments – opportunities are missed in the creation of a therapeutic setting for patients. This research seeks to address holistic healing needs of patients, by creating a positive built environment for patients, which encourage social interaction, and psychological, and spiritual wellness.

CHAPTER | 7

7.1 I CONCLUSION

In conclusion, hospital architecture is the physical manifestation that responds to the needs of patients through its design. Although the built environment does not cure patients, it has the ability to contribute to the patients healing and it helps patients to cope with prolonged hospitalisation and arduous treatment. The built environment design of 'one solution fits all' is not applicable. It is established that children have different needs to adults. It is therefore important that there is greater understanding of the patients' physical, psychological, social, and spiritual needs in the design of a built environment for children. If the needs of patients are acknowledged, as architectural response, then the physical building may accomplish the promotion of the child's holistic needs.

The findings of the research are as follows:

- The built environment may have a bearing on the patient's attitude during hospitalisation to their recovery and openness to treatment.

- The design of the environment can affect patient stress and psychological well-being. Although the building does not directly heal the patient, the characteristics can promote patient healing.

- The building engagement with natural environment can assist to mitigate patient stress, promote social, psychological and spiritual well-being.

- The organisation of space and the physical relation between them has an effect on patient behaviour and the experience of patient comfort within the built environment. This has an effect on the social wellness, psychological wellness, and the overall healing of the patient.

- The design of the environment should cater not only for the patient group needs but also provide for some individual needs, such as control of privacy, without being disconnected from the larger group.

- The built environment should allow the patient a sense of choice and movement, mitigating the adverse effects of a controlling institutional environment.

- The design should encourage various social needs of the patient, and cater to the individual and the group. It should promote spontaneous social interaction. Ultimately, the

encouragement of positive social behaviour affects the patient's psychological and social wellness. Positive social behaviour potentially improves patients' openness to treatment and engagement with staff and peers.

- The design of the built environment may further improve patient healing with the inclusion of multidisciplinary teams who provide comprehensive patient treatment and which are critical to the patients' holistic recovery.

- The built environment design can be used to provide support to the parent community, their role in assisting their children in coping with hospitalisation is invaluable, mitigating patient stress associated with the going to the hospital, treatment, separation and the healing process.

- The built design not only has a bearing on the patient, but it also has an effect on staff. Well designed facilities may reduce staff turnover, the ability to sustain prolonged patient and professional relationships that may contribute to patient healing.

7.2 I RECOMMENDATIONS

With the support of the research such as literature review, precedent and case studies, the following recommendations have been made towards the design of new paediatric oncology typology that promotes holistic healing and wellness. The research has exhibited that the qualities of the built environment design can have a bearing on holistic patient care in the following ways:

- The built environment design should be welcoming to the patient, and avoid overbearing designs which may have a negative psychological effect on patients on arrival.

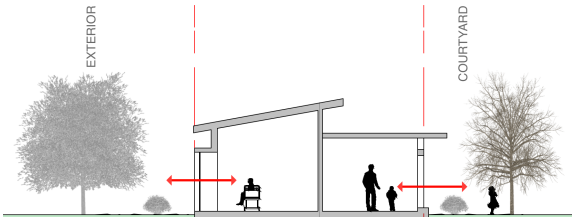


Fig I 92: Connecting the external natural and internal environments, creates a positive distraction for patients and therapeutic setting to encourage healing (Author, 2016).

- The internal built environment design should be considerate of paediatric oncology patients, giving them the sense that the place is friendly. The internal design should communicate to the patients that humane care is provided, should promote hope, and should encourage patients to get through their treatment and to recover.

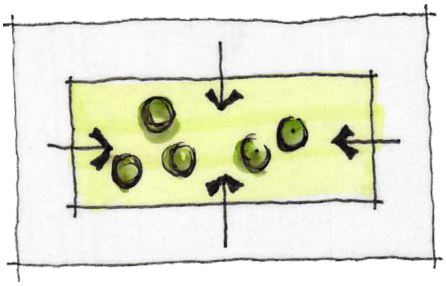


Fig I 93: Courtyards allow for healing gardens creating a therapeutic healing setting, positive distraction and encourage social activity (Author, 2016).

- The built environment should avoid having a sterile, dull and institutional nature. Alternatively, an open yet connected with other functions, providing the opportunity for chance social interaction and clarity in the facility. Although it must acknowledged that the treatment areas will need to remain sterile due to operational efficiency and infection control to provide treatment.

- The built environment should avoid the negative characteristics of an institutional environment, and take into consideration a patient's sense of confinement.

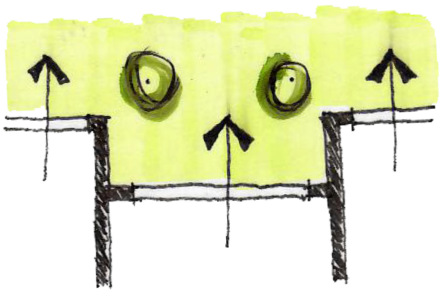


Fig I 94: Link the natural exterior and the interior spaces (Author, 2016).

- The built environment design should have a ‘home-like’ character, one that is warm, welcoming, and not intimidating for patients. Furthermore, the design should consider a child’s anthropometrics by taking into account scale, and being sensitive to form and volume.

- The design of the built environment should cater to the physical, psychological, social and spiritual needs of the patient. All of which will positively contribute towards the patient's comfort and healing.

- The building design needs to foster a close relationship between the interior and the natural exterior, such as access to views of nature and natural lighting. Patient access to a controlled natural exterior setting, where patients can be supervised by a parent or staff. Not only providing a patient with a choice during hospitalisation, the natural setting also contributes to a calm and therapeutic effect on the patients.

- The use of specific colour highlights within the built environment should be considered to create a sense of a warm, welcoming space and engaging.

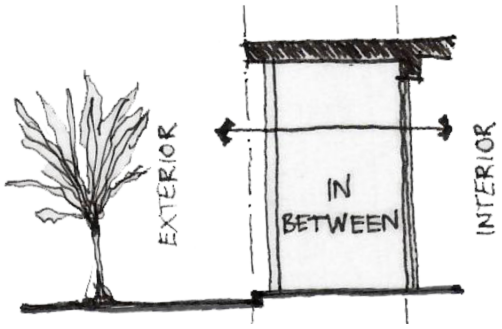


Fig I 95: In-between space allows for a sensitive response from moving from one space to another or one extreme to another (external to the interior space) (Author, 2016).

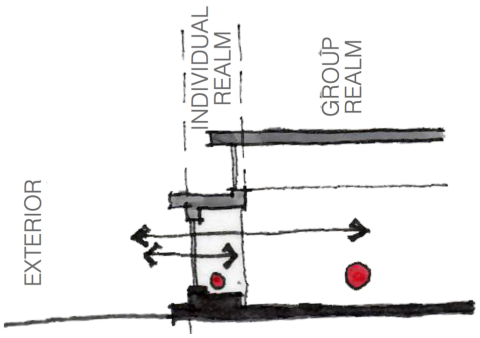


Fig I 96: Spatial gestures off larger spaces, allow spaces for the individuals choice and promote intimate social behaviour. While allowing to maintain a connection to the group (Author, 2016).

- The built environment should encourage social interaction, through a spatial design that considers a child's demeanour and behaviour. The design should be open and clear, providing transitional or in-between spaces allowing the patients choice. In-between and transitional spaces create a connectedness through the design of the built environment. As opposed to the institutional design with clearly defined spaces according to function create a disconnect. The institutional compartmentalised design has an overbearing control over the patient's behaviour.

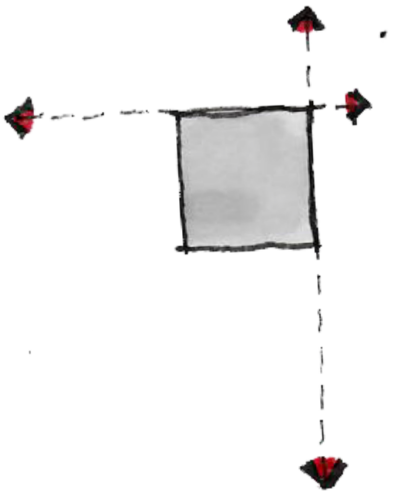


Fig I 97: Communal spaces, allows for multiple social activities to take place, a place where occupants can connect. (Author, 2016).

- The facility design should take into consideration the parents role and involvement in the treatment and comfort of the patient, and the time parents will spend in the built environment at the patient's side.

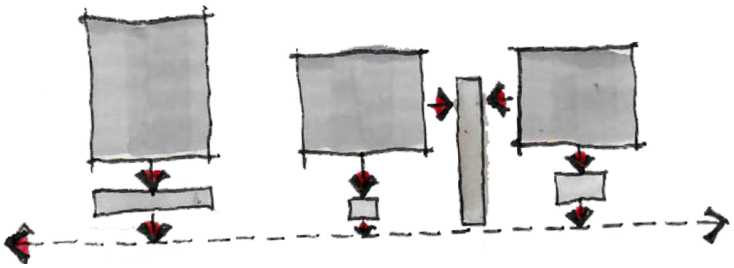


Fig I 98 : The internal street concept, highlighting the in-between spaces between functions, potential to create choice and to connect nature the built environment (Author, 2016)

- The design should house the functions of a multi-discipline team in order to provide patients with all the needs for treatment, therapy, counselling and continuing the patient education.

- The design should cater not only for the patient group but also the individual patient. The ability for the patient to control his or her privacy within the built environment, without compromising another. Through the transition space grading from the most public to the patients private realm.

- The architectural language of the design should challenge the established preconception of current hospital design, readdressing the architectural language that communicates the quality of care and that is provided.

- The design should aid in connecting the internal built environment and its occupants to nature, to create a therapeutic environment. Nature provides a positive restorative properties and positive distraction for all occupants.

Considering the patient needs, and the need for architecture to respond to the nature of the patient. The research highlights that the physical, psychological, social and spiritual wellness of a patient can be positively influenced by the built environment design, that is considerate of its patients needs, natural behaviour, and a connection to nature. An emphasis is placed on considering the patient needs and their natural behaviour within the built environment, and the buildings connection to nature during design and planning, can positively contribute towards a healthier built environment for paediatric patients and other occupants.

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FIGURE | 44 - Roger Stirk Harbour & Partners. 2009. Maggie's West London Centre. Available:http://www.rsh-p.com/projects/maggies-london/#concept. [Last Accessed Date:02 May 2016.]

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FIGURE | 48 - Verderber, S. and Refuerzo, B.J. 2003. *Innovations in hospice architecture*. Taylor & Francis.

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FIGURE | 55 - Verderber, S. and Refuerzo, B.J. 2003. *Innovations in hospice architecture*. Taylor & Francis.

FIGURE | 56 - Google Maps. 2016.

FIGURE | 57 - Gorny, H. (1988). Historic Hospitals in Natal. March Thesis, University of Natal.

FIGURE | 58 - Gorny, H. (1988). Historic Hospitals in Natal. March Thesis, University of Natal.

FIGURE | 59 - Apple Maps. 2016.

FIGURE | 60 - Apple Maps. 2016.

FIGURE | 61 - FGG Architects. 2016.

FIGURE | 62 - Author. 2016.

FIGURE | 63 - Author. 2016.

FIGURE | 64 - Author. 2016.

FIGURE | 65 - Author. 2016.

FIGURE | 66 - Author. 2016.

FIGURE | 67 - Author. 2016.

FIGURE | 68 - Author. 2016.

FIGURE | 69 - Author. 2016.

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FIGURE | 71 - Author. 2016.

FIGURE | 72 -Author. 2016.

FIGURE | 73 - Author. 2016.

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FIGURE | 75 - Author. 2016.

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FIGURE | 80 - FGG Architects. 2016.

FIGURE | 81 - Apple Maps. 2016.

FIGURE | 82 - FGG Architects. 2016.

FIGURE | 83 - FGG Architects. 2016.

FIGURE | 84 - FGG Architects. 2016.

FIGURE | 85 - FGG Architects. 2016.

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FIGURE | 88 - FGG Architects. 2016.

FIGURE | 89 - FGG Architects. 2016.

FIGURE | 90 - FGG Architects. 2016.

FIGURE | 91 - Author. 2016.

FIGURE | 92 - Author. 2016.

FIGURE | 93 - Author. 2016.

FIGURE | 94 - Author. 2016.

FIGURE | 95 - Author. 2016.

FIGURE | 96 - Author. 2016.

FIGURE | 97 - Author. 2016.

APPENDIX A

INTERVIEW QUESTIONS FOR DOCTORS & PRACTITIONERS

SET ONE.

1. Describe your definition of holistic wellness/ healing of a patient ?

2. How critical is the role of the built environment on the healing process of a patient during hospitalisation ? please describe ?

SET TWO.

Patients healing can be promoted by catering to their physical, psychological, social and spiritual needs. The built environment should not only be a place to diagnose and treat patients of the illness itself, instead be place were holistic restoration of all the patients needs can take place.

1. The four criteria of healing described, in your opinion, do they have the ability to contribute positively on the patient healing and comfort ? please describe ?

2. Do the four criteria discussed cover all the needed aspects of patient healing within the built environment, if not please describe ?

3. Which of the four criteria do you think the current built environment most fulfils ? please describe ?

4. Which of the four criteria do you think is the least available in current built environment ? please describe ?

5. Within your facility, in your opinion, where could the built environment be improved to provide the patient with holistic care ?

6. Are there features within the built environment, that in your opinion, provide a positive impact and promote holistic healing ?

SET THREE.

Patients healing can be promoted by creating an built environment design that reduce patient stress and assist in the patients ability to cope with hospitalisation.

1. How critical is the role of the built environment design in reducing patient stress during hospitalisation ? please describe

2. Which features do you think should be considered in the built environment that can reduce patient stress during hospitalisation ?

3. Which design considerations do you think will assist patients cope during hospitalisation ?

4. Which features do you think should be considered in the built environment that can provide patient positive distractions during hospitalisation ?

PART I 2

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KEY WORDS I

HOLISTIC HEALING I PATIENT CENTERED DESIGN **I CONNECTING TO NATURE I** SOCIAL SUPPORT **I HOME LIKE I** DE INSTITUTIONALISE **I CHOICE I** THERAPEUTIC

WHO I

PAEDIATRIC ONCOLOGY PATIENTS

WHAT I

PAEDIATRIC ONCOLOGY UNIT

WHY I

CURRENT PAEDIATRIC ONCOLOGY BUILT ENVIRONMENT DESIGNS ARE NOT IDEALLY DESIGNED TO HEAL PATIENTS HOLISTICALLY

HOW I

THROUGH PATIENT CENTRED DESIGN, CATERING TO THE HOLISTIC NEEDS OF THE PATIENT TOWARDS PROMOTING HOLISTIC HEALING.

CONCEPTUAL FRAMEWORK I

HOLISTIC HEALING

THEORETICAL FRAMEWORK I

AGE ENVIRONMENTAL IMPACT THEORY

The ability to adapt to an environment, acknowledges the differences in perception of space between younger and older population groups

AGE ENVIRONMENTAL IMPACT THEORY

ACCESS TO NATURE
CONTROL
SOCIAL SUPPORT

1.0 | INTRODUCTION

Part Two of the document, focuses on the process of designing a "A New Paediatric Oncology Unit at Grey hospital Complex, Pietermaritzburg, KwaZulu-Natal". The research in Part One of the document serves to provide background information towards a "Holistically designed Healthcare built environment". The intention of the design report, is to highlight the application of the findings from the research study to a architectural design. The summation of the theoretical and conceptual research in Part One can be found in, Conclusions and Recommendations, providing the foundations for the proposed holistic design of a Paediatric Oncology Unit.

1.1 | CONCEPT DESCRIPTION

The pediatric oncology unit design needs to take into consideration its context, as it is critical the design integrates and has a symbiotic relationship with the existing hospital and its infrastructure. The design will serve the Pietermaritzburg and further inland region of Kwa-Zulu Natal. The facility will provide the following services: pediatric oncological care, therapy, treatment, psychological and palliative care. These services that are afforded will be done so within a built environment that is sensitive to the nature of the child, and cater to the holistic needs of the patient. The new pediatric unit will assist in improving the perception of healthcare built environments for children, a place where children feel comfortable, secure and receptive to treatment. While providing these services, through concept of holistic design and its benefits to the patients health and comfort will inform the design decisions.

Some elements that will form part of the proposed design and it respective site are listed:

- redesigning the existing parking area adjacent to selected site, by way of landscaping and softening the route by creating green corridors for pedestrians and patients that connect to the proposed design.

- to establish appropriate and necessary connections with existing hospital facilities adjacent to the selected site.

- to consider differing qualities of external spaces for patients and external public spaces.

- the sites sits on a North Eastern axis is ideal situated to take advantage of natural lighting.

- passive solar control and existing trees on the edge of the North East edge of the site assist providing passive solar shading or filtering morning light and afternoon sunlight glare.

- using natural light to create a positive therapeutic mood within the built environment, through the play of fenestration that can capture both light and views to connect the interior and natural exterior realms.

- the width of the design should have a narrow cross section to maximize natural lighting into deep spaces.

- design of spaces should be flexible and provide a level of adaptability to accommodating averring needs.

- finishes of the building should be allow for brighter colors and material finishes, however they must be listed on the Department of Health approved list for materials.

- polished concrete floor finishes creates a economic and attractive for large exterior spaces.

- tactile qualities for wall finishes.

- the landscape around open public spaces to include seating areas, allows for places of pause and play.

1.2 | CLIENT

1.2.1 | INTRODUCTION

As identified in the case studies in part five of the research, Government Healthcare institutions, have due to financial and infrastructure limitation facilities are unable to fully cater to the holistic needs of patients. Private Healthcare institutions in contrast are able to update infrastructure and have the ability to build better quality facilities, and are better financially funded. Given the limitation in current Government healthcare institutions, suggests the KwaZulu-Natal Department of Health as the prospective client for the proposed typology. The South African government has identified shortfall in healthcare as a basic human right, has placed importance on providing quality healthcare that is accessible to all South Africans. Government is committed to improving existing and new build healthcare projects throughout South Africa to meet the country's demand for healthcare, basing local projects on international standards like the United Kingdom's National Health Service model. International standards focus on improving the quality of design, infrastructure, maintenance and quality of care provided to patients

1.2.2 | THE CLIENT ORGANISATION

KwaZulu-Natal Department of Health



Fig | 1: Department of Health - KwaZulu-Natal Logo (doh.gov.za, 2016)

Vision

Optimal health for all persons in KwaZulu-Natal

Mission

To develop and implement a sustainable, coordinated, integrated and comprehensive health system at all levels, based on the Primary Health Care approach through the District Health System, to ensure universal access to health care.

Core Values

- Trustworthiness, honesty and integrity
- Open communication, transparency and consultation
- Professionalism, accountability and commitment to excellence
- Loyalty and compassion
- Continuous learning, amenable to change and innovation

The Department of Health (DoH) has an overall responsibility for healthcare in South Africa, with the responsibility for public-sector healthcare. The department's priority is to improve the health status of the entire population and to realise its vision of a long and healthy life for all South Africans. To accomplish this, it has identified four strategic outputs:

- Improving life expectancy
- Decreasing maternal and child mortality
- Improving health-system effectiveness.

Department of Health strives to improve health in South Africa through legislation with the South African government. The DOH collaborates with the private sector in the decision making, in order to keep improving, as well as creating guidelines such as the DOH R158 guidelines. These guidelines assist designers and hospital CEO's for new or existing facilities to building and maintain healthcare facilities up to date and providing a safe and high quality environment for care (doh.gov.za, 2016).

1.2.3 I ARCHITECTS DELIVERABLES

The client's prerequisites from the architect are as follows:

- **BRIEF AND SCHEDULE OF ACCOMMODATION** – To translate the client requirements from the research document findings, towards a design brief and schedule of accommodation for the proposed typology.

- **SITE SELECTION** – To aid in the selection of site for a proposed paediatric oncology facility, by investigating and critically analysing the suitability to accommodate the proposal.

- **DESIGN PROPOSAL** – Architect to provide the client with a detailed design of the proposed building incorporating the research and accommodation from the client.

1.2.4 I CLIENT BRIEF AND OVERVIEW

- KwaZulu-Natal Department of Health, requires a new paediatric oncology facility to replace existing inadequate paediatric oncology facility.

- The proposed typology to provide high quality care, through the provision of inpatient and outpatient facilities.

- The proposed paediatric oncology facility, should incorporate latest healthcare design principles from inception, while pursuing the Department of Health's vision of "optimal health", a design that embodies a welcoming and caring environment for patients.

- The architect is to design a built environment that is therapeutic, de-institutionalised and domestic-like in nature to promote patient comfort, healing and recovery. An environment that encourages holistic healing principles of the physical, psychological, social and spiritual needs.

INPATIENT FACILITY:

- The unit to accommodate 30 inpatients at a time, 4 single wards or isolation wards provided for extremely sick patients that require containment.

- High care unit facility to accommodate 5 patients, that may require intensive care prior or post operation.

- Wards divided into gender groups with a 50/50 split - Males and females to to have separate accommodation.

- Patients should have their own corner in order to personalise and to define their personal space easily.

- The three bed ward designs should be configured in such way as to promote social engagement between other patients, to promote social support within the patient group.

However curtains around the beds should be provided for privacy for washing or examinations is necessary.

INPATIENT FACILITY:

- The unit to accommodate four patients at a time for private treatment, an open lounge to provide treatment to 6 patients and 2 private lounges. Providing

THERAPY SPACES:

- Numerous spaces for therapy have been provided, please refer to accommodation schedule. These spaces are to engage with the external natural realm, to create a therapeutic environment that can promote healing. The natural realm can be a positive distraction for patients, considering they often go through lengthy treatment sessions.

TREATMENT SPACES:

- These spaces are to be located further away from the wards, as the procedures performed may be painful for patients. By planning these spaces further away, may reduce audible noise from patients screaming and crying, that may be potential stressor for other patients.

PUBLIC SPACES:

- The public spaces, internal and external should be open, welcoming and engage with the patients. The design needs to be disabled friendly for universal access, considering that patients are often weak from the therapies and treatments.

OUTDOOR SPACES:

- The built environment should incorporate external landscaped areas for recreational purposes and outdoor therapy with healthcare professionals. Through the practice of play patients are encouraged to develop and to socialize, providing patients with positive distractions and a coping mechanism to deal with hospitalization. All areas should be defined by the building form, and to be supervised by staff at all time.

SAFETY AND SECURITY:

- Entry and any Access into the facility should be controlled by staff through one clear entrance area, that has clear line of sight and supervised by staff at all time. No unauthorized entry into the patient areas.

- Outpatient and in-patient zones should be clearly defined, as the different patient groups spend different amounts of time in hospital (in-patient - longer periods of hospitalisation, out-patient - stay for the day).

- The nurse's station should be positioned to enable the nurse on duty to have a visual line of sight of circulation and entrances to patient spaces.

- The facility must use robust materials, finishes and furnishings that are easy to clean to prevent the spread of disease, these finishes need to comply with the healthcare regulations R158.

- The facility should incorporate safe storage of records, equipment, supplies and waste. The facility needs to tap into existing hospital service systems. Ground floor of the ward blocks are used for the delivery of medical supplies from the main stores to food for patients from the hospital kitchen.

1.2.5 I ACCOMMODATION CRITERIA

The proposed paediatric oncology facility is composed of various services and functions that are grouped into key groups:

- **ADMINISTRATION:** Healthcare facilities require multiple staff spaces to maintain operational efficiency, spaces such as, patient records, reception desk to supervise patient waiting spaces and handle patient appointments. This includes the safety and security of the facility, maintaining staff and patients within the facility secure.

- **IN-PATIENT FACILITY**: These spaces provide in-patient patients accommodation during the hospitalisation period until patient has been healed or is considered able to go home.

- **OUT-PATIENT & THERAPY FACILITY:** Spaces that provide clinical support, and accommodate the various patient therapies and treatment functions such as, physical, phycological rehabilitation and counselling.

- **EDUCATION**: Government hospitals are often used for academic purposes for in service training for professionals. Provide facilities for healthcare academics for training and education to students and other professionals. In addition educational facilities provided for patients in order to continue schooling education and recreational activities for younger patients.

- **COMMUNAL**: Spaces within the built environment that provide patients with a common space to encourage social interaction with other patients, as well as spaces for patients and their families and friends to meet. These spaces can double up for group therapy sessions with patients.

- **SERVICES**: Spaces that provide services in order for the facility functionality is maintained, functions such as medical, biological and general waste. These spaces also deal with medical supplies and bed linen that is critical to the operation.

The accommodation schedule is populated from the information gathered, from case and precedent studies in chapter five, Robin House Childrens Hospice and the Maggie Centre West London. Through interviews with Healthcare architects, Frik Lange and Kevin Bingham, and the information analysed in the literature review on how to address the issues, towards improving built environment designs that promotes holistic healing.

Please refer to the table below for the proposed accommodation schedule, and the conceptual spatial bubble diagram illustrating the relationship between built environment spaces: administration, communal, public, patients and staff with the various departments within the facility

1.2.7 | CONCEPTUAL SPATIAL DIAGRAM

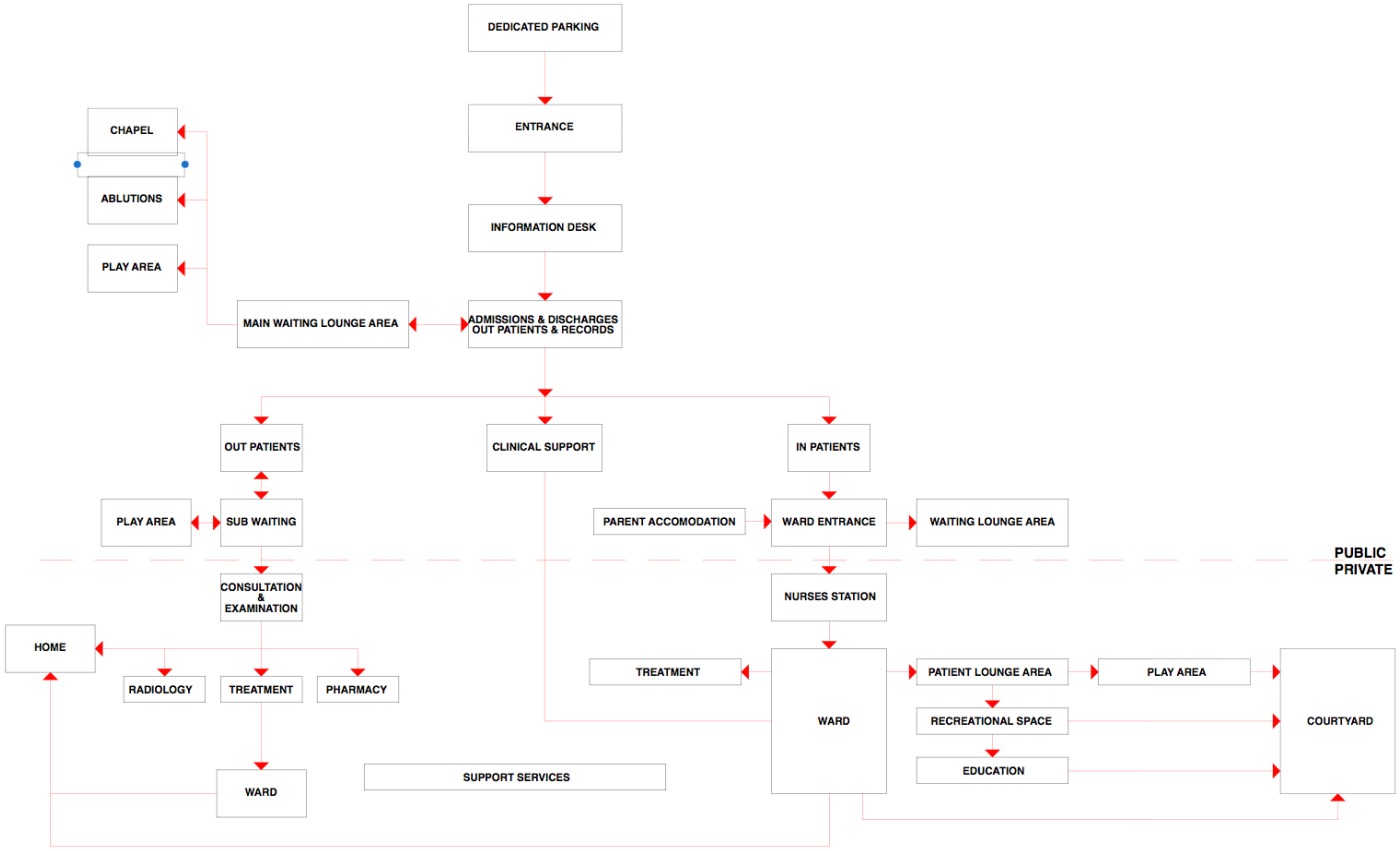


Fig | 2: (Author, 2016).

2.0 | SITE SELECTION, SURVEY AND ANALYSIS

2.1 | INTRODUCTION

The process of selecting the ideal site is not a straight forward exercise, due to the necessity of certain criteria having to be met for the proposed typology to be feasible. Challenges facing the design such as, the typology needing to be on a Department of Health, classified level 1 or District hospital site. As discussed in chapter four, South Africa does not have a facility that has been designed from inception to provide specialised oncological treatment of paediatric patients and their needs. The facility should ideally be located on a existing Level 1 Hospital site, in order to connect into the existing healthcare infrastructure that is in place, and minimise the duplication of services.

Paediatric oncology facilities in South Africa are divided into, Government and Private facilities. Private healthcare facilities predominately care for the financially wealthy population group, these facilities generate revenue and profit by treating patients and are self sufficient institution. Government healthcare hospitals are a fundamental cornerstone of the health care system, providing accessible healthcare to the majority of the population. The selection of existing hospital site should be considered in terms of demand for the provision of care in order for it to be a feasible option. Government hospital site would allow paediatric oncology care to a larger segment of the population who are unable to get care at unaffordable private hospitals.

The criteria that are required to be taken into consideration when evaluating the potential sites appropriateness, are as follows:

2.2 | SITE SELECTION CRITERIA

- **LEVEL 1 / DISTRICT HEALTHCARE**: The presence of a healthcare institution that is classified as a Level 1 or District Hospital by the Department of Health, the proximity allows access to share existing services, infrastructure, professionals, financially feasible and broadens the types of care available.

- **POPULATION**: This criteria ties directly to the accessibility criteria below. Paediatric oncological treatment is a specialised healthcare service and therefore needs a larger population catchment area in order for their to be a sufficient patient population for this typology to be feasible.

- **ACCESSIBILITY**: The selected site needs to be easily accessed by patients, family and friends alike, most of which depend primarily on public transport for transportation. The parents and families role in the patients healing process is invaluable. Factors such as proximity to major transportation networks, the better the network in the area which translates into the healthcare facility ability to provide service to a larger patient population.

- **ORIENTATION:** Orientation provides the opportunity to the building to maximise the ability to allow natural light.

- **PRESCHOOL, PRIMARY AND SECONDARY EDUCATION PROXIMITY**: This criteria relates to the presence of existing education institutions within the vicinity of the proposed site. Whereby education professional at these institutions can be used to provide patients with education during the hospitalisation period, in order to continue their education. This is critical not only to continue the education, but to maintain the social bonds with friends

- **ACCESS TO NATURE**: Throughout the research and the theories selected, identify the positive role of a therapeutic design impacting on the recovery of the patients as well as comfort and a positive distraction. Therefore a site with sweeping natural views and allows sufficient space for the creation of green spaces in and around the built environment.

- **SAFETY**: The site should be a one that will be a safe location for all occupants of the facility. Considering the vulnerability of the patients involved in the proposed typology, security needs to be sound.

2.3 | SITE SELECTION OPTIONS

2.3.1 | SITE OPTION 1: INKOSI ALBERT LUTHULI HOSPITAL COMPLEX, DURBAN, KWA-ZULU NATAL.

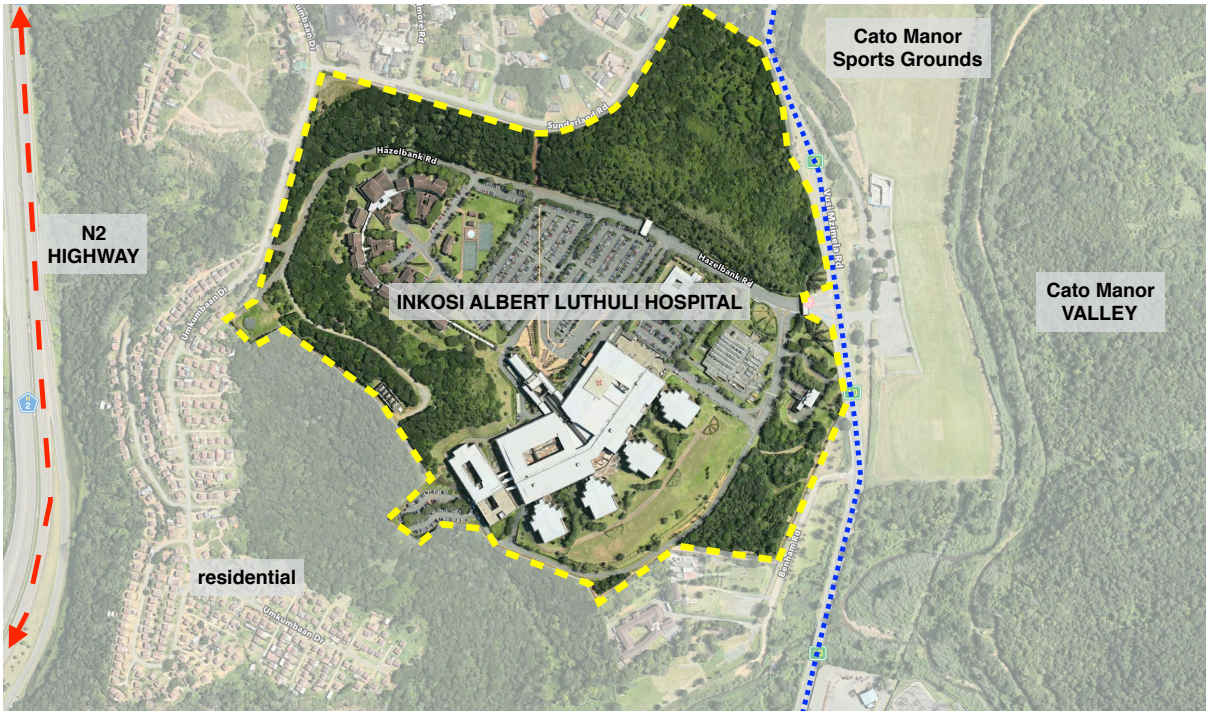


Fig | 3 : Satellite Photo edited by author (Apple Maps, 2016).

| SITE OPTION ONE: CRITERIA ADJUDICATION

CRITERIA	SCORE
EXISTING LEVEL 1 / DISTRICT HOSPITAL	**7**
POPULATION	**6**
ACCESSIBILITY	**8**
ORIENTATION	**10**
EDUCATION	**4**
ACCESS TO NATURE	**7**
SAFETY	**9**
TOTAL	**54 / 70**

| SITE OPTION ONE: CRITERIA ASSESSMENT

LEVEL 1 / DISTRICT HEALTHCARE: Inkosi Albert Luthuli Hospital Complex is classified by the Department of Health as a district healthcare institution. Currently houses an operational paediatric oncologyy unit, providing oncological care.

POPULATION: The hospital sits within the eThekwini Municipality, which Durban is the main city centre, serving a large population group. However Inkosi Albert Luthuli Hospital Complex is not the only facility that provides paediatric oncological treatment, and therefore various options available for treatment within the metropolitan area such as, Addington Hospital (Government), Durban Oncology Centre (Private), Parklands Hospital (Private). Patients are brought in from other facilities that are unable to accommodate their local capacity.

ACCESSIBILITY: Existing Hospital site is accessed off Belair road which is a primary road : and within 200m from the Solomon Mahlangu Drive (M7 Freeway) and within 1km of the N2 highway. The site is decently situated public transport routes, making the site accessible to patients, parents, staff and visitors.

ORIENTATION: The site is on a northeasterly axis. The site sits elevated in relation to the surroundings and facing the Cato Manor valley. The site is sunlight throughout the day, although may be subject to micro climate weather, such as anabatic, katabatic winds and temperature inversions due to the location on the side of a valley. Possibly having drastic climatic changes between day and evening.

PRESCHOOL, PRIMARY AND SECONDARY EDUCATION PROXIMITY: The existing hospital is isolated from existing schools, schools can be found between a radius of 2-5km: Manor Gardens Primary School being the closest, then Penzance Primary School, Port Natal High School, Glenwood High School, Durban Girls High School and Crawford College.

ACCESS TO NATURE: Hospital site located on a hill side, has a vantage point which allows sweeping views of green fields, nature and a open view of the CMOSS green conservancy belt in the Cato Manor valley.

SAFETY: Hospital site is secured as per the Department of Healths requirements.

2.3.2 | SITE OPTION TWO: GREY HOSPITAL COMPLEX, PIETERMARITZBURG, KWA-ZULU NATAL

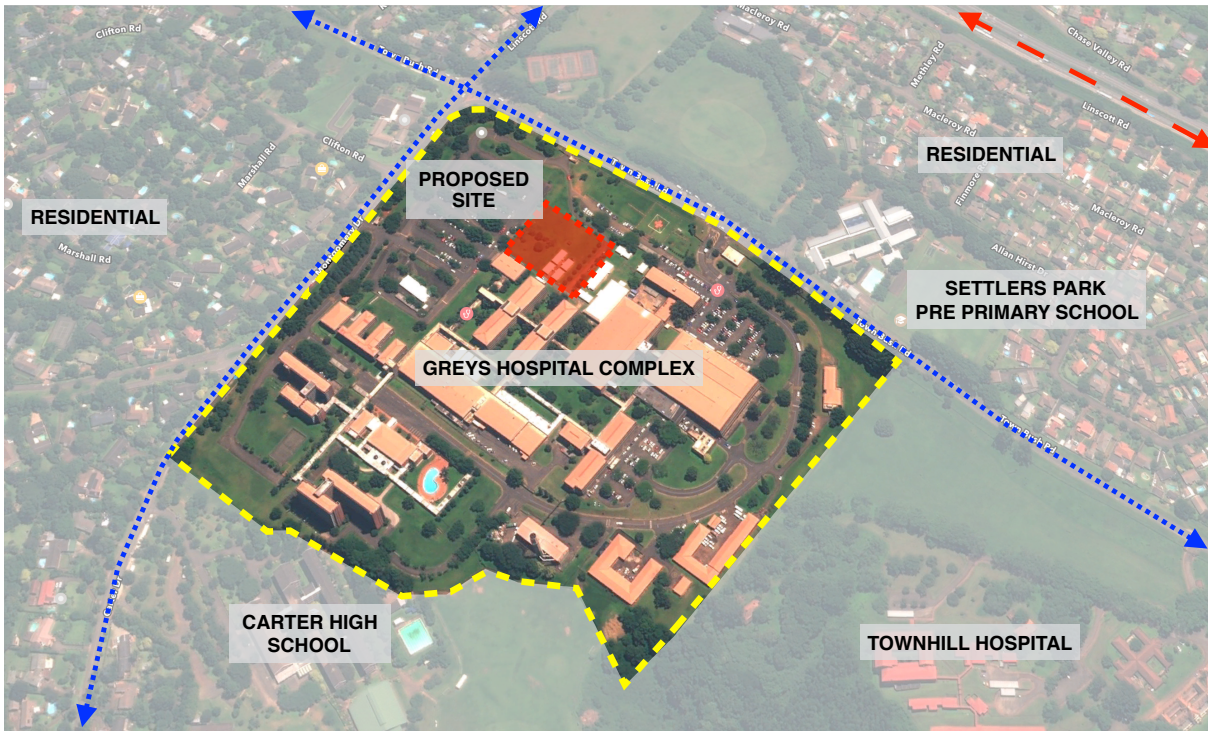


Fig | 4 : Satellite Photo edited by author (Apple Maps, 2016).

| SITE OPTION TWO: CRITERIA ADJUDICATION

CRITERIA	SCORE
EXISTING LEVEL 1 / DISTRICT HOSPITAL	**10**
POPULATION	**9**
ACCESSIBILITY	**9**
ORIENTATION	**9**
EDUCATION	**8.5**
ACCESS TO NATURE	**8**
SAFETY	**9**
TOTAL	**62.5 / 70**

I SITE OPTION TWO: CRITERIA ASSESSMENT

LEVEL 1 / DISTRICT HEALTHCARE: Greys Hospital Complex is classified by the Department of Health as a district healthcare institution. Currently houses an operational paediatric oncologyy unit, providing oncological care.

POPULATION: The hospital sits within the Msunduzi Municipality - located within 2km from Pietermaritzburg, it serves the metropolitan population group as well as patients further inland. Greys Hospital Complex is the only facility that provides paediatric oncological treatment in the region, alternatively the closest facility is 90km away in Durban. Currently the existing facility was not specifically designed with the end user in mind and has reached its capacity to accommodate more patients, unable to cater to the demands, patients are decanted to Inkhosi Albert Luthuli Hospital in Durban. This results in patient families having to travel long distances to see their children or patient.

ACCESSIBILITY: Existing Hospital site is accessed off Town Bush Road road which is a primary road : and within 500m from the N3 Highway off/on ramp. The site is well situated on main public transport routes, making the site very accessible to patients, parents, staff and visitors.

ORIENTATION: The site is on a northwesterly axis. The site sits elevated in relation to the surroundings and facing Pietermaritzburg and the forrest hills.

PRESCHOOL, PRIMARY AND SECONDARY EDUCATION PROXIMITY: There are three schools of three different schooling levels within a radius of 500m: Settlers Park Pre Primary, Northern Primary School and Carter High School. Providing a wide range of education in the near vicinity, making accessibility for education professionals to attend to patients educational needs.

ACCESS TO NATURE: Existing Hospital site is located on a bulk earth work platform that has been planted with trees, the site elevated position allows for open vista of the city of Pietermaritzburg, as well as the forested hills. This provides various vistas that can be taken advantage of.

SAFETY: Hospital site is secured as per the Department of Healths requirements.

2.4 | SITE OPTION: CONCLUSION

The chosen site, option two (GREY HOSPITAL COMPLEX, PIETERMARITZBURG, KWA-ZULU NATAL) is ideally situated within a pleasant natural setting, views to sweeping vistas of both urban and natural settings, and within close proximity to transport and education nodes. This is important to the proposed design, as creating a therapeutic setting will positively affect the patients healing, as well as providing a source for positive distraction while hospitalized. The accessibility to the site is critical as the hospital complex services a large population catchment area, and therefore important that the facility is accessible to all means of transport, especially public transport. The site cadastral (ERF 1195 of the Farm of Pietermaritzburg) information stipulates that the site has been zoned for healthcare and residential. Although the current facility can meet the physical aspects of treatment of the illness, it is unable to provide for the psychological, spiritual and social needs of the patient. The existing infrastructure is unable to cater to the demand (patients decanted to hospitals in Durban), the built environments inability to provide patients with holistic healing make the Grey Hospital Complex the ideal candidate site for the proposed holistically designed paediatric oncology unit.

2.5 I SITE ANALYSIS

SITE DATA

Current site undergoing consolidation of multiple erven that make up the Grey Hospital Complex site.

- Zoning : E1
- Building lines: 7.5m on road fronts and 4.5m on sides and rear
- Coverage: 50% Allowable
- Height Restrictions: buildings not to exceed 60 degrees from the perimeter boundary.

AREA & SITE BOUNDARY

ERF 1195 of Farm Pietermaritzburg - 252 191 sq m

Allowable Coverage - 126 095.50 sq meters or 50% (allowed)

Existing Coverage - 50 730.76 sq meters

Proposed Building - 5230.53 sq meters

Proposed Coverage - 55 961.29 sq meters or 22.19% (Permissible)

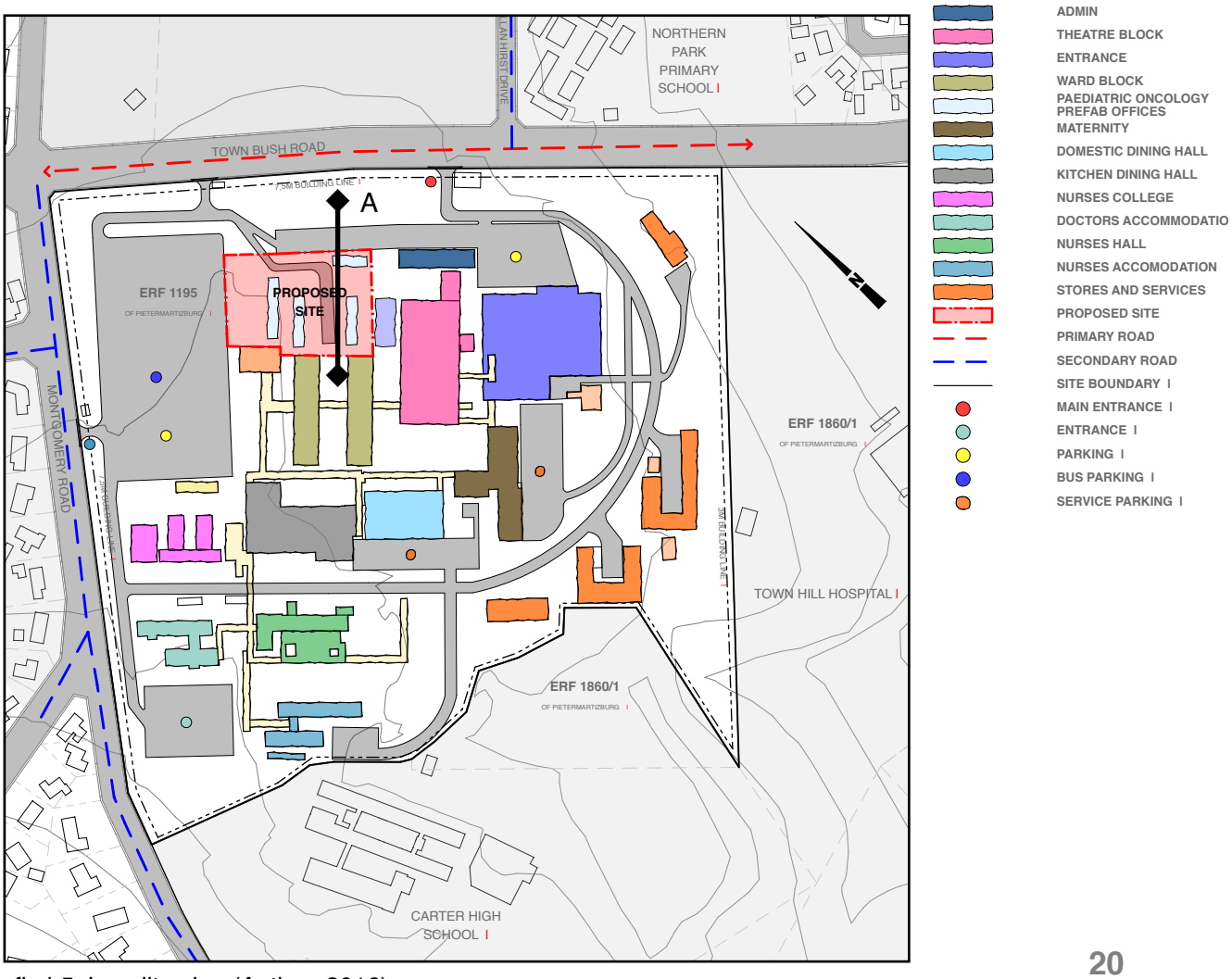


fig I 5: Locality plan (Author, 2016).

ORIENTATION AND VIEWS

the selected site is orientated in a northeasterly axis, and is constantly sunlight throughout the day. Due to the elevated position of the site, there are sweeping views of the forested hills to the North East and a views of the Pietermaritzburg CBD.

ACCESS

the hospital currently has two access points. The main entrance which is situated off Town Bush Road, the second entrance is off Montgomery Road. Both entrances are connected via a network of internal roads. There are bus stop on either side of the Town Bush Road entrance and Montgomery Road, and taxis stop just out side the entrances to pick and drop off staff, patients and visitors coming and going from the hospital.

EXISTING

the site sits within an operational District/Level One hospital complex. The proposed site is currently the location of the pediatric oncology prefabricated doctors offices (please refer to fig.) . The current wards are situated in close proximity to critical hospital services that are required to provide oncological treatment to pediatric oncology patients such as; the doctors offices, theater block and the radiology building.

SITE PROPERTIES

The site is flat, it was flattened part of a designed bulk earthworks when the ward buildings were designed and constructed. This platform sits higher than the parking area to the North East and on the same level as the large parking area to the North West. The land is covered in grass, with low trees running on the North East bank perimeter facing the narrow parking area.

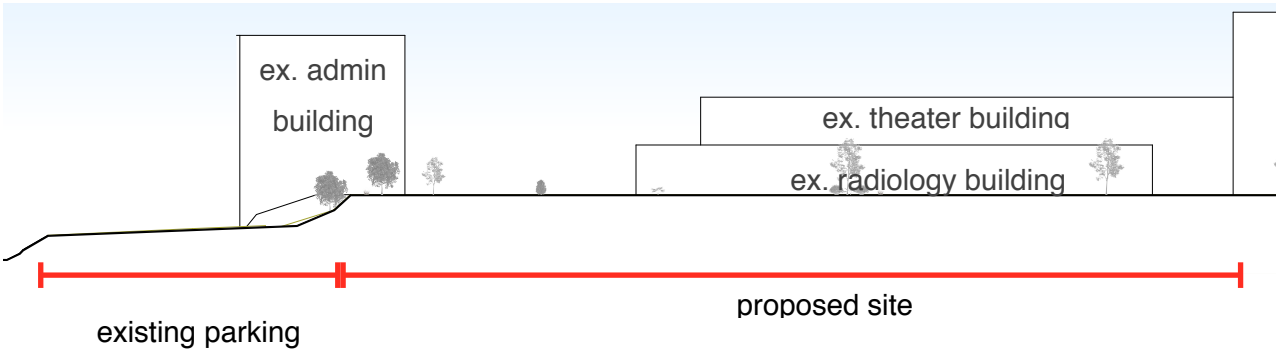


Fig I 6: Section A - A (Author, 2016).

CLIMATE

Pietermaritzburg climate is described as warm and temperate. Summer temperatures are hot and most of the annual rainfall is experienced during this season, winter is cold and dry. The temperature in this regions averages at 18.2 °C. and the annual precipitation is averages 897 mm. East South East wind is known to bring rain in the summer months and South East the rain during the winter period. Pietermaritzburg normally receives about 695mm of rain per year, with most rainfall occurring mainly during mid summer.

2.6 I DESIGN CONCEPT

The design takes into considered concept of holistic healing, Supportive design and Age Environment Impact theory and aims in creating a built environment design that is designed with the patient in mind, to cater to their physical, social, psychological and spiritual needs. The framework information has been used in combination with the site analysis, accommodation requirements and the national health regulations as the backbone towards informing the design. The author has used these sources as well as knowledge obtained from researching the topic to guide the design.

The design was generated by acknowledging the existing hospital functions needed for the proposed unit to function and the need to take advantage of the ideal orientation of the site for a habitable space. Identifying the existing facilities currently used to provide oncological treatment to pediatric oncology patients and its connection to the access point off Montgomery Road. The route through the site and its connection to the existing pediatric oncology doctors offices, the radiology department, the ward block and the theater block buildings creates a axial spine onto which functions connect to. This axial form not only aids in efficiently connecting to the critical existing specialized healthcare facilities, but also connects to the existing back of house network on the ground floor.

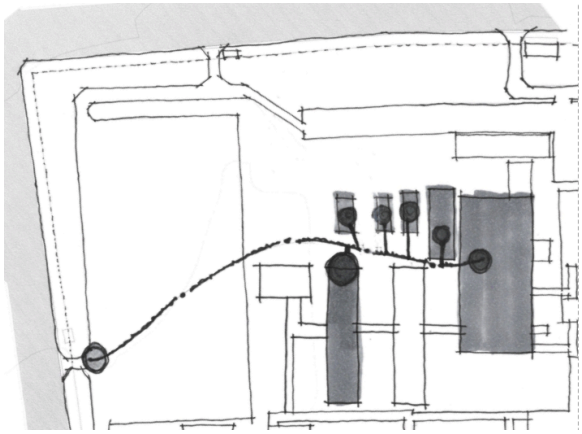


Fig I 7 : Sketch of site in relation to critical existing functions (Author, 2016).

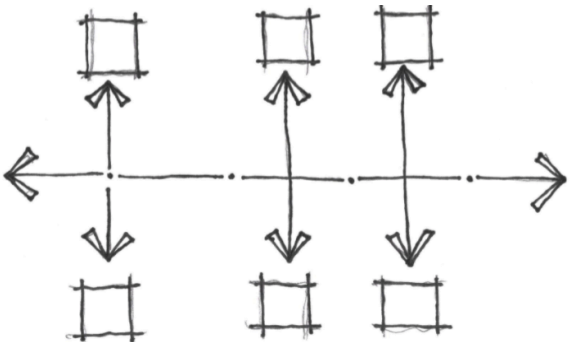


Fig I 8 : Sketch of axial route created by connecting to existing critical functions (Author, 2016).

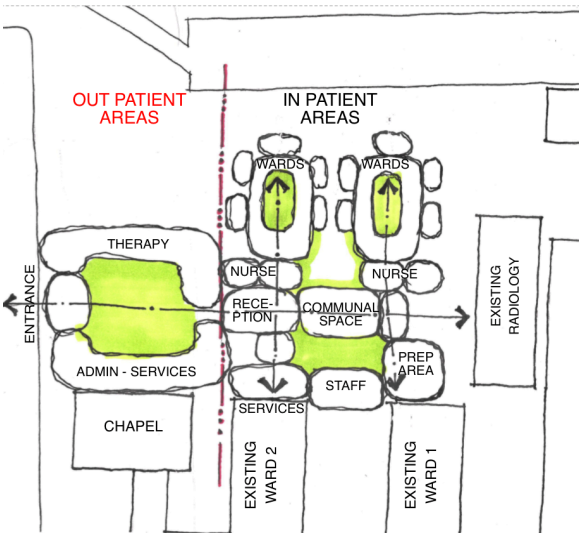


Fig I 9 : Breaking down the functions into smaller complexes to reduce the massing of the design (Author, 2016).

The axial spine allows for the public front, entrance and more noisy side of the building to sit on the edge of adjacent existing large parking area in the North. This allows for patients to gain easy and quick access into the unit from their transport to the facility via drop off or parking. The design of the unit grades from the public front edge, adjacent to the large existing parking area. Further in south, the more private areas such as the in patient wards and where the specialized facilities such as the radiology building exist.

The intention was for the design through a series of thresholds to define the change in function and practice. The entrance of the unit constricts and then releases the into the courtyard space which can cater to various social practices, such as a space for pause, socializing and play. The green courtyard space itself defines a threshold between the outpatients and the inpatient spaces. The planning of the design acknowledges the nature of of both the in-patient and out-patient hospitalisation stay. The out-patients have short treatments and short hospitalisation periods, the areas for this group of patients where deemed necessary to be closer to the entrance due to their short stays period, while the out-patients critical nature are set further back from the in-patient area are more private and closer to the existing radiology and theater block.

De-institutionalised design - research suggests the importance of creating a built environment design that moves away from clinical institutional language, towards a design that is considerate in both scale and in its home like experiential qualities. In order to create a place of refuge for children with cancer, that caters to their holistic needs and comfort. A critical stride towards healing of a patient, is the willingness of the patient to receive that treatment. It is therefore an important the design of the entrance is considerate of the end user, welcoming and engaging. The first impression upon arrival has a bearing on the patients attitude towards the treatment process.

Planning and massing of the design seeks to create a domestic like scale and deinstitutionalised architectural language. A way to create a therapeutic built environment, is by connecting the internal realm to the natural external realm. In opening up the internal realm to the nature, reducing the perception of containment and a connectedness to nature. By connecting patients to the natural realm, positively influences their social, psychological and spiritual well being.

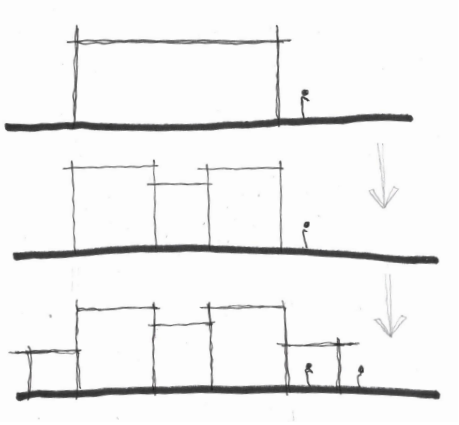


Fig I 10 : Breaking down the overall massing of the design form into scale sensitive massing. (Author, 2016).



Fig | 10 : Sketch plans of a series of smaller complexes to reduce the massing of the design (Author, 2016).

The approach to counter institutional design, was to consider the proposed scheme through Aldo van Eyck's idea of “city is a home and a home a city”. The idea that functional spaces are made up of smaller buildings that make the greater scheme, connected through transitional spaces. This was achieved by articulating the different functions into smaller forms, and creating a series of complexes. This approach allows to break down the overall massing of the design, and moving away from a single large building mass (which is very institutional in nature). The smaller complexes allows for the scale to remain smaller and domestic like in scale, and less intimidating to patients.

Discretion was used in the form design, curves and organic forms were considered over the rectilinear to soften the built environment. These softer forms where considered where it would not affect the operational functionality of the unit and according to regulations. The idea that the unit will be home to patients for long periods of time, the notional idea of the home was considered to the approach to the design of the wards. The ward designs seeks to break the monotony and institutional approach to current multiple bed ward design. Each ward layout shares similarities of a small home, the bedroom and bathroom that services the patients within that ward and a small common space or lounge. Each Ward has its unique designed “stoep” and a colour. This idea gives the ward an address, a method of way finding to assist in navigating the wards for patient, parents, visitors and staff.

Current institutional healthcare environments allow for little choice but to relegate patients to the ward for all facets of their stay during hospitalisation period, activities such as: bathing, relaxing, sleeping, visiting and eating take place in the ward. The proposed scheme looks to

avoid the sense of containment, by providing choice for patients within the built environment such as: alcoves with with racked seating in the transition spaces, to promote social activities and encounters. The larger spatial an volumetric spaces are conducive for the communal space, to provide option and a space for large group social activities to take place, such as: dining, playing and relaxing. The large communal spaces allow patients and parents that is informal and home like environment, catering to a wide range of activities for individuals and as a group within a space that is safe and easily monitored by staff.

The external spaces prior entering the building have considering the needs of patients and parents needs. Therefore landscaped paths from the parking were created to provide seating and pause spaces in a therapeutic natural landscape for those arriving or departing. The attitude of the design to the approach of the patient, is one that emphasis a tranquil and positive natural setting. Using the park like settings and consideration, to provide patients and parents positive a positive setting prior to entering the healthcare environment. This can have have a positive psychological effect on the patient, making more relaxed and receptive to treatment.



Fig I 11 : Journey to the facility to encourage play, pause spaces and create a therapeutic setting (Author, 2016).

The design uses contrasting elements to form a balanced composition. The geometric design element of the entrance building expresses an element of play and engagement, identifying that the healthcare facility is designed for children. The roofline of the design varies in height, subscribing to the concept of the design being “city is like a home and a home like a city” design made up of a network of homes (wards) and functions (therapy and communal areas). The differing heights allow in creating a hierarchy through varying volumes, from the smaller most private

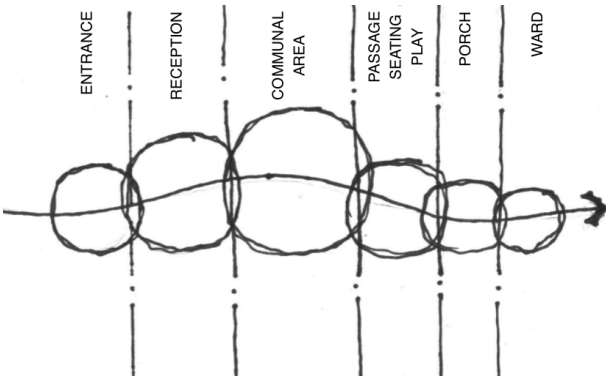


Fig I 12 : Private to Public spatial and volumetric relationships. (Author, 2016).

ward space, to the larger most public communal areas. This hierarchy allows for the breaking down of the elevations reducing the possibility of monotony in the elevations or institutional like aesthetic. With the combination of setbacks and protrusions of walls as well as the varying heights of the spatial volumes allows to articulate the functional spaces. The design of elevations and color of each ward varies from one to another, giving each ward a unique identify, breaking away from the monotonous character. Although some elements are aesthetic, the playful nature of varying shapes and sizes of the fenestration and the use of color create elevations that is engaging and playful - appealing to the bright playful nature of a child.

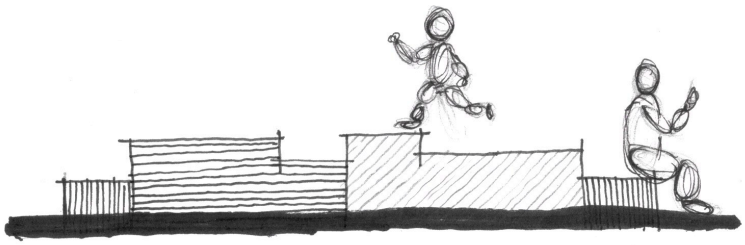


Fig I 13 : Seating and benches, provide children with seating, as well as encourage interaction, climbing or play. (Author, 2016).

In keeping the design to one storey, the elevation of the building maintains a domestic scale and proportion. This attention to scale is mindful of the end user being children as patients, ensuring that as little of the building is two storeys a not to become alienating or daunting for the patient. The predominately ground floor design ensures that all internal spaces are easily accessible to the disable, as it maybe likely some patients may be limited to a wheel chair. The massing and geometric form should allow the entrance of the building to be easily recognizable and engaging to both patient and visitor. The design becomes a sort of icon within its context through the use of geometric forms, colours and textures.

Healing Courtyards - The design objective was to connect to the natural realm, due to its restorative properties and positive effect of the psychological, social and spiritual well being of the patients. By designing the functional building masses to define a series of courtyards, allows the interior built environment a close connection between occupants to the natural realm. The courtyard also allow for interior spaces to be naturally illuminated, this is further reinforced by the narrow cross section of the built environment. Natural lighting provides both quality natural illumination, it positively affects the occupants psychological well being. The shadow of trees and vegetation within the courtyard creates an ever changing play of light and shadow, creating different characteristic within internal spaces at different times of the day. this ever changing qualities of the internal environment can have a positive effect

and mood on all occupants. The wards have been designed around the healing garden for internals spaces to engage with the natural realm.

Circulation - As identified in the circulation of the selected case studies, these circulation spaces are normally double loaded, artificially lit, disconnected from nature and single functional space. Instead circulation takes place via arcades around courtyards, circulation spaces that not only function as transitional element, through spatial gestures spaces such as alcoves to encourage social interaction to take place, these spaces could be used as pause place. The circulation arcades around the natural realms, allows for a constant connection to healing gardens, courtyards, natural sunlight and natural landscapes - these natural properties create a therapeutic environment and positively affects patient healing and comfort.

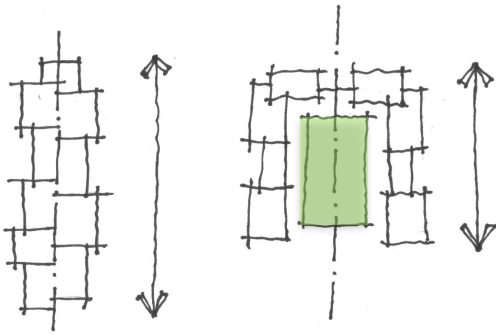


Fig I 14 : Linear institutional double loaded corridors Vs. circulation around a therapeutic courtyard. (Author, 2016).

The wards have been designed around the central healing gardens, this allows to the design to avoid long straight, and possibly double loaded corridors. The circulation space has been designed to have an experience of an arcade, and act as an extension of the exterior, an in between space between the two extremes the interior and the exterior. The transparency and strong connection to nature allows abundant natural lighting into the circulation space, this is further assisted by the narrow floor plates that maximize this effect.

As highlighted by Aldo van Eyck that circulation spaces are not just spaces that allows us to move from one function to another. Circulation spaces can provide the possibilities of encouraging social activities to take place and connecting them top nature.



Fig I 15 : Domestic like scale massing, narrow plates to allow natural lighting. Interior spaces have access to views of the exterior natural realm. (Author, 2016).

Ward designs - The design of the ward spaces take into consideration the various requirements stipulated by the National Health regulation the R158 document. Taking into consideration not only the wards themselves, but the services required to maintain the facility, provide safety and security and the spaces needed for treatment. Due to the nature of the patient, security is an important component, nurses stations have been placed at the entrance points into the built environment and into the ward spaces. Nurses stations monitor the movements and entry of not only parents and visitors that enter the healthcare environment. Nurses stations are positioned to allow supervise the patients for security and safety. Through the use of transparency within the built environment allows for a high degree of overlapping monitoring is possible. Critical patient wards or isolation wards have been purposefully design close to the nurses station, these patients are high risk and need to be in close proximity.

Pediatric in-patients are generally hospitalized between a couple of days and several months depending on the severity and response to treatment. The process of hospitalisation can be a very traumatic experience for a child, moving from their own home to an environment that is unknown. This experience can have effect on the patients behavior, making the patient withdrawn and shy. A common method used with new patients is play therapy with other patients, this not only assist in creating bonds, a sense of support amongst patients can be established. This idea of promoting relationships between patients was used in the design of the three bed ward, where interaction and support amongst patients could be encouraged.

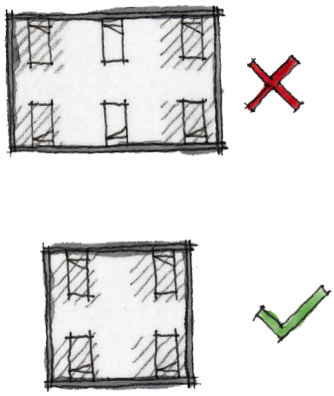


Fig I 16 : Personal space within a multi bed ward. (Author, 2016).

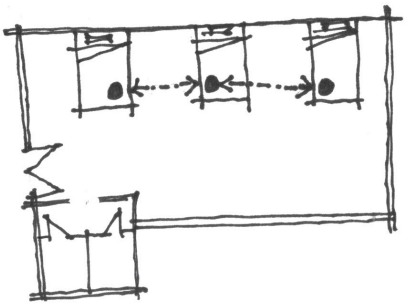


Fig I 17 : Linear bed layout not conducive to promoting social interaction between patients within a multi bed ward. (Author, 2016).

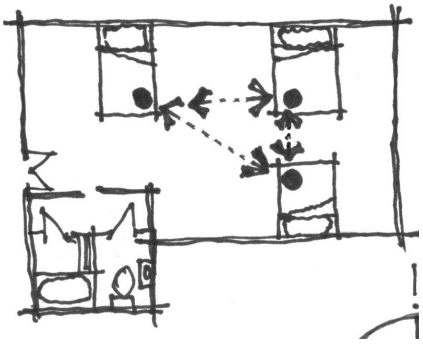


Fig I 18 : Ideal bed layout conducive to promoting social interaction between patients within a multi bed ward. (Author, 2016).

The idea that the unit will be home to patients for long periods of time, the notional idea of the home was considered to the approach to the design of the wards. The ward designs seeks to break the monotony and institutional approach to current multiple bed ward design. Each ward resembles that of a small home, the bedroom and bathroom that services the patients within that ward and a small common space or lounge. Each Ward has its unique designed “stoep” and a colour. Giving each ward an identity address, a method of visual way-finding to assist in navigating through the wards for patient, parents, visitors and staff.

Personal Space - a crucial element when a patient is hospitalized, is the definition of their own space they can call their own. Patient personal space is important, as patient should be encouraged to personalize their own space with their own things. This allows patients to psychologically cope with their hospitalization. Ward designs with multiple beds were investigated, it was identified that wards with more than 4 wards made it difficult for patient with beds in the middle of the ward more difficult to define their own space within the ward. It was for this reason a smaller bed ward was considered, where all patients could have a corner of a ward, in order to easily define personal space within the group realm. The wall spaces provide the opportunity for patients to personalize to their own liking (giving a the patient a sense of control of the built environment). This personalization is possible without encroaching on other patients personal space.

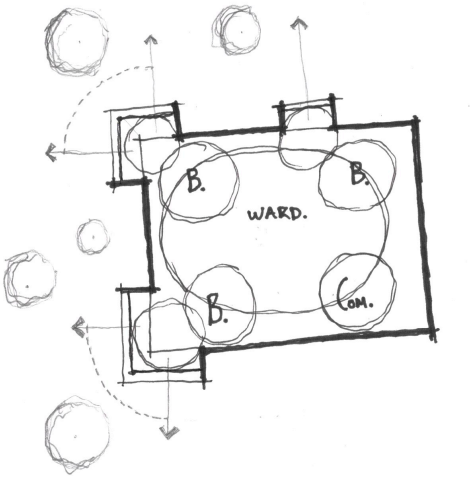


Fig I 19 : Sketch showcasing the spaces for the individual within the group environment of the patient ward. (Author, 2016).

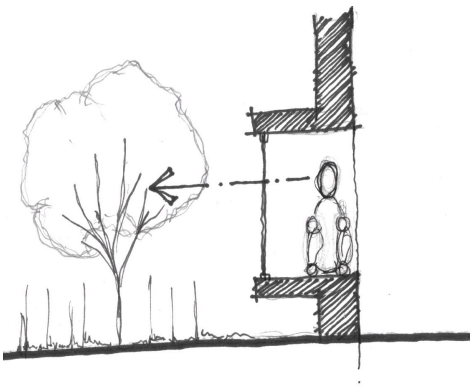
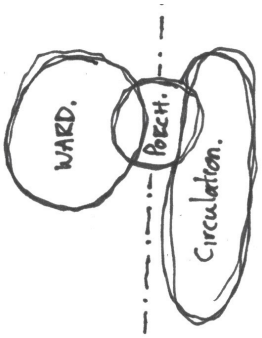


Fig I 20 : Window seating alcove in the ward, allow a space for a place for individual while still connected to the group realm. Providing patients with choice as well as space that connects to nature and provides a therapeutic space for healing and restoration (Author, 2016).

The design of the ward was not only considered for the group within the ward, but the individual within the space. The design caters for the needs of the individual within a larger group space, by using bay windows. The bay window provides a smaller volume in which patient has an option to retreat to, a place of solace with a connection to nature, but remaining connected to the group realm.

The design considers the transition from the private and public realms, inside the ward being the private realm and the circulation space to which the ward is connected to the public realm or the group. To avoid the extreme transition from the public to the private, an in-between space was considered to provide a buffer between the two realms. The in-between space promotes for chance encounters and social interaction, allowing the patient choice - to avoid having to choose between either public or private realm. At the entrance of each ward a “stoep” or a porch with benches for seating, sharing similarities to Aldo van Eyck’s orphanage where using a transition space before entering another functional space. By provides the patient with choice within the built environment, allowing the patient a connection to the group realm without necessarily participating (this avoids patient getting isolated from the group).



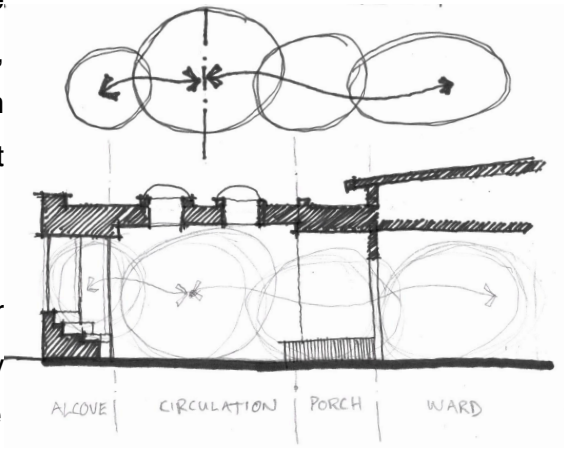


Fig I 21 & 22: Porch is an in-between space, transition space between the public and private spaces - circulation space / porch / ward (Author, 2016).

The trees on the site have been maintained for shading, aesthetics as well as promoting biodiversity that provide distraction for patients (trees encourage birdlife and reptile life etc.). Additional plants and trees will be planted in the courtyards and around the proposed ward buildings where they may be needed. The outdoor elements have been considered for pause and for play, features such as bench blocks and steps can encourage children to engage, play, climb and explore. The design creates an environment that is friendly and engages the playful nature of the patients.

2.7 I ACCOMMODATION SCHEDULE

PROPOSED SCHEDULE OF ACCOMMODATION I

Space	Area (m)	No.
Public Area I		
Entrance	100	1
Waiting	100	1
Public ablutions	30	1
Security Control	10	1
Sub Waiting	30	1
Chapel / Place of Reflection	20	1
Administration I		
Information Desk	10	1
Admin Offices	70	1
Medical Records	30	1
General Storage & DB Room	70	1
Ablutions	25	2
Data Capturing	15	1
General Store	12	1
Staff Areas I		
Boardroom	20	3
Staff Room / Lounge	30	1
Staff Kitchen	15	2
Library	60	1
Staff Ablutions / Change Rooms	40	1
Training Room	20	1
IT Server Room	15	1
Storage Room	15	1
Sterile Room	9	1
Doctors Offices + Consulting	12	12
Clerk Offices Open	90	1
Support Services I		
Dirty Linen	4	10
Linen Packing	4	10
Decontamination Room	3	8
Storage Office	1	15

Storage Office	1	15
Stores	4	10
Mortuary	1	15
Clean Utility Room	5	10
Cleaners Room	4	10
Kitchen	1	10
Patient Areas I		
Bed units - Hot Box	4	15
Bed units - Children	4	45
Bed units - Adolescents	4	45
Bath/Shower	12	10
Toilet	1	30
Treatment / Procedure Room	6	15
Counselling Room	2	20
Play Area	2	35
Recreation Area	2	35
Courtyard	2	100
Lounge / Communal Area	1	35
Education Area	2	35
Out Patient Areas I		
Waiting Area	1	35
Patient Ablutions	1	30
Group Therapy Courtyard	1	20
Storage	2	12
Clinic & Consulting	4	12
MDT	2	12
Chemo Therapy	1	65
In-Patient I		
Information Desk	1	10
Medical Records	1	10
Data Capturing	1	10
Stores	1	10

Triage		
Nurse Station	4	10
Patient Ablutions	1	20
In patients Recreational Area		
Nurses Offices		
Sluice Room	5	10
Linen Store	5	10
Social Workers Offices	1	30
Storage	1	15
Records	1	15
Other I		
Outdoor Seating Area		
Therapy Gardens	1	150
Parent Accommodation	1	300
ESTIMATED AREAS		
Public Area I	350m2	
Administration I	400m2	
Staff Areas I	700m2	
Support Services I	500m2	
Clinical Support I	150m2	
Out Patient Areas I	680m2	
In-Patient I	3100m2	
Patient Therapy I	460m2	
Parent Accommodation	300m2	
Other I		
TOTAL	6640m2	

2.8 | REFRENCES

FIGURE | 1 - Department of Health. 2016. http://www.gov.za/. [Accessed 02 October 2016].

FIGURE | 2 - Author. 2016.

FIGURE | 3 - Apple Maps. 2016.

FIGURE | 4 - Apple Maps. 2016.

FIGURE | 5 - Author. 2016.

FIGURE | 6 - Author. 2016.

FIGURE | 7 - Author. 2016.

FIGURE | 8 - Author. 2016.

FIGURE | 9 - Author. 2016.

FIGURE | 10 - Author. 2016.

FIGURE | 11 -Author. 2016.

FIGURE | 12 - Author. 2016.

FIGURE | 13 - Author. 2016.

FIGURE | 14 - Author. 2016.

FIGURE | 15 - Author. 2016.

FIGURE | 16 - Author. 2016.

FIGURE | 17 - Author. 2016.

FIGURE | 18 - Author. 2016.

FIGURE | 19 - Author. 2016.

FIGURE | 20 - Author. 2016.

FIGURE | 21 -Author. 2016.

FIGURE | 22 - Author. 2016.

DESIGN PRIMER

KEY WORDS

HOLISTIC HEALING | PATIENT CENTERED DESIGN | **CONNECTING TO NATURE** | HOME LIKE | **DE INSTITUTIONALISE** | CHOICE | **THERAPEUTIC** | NATURE | **SPIRITUAL** | FAMILY

TITLE

PRACTITIONERS AND CARE GIVERS VIEWS ON IMPROVING THE BUILT ENVIRONMENT OF PAEDIATRIC ONCOLOGY FACILITIES, TOWARDS A HOLISTIC DESIGN FOR A PAEDIATRIC ONCOLOGY UNIT, PIETERMARITZBURG

WHO

PAEDIATRIC ONCOLOGY PATIENTS

WHAT

PAEDIATRIC ONCOLOGY UNIT

WHY

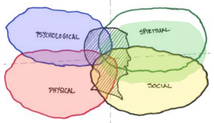
CURRENT PAEDIATRIC ONCOLOGY BUILT ENVIRONMENT DESIGNS ARE NOT IDEALLY DESIGNED TO CATER TO THE HOLISTIC NEEDS OF PAEDIATRIC PATIENTS.

HOW

THROUGH PATIENT CENTRED DESIGN, CATERING TO THE HOLISTIC NEEDS OF THE PATIENT TOWARDS PROMOTING HOLISTIC HEALING.

CONCEPTUAL FRAMEWORK

HOLISTIC HEALING



HOLSITIC HEALING REFERS TO THE WELL BEING OF NOT ONLY THE PHYSICAL WELL BEING, BUT ALSO THE SPIRITUAL, SOCIAL AND PSYCHOLOGICAL TOGETHER.

PROBLEM STATEMENT

EXISTING PAEDIATRIC ONCOLOGY UNITS IN SOUTH AFRICA HAVE COME ABOUT FROM BEING CONVERTED FROM EXISTING ADULT WARDS TO ACCOMMODATE PAEDIATRIC ONCOLOGY UNITS. THIS HAS RESULTED IN LIMITED SPACE TO CATER TO THE SPACIAL NEEDS OF CHILDREN. FOCUSING ON THE PROVISION OF MEDICINAL CARE AND OFTEN OVERLOOK THE OTHER HOLISTIC COMPONENTS AND NEEDS.

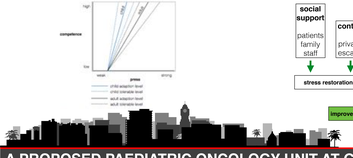
THE RESTRICTIVE, INSTITUTIONAL AND CLINICAL CHARACTER OF CURRENT DESIGNS, ARE DETRIMENTAL TO THE CHILDS EXPERIENCE, COMFORT AND ULTIMATELY THE HEALING PROCESS. THE IDEA THAT THE SAME ENVIRONMENT FOR AN ADULT IS SUITABLE FOR CHILDREN - "ONE SIZE FITS ALL". CURRENT BUILT ENVIRONMENTS DOES NOT CONSIDER THE CHILDS PLAYFUL NATURE, THEIR PSYCHOLOGICAL, SOCIAL, AND SPIRITUAL NEEDS, THAT TOGETHER PROMOTE HOLISTIC HEALING AND COMFORT.

THEORETICAL FRAMEWORK

AGE ENVIRONMENTAL IMPACT THEORY

THE ABILITY TO ADAPT TO AN ENVIRONMENT,

ACKNOWLEDGES THE DIFFERENCES IN PERCEPTION OF SPACE BETWEEN YOUNGER AND OLDER POPULATION GROUPS



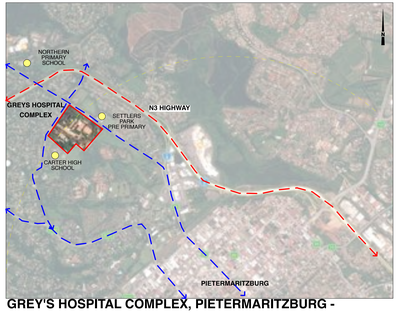
SUPPORTIVE DESIGN THEORY

CONNECTION TO NATURE
CONTROL
SOCIAL SUPPORT



SITE SELECTION

LEVEL 1 / DISTRICT HEALTHCARE | POPULATION | **ACCESSIBILITY** | ORIENTATION | **EDUCATION** | CONNECTION TO NATURE | **SAFETY**



GREY'S HOSPITAL COMPLEX, PIETERMARITZBURG - KWAZULU NATAL



GREY'S HOSPITAL - PAEDIATRIC ONCOLOGY UNIT



GREY HOSPITAL HOSPITAL PRECINCT

PRECINCT IS DEVIDIDED INTO 5 FUNCTIONAL ZONES - REFER TO ZONING.

WITHIN CLOSE PROXIMITY OF HIGHWAY (N3) AND PRIMARY ROADS - LARGE CATCHMENT AREA.

INSUFFICIENT FACILITIES TO ACCOMMODATE DEMAND - PATIENTS DECANTED TO DURBAN HOSPITALS.

FACILITIES ARE NOT IDEAL FOR HOLISTIC HEALING.

- EXISTING WARD CONVERTED FROM ADULT WARD TO HOUSE PAEDIATRIC ONCOLOGY UNIT
- INSTITUTIONAL DESIGN - DOUBLE LOADED CORRIDORS
- NO LINK TO NATURE
- NO RECREATIONAL SPACES
- LACK OF CHOICE FOR PATIENT AND PARENT
- DESIGN LACKS SENSITIVITY TO PATIENT


IMAGE 1


IMAGE 2


IMAGE 3


IMAGE 4

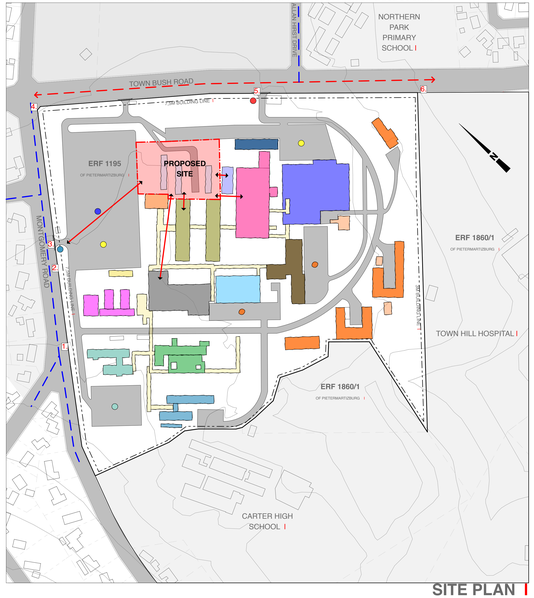

IMAGE 5


IMAGE 6



ZONING


EXISTING RADIOLOGY AND PAEDIATRIC ONCOLOGY PREFABRICATED BUILDING



SITE PLAN

SITE IMAGES



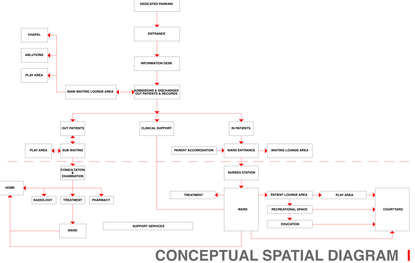
KEY

THE CLIENT

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

CLIENT BRIEF

- KwaZulu-Natal Department of Health, requires a new paediatric oncology facility to replace existing inadequate paediatric oncology facility.
- The proposed typology to provide high quality care, through the provision of inpatient, outpatient facilities.
- The proposed paediatric oncology facility, should incorporate latest healthcare design principles from inception, while pursuing the Department of Health's vision of "optimal health", a design that embodies a welcoming and caring environment for patients.
- The architect is to design a built environment that is therapeutic, deinstitutionalised and domestic in nature to promote patient healing and recovery. An environment that encourages holistic healing principles of physical, psychological, social and spiritual healing.



CONCEPTUAL SPATIAL DIAGRAM

ACCOMMODATION

- **ADMINISTRATION:** To maintain operational efficiency, spaces such as, patient records, reception desk to supervise patient waiting spaces and handle patient appointments.
- **IN-PATIENT FACILITY:** Provide in-patient patients accommodation during the hospitalisation period until patient has been healed or is considered able to go home.
- **OUT-PATIENT & THERAPY FACILITY:** Provide clinical support, various patient therapies and treatment functions.
- **EDUCATION:** Government hospitals are often used for academic purposes for in service training for professionals.
- **COMMUNAL:** Provide patients with a common space to encourage social interaction with other patients, spaces for patients and their families and friends to meet.
- **SERVICES:** Provide services in order to run the facility, ands functionality to be maintained.

BULK AREAS

PUBLIC AREA - 350m²
ADMINISTRATION - 400m²
STAFF AREAS - 700m²
SUPPORT SURVICES - 500m²

CLINICAL SUPPORT - 150m²
OUT PATIENT AREAS - 3100m²
IN PATIENT - 680m²
PATIENT THERAPY - 460m²

TOTAL - 6340m²

DESIGN AIM

To create a de-institutionalised built environment, by using architectural spatial gestures and in between spaces to encourage patient choice and social interaction.

Link the internal built environment and the natural.

Creating a design that provides a therapeutic environment to provide holistic healing, comfort and positive distractions for the patient.

Built environment that considers the patient as an individual and as a group.

Using the concept of a home in dealing with spatial relationships

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201501386

PRECEDENT

MAGGIE CENTRE WEST LONDON UK, ROGER STIRK HARBOUR AND PARTNERS












- HOME LIKE DESIGN
- HEART OF THE FACILITY IS CENTRED AROUND THE DINNING ROOM.
- USE OF SPATIAL GESTURES TO CREATE SMALLER SOCIAL SPACES FOR INTERACTION.
- ALL INTERNAL SPACES HAVE A CONNECTION TO NATURE.

MAGGIE CENTRE GLASGOW UK, OMA ARCHITECTS



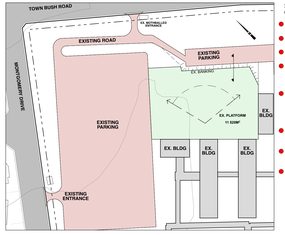






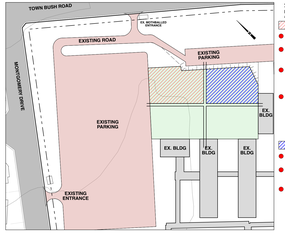
- THE DESIGN IS CENTRED AROUND GREEN COURTYARD.
- SPACES ARE EXTRUDED OFF CIRCULATION AROUND THE PERIPHERY OF COURTYARD. CREATING SPACES FOR VARIOUS FUNCTIONS.
- INTERNAL SPACES CONNECT TO NATURE.
- NARROW FLOOR PLATES ALLOWS TO MAXIMIZE NATURAL LIGHTING INTO THE BUILDING.

SITE DESIGN CONSIDERATION PROCESS



SITE ORIENTATION

- GOOD SOLAR ORIENTATION
- GOOD VIEWS OF NATURE
- GOOD VIEWS OF THE CITY
- CURRENTLY THE LOCATION OF THE PAEDIATRIC ONCOLOGY OFFICES - PREFAB BUILDINGS
- CURRENT SITE BORDERS EXISTING SERVICES REQUIRED FOR A PAEDIATRIC ONCOLOGY UNIT
- EXISTING EARTHWORK PLATFORM
- EXISTING NATURAL BANKING - WITH PARKING AT THE BOTTOM
- EXISTING RAISED PLATFORM PROVIDES A NATURAL PRIVACY TO THE NORTH EAST PORION OF THE SITE



SITE POSITION OF BUILDING & FUNCTION

- GOOD VIEWS TO NATURE
- SHARES AN EDGE WITH EXISTING PARKING
- FURTHEREST FROM EXISTING HOSPITAL FACILITIES

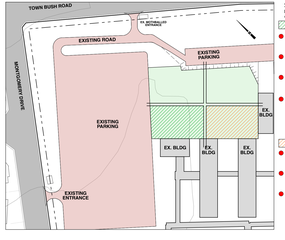
SUMMARY

- QUADRANT IDEAL FOR OUT PATIENTS, CLOSE TO VISITOR PARKING. LARGE OPEN SPACE WITH EXISTING TREES PROVIDES POSITIVE VIEWS AND DISTRACTION FOR PATIENTS

- GOOD VIEWS TO NATURE
- GOOD VIEWS TO THE CITY

SUMMARY

- QUADRANT OF THE SITE LENDS ITSELF TO IN PATIENT WARDS. LARGE OPEN SPACE WITH EXISTING TREES PROVIDES POSITIVE VIEWS AND DISTRACTION FOR PATIENTS. VIEWS OF THE CITY PROVIDE AN ALTERNATIVE SCENE.



SITE POSITION OF BUILDING & FUNCTION

- SHARES A BOUNDARY WITH EXISTING PARKING.
- SHARES A BOUNDARY EDGE WITH EXISTING HOSPITAL
- LESS VIEWS

SUMMARY

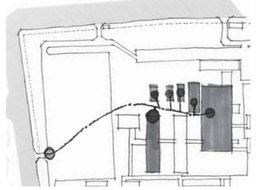
- QUADRANT OF THE SITE LENDS ITSELF TO THE ENTRY POINT FOR THE PROPOSED UNIT. IDEAL AREA TO CONNECT TO EXISTING WARD BLOCKS AND BACK OF HOUSE SERVICES.

- SHARES A BOUNDARY EDGE WITH EXISTING WARD BLOCK
- SHARES A BOUNDARY EDGE WITH EXISTING RADIOLOGY
- NO VIEWS

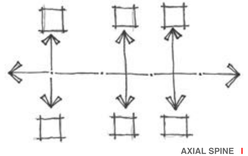
SUMMARY

- QUADRANT OF THE SITE BEST SUITED TO BACK OF HOUSE FUNCTIONS. EXISTING COURTYARD IDEAL FOR PATIENT THERAPY SESSIONS.

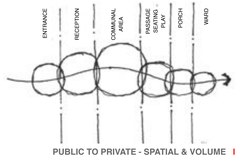
DESIGN PROCESS



CONNECTING TO SITE AND EXISTING FUNCTIONS

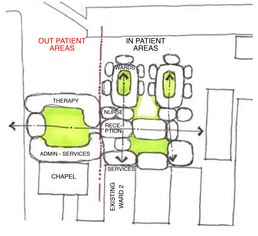


AXIAL SPINE



PUBLIC TO PRIVATE - SPATIAL & VOLUME

A SENSITIVITY TRANSITIONING FROM ONE FUNCTION TO ANOTHER, FROM INTERIOR / EXTERIOR OR PUBLIC TO PRIVATE. BOTH - SPATIAL AND VOLUMETRIC



ARCHITECTURAL PRINCIPLES



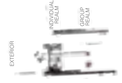
IN - BETWEEN SPACES



SPATIAL GESTURES



CONNECTING INTERNAL TO THE NATURAL REALM



SPACE FOR THE GROUP AND THE INDIVIDUAL



CITY IS A HOME AND A HOME A CITY



COMMUNAL SQUARE

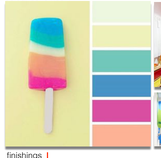


THE INTERNAL STREET - IN BETWEEN



HEALING GARDEN COURTYARD

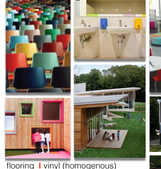
colour schemes



artwork



finishings

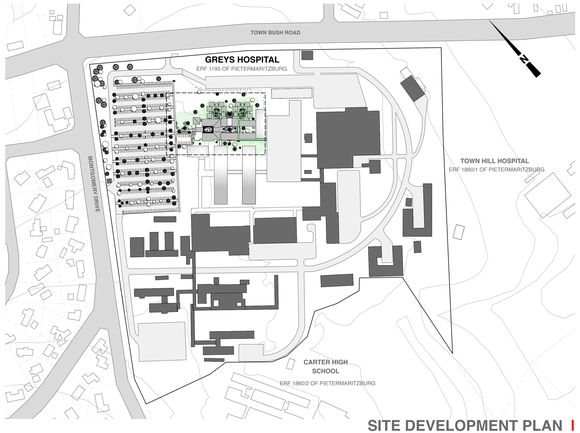




flooring | vinyl (homogenous)

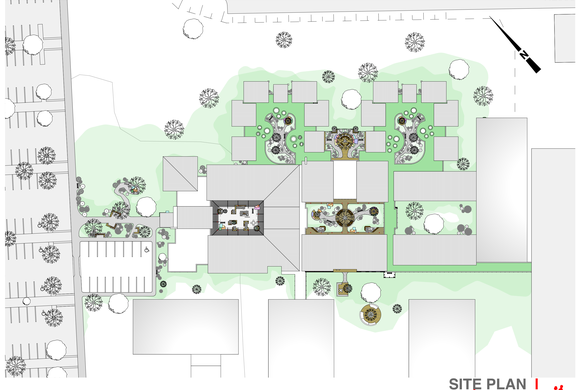


MOOD BOARD



SITE DEVELOPMENT PLAN

1:2500



SITE PLAN

1:500

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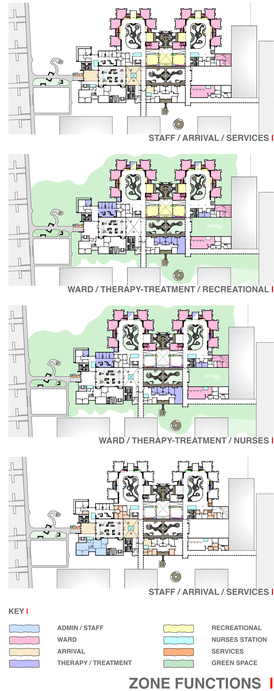
GROUND FLOOR PLAN

1:200



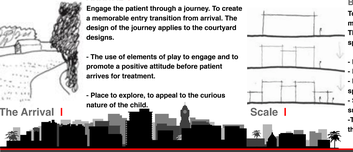
FIRST FLOOR PLAN

1:200



ZONE FUNCTIONS

N/S



ARRIVAL

Engage the patient through a journey. To create a memorable entry transition from arrival. The design of the journey applies to the courtyard designs.

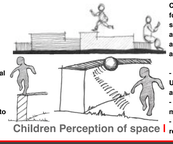
- The use of elements of play to engage and to promote a positive attitude before patient arrives for treatment.

- Place to explore, to appeal to the curious nature of the child.

BREAKING DOWN THE MONOLITHIC FORM

To avoid institutional characteristics of existing monolithic hospital forms.
The attitude towards the form applies to the patient spaces.

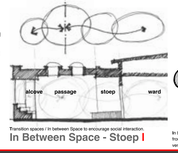
- Less intimidating for patients.
- Breaking down the form allows.
- Large volume spaces are ideal for group or communal spaces - reducing the feeling of confinement.
- Smaller volume spaces are ideal for intimate and smaller activities.
-The horizontal form is broken down, improves views to the external realm.



CHILDS PERCEPTION & SCALE

Children perceive elements differently to adults, for example a wall is boundary to demarcate space, whereas a child sees, walls are for walking along or bouncing a ball. The physical anthropometrics of a child differ to that of a adult and therefore the scale is an important factor.

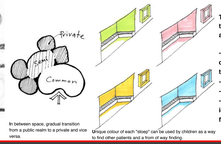
- Elements that enable a child's playful nature. Using the in between space to encourage play - and further socialization
- Play encourages social interaction and mechanism to cope with hospitalization.
- The use of play can encourage a positive response to treatment.

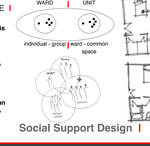


IN BETWEEN SPACE - PUBLIC AND PRIVATE

The in between space provides a buffer or a gradual transition from one type of function to another. This is achieved both spatially and volumetrically.

- The "stoep" design creates a space for seating and doubles up a play space, while visually connected to the natural realm.
- Encourage social interaction to take place.
- A meeting space for patients, parents or doctors.
- The colour used in these spaces, gives each ward an identity. The colour allows for a simple and easy way finding for children (and identity with).

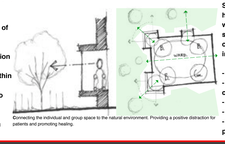




SOCIAL SUPPORT

Design encourages social support between the individual, the patient group, the parents, and the professional team. To assist in the healing, comfort of the patient.

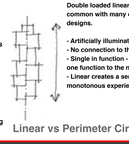
- The design configuration promotes social interaction between patients.
- Patient able to define their own personal space within a multi bed ward.
- Patient has the option of the alcoves, as a space to retreat into - an intimate space.
-Larger spaces encourage for a common meeting space for various activities, social interaction and a spaces to engage with professionals.



THE INDIVIDUAL WITHIN THE GROUP

Social support is important in patients holistic healing process, the patient should be provided with choice and space for the individual. These spaces cater for the individual but remain connected to the group realm. Designed alcoves in wards provide a positive space for patients:

- Personal and intimate space.
- Views to the external natural realm and courtyard through the fenistartion.
- Assists the patients healing process
- Place of reflection.
- Visually connection to group space (preventing patients insolation)



LINEAR

Double loaded linear corridors common with many current hospital designs.

- Artificially illuminated
- No connection to the outside
- Single in function - to move from one function to the next.
- Linear creates a sense of monotonous experience.

PERIMETER

Circulation runs on the periphery of a courtyard.

- Naturally illuminated
- A connection between internal and external realms.
- Encourages not only movement, but a place to stop and take in scenes of the external realm.
- Green Courtyards are therapeutic and provide positive distraction

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ARCHICAD EDUCATION VERSE



NORTH ELEVATION
1:200



SECTION A-A
1:200



EXTERNAL ARIAL VIEW



EAST ELEVATION
1:200



SECTION B-B
1:200



EXTERNAL ENTRANCE



EXTERNAL WARD BUILDING



INTERNAL WARD SPACE



WARD COURTYARD



SOUTH ELEVATION
1:200



SECTION C-C
1:200



EXTERNAL PLAY SPACE



PATIENT WARD



COMMON SPACE



WARD SPACE

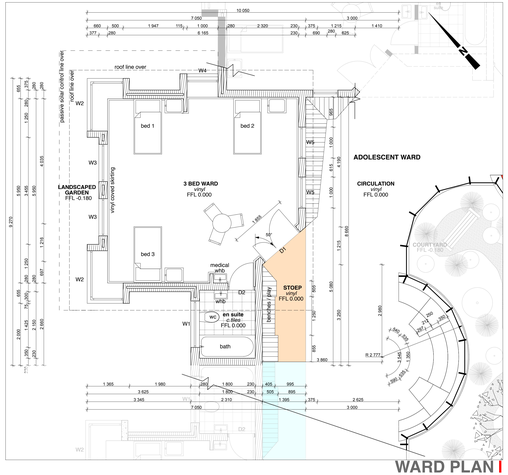


COURTYARD

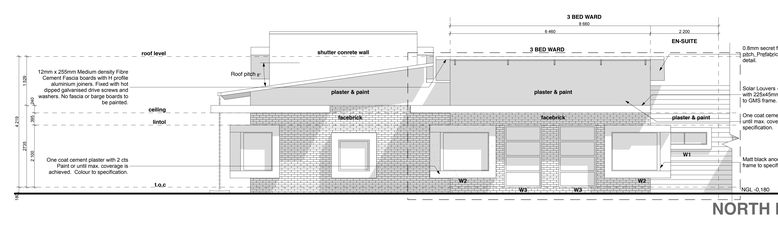
RENDERS
N/S



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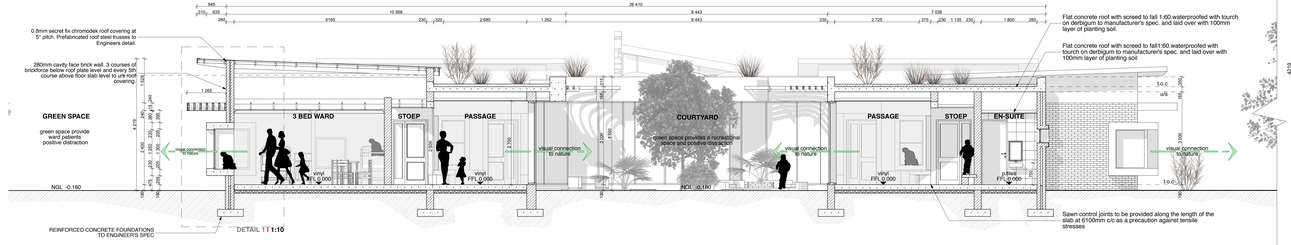


WARD PLAN I
1:50



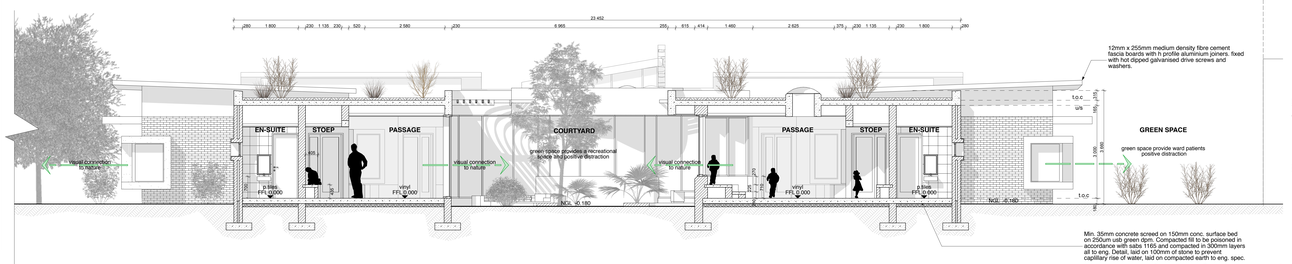
NORTH ELEVATION I
1:50

EAST ELEVATION I
1:50

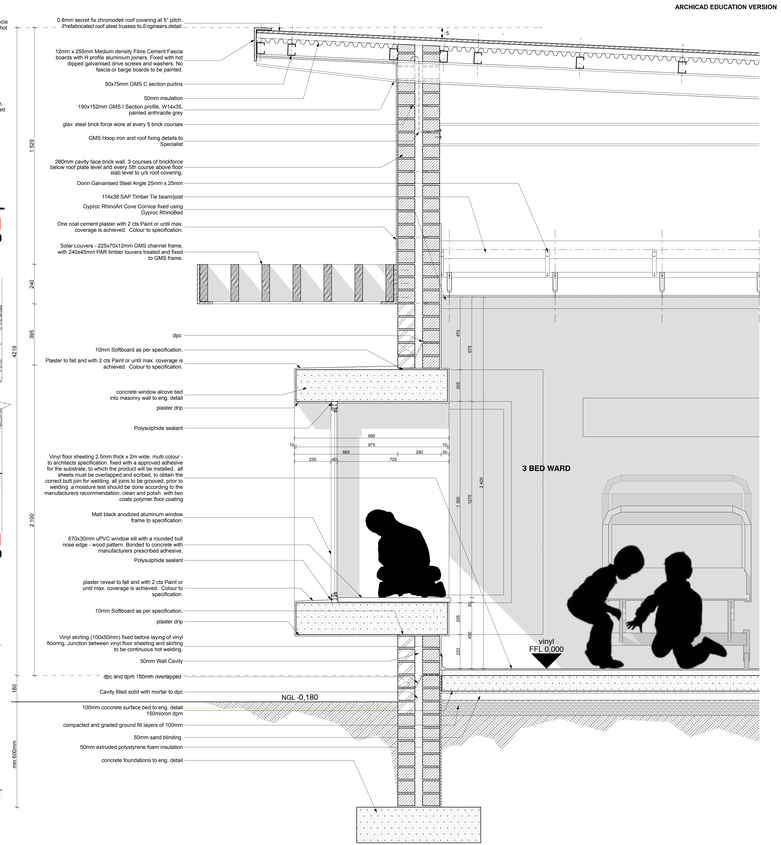


DETAIL 1T 1:10

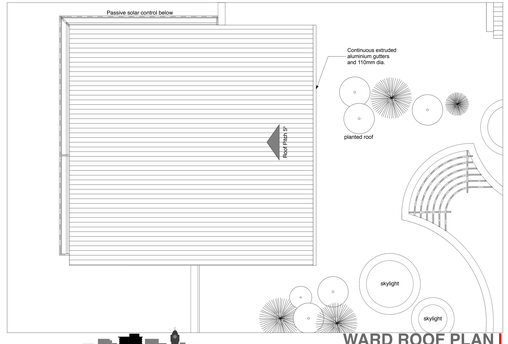
SECTION B-B - 1I
1:50



SECTION B-B - 2I
1:50

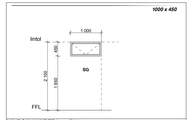


DETAIL 1I
1:10



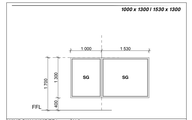
WARD ROOF PLAN I
1:50

HENRIQUE DA SILVA
201501389



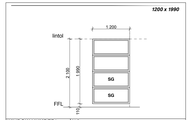
WINDOW NUMBER/ TYPE	W 1
WINDOW DESCRIPTION	1000h x 450w extruded alum. frame with mitred corners to form close joints, fixed with stainless steel self tapping screws, to AAMSA stds. All alum. joints to be sealed 100%. Whole unit to be sealed with silicon, after installation, to form water tight joint bet. brickwork and frame.
FRAME FINISH	powder coated, 50 micron - natural anodised
GLAZING	4mm clear float glass, to comply with ISO 9000
BEADING	glazing in black vinyl gasket & aluminium glazing beads to match frame
IRONMONGERY	as per manufacturer
QUANTITY/NO. OFF	Ward 1 OFF

1:50 WINDOW SCHEDULE



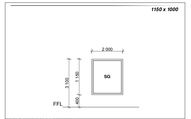
WINDOW NUMBER/ TYPE	W 2
WINDOW DESCRIPTION	1300h x 1530w & 1300h x 1000w extruded alum. frame with mitred corners to form close joints, fixed with stainless steel self tapping screws, to AAMSA stds. All alum. joints to be sealed 100%. Whole unit to be sealed with silicon, after installation, to form water tight joint bet. brickwork and frame.
FRAME FINISH	powder coated, 50 micron - natural anodised
GLAZING	4mm clear float glass, to comply with ISO 9000
BEADING	glazing in black vinyl gasket & aluminium glazing beads to match frame
IRONMONGERY	as per manufacturer
QUANTITY/NO. OFF	Ward 2 OFF

1:50 WINDOW SCHEDULE



WINDOW NUMBER/ TYPE	W 3
WINDOW DESCRIPTION	1990h x 1200w extruded alum. frame with mitred corners to form close joints, fixed with stainless steel self tapping screws, to AAMSA stds. All alum. joints to be sealed 100%. Whole unit to be sealed with silicon, after installation, to form water tight joint bet. brickwork and frame.
FRAME FINISH	powder coated, 50 micron - natural anodised
GLAZING	4mm clear float glass, to comply with ISO 9000
BEADING	glazing in black vinyl gasket & aluminium glazing beads to match frame
IRONMONGERY	as per manufacturer
QUANTITY/NO. OFF	Ward 2 OFF

1:50 WINDOW SCHEDULE



WINDOW NUMBER/ TYPE	W 4
WINDOW DESCRIPTION	1150h x 1000w extruded alum. frame with mitred corners to form close joints, fixed with stainless steel self tapping screws, to AAMSA stds. All alum. joints to be sealed 100%. Whole unit to be sealed with silicon, after installation, to form water tight joint bet. brickwork and frame.
FRAME FINISH	powder coated, 50 micron - natural anodised
GLAZING	4mm clear float glass, to comply with ISO 9000
BEADING	glazing in black vinyl gasket & aluminium glazing beads to match frame
IRONMONGERY	as per manufacturer
QUANTITY/NO. OFF	Ward 1 OFF

1:50 WINDOW SCHEDULE

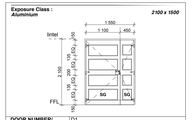


WINDOW NUMBER/ TYPE	W 5
WINDOW DESCRIPTION	1700h x 1000w extruded alum. frame with mitred corners to form close joints, fixed with stainless steel self tapping screws, to AAMSA stds. All alum. joints to be sealed 100%. Whole unit to be sealed with silicon, after installation, to form water tight joint bet. brickwork and frame.
FRAME FINISH	powder coated, 50 micron - natural anodised
GLAZING	4mm clear float glass, to comply with ISO 9000
BEADING	glazing in black vinyl gasket & aluminium glazing beads to match frame
IRONMONGERY	as per manufacturer
QUANTITY/NO. OFF	Ward 2 OFF

1:50 WINDOW SCHEDULE

WINDOW SCHEDULE
1:50

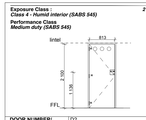
Exposure Class : *Aluminium* — *2100 x 1500*



DOOR NUMBER/ TYPE	D1
Material :	Timber
Appearance :	Flush panelled
Leaf :	Double leaf unequal
Action :	Single swing
Edging :	N/A
Finish :	Powder coated, 50 micron - natural anodised
DOOR FINISH	
Preparation :	N/A
Primer :	N/A
Undercoat :	N/A
Finish :	Powder coated, 50 micron - natural anodised
FRAME	
Material :	Aluminium frame
Profile :	Double rebated
Wall :	220mm Brick
Wall finish:	Painted interior / Painted exterior
LOCATION	Entrance to unit
FURNITURE	Face fixing backplate for lever and cylinder lock reversel : half set Aluminium finish/
Hinges	By specialist
Rebate	Purpose made stainless steel rebates
Lockset	latch for cylinder lock/
Closer	double cylinder lock
QUANTITY/NO. OFF	Ward 1 OFF

1:50 DOOR SCHEDULE

Exposure Class : *Class 4 - Humid interior (SABS 545)* / *Performance Class :* *Medium duty (SABS 540)* — *2100 x 813 x 42*



DOOR NUMBER/ TYPE	D2
Material :	Timber
Appearance :	Flush panelled
Leaf :	Single leaf
Action :	Single swing
Edging :	Face over edge
Finish :	Commercial veneer for painting
DOOR FINISH	
Preparation :	For painting
Primer :	1ct pink wood primer
Undercoat :	1ct universal undercoat
Finish :	2ct high gloss enamel
FRAME	
Material :	Aluminium frame
Profile :	Double rebated
Wall :	220mm Brick
Wall finish:	Painted interior / Painted exterior
LOCATION	Bathroom & Bedroom
FURNITURE	Face fixing backplate for lever and cylinder lock reversel : half set Aluminium finish/
Hinges	Heavy duty sinkless hinge
Rebate	Purpose made stainless steel rebates
Lockset	double cylinder lock
Closer	double cylinder lock
QUANTITY/NO. OFF	En-Suite 1 OFF

1:50 DOOR SCHEDULE

DOOR SCHEDULE
1:50

STRUCTURE & EXTERNAL

CONCRETE FOUNDATIONS

- Concrete foundations to be design by structural engineers, concrete strength to be at 25mpa with 30mm conc coverage to reinforcing. foundation system to be decided once Geo Technical investigation has been completed by most profitable system.

CONCRETE SURFACE BED

- 180mm thick reinforced concrete surface bed to structural engineers design, to be at 25mpa concrete strength with 40mm (to 5m) concrete coverage to reinforcing. Surface bed with BRC steel mesh reinforcement at 300mm centers in both directions as per structural engineer detail, to be laid on a 0.25mm thick polyethylene damp proof membrane, on 150mm thick compacted G5 crushed stone and be turned up, dressed to load bearing walls, and lapped with Bituguard SABS DPC. Damp proof coursing to be STS micron DUPPLAS black black-grip or equal and approved lapped minimum 150mm wide, to be laid on a level mortar bed and be continuous with the damp proof course. Damp proof Course in cavity construction to be at least 2 courses above ground level and at cmear-zero at least one course above finished ground-level at outer-skin. Under-cill Damp-proof Course (in cavity construction) to be at least 2 courses below bottom of window cill, and to be turned into reveal and sandwiched in mortar joint between brickwork. All as detailed. Damp-proof Course at door and window reveals (in cavity construction): minimum 150mm wide, to be tucked into side of door and window frame, and sandwiched in mortar between outer face-brick skin and cavity closer and to overlap tilted and cill Damp-proof Course.

BRICKWORK

- Masonry Cavity wall: 280mm masonry double skin cavity wall brick course with 50mm airgap coated with bituminous layer on the interior, with dpc at slab level as required and with 5mm dia corrosion resistant metal bricklies every 450mm vertically, above and below window and door openings to engineers' specifications. 10mm plastered on the outside with paint.
- Cordeva Firelight Satin Face Brick used for both round cambered and vertical joints.

PASSIVE SOLAR CONTROL - TIMBER LOUVERS AND C SECTION FRAME

- 280x125x6mm Galvanised steel C-SECTION, primed and painted red fixed to galvanised steel plate bolted to masonry with M12 bolts and chemical anchors to structural engineers specification and detail. Timber louvers fixed to Galvanised steel C-SECTION with galvanised steel bolts with washers.

PLASTER AND PAINT

- Two coat steel trowelled resilient plaster. Prepare, skop and apply 1ct primer/undercoat and 2cts acrylic emulsion paint. All paints used to be SANS approved. Colours to be approved by architect.

ALUMINIUM WINDOWS

- Extruded aluminium frame and mullions with mitred corners to form close joints, fixed with stainless steel self tapping screws, to AAMSA stds. All alum. joints to be sealed 100%. Whole unit to be sealed with silicon after installation to form water tight joint between frame and brickwork. Window to be supplied with 10 YEAR GUARANTEE against peeling & de-colouration of powder coating to comply with SANS 10483 part N.

INTERIOR

FLOORS

- GENERAL FLOORING - Vinyl sheet - 2.5mm - heterolay - Lay 2.5mm thick vinyl sheet as per Marley Superflex or equal approved, worked with matching welding rods to cured screeds rectified of all defects and fixed with adhesive recommended by the sheet manufacturer. Adhesive to be smooth-spread and compressed with a 50kg roller. Sheet to be welded together and sealed as per manufacturer and recommendations of manufacturer. Clean and polish floors with two coats polymer floor coating. Vinyl colors to be approved by architect. - Refer to mood board for sample colours.
- SEMI SOLID FLOORING - Vinyl tiles - 3mm - Tarkett Standard Excellence 3mm - HOMOGENEOUS PHOTO PATTERN CONSOLIDATION tiles fixed with 3M THIXO construction adhesive as per laying of tiles to be epoxy grouted and laid on screed to bid, made with waterproof admixture. Form movement joints in the floor finishes directly above the joints in the floor construction/screed/structure. Colour/pattern/s - Shadow 5045. Screed measured to thickness - Shadow depth of bedding coat over background movement joints and not exceeding 3m in either direction or post tensioned slabs and 5m on RC slabs and surface beds, all junction with wall and floor and where tiling is continuous over movement joints.

ALUMINIUM DOORS

- Extruded aluminium frame and mullions with mitred corners to form close joints, fixed with stainless steel self tapping screws, to AAMSA stds. All alum. joints to be sealed 100%. Whole unit to be sealed with silicon after installation to form water tight joint between frame and brickwork. Window to be supplied with 10 YEAR GUARANTEE against peeling & de-colouration of powder coating to comply with SANS 10483 part N.

WALLS

PLASTER AND PAINT WAND AREAS

- Two coat steel trowelled resilient plaster. Prepare, skop and apply 1ct primer/undercoat and 2cts acrylic emulsion paint. All paints used to be SANS approved.

WALL TILES

- 1st grade "Johnson" Matlase 200 x 200 x 8mm glazed pressed ceramic tiles code MW6N Matt White with Tal Profile 5 x 5 x 5mm internal angle trim to external corners and Tal Profile internal angle trim. Joint tiles with Tal Super White grout with water content replaced with Tal Bond. Form 6mm wide movement joints in tiling through full depth of bedding coat over movement joints in the background, and fill with sealant. Set vertically and horizontally at approx 4.2m centres and where tiling is continuous over different backgrounds.

Movement joint sealer (polysulphide) - Sikaflex SL3S.

Plaster waterproof admixture - Sikalite

SPLASH BACK - WHB & MEDICAL WASH HAND BASIN

- 1st grade "Johnson" Matlase 83 x 83 x 8mm glazed mosaic glass tiles code VTO119 Matt White with PVC edge with Tal Profex waterproof adhesive on wall plaster made with waterproof admixture. Joint tiles with Tal Super White grout with water content replaced with Tal Bond.

CEILINGS

SUSPENDED CEILING (ABLUTIONS)

- 4.4mm Gyprock board fixed joint side up to screw-up plasterboard ceiling system. Fibreglass skrim tape to butt joints and plaster ceiling with 3-5mm skim plaster. Prepare, skop and apply 1ct primer/undercoat and 2cts acrylic emulsion paint

SUSPENDED CEILING (WARD)

- All paints used to be SANS Approved. Rhinolite skim plaster. 1200x600mm Everite Thermoclad 6mm nutec-cement ceiling boards, backed with 25mm polystyrene and clad in Embossed white vinyl suspended on exposed prepainted aluminium capped metal bars.

SANITARY

CHILDREN'S WC / PARAPLEGIC

- Lauren Flora Kids 3to 7SQO vitreous china pan with side inlet for Flushmaster flush valve and matching vitreous china cistern with lever operated flushing mechanism, to be fixed to 100 x 100 back entry 32mm Flushmaster flush valve with extended lever handle C-FMB-80 for use by disabled.

Stainless Steel Railings

- 750mm Chairman Industries Ref. 35N. 35mm SA Satin Polished finish stainless steel Flushvalve Grab Rail - Supplied complete with fixing screws and plastic plugs for concealed fixings.
- 750mm Chairman Industries Ref. DL2. 32mm SA Satin Polished finish stainless steel Drop Leg Side Rail - Supplied complete with fixing screws and plastic plugs for concealed fixings.

WASH HAND BASIN - BATHROOM

- WHB, size 510 x 400mm with overflow and two tap hole configuration fixed to wall with and including 2 x 10mm bolts. 32 x 32mm bottle trap, chrome plated with 75mm deep seal, inlet screwed female, outlet to be 32mm dia plain spigot for connection to 32mm dia PVC waste. 10mm chrome plated basin waste plug with 75mm deep seal for 40mm PVC waste. 10mm chrome plated basin set pillar tap, 1 off basin waste with plug, chain, stay and back nut No. 301. Flow restriction washers to be fitted to taps. All in accordance to relative SANS

MEDICAL WASH HAND BASIN - WARD

- WHB, size 510 x 400mm with no overflow fixed to wall with and including 2 x 10mm bolts. 32 x 32mm bottle trap, chrome plated with 75mm deep seal, inlet screwed female, outlet to be 32mm dia plain spigot for connection to 32mm dia PVC waste. 10mm chrome plated bottle trap with 75mm deep seal for 40mm PVC waste. 10mm chrome plated basin set pillar tap, 1 off basin waste with plug, chain, stay and back nut No. 301. Flow restriction washers to be fitted to taps. Wall type, with short straight connections and angle regulating valves at 175mm fixed centres with swanneck swivel outlet (No 5mc) and hook excluded. All in accordance to relative SANS.

SOAP DISPENSER - WARD / EN-SUITE

- Sanis Nov Satin finish (type 304) stainless steel vandalproof push button liquid soap dispenser. 1.25 litre capacity. 220h x 103w x 75d), complete with concealed mounting plate.

PAPER TOWEL DISPENSER

- Sanis Matic Plus Paper Towel Dispenser, Satin finish (type 304) stainless steel wall mounted. Complete with wall mount bracket and fixing screws and plugs.

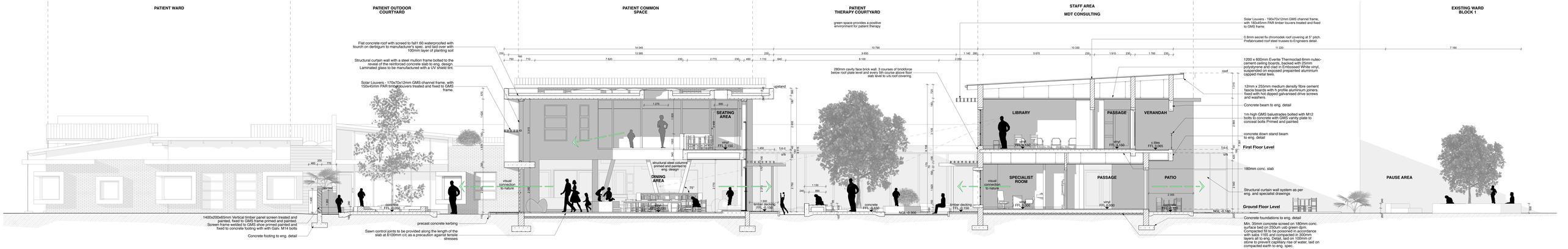
PAPER TOWEL BIN

- Sanis Disposal Plus Wall Bin Ref. SD136, Satin finish (type 304) stainless steel wall mounted paper towel receptacle. Complete with with wall bracket and fixing screws and plugs.

WHITE BOARD

- 1200mm high x 1500mm wide, enamel magnetic whiteboard with natural anodised aluminium edge trim.

FINISHING SCHEDULE



SECTION A-A
1:50

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201501385