feel + learn + heal
A CHILDREN'S DEVELOPMENT CENTRE AND CLINIC

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submitted in partial fulfilment of the requirements for the degree
Magister in Architecture (Professional) in the FACULTY OF
ENGINEERING, BUILT ENVIRONMENT AND INFORMATION
TECHNOLOGY at the UNIVERSITY OF PRETORIA 2012.

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abstract

Although human beings continuously learn through their experiences and impressions, the most important years in determining all the actions and decisions which will be made in life, are during childhood.

In designing spaces for children, their perception of the built environment and interaction with their surroundings needs to be understood in terms of the influence that elements of architecture and the landscape have on their sensorial and motoric actions as well as social activities.

FEEL + LEARN + HEAL, the subject of this dissertation, is a centre for childhood development and an ambulatory clinic, which will demonstrate how built environments enhance perceptual experience by means of sensory stimulation and healing environments. The study area is located on the urban edge, north east of Pretoria’s Central Business District and forms a gateway into the city at a large intersection, where Boom, Southpansberg, Dr. Savage and du Toit Street intersect.
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acknowledgements

To God, the architect of my life, for this opportunity and inspiration in everything I do. My mother, for all the love and encouragement, I dedicate this in your loving memory. To my father, for being my voice of reason, my steadfast support and for always believing in me. To Gary and Jacques, for the endless guidance and understanding. Thank you to all my family and friends, for the love and loyal support.
introduction
introduction

This dissertation will investigate the requirements and design of a new children’s and young people’s centre and day clinic in the Pretoria inner city.

background and context

Environmental and architectural psychology that influence design thinking will be investigated, looking at the physical and behavioural effects that environments have on children and applying it to the design of a centre where this knowledge can be disseminated.

Spatial and material quality of the design proposal and the affect of spaces on children, is investigated to discover which spaces enhance the sense of place and well being in built environments.

Other fields that will also be explored include educational aspects and sustainability issues. A trans-disciplinary approach is used, integrating the knowledge of childhood development, architecture, interior and landscape architecture.
Real-world problem to be addressed

This dissertation will look at the problems faced in the public health care sector in South Africa, primarily focusing on the inadequacy and poor conditions of current state facilities and thus looking at possible integrated solutions that will contribute to the civic character of the city.

"Hospitals and other healthcare buildings are a textbook opportunity to define what a healthy building is. As the civic institutions that not only treat illness but also restore health, they are exemplars for reframing conventional assumptions that determine not what buildings are, but what buildings could and should be" (Guenther & Vittori, 2007: [17]).

A shortage of competent and qualified health personnel contributes to inadequate health care. The South African Human Rights Commission’s (SAHRC) public hearing indicated that health institutions are severely understaffed and experience difficulties retaining existing staff members. The Department of Health should focus on retention strategies that include improving working conditions for health personnel, especially safety and security highlighting the non-monetary incentives that the department provides (SA, 2009: 35-39).

"In South Africa child survival warrants urgent attention because children continue to die at an unacceptably high rate from largely preventable causes" (Proudcock, 2007: 49).
**project significance**

Health care facilities for children in South Africa very often lack the understanding of children’s perception of the built environment, and this study wishes to create greater awareness around design mechanisms that can be put into practice to positively affect children’s cognitive development, social cohesion and health. A paediatric health care facility that can cater for the developmental needs of children is seen as the basis of this field of study, and a place where significant changes can be made.

Access to health care services, especially to the poor, is severely constrained by expensive, inadequate or non-existent transport and long waiting times at clinics and other health care service providers. These constraints amount to a denial to access health care for some of the poorest and acerbate existing vulnerabilities of marginalised groups and individuals within our country (SA, 2009: 56).

**site specific problem**

This project will be an exploration and investigation into the way that architecture is experienced; the effect, subconsciously and consciously, that architecture can and should have on the everyday user in enhancing perceptual experience by means of sensory stimulation.

The study area is located on the urban edge, north east of Pretoria’s Central Business District and forms a gateway into the city at a large intersection, where Boom, Southpansberg, Dr. Savage and du Toit Street intersect. Traffic flow is heavy in this area, with routes going to and from the northern suburbs of Pretoria and Mamelodi Township.

The study area has become defragmented from the CBD, and an opportunity to re-connect this site with the dense urban fabric of the city through an architectural intervention will improve the experience of the public domain and quality of life within the inner city of Pretoria. Architecture forms part of the city and should thus be approved by the public and form a shared vision. Public awareness of architecture and the spaces that shape our lives should be aimed at.

The Dr. Savage Taxi Rank as well as the Blood Street Taxi Rank create high accessibility to the site, and encourage heavy pedestrian movement in this area. Accessibility is key to the success of the project and will encourage the everyday user to become involved in the activities at the centre.
study area
north eastern edge of pretoria CBD
**research questions**

- How do spaces children inhabit, influence or affect how they experience the built environment and more specifically; how can our surroundings be improved in order to aid in mental and physical stimulation or recovery?

- What is the current approach to designing spaces for children and should it perhaps be re-evaluated?

- Can children’s cognitive development be improved or enhanced through their surroundings, natural or man-made, and if so, are there specific systems that can be introduced for a range of building programmes?

The Theoretical Discourse will thus focus on the intangible dimensions related to architecture such as experiential psychology, and look at ways to respond to the outcomes with tangible proportions.

**aims of the design**

This project aims at creating awareness around designing spaces for children, targeting their senses, intellect and creativity.

It also aims at providing an architectural response which supports development and perceptual development in early childhood.

**information required**

Technical information regarding the design of an ambulatory clinic is of crucial importance and the expertise of various health care practitioners as well as specialists in the design field of health care facilities will be employed.

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"Our surroundings influence not only the way we think but our intellectual development" (Salingaros, 1999).
design problem

Designers have the ability to influence the community by manipulating the space experienced by a person. The act of creating, manipulating or destroying form, can alter the human psyche. The world is shaped by thoughts and aspirations of architects, using their own thoughts, experiences and opinions. The six basic principles set out by the Reconstruction and Development Programme of the South African Government are: to perform as an integrated and sustainable programme, a people driven approach that aims to provide peace and security for all, to build the nation, link reconstruction and development, as well as ultimately deepen democracy in the fabric of our society (Munslow & Fitzgerald, 1995: 42). The responsibility lies with the architect to not only reflect on an existing society, but to propose a vision for a new society. A clear understanding of the current user needs to be established, keeping the needs of this society in mind, in order to design spaces that provide tangible solutions to intangible problems.

illus 1.3 The six basic principles set out by the Reconstruction and Development Programme of the S.A. Government
**research methodology**

The proposed research methodology to be followed is the analytical survey method that will attempt to describe and explain why certain situations exist. In this approach two or more variables are usually examined to test the research hypotheses. The survey will be conducted to establish the patient’s sensory experience of current health care facilities and how this spatial experience can be improved through humanistic design approach.

The system approach illustrated below will be used as part of the research and design development strategy.

The design methodology will proceed to:
- Identify the functions/activities relating to humans
- Analyze the experiences relating to humans
- Translate these into architectural form

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**limitations to the project**

The extent of design and programme of the building and its technical nature will be limited by the time constraint placed on this project, and is narrowed down to an ambulatory or day clinic with provision for outpatient wards and allied services centre. Therefore the study will include services only necessary to facilitate procedures carried out at such a clinic and will not include inpatient and intensive care wards. Patients treated at this clinic will be discharged on the same day of surgery or consultation. This clinic hopes to relieve day-patient numbers at the Steve Biko Academic Hospital, where patients can only be seen on a referral basis.

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**illus 1.3 Proposed research methodology**
**user profile**
The user profile consists of an infant or young patient and parent/guardian supporting the child, administrative and medical staff members that are employed by the Department of Health.

**the client**
The centre’s functions will include a full paediatric clinic and allied services centre. The Department of Health has, as one of its main aims, the encouragement of preventative and health promotive approach (SA (b), 2004).

According to the South African Department of Health areas to be targeted include:

- Free health care for children under six and for all homeless children at public clinics and health centres;
- A programme to improve maternal and child health through access to quality antenatal, delivery and postnatal services for all women to be implemented free at the point of delivery;
- Preventive and promotive health programme for children must be improved including a more effective, expanded programme of immunisation with 90% coverage in three years.

illus 1.4
Potential user profile of services offered at clinic
urban context
**city-wide context**

The proposed study area to be investigated for this urban framework is located in the South African Province of Gauteng. Tshwane, a municipal ward of this province has as its Central Business District (CBD), the city of Pretoria. It is within this context and including the north eastern edge of the city, that the subject under investigation will be modelled.

illus. 2.1 Pretoria corridor development

**city-wide context**

north eastern edge of Pretoria CBD

illus. 2.2 figure ground of Pretoria
**study area**
The precinct under investigation is bounded by Church Street in the South, the Pretoria Academic Hospital complex to the North, Andries Street to the West and Hamilton Street to the East. This area displays a wide variety of uses, differing greatly in urban character from the rest of the city. The form, organisation and general use, displays a disintegration of the urban fabric. This lends a sense of detachment from the urban environment.

Interventions proposed are to reconnect this part of the city and should rejuvenate public life in order to optimise the urban character of this area.

**REASONS FOR SITE SELECTION**
The site was identified for the following reasons:

- It is within walking distance of high density residential buildings
- It is in close proximity of educational facilities
- It is easily accessible by public transport
- It lies central to work environments
- It will allow landscapes to be created to accommodate healing environments
- It has urban regeneration potential

(Moore, 1987: 42)
In his book 'The Image of the City', Kevin Lynch classifies five physical elements which contribute to the environmental image of a city (1982 46-49).

In order for the user to establish a clear city image five elements are indentified and improved on. Users comprehend their surroundings in consistent and predictable manners, creating mental maps with five elements:

- **Node**: Central gathering places, such as squares or plazas.
- **Landmark**: Unusually distinctive and recognizable features.

![Node Image](illus. 2.4)

![Landmark Image](illus. 2.5)
environmental image

NODES
a focal point within an area that usually is a hub of activity. These concentrations of activities can range from transportation to commercial nodes.

LANDMARKS
a physical object within the urban context that allows for referencing of geographical position within an area. Often describes identity and structure to the environment.

DISTRICTS
areas within the city which demarcate the essence of the vicinity. Different districts have a different ‘feel’.

EDGES
boundaries that prevent movement or accessibility to a certain area. They can also be channels of social activity. It allows the user to define and arrange the area they interacted with.

PATHS
a corridor of movement that is inter-operated on different scales and importance. They may be walkways, streets, roads, highways, railroads, etc.
illus. 2.9 landmarks within pretoria

landmarks

- national zoological gardens
- union buildings
- church square
- strijdom square
- loftus stadium
- city hall
- burgers park
- train station
- berea park
- unisa building complex
**landmarks**

Buildings, statues, parks and stadiums are amongst other objects in the urban landscape that act as landmarks within the city. The user uses these objects to orientate and locate themselves within the city. Landmarks are associated with familiar markers that give importance to an area and enriches the users experience.

illus. 2.10

voortrekker monument

illus. 2.11

city hall

illus. 2.12

loftus stadium

illus. 2.13

union buildings
edges

The natural environment forming boundaries to the North and South of the city include the Daspoort and Schurweberge mountain range. The Apies River and Steenhoven Spruit define the city edge to the East and West. A low-lying plain is formed between these natural barriers, which the city was built upon. The topography of the urban edge defines it as the meeting point between natural and urban.

illus. 2.14

study area

illus. 2.15

development of Pretoria within natural edges
public space

potential north eastern public space

sammy marks square

church street

theatre square

strijdom square

burger's park

illus. 2.17 pretoria public space network
**nodes**

Nodes are located at spaces with intensified use: for transport, civic or retail purposes. Public squares and places of intensified public gathering, reinforce their importance and encourage further development. A direct correlation exists between urban quality and public life. Public spaces encourage a variety of public activities. A diagram depicting designed open public spaces in Pretoria, reveals a lack of such urban elements in the north eastern urban edge. The may contribute the visible disjointed urban fabric, and an introduction of such spaces could reconquer the city and inspire urban regeneration.

The three nodes identified in the study area, will specifically indicate access into and through the proposed study area. The transportation routes within this context define the urban landscape. The connection between these access routes have been identified as nodes and were defined as:

- **Gateway node**
- **Transport node**
- **Places of arrival and departure**
paths
Church street and Paul Kruger street are two of the major axis that intersect at Church Square, the historical civic centre of the City of Pretoria. They divide the city into four quadrants with a grid pattern layout of city blocks with the church as its heart. (Holm, 1998: 62)
**proposal**

Nodal Framework

1. Transportation Hub

The study area is located on the urban edge, north east of Pretoria’s Central Business District and forms a transport node at a large intersection, where Boom, Southpansberg, Dr. Savage and du Toit Street intersect.

2. Relation to site

The Dr. Savage Taxi Rank as well as the Blood Street Taxi Rank create high accessibility to the site, and encourage heavy pedestrian movement in this area. The Children’s Development Centre and Clinic will be located at the centre of this transport node in order to improve accessibility and strengthen the educational and health identity of the precinct. Traffic flow is heavy in this area, with routes going to and from the northern suburbs of Pretoria and Mamelodi Township, linking the site to residential areas. The study area has become defragmented from the CBD, and an opportunity to re-connect this site with the dense urban fabric of the city has arisen.

*illus 2.20*

showing existing nodes in the study area
the site
micro scale context
SITE SWOT ANALYSIS

the site

STRENGTHS
- Vacant land (no demolition required)
- Site accessibility in terms of location:
  transport nodes
- Heavy pedestrian flow

WEAKNESSES
- Position of vehicular entrance
- Lack of urban identity in area

OPPORTUNITIES
- Gateway site
- Proximity of referring hospital, Steve Biko
- Opportunity to define the urban edge of city
- Defragmented portion of urban fabric
- High heritage value buildings in close proximity
- Introduction of traffic calming mechanisms at intersection
- Possible link with "island"

THREATS
- Heavy traffic flow
- High noise levels
**bio-physical context**

**CLIMATE:**
Pretoria is situated in the Northern Transvaal climatic region. Both the diurnal cycle and the passage of seasons result in large climatic variation. Humidity in the area is moderate while solar radiation is strong.

The total annual rainfall is 674mm. The maximum monthly rainfall is in January 136mm and the minimum in July 3mm. (Holm, 1996: 69)

**TEMPERATURES:**
Summer 20-38 degree Celsius
Winter 10-27 degree Celsius
Average relative humidity: 59%
Sunshine: 60-80%

**PREVAILING WINDS IN SUMMER:** North easterly and south easterly

**PREVAILING WINDS IN WINTER:** South westerly and north easterly
(SA Weather Bureau)

**SUMMERS:** hot and thunderstorms generated by thermal air movement

**GEOLOGY:**
Soil conditions
Assumed acceptable due to the nature of surrounding structures.

**NOISE:**
Very high noise level occur on the south eastern edge of the site, radiating from Boom and Soutpansberg Street.

**illus 3.6**
Sketches showing climatic conditions and the influences that they will have on the building design.
**sensory context**

Various senses are triggered when experiencing the energy intensity of this intersection. The Boom Street Taxi Rank and Dr. Savage Taxi Rank generates background noise, through music being played, informal trade and vehicular noise. An array of smells, ranging from light industrial work across the road to informal food stalls on the site, creates a typical local urban atmosphere on street edges. Neglected natural environments create an unsafe feeling and lack of ownership. The range of textures varies between fine grained surface to the rough textures of deteriorated building fabric.

**medical + educational**

The Children’s Development Centre and Clinic will be situated amidst various medical and educational facilities, and hopes to strengthen and create awareness around this identity of the precinct.

Schools, specialised schools, hospitals and clinics are all located within a 3km radius of the site.
<table>
<thead>
<tr>
<th>RIGHT</th>
<th>ACT</th>
<th>DETAILS</th>
</tr>
</thead>
</table>
| The right to health care services | National Health Act 61 of 2003 | Free primary health for everyone  
Free health care for pregnant women and children under six years  
Free health care for social grant recipients  
Integrated management of childhood illnesses |
| The right to social services and protection | Children’s Act 38 of 2005 | Early childhood development  
Parenting skills training  
Child and family counselling  
Protection services  
Child and youth care centres |

THE CONVENTION ON THE RIGHTS OF THE CHILD (1989) GENEVA, UN

According to article 24(1) “State parties recognise the right of the child to the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health.” Article 24(2) provides that State Parties must take appropriate measures to ensure full implementation of this right, and specifies the following:

1. To diminish infant and child mortality
2. To ensure the provision of necessary medical assistance and health care to all children with emphasis on the development of primary health care
3. To ensure that all segments of society, in particular parents and children, are informed, have access to education and are supported in the use of basic knowledge of child health and nutrition, the advantages of breastfeeding, hygiene and environmental sanitation and the prevention of accidents
4. To develop preventive health care, guidance for parents and family planning education and services. (UN, 1989)
surrounding urban context

URBAN FORM

The new urban form is derived from the surrounding context and site allocations.

SCALE

A suitable scale is established through sensitivity of surrounding residential and light commercial buildings, and will contribute to the quality of buildings on the urban edge.

PROGRAMME

The Children’s Development Centre and Clinic will be situated amidst various medical and educational facilities, and hopes to strengthen and create awareness around this identity of the precinct.

The programme of the building will specifically respond to the existing Prinshof School for the blind to the north of the site, by incorporating a multi-senory impaired therapy centre.
informal trading along boom street

commercial activity along bloed street

residential building along boom street view from site

residential building along boom street view from site

commercial building on the corner of bloed and prinsloo street

carbonatto building at dr. savage and boom street intersection
theoretical discourse
PROBLEM STATEMENT
THEORETICAL DISCOURSE
The Human Experience
Architecture for Children
Healing Environments
DESIGN
Precedent study
Objectives of design
Key issues to be looked at
Schedule of accommodation
theoretical discourse
**Problem Statement**

"When an occupant experiences a building, they immediately become involved in an array of overlapping processes that all contribute to their experience" (Lehman, [2008]). It is therefore of fundamental importance to comprehend the influence that architecture has on the user.

In designing spaces for children, their perception of the built environment and interaction with their surroundings needs to be understood in terms of the influence that elements of architecture and the landscape have on their sensorial and motoric actions as well as social activities. Children develop a sense of place attachment through the ability to change and manipulate their environment, and architecture should become a tool in childhood development and stimulation of their cognitive functioning. It is through active experience and direct contact with the environment, that cognitive faculties of sight, touch, taste, audio and olfactory are stimulated (Said, 2000).

**Illus 4.1**
Sketch indicating conceptual ideas around theoretical discourse
the human experience – sensual architecture

Through a movement away from the retinality of the Modern Movement, towards a multi-sensory engagement with the environment, a fragile architecture can be created (Pallasmaa, 2000: 1). Sensory impoverishment is caused by the tendency of our technological culture to standardize environmental conditions and make them entirely predictable. Architecture can either be viewed as a visual encounter with an image of conceptual idealism, or truly understood through an experiential reality and authentic architectural encounters.

In his paper titled Hapticity and Time, Juhani Pallasmaa, explains that all our senses are an extension of tactility or the sense of touch: the senses are specializations of the skin and that touch is therefore the unconsciousness of vision. "Our culture of control and speed has favoured architecture of the eye, with its instantaneous imagery and distant impact, whereas haptic architecture promotes slowness and intimacy, appreciated and comprehended gradually as images of the body and the skin" (Pallasmaa, 2000: 2). Architecture should create a dialogue between concept and making, visuality and tactility, for without the one, the other cannot exist. Architecture should always revolve around the relationship between the human body and its environment, and the way the individual subject experiences very specific situations.

Early exposure to sensory experiences greatly increases the ability to synthesize multisensory information. Children should be exposed to a very rich sensory environment from a very young age (Wallace & Stein, 2006)
UBUNTU CENTRE
Zwide, Port Elizabeth

ARCHITECT: FIELD ARCHITECTURE IN ASSOCIATION WITH NOH ARCHITECTS AND JOHN BLAIR ARCHITECTS

Situated in a city where more than forty percent of its inhabitants are infected with HIV, the Ubuntu Centre focuses on getting children access to higher education and employment. The building programme includes prenatal and child healthcare, HIV testing, counseling, and treatment for mothers.

One of the co-founders of the Ubuntu Fund was asked in an interview, why spend so many resources on a building, by which he responded "buildings are symbolic, and this building shows the children of Zwide that they are worthy of everything the world has to offer"—including ambitious architecture.
precedent

ILLUS 4.5
Zwide Pathways

LESSONS LEARNED

Health and educational functions in a South African context

Concrete as a building material, creating a sense of permanence and safety

Natural materials and concrete forming a dialogue between modern and ancient

Skills training to local unskilled labourers

Rooftop garden for vegetable soup kitchen
STIMULATING ENVIRONMENTS

The behavioural effects of the environment when individuals adapt to stress does not ameliorate the stress. In toxic stress environments such as those with high noise pollution levels, a decrease in productivity, sociability and concentration is noted. These effects need to be considered not only in response to the stimulation provided, but also what it means to the person experiencing them. Genetic, cultural and experiential backgrounds and their differences also contribute to the effects. For example, in modern societies which are made up of many diverse cultures, it is often difficult to merge ideas of personal place and territoriality. It becomes increasingly difficult to adapt to different cultures, so that it is often better to support them within less defined spaces which provide multiple opportunities for interaction (Gallagher, 1993: 159-161).

When we are able to perform activities that we enjoy, whether playing the piano or running, our actions merge with our awareness and we stop being the self-conscious spectators of our experience. This is often described as feeling as one with something that is greater than the self (ibid.: 172). When this occurs, the built environment supports human activity in the best possible way. It provides comfortable places for humans to be in.
designing spaces for children
COGNITIVE DEVELOPMENT
Although human beings continuously learn through their experiences and impressions, the most important years in determining all the actions and decisions which will be made in life, are during childhood. In Prof. Ismail Said’s research paper on Architecture for Children, he explains that children’s functioning and development is shaped by interaction with their surroundings and spaces designed for them and must conform to their physical, cognitive and social needs. In a hospital environment where it is necessary for children to feel at ease with their surroundings, place attachment can be achieved through the ability to change or manipulate the environment (Said, 2000).

Urban environments require spaces which support development through balanced neural input such as audio, tactile and motor activities. This development derived from exploration, forms the basis for learning.
Sensory stimulation required for children’s spaces to maximise development
CHILDREN’S SPACES
Young children continuously experiment, feasting upon nuances of colour, light, sound, odour, and touch, unfettered by goals, times and expectations. Of the five senses, touch is said to be the most important, because it improves the child’s perception of form and space. (Olds, 1987: 117).

An ideal environment for young children offers opportunities to learn by moving and stimulating the whole body. Bodily movement extends to the inner states of sensory awareness. The outdoors, with its wide variety of stimuli in natural elements is the ideal playscape for developing sensory awareness in children (Old, 1987: 120).

Play areas should support different functions, and foster many types of interaction desired by children. By using low levels of imagery, spaces allow various types of play within the same area and can accommodate broader cultural variety of users (Olds, 1987: 123-130). The diversity and complexity of experience and the child’s ability to interpret and grow with their playground features are fundamental to their physical development (Fjortoft, 2004).
ST. CYPRIAN’S SCHOOL  
MOLTENO HOUSE EXTENSION  
ORANJEZICHT, CAPE TOWN

ARCHITECT: NOERO ARCHITECTS

The St. Cyprian’s School is a well-established Anglican school in Cape Town. Both the setting of the school and the original buildings, which were designed by the office of Herbert Baker, Kendall and Morris, are very special.

Although the school has developed over the last hundred years into a rich mosaic of various building styles and histories, it has resisted the temptation to re-organize the spaces in a rational, utilitarian modern manner. This has given rise to a set of spaces similar to those found in a city, where chance encounters can and do occur. This crisscrossing paths of the pupils everyday to and from classrooms, creates a non-hierarchic network of spaces and movement routes, that allow the youngest and oldest girls’ paths to cross over one another.

The concept of the ‘Third Space’ was introduced to allow users the creativity of programming space for themselves. This way of designing space goes against the traditional way of thinking and designing with only utilitarian functions in mind, which often has the following consequences:
- the spaces exclude the creative involvement of children in the use of the spaces, due to the singularity of use
- it follows that the spaces don’t allow for multiple or other uses

illus 4.10  Molteno House Plan

theoretical discourse
**ILLUS. 4.11**
Axonometric view with new school additions

**Molteno House Extensions**

**LESSONS LEARNED**

Concept of the 'Third Space'
- that offer children a chance to invent their own ways of occupying space
- through ambiguous spaces similar to those found in a city, where chance encounters can occur.
DESIGN GUIDELINE FOR PLAYSCAPES:

SENSE OF PLACE
Spatial configurations, such as complex activities around a foyer, improve the sense of place and connectedness to other spaces. Open-plan design allows each activity to flow into the other, promoting smooth transitions during play.

VARIETY OF SPACES
A variety of juxtaposed and contrasting spatial situations is necessary to support rich possibilities for play. Adult supervision should be integrated into the surroundings, such as providing seating on the actual play forms within the environment.

THREE-DIMENSIONAL SPACE
Three-dimensional juxtaposition of levels offers a matrix of spaces, platforms, and pathways creating maximum potential for physical, verbal and visual interaction. Behaviours promoted in these spaces include hide, reveal, looping, overlooking and observing others from a position of safety, ground hogging and verbal communication between children.

NON-OBJECTIVE ENVIRONMENTS
Non-objective environments and loo, interlocking objects provide no imageable or realistic representations and allow children to indulge in fantasy games.

VARIETY OF SURFACE FINISHES
A variety of surface finishes such as concrete, timber, carpet, rubber, bricks, steel and plastic offer children a variety of tactile experiences on vertical, horizontal and inclined surfaces through which bodily contact can occur.

KEY PLACES
Key places are dominated by one major element which supports bodily movement such as a falling pad or a slide which promotes solitary play or group interaction. The spaces surrounding these elements should consist of complex juxtaposition of levels and pathways.

SYSTEM OF PATHWAYS
Paths infer movement which is synonymous with play. Paths could intersect so that various choices are available. Dead ends should be avoided and temporary slides or tunnels can be incorporated into pathways, offering children a different perspective over the environment.

STRUCTURAL INTEGRATION
Play and sitting surfaces use floors, walls and ceilings and horizontal or vertical supports. Residual spaces, such as those under staircases, become private spaces within which children may retreat and release emotional anxieties such as fear, anger or frustration (Olds, 1987: 133)

ilius. 4.12
Variety and contrasting spatial situations that support rich possibilities for play

ilius. 4.13
Diagrammatic sketch showing spatial configurations that create a sense of place
healing environments

Human health depends heavily upon the individual coping resources, which can be challenged by the taxonomy of design characteristics and interaction with our surroundings. The design dimension linked to stress explained by Evans and McCoy, in an article on environmental psychology, are: stimulation, coherence, affordances, control and restorative dimensions. These dimensions directly correlate with the idea of multi-sensory architecture and should be used as an instrument to design spaces that stimulate sensorial development. A brief summary of each design dimension adapted from When Buildings Don't Work is given below:

STIMULATION:
- Amount of information in a setting
- Moderate levels are optimal
- Too much stimulation: cognitive processes demand concentration
- Too little stimulation: causes sensory deprivation

COHERENCE:
- Clarity or comprehension of building elements and form
- Impediments thereof include: ambiguity, disorganization and disorientation
- Enables user to make deductions about identity, meaning and location

- Stress occurs when predictions are hard to make
- Key issue: legibility

AFFORDANCES:
- Are marked disorientation as a result of optical illusions
- For example: change in texture in change in level

CONTROL
The ability to alter one’s physical environment or regulate exposure to surroundings can be achieved through:
- Hierarchy of spaces
- Defensible space
- Flexibility
- Visual exposure
- Openness of perimeter

RESTORATIVE
- The potential of design elements to function therapeutically and reduce cognitive fatigue
- Promotes healing through: retreat, fascination and exposure to nature
- Reflective activities: minimum distraction, degree of isolation through views of nature

(Evans & McCoy, 1998)
Natural environments greatly impact the health of humans. Access to views of the natural environment can improve cognitive functioning and improve recovery from surgery or illness. It has also been shown that nature buffers stress in rural children (Wells, 2010).

The burden of illness is greatest in lower socioeconomic groups. Urbanization and industrialization have decreased the likelihood that supportive social relationships can exist, even though they have created the conditions for a higher standard of living in material good and improved sanitation.
PUBLIC TRANSPORT SHARED SERVICES CENTRE
BRIDGETOWN, CAPE TOWN
ARCHITECT: MAKEKA DESIGN LAB

The Public Transport Shared Services Center, in Cape Town, is the new regional headquarters for public transport in the Athlone, N2 area. The site is located on a piece of land resonates historic racial, ethnic and class divisions. The building hopes to be a catalyst for integration of the divided taxi industry. The programme includes office space, a bus testing facility and a public/customer care interface.

The primary design focus is that of sustainability, and the building makes use of natural light, ventilation, water recycling systems and energy strategies. Materials are predominantly local, nontoxic, and from renewable sources whilst the embodied energy of each material was considered in order to minimize the impacts to this end.

The construction process focussed on empowerment of women, youth, semi and unskilled labour from local communities within a 5km radius.
**precedent study**
Local and international precedent studies that will be investigated in order to inform design decisions will look at the following aspects of architecture:

- The human experience – Sensual architecture
- Spaces for children
- Healing environments
- Accommodation and functional layout of pediatric ambulatory clinics
- Greening strategies in health care buildings

**objectives of design**
The main design objective is to create a community upliftment platform within the context of a healthcare environment that focuses on a multisensory healing and development environment for children and youths. Emphasis will be placed on sustainability issues that are the forefront of the built environment.

**key issues to be looked at**
Design philosophy – Multi-sensory spaces for children, for cognitive functioning and development. A multisensory space aims at stimulating all of the senses.

Technical development – Information on the technical specifications for medical facilities, such as operating theatres and intensive services to such facilities

**LESSONS LEARNED**
Greening strategies employed in this building are commendable, and has the highest energy efficiency to date for this building type.

Water strategies  - recycled greywater system
- water harvesting

Energy strategies  - solar water heaters
- hybrid passive ventilation system

Empowerment targets
Natural light optimisation strategies
The sprawling single building complex, rather modest in its material usage and appropriate use of contextual scale, sets the scene for the new Moses Kotane Regional Hospital, in its markedly rural location. The diminutive village of Ledig in the Northern Province, situated at the foot of the Pilansberg Mountains, is hardly a nascent community, embraced by unassuming single storey buildings. This unpretentious structure contributes to the unimposing civic character of the environment and serves as the new referral hospital to all 45 surrounding clinics and four health centres in the Moses Kotane sub-district, with a full capacity of 200 patients. The recently completed hospital has however not yet reached its prospective of treating the amount of patients it initially set out to handle although several of the wards will become operational in the second phase of construction. This project, the winner of a national competition hosted by the Department of Health in 2004, has stepped up the level of proficiency in the design and practice of public healthcare facilities in South Africa.

THE DESIGN
The atrium provides an open concourse to the public realm and emphasizes the transparency that the local government sets out to achieve. Public spaces are spacious, uncluttered and filled with natural light.

Circulation routes were sensitively designed to form connections between main spaces, and allow for natural lighting and ventilation through skylights and operable louvres. The building layout and movement throughout the hospital is logical and navigation effortless, due to excellent signage, a crucial aspect in any medical facility. Integrated vertical structures, which serve as double-volume light wells to public waiting areas, in addition act as way finding elements throughout the building. The administration functions of the building complex are allocated in the private zone on the first floor, with ample natural lighting permitted by clerestory windows along the passage and also allow a degree of transparency through glass facade offices.
Allied services, including speech and hearing, occupational and physical therapy, enable patients a view to the landscaped courtyards and natural lighting and ventilation. Additional overhangs on the northern facades and operable windows allow occupants to control the internal environmental conditions.

The structure consists of a reinforced concrete frame in the double storey administration zone, covered by profiled iron sheeting, and solid walling, internally and externally, all synonymous with the local building knowledge and appropriately robust.

POST OCCUPANCY CONCERNS
As a result of the extensive planning, design and construction process and a constant flux in staff requirements, current concerns faced at this facility do not necessarily reflect an inadequacy of the original intent of the building design. For instance, the outpatient ward is currently functionally ineffective, and although a decision on rather focussing on efficiency was made right at the beginning of the planning phase, the reasoning behind it is not always communicated properly to staff. Consulting rooms are laid out along a lengthy, narrow, uncomfortable passage, incapable of isolating patients with transmittable conditions, awaiting

illus. 4.17

Vertical wayfinding elements

illus. 4.18

Natural lighting along passages
medical screening tests. It is however contested that emotional harm resulting from the social stigma attached to a patient that requires such treatment, would be greater than the risk of physical transmittance.

Landscaped courtyards are designed to accommodate patients and family members, although a lack of maintenance has resulted in overgrown weed gardens and are mostly inaccessible to the public due to stringent security requirements. Intolerable glare, from the light coloured crusherrock, results in predominantly closed blinds during daytime hours.

CONCLUSION
The main building and its ancillary outbuildings, which accommodate staff housing units, takes full advantage of this area’s crisp daylight, sporadic cool breezes and astonishing panoramic views. The dichotomy of technology within, and rural surrounds, is integrated into an appropriate typology through the economic use of scale and sensitivity towards the natural environment. This project has certainly stepped up the level of proficiency in the design and practice of public healthcare facilities in South Africa.
illus. 4.20 Panoramic view of main waiting area

illus. 4.21 Main circulation route with natural lighting and access to the natural environment

illus. 4.22 Clerestory windows with louvres in passage of the administration zone
design development
AIMS OF THE DESIGN
INITIAL CONCEPT DEVELOPMENT
SITE IMPLICATIONS
PRINCIPLES
CLUSTER ORGANIZATION
MOVEMENT
BUILDING RESPONSE
design development

As Wittgenstein points out ‘(t)oday the difference between a good and a poor architect is that the poor architect succumbs to every temptation and the good one resists it’. (Perkins, 1995: 220)

aims of the design
This project aims at creating awareness around designing spaces for children, targeting their senses, intellect and creativity.
It also aims at providing an architectural response which supports development and perceptual development in early childhood.

initial concept development
The purpose of the design development is to illustrate the design process and thinking behind major decisions as clear as possible. The design process consisted of a vast amount of decisions and potential resolutions that argued out throughout the course of the study.

response to context
The figure-ground of the study area indicates an undefined and illegible urban fabric, where a definite need for intervention on this north eastern edge of the city is necessary. As already mentioned, this area is characterized by major road networks which connect as a very important gateway intersection of the city of Pretoria. Due to the vacant land that the proposed building will be situated on, an opportunity is created to connect the site with the rest of the urban grid, which will hopefully be the start of an activity corridor connecting the rest of Pretoria North and surrounding Townships to Pretoria CBD. This need gave rise to the programme, which identified the elements from which the project took its form.
The proposed site, which sits on the corner of busy incoming and outgoing routes, is in close proximity to the TUT Art Campus, the Prinshof Primary School and the Steve Biko Academic Hospital.

Dewar and Uyttenbogaardt see pedestrian movement as the primary definition of scale of urban development. Distance is the primary physical barrier to ease of access and therefore, the best situation are when people gain access to their daily activities by foot (Dewar, 1991: 17).

As the proposed site sits within five walking minutes from both the Bloed Street Taxi Rank and Dr. Savage Taxi rank, the site is easily accessible.

Workers and staff for the proposed development that have to travel into the city, therefore have direct access to the proposed site, as it is within walking distance of the taxi ranks. Money and time would thus not be wasted on further vehicular transport to their daily amenities. Dewar et al states that exposure and interaction is the beginning of urban development. It is at this point that the places of greatest opportunity arise in the city. The two lines of movement (vehicular and pedestrian) on and around the site create ample exposure as well as interaction amongst the city inhabitants through the proposed development.

illustration 5.1 Figure-ground sketch of the study area and site, showing the missing pieces of the urban fabric
site implications

SLOPE
The site has a slope of approximately 1:20 causing a linear axis along the fall.

ACCESS
Primary access and secondary access is as conceptualized on the diagram.

VIEWS
The site has landscape views towards the north and will influence the orientation of the buildings.

MOVEMENT
The pedestrian desire lines and movement from the street edge towards the building break up the building footprint.
illus 5.6 Section through the site

illus 5.4 Movement routes around and through site

illus 5.5 Views of natural environment
principles
INTEGRATION WITH THE LANDSCAPE
The project achieves complete integration with the landscape through:
- creating a complex of buildings linked through permanent walkways
- the restructuring of open space through place-making
- a building focussed on vistas

SCALE
The architect has an understanding of human scale which was very appropriately used in this project, with specific focus on the scale of a child. Of a form or space’s three dimensions, its height has a greater effect on its scale. While the walls of a room provide enclosure, the height of the ceiling plane overhead determines its qualities of shelter and intimacy.

LAYERING
Layering is used to mark a transition between a boundary or edge. Public functions filter outward from the centre of the site into more private functions through the building form and use of materials. Walkways create an intermediate semi-public or semi-private space and interacts with the public square. The opacity or transparency of facades denotes the nature of interaction.

The south eastern facade of the building facing onto the street, is reacting the the fast-paced vehicular-dominated environment, however for pedestrians the interaction should be finer grained, with elements which promote lingering and social activities, such as public seating opportunities.
The site has landscape views towards the north and will influence the orientation of the buildings.

COMPLEXITY AND SIMPLICITY
The buildings and configuration of spaces and elements have a complex, yet simple quality that puts the user at ease, while still capturing his interest. This is due to the use of simple elements, configured in a complex layering with deep meaning and symbolism.

PROPORTION
Proportion of the buildings and spaces is derived from mainly two sources:
- Material proportion: materials are used in a rational and honest fashion that is reflected in the proportions
- Structural proportion: the size and proportion of elements are directly related to the structure

ATTENTION TO DETAIL
The attention to detail lends a superior quality to the design of the buildings. This conveys the noble and honest intention. It expresses thoughtfulness and care towards the user.
Allied Services Massing Model
smaller scale of buildings for more intimate spaces

linked services

linked through walkways

staggered configuration to separate entities

Illus 5.7 Scale of the building proportions

windows at a child's eye level

Illus 5.8 Focus on child's scale

design development
**cluster organization**

SPATIAL ORGANIZATION

The building complex is organized as a cluster of forms and spaces. This is due to three main considerations:

01 - **To allow movement through the complex**

The traditional institutional building is one that is enclosed and unaccessible. This is the cause for great speculation as to what is happening inside the building. The stigma around institutional buildings can be contributed partly due to this. Through the design of permeable structures arranged in an accessible configuration, a transparent process is communicated.

02 - **To allow a range of users to utilize the facilities**

Visitors will utilize the facilities in a number of ways that might not include necessarily all the functions of the centre. Through grouping suitable accommodations together, the visitor can use spaces without disrupting others.

03 - **To create different types of spaces with varying levels of publicness**

The site is so vast that it became necessary to distinguish smaller spaces in order to allow the patient to choose a setting in which he/she would be comfortable in.
illus 5.12 Sketch showing the zoning plan

illus 5.13 Sketch showing the initial design layout of building programme

FUNCTIONS
1 - Main access spine
2 - Consulting rooms
3 - Allied services
4 - Clinical functions
5 - Clinical functions
**movement**

**BUILDING APPROACH**

The primary approach is spiral which prolongs the sequence of the path and emphasizes the three-dimensional form of the building parameter.

The secondary approach, which is slightly more oblique, enhances the effect of perspective on the building. Since the path is re-directed two times, the sequence of the path is also delayed.

**ENTRANCES**

The primary entrance and foyer is open, legible and articulated. It has landmark qualities and thereby orientates users towards the access and information points.

**CONFIGURATION OF PATH**

Both the primary and secondary paths are linear and organize a series of spaces.

**LEGIBILITY**

Visual legibility strongly influences the ease with which unfamiliar visitors may navigate the building. Legibility is strengthened through vertical movement or central staircase that act as a visual point of reference from the square and various parts of the building, facades that are transparent allow a certain degree of visibility, and walkways that contribute to rational understanding of movement along building.
illus 5.18 Sketch showing visual access between interior and exterior spaces

illus 5.19 Sketches showing plan development
illus 5.20 The complex reaching into the landscape (integration of building and landscape)
building response

1. ENTRANCE FOYER AND RESTAURANT
The information desk acts as a reception for the whole complex and is centrally located at the foyer. The entrance foyer is a public space situated at the primary entrance from where people disperse to separate buildings. The waiting area and public ablutions are also situated here.

The restaurant sits at the most public edge of the building, which will allow a variety of users to occupy this space.

2. CLINIC AND CONSULTATION AREA
The primary clinic is situated in a more private area to ensure privacy and a connection with the natural environment. Consultation rooms are on the street edge, protected from noise levels by vegetation and screen walls - that also create a comfort area.

3. TRAUMA UNIT AND PHARMACY
The trauma unit is located adjacent to the main entrance, with ease of access for emergency vehicles as well as the general public. The pharmacy is located at the street edge, containing more public functions.

4. ALLIED SERVICES
The two allied services buildings are situated around a mobius playstrip, ensuring access to nature and activities.

5. CLINICAL SERVICES AND STAFF AREAS
The majority of clinical and staff areas are set on the western side of the site, with access controlled entries. The staff dining area and kitchen opens up onto a private green space - extending the building into the landscape.
ONE DOES NOT PHYSICALLY EXPERIENCE SPACE SIMPLY BY GLAZING AT BUILDINGS OR LOOKING AT THEM FROM ABOVE. SPACE IS EXPERIENCES ONLY THROUGH SEQUENTIAL MOVEMENT. - FUMIHIKO MAKI

**movement**
The movement system becomes part of the buildings and is defined by spatial elements. These elements are dynamic and enhance the notion of movement through their rhythmic configuration.

Where there exist no movement the buildings become enclosed, indicating a grounded, static form.

Illustration 5.22
Movement concept
connections and contact

VISUAL CONTACT
Visual connectivity allows a transparent process to be maintained. This facilitates awareness, stimulation and wayfinding within the complex.

SCALE
The impression of a space often dictates or accommodates the type of contact we make. An important factor in the perception of a space is scale. Different scales will be used for different types of spaces.

In this project, the general interior scale of the buildings is of a residential nature. This gives a human and intimate quality. It is important that the user feels at ease and not challenged by his surroundings.

Where the nature of the spaces change from more public, to more private, the scale has been adapted to imply the use of the space.
**space definition**

**DESIGN PHILOSOPHY**

Two systems are used in the space forming of the project: space defining and space enclosing systems. This is due to the nature of the accommodation. The amount of privacy is controlled through the amount of enclosure. The amount of accessibility and permeability is allowed through space definition.

The two systems are expressed architecturally through the structure, form, openings and detailing of the buildings.

It is essential that the buildings communicate private and public functions in this manner as these systems replace traditional institutional systems of high walls and bars in front of windows. The inclusive quality of the buildings is not influenced by the structures, but allow for informed choices to be executed by the user.

For the space defining system a steel structure and roof is used that integrates with a space enclosing system that is expressed mainly through concrete walls and roofs.

**ENCLOSED SPACE**

Enclosed spaces mainly consist of the service and the private spaces where access is controlled and users feel secure.

The plan form of enclosed spaces indicated 'here' and 'there' as two distinct realms.

Space enclosing systems separate inside from outside and establish differences between different space types.

**DEFINED SPACE**

Defined spaces are the served and the public spaces that are permeable and where occupants and activities are visible.

On plan, defined spaces have a loose spatial quality, its dominant feature is to 'connect' and maintain spatial continuity between building and landscape spaces.

Space enclosing systems are subject to gravity, while space defining systems appear not to be responsive to gravity.
illus 5.27 Development of building layout plan. April 2012

design development
Sketch showing the concept of layering to be
illus 5.29 Development of building layout plan. March 2012

illus 5.30 Sketches showing legibility and views of the proposed building
building programme

functions
GROUND FLOOR
Semi-private indoor spaces for play, education and interaction of children in a safe environment

Private spaces for soothing, nurturing and comforting of ill or distressed children

Welcoming and inviting public healthcare facilities, that provide a variety of basic healthcare needs

Semi-public Outdoor play area for interaction of children

Public Outdoor play area for interaction of children

Lettable restaurant as interactive social platform and generator of income

FIRST FLOOR
A semi-public indoor space for play, education and interaction of children in a safe environment

A daycare centre that provides short term care of children while parents visit healthcare practitioners

A research laboratory for education and clinical services

Offices space for administrative functions
Storage space for medical files
accommodation

GROUND FLOOR
Atrium and Waiting area
Restaurant and Kitchen
Trauma Unit - Examination Rooms
  - Procedures
  - Trauma and Triage Room
  - X-Rays
  - Stores
  - Unit Manager Office
Rape Crisis Centre
Pharmacy and Pharmacy Store
24hr Paediatric Clinic
Doctor’s and Nurse’s Consultation Rooms
Public Ablutions
Allied Services - Social Services
  - Physiotherpay
  - Dietician
  - Eye-testing Facility
  - Occupational Therapy
  - Speech and Hearing Therapy
Staff Ablutions
Staff Dining Room
Kitchen
Laundry
Services - Holding Area
  - Cleaner’s Room
  - Sluice
  - Milk Kitchen
  - Sterilization
  - Linen Store
  - Equipment Store
Doctor’s Rest Room

accommodation

FIRST FLOOR
Laboratory - Serology
  - Clinical
  - Bacteriology
Offices - Housekeeping and Maintenance
  - Administrative
  - HR Manager
  - Hospital Manager
  - Secretary
Medical Files Vault Store
Library - Reading Spaces
  - Administrative Offices
Media Library
Child Care Centre
# Building Occupancy

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<td></td>
</tr>
<tr>
<td>Hospital Manager</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Therapist/Specialist</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Assistant</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Cleaners</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>84</td>
<td>150</td>
</tr>
</tbody>
</table>

**Total 234 users**
illus 5.31

view from administration offices on the first floor towards
atrium and reading space for children

illus 5.32 Northern elevation
clinical services and staff areas

key plan

ENTIRE AREA = SERVICE

goods yard

main staff circulation

enclosed green space
accommodation
GROUND FLOOR
Staff Ablutions
Staff Dining Room
Kitchen
Laundry
Services - Holding Area
- Cleaner’s Room
- Sluice
- Milk Kitchen
- Sterilization
- Linen Store
- Equipment Store

guidelines
LAUNDRY
0.8 - 3.0 kg/bed/day

SEQUENCE OF WORK:

<table>
<thead>
<tr>
<th>Step</th>
<th>Area (sqm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receipt Sorting Weighing</td>
<td>15sqm</td>
</tr>
<tr>
<td>Washing Spinning Beating out</td>
<td>wet 30sqm</td>
</tr>
<tr>
<td>Mangling/Drying Pressing Ironing</td>
<td>dry 60sqm</td>
</tr>
</tbody>
</table>

Sewing
Storage
Issue

SERVICE YARD
A hospital/clinic service yard requires the following basic functions:

GOODS YARD FOR DELIVERIES
DISPOSAL OF THE FOLLOWING:
- Kitchen
- Septic
- Metal
- Glass
- Paper
- Chemical

PLANT ROOM CONTAINING:
- Generator
- Sprinkler control
- Oxygen distribution

illus 5.33 Detailed plan of service core of building

design development
clinic and consultation rooms

key plan

views

main staff circulation

secondary circulation
accommodation
GROUND FLOOR
24hr Paediatric Clinic
Doctor’s and Nurse’s Consultation Rooms

precedents

OVERHEAD PLANES
The ceiling plane, inside the consultation areas, defines the space and articulates zones within the room. The height and scale creates a child-friendly environment and is manipulated to improve acoustical qualities and reflection of natural light.

illus 5.34 Detailed plan of clinic and consultation rooms
illus 5.35 Use of integrated service bed panel
illus 5.36 Blackboard wall in comfort area for expression of creativity
illus 5.37 Detailed section through minor ward
accommodation
GROUND FLOOR
Trauma Unit - Examination Rooms
  - Procedures
  - Trauma and Triage Room
  - X-Rays
  - Stores
  - Unit Manager Office
Rape Crisis Centre
Pharmacy and Pharmacy Store
Doctor's Rest Room

— — — RAPE CRISIS CENTRE

The rape crisis centre is situated in a private part of the clinic, accessible from a less visual part of the building in order to protect the identity of rape victims and to lessen the psychological stress. The patient will firstly require medical attention, in a doctor's office and thereafter participate in a police investigation. Psychological therapy will follow once these processes are completed.

The space requires a typical home approach, to ensure the patient feels comforted, this will be achieved by using warm materials, soft lighting and high levels of natural light and privacy.

illus 5.38 Detailed plan of trauma unit and pharmacy
illus 5.39 Rape crisis centre process
accommodation
GROUND FLOOR
Atrium and Waiting area
Restaurant and Kitchen
Public Ablutions

illus 5.41 Climbing wall in atrium space

illus 5.42 Interactive mobile solar screen

illus 5.43 Detailed section reception area and library
allied services and mobius play

key plan

illus 5.44 Detailed plan of allied services buildings
accommodation
GROUND FLOOR
Allied Services - Social Services
- Physiotherapy
- Dietician
- Eye-testing Facility
- Occupational Therapy
- Speech and Hearing Therapy

illus 5.45 Perspective view of Mobius playscape

illus 5.46 Detailed section through allied services buildings
### building users

Hypothetical building users were created to illustrate the facilities visited and developmental stimulation that applies.

<table>
<thead>
<tr>
<th>USER PROFILE</th>
<th>MEDICAL REQUIREMENTS &amp; FACILITIES USED</th>
<th>DEVELOPMENTAL EXPERIENCE &amp; ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>1 year old</td>
<td></td>
</tr>
<tr>
<td>TRAVELLED FROM</td>
<td>PRETORIA CBD</td>
<td>VISUAL STIMULATION through sight</td>
</tr>
<tr>
<td>MODE OF TRANSPORT</td>
<td>PEDESTRIAN</td>
<td>COGNITIVE DEVELOPMENT physical stimulation</td>
</tr>
<tr>
<td>ACCOMPANIED BY</td>
<td>MOTHER</td>
<td></td>
</tr>
</tbody>
</table>

#### GASTROENTERITIS
- RECEPTION
- INFANT WARD - ISOLATION
- OVERNIGHT FACILITIES

#### RESTAURANT
- PHARMACY
- OUTDOOR COMFORT GARDEN
- INDOOR COMFORT AREA

#### VACCINE
- RECEPTION
- WAITING ROOM
- DOCTOR'S CONSULTING ROOM

#### HER BROTHER GOES TO MEDIA LIBRARY
- MOBIUS PLAY STRIP
- OUTDOOR COMFORT AREA

#### CO-ORDINATION DEVELOPMENT mobius strip
- BALANCE SKILLS mobius strip
- COGNITIVE DEVELOPMENT media library
<table>
<thead>
<tr>
<th>USER PROFILE</th>
<th>MEDICAL REQUIREMENTS &amp; FACILITIES USED</th>
<th>DEVELOPMENTAL EXPERIENCE &amp; ACTIVITIES</th>
</tr>
</thead>
</table>
| **6 years old**
AGE
TRAVELLED FROM: SOSHANGUWE
MODE OF TRANSPORT: BUS
ACCOMPANIED BY: OLDER BROTHER | SPEECH & HEARING THERAPY
SPEECH AND HEARING WAITING AREA
MOBIUS PLAY
THERAPY ROOM | AGILITY mobius strip
HAND-EYE CO-ORDINATION mobius strip
COGNITIVE DEVELOPMENT therapy |
| **12 years old**
AGE
TRAVELLED FROM: PRETORIA CBD
MODE OF TRANSPORT: PEDESTRIAN
ACCOMPANIED BY: NONE | SEXUAL ABUSE
RAPE CRISIS CENTRE
OCCUPATIONAL THERAPY | COGNITIVE DEVELOPMENT therapy |

[Diagram of architectural plan]
technical investigation
STRUCTURAL COMPOSITION
FLOORS
EXTERNAL MEMBRANE
INTERNAL MEMBRANE
ENVIRONMENTAL CONSIDERATIONS

Occupant Comfort
Thermal Comfort
Visual Comfort
Ventilation
Acoustic Comfort
Views

Inclusive Environments
Public Transport and Routes
Parking
Building Entrance
Circulation
Ablution Facilities

Greening Strategies
Fire Control
structural composition

The primary structural system employed in the new design consists of reinforced concrete walls, structural brickwork and reinforced concrete roofs. The design also took advantage of the thermal mass and structural integrity of concrete as construction material. The material palette selected for this semi-public building was selected to create and emphasise the effect of the tactile human sense, using colour, texture and light as inspiration. Other aspects addressed through the selection of materials include the effect of the threshold, while complementing the existing city fabric and almost industrial textures, seen in this part of the city. Material consideration further included solar heat gain, durability and sustainability. Plastic and metals are recycled, while glass products are strong and reusable.

CAST IN SITU CONCRETE
STRUCTURE
Load-bearing walls and columns (at 4000 centres), with masonry infill in certain sections which support the remaining structure

CAST IN SITU CONCRETE
FLOOR SLAB

CALCULATIONS
Reinforced solid concrete slab
L = typical span (2000-7000)
d = typical depth (100-250)
L/d = Typical [22-32]
7000/255 = 27.45

Applied depth of 255mm over typical span of 7000mm. (Orton, 1994:34)
STRUCTURAL STEEL COLUMNS WITH BEAM OVERHEAD
Custom made structural steel columns clad with aluminum infill panels and timber interior

LOAD-BEARING STRUCTURAL MASONRY WALLS

CAST IN SITU CONCRETE STRUCTURE
Load-bearing walls and columns (at 4000 centres), with masonry infill in certain sections which support the remaining structure
EXTERNAL

Navigation around the building complex is made accessible to children and the handicapped through a variety of different surface finishes. External landscape areas which mark different movement routes within the landscape consist of 600 x 2000 concrete blocks [02] that emphasise the edges of the site. Within these concrete blocks are braille tiles (bumpy extruded tiles) [05] that make it easy for the visually impaired users to navigate their way [06]. Main movement routes are covered with a 5mm stone aggregate bound by a macadamised asphalt base. Surfaces will be pigmented in certain areas to demarcate certain activity spaces. Surrounding movement routes consist of fine-aggregate cast in situ blocks of 600 x 1500 mm. These blocks will be cast with patterns in certain areas [04], demarcating transition areas. Parking and service areas are covered with permeable interlocking paving. External decked areas (restaurant and staff dining areas) consist of a mentis grid and marine grade timber surface [07]. Saligna, is used in all vertical circulation routes, and encourages the idea of a temporary versus permanent structure. Saligna is also used in the allied services building, where a 'nestled' loft space is created for children, here, views through the floor plane challenges the idea that floor should be solid, and allows natural light to filter into the space bellow.
INTERNAL

On ground floor the concrete surfaces are finished in a variety of ways. All areas on the ground floor will experience heavy traffic flow and will therefore need to be robust. The concrete surface beds within the allied services buildings are finished with a mechanical floor grinder after construction is complete. The surface finish is given a smooth polished look and the aggregate used in the concrete mix is slightly exposed after 2mm of the surface has been removed. In large areas where cracking may occur, the concrete is cast in one session and movement joints are later cut into the surface using a grinder. In play areas and internal comfort areas, smooth rubber tiles [01] are placed over the floor to prevent injury and to provide shock absorption.

In the entrance foyer and restaurant, the concrete surface bed is finished with a layer of epoxy resin. All clinic functions, which includes consultation rooms, wards and services, will receive a compact PVC floorcovering [09], that will provide heavy loads resistance, acoustic efficiency, and micro-organism protection. 2.6mm thick Sarlon tech sparkling sheeting is applied to concrete surface bed using an acrylic adhesive, joints must be butted, grooved and heat welded to ensure that the welding rod bonds to more than 70% of the sheet thickness.

Ablutions are finished with tiles as indicated. The concrete slabs on the first floor of the the administration area is finished with epoxy resin and the laboratory with compact PVC floorcovering.
WALL SYSTEMS
The wall system consists of two parts, a cast in situ concrete (enclosing) system and a composite clad (space defining) system.

CONCRETE
The building consists of various concrete products used in the construction of concrete columns with masonry infill, load bearing walls and floor and roof slabs. Concrete was chosen for its high mass that attributes to good thermal insulation and sound isolation necessary for the auditorium. Although it is perceived as a heavy, cold material, this view is challenged by using different off-shutter methods [03]. These methods include horizontal timber panels and smooth steel panels.

Pigments used in the concrete work are mainly applied to ensure that the colour remains consistent despite the aggregate used. Two neutral hues are used in the design, namely off white and light grey. These hues have been chosen to ensure that the interior spaces seem light and airy. This is enhanced by the application of a light-transmitting concrete in the communal waiting area [01] & [02].

COMPOSITE CLADDING
A structural steel frame that defines that outer skin of the building consists of two cladding materials. Custom made structural steel columns form the base of the skin. The majority of the building is clad in 25mm Softwave aluminum panel, fixed to the outside of the steel frame.

Aluminum was chosen as cladding material due to it’s compelling argument to be regarded as a green material - it’s recyclable, lightweight, versatile and highly durable - and one of the most
abundant materials in the earth’s crust. Aluminum has an embodied energy of 8.24kg/CO2/kg, which is high compared to other construction materials, but possesses many other attributes, such as safety factors and recycling ability that makes it a suitable material for this application.

Advancing technologies has also meant that mines have reduced energy required to make bauxite into aluminum by almost 70%, with over 50% of that energy from renewable resources - largely hydro-electric (Hunter, 2012:35).

Below the aluminum cladding is a operable louvre system to allow for fresh air intake. Another louvre system is located at the roof level, where the steel frame connects to the concrete beam, which extracts exhaust air from the room and therefore enhances the natural ventilation of the spaces.
internal membrane

A range of surface finishes and textures are used in the interior spaces to emphasize the tactile qualities of materials and to stimulate the sensorial experience of the user.

TIMBER
The timber used in the design, represents the warm natural building materials. Withing the structure of the building, curved timber panels create an extension of the roof into the wall skin and extend into the horizontal plane to form seating [05]. In most instances, the timber improves accoustic qualities of the space and softens the interior.

Timber in this application, is reminiscent of the vegetation on site, and brings these warm qualities into the interiors. The impermanence of wood strongly contrasts that of the concrete and masonry and allows for change of the spaces as the needs of the users evolve.

MASONRY
Brickwork will be used as a reminder of conventional building methods, requiring little maintenance and less skilled labour, as opposed to concrete work. It also provides textured surfaces and load-bearing support.
RESIN PANELS
Resin panels in various natural elements [01] &[02] bring the landscape into the interior spaces and transmits coloured light into the interiors. The resin panels are made from 40% recycled materials and are used for partitioning and sliding doors.

BRAILLE PATTERNS
Braille patterns on handrails [03] and on wall surfaces [04] react to the visually impaired and is used to orientate them in the building environment.

LIGHT & COLOUR
Light plays with the illusion and perception of space by creating a unique and qualitative experience. Man’s psychological reactions and physical well-being is influenced by light (Gallagher, 1999: 75). Lighting merges qualities of space: sound, texture, colour and movement, beyond its physical attributes. These qualities of light are specifically important in the design of the clinic, which should promote psychological development. Light is emphasized by the use of colour, in roof light glazing and ceramic tiles.
environmental considerations

Occupant Comfort
The objective is to create light and airy spaces reminiscent of exterior spaces. The spatial understanding of the project is intended to be in contrast to crowded, gloomy clinical conditions within the city context of Pretoria CBD.

For user quality people must feel physically comfortable; the building must not be too cold, too hot, dirty, dark or noisy. The building must be sufficiently in harmony with the human perceptions (the way it looks, smells, sounds and feels).

01 - THERMAL COMFORT
Maximum use is to be made of passive systems to eliminate the need for mechanical ventilation systems where possible, thereby cutting on costs, maintenance and carbon footprint. Exaggerated vertical dimensions improve thermal comfort by means of the stack effect’s removing excessive heat from the spaces.

The greenhouse effect, illustrated in the figure above, is the phenomenon where shortwave radiation (sunlight) penetrates glass and heats up interior spaces and objects, which, in turn, radiate long-wave radiation, most of which cannot pass through glass, leading to a heating effect (Marshall, 2000: 78).
Marshall explains that this can be prevented by means of large overhangs to north-facing structures. This allows for sun protection in summer and penetration in winter.

Fig. 05.03 illustrates how trees and plants may be used selectively to provide shade in summer and to permit sunlight in winter.

The thermal flywheel effect, as illustrated in fig 05.04 will be incorporated in the design, therefore the buildings are intended to have thick, well-insulated walls with high thermal mass. Thermal mass, which slows the transmission of heat, creates a thermal flywheel effect in the buildings. Roof overhangs should allow radiation to reach the walls during winter months and protect the walls during summer months. In winter, the heating of the walls takes place during the day, after sunset, the wall continues to lose radiation both inward and outwards, offsetting a drop in night ambient temperature.

In summer, the same process takes place, but nor the inward radiation may be problematic if the ambient temperature does not drop substantially, therefore roof overhangs should protect walls from excessive heat gain (Marshall, 2000:80).
MASSING
The thermal mass required is achieved by concrete work absorbing direct solar radiation during the day, and releasing the accumulated heat into the interior spaces after a certain time delay. This delay is determined by the density and thickness of the absorbent surface. A slab depth between 230mm and 500mm is usually sufficient to produce an adequate time delay so that day and night temperatures even out.

ORIENTATION
The building mass sits along a east-west axis which enables proper north orientation of most of the building. Facades facing east or west are limited in size and where they are glazed, they are screened from direct sunlight. The subsidiary wings of the building is divided into two sections, by pulling these apart, the spaces within sections are exposed more effectively to the benefits of passive systems. Also, as a result, various micro-climates, such as shading and cooling from existing trees, develop between the built forms.
VENTILATION
Building placement and orientation will be according to the prevailing wind direction for optimal natural ventilation. Maximum building width will not exceed 12m for ventilation. The stack effect is to be implemented for enhance air movement throughout the building. The amount of ventilation is user-adaptable by means of operable windows.

The nature of the building does not lend itself to rely solely on passive ventilation systems. The formal parts of the building (trauma unit, laboratory and kitchen) need mechanical ventilation to achieve optimum human comfort levels. A deliberate attempt was made to reduce the demand on the mechanical ventilation system and to save energy. Principles that are applied include: high thermal mass provided by the concrete roof and walls – taking advantage of the fly wheel effect, using a light colour concrete of the exterior walls of the building.

The light colour of the concrete will also reflect solar heat instead of gaining heat through absorption. The prevailing summer wind direction is from the north-east. The glazed openings at the end points of the building open up and thereby promote cross ventilation. Since cross ventilation can only occur when there is enough difference in temperatures between indoor and outdoor areas, the building increases their interior skin by layering the north elevation, thereby protecting the interior core of the building from direct heat gain from the hot afternoon sun.

The main design features that will be incorporated in the design, which will affect the indoor ventilation conditions are:

- Narrow building section to allow easy cross ventilation
- Windows at ceiling level for the escape of hot air
- Total area of openings
- Operable windows
- Use of casement windows, as they offer better air flow
- Minimizing interior obstruction
- Slightly larger wind outlets
02 - VISUAL COMFORT
Visual comfort depends on sufficient light, avoidance of glare and visual contact with the exterior.

The building’s northern orientation will maximize the use of day lighting. Adequate screening and roof overhangs will prevent unwanted heat gain and glare. To maximize the use of natural day lighting, direct lighting will be supported by diffused and reflected light to illuminate the entire space.

GLAZING AND LIGHTING
Most glazing is fixed to the building structure by aluminium frames. The life span benefit of using aluminium in the building outweigh the initial costs, the recycling potential of aluminum members and their clean finish will ensure the consistent appearance of the building façade. Areas with fixed programmes such as the allied services facilities and the treatment rooms will use aluminium-framed glazing sections.

Because of the public nature of the building, the installation of many low-level windows and the potential for spontaneous, informal activities, glass panes used mostly 9mm laminated safety glass. Panel sizes do not exceed 6m². All glass panels, which might not be obvious in their position and may cause injury, will be marked appropriately.

The curtain wall used in the main atrium and restaurant has a clean finish achieved by using fins and fixing the glass to the bottom using the appropriate structural members.

Glazing is used in the design with the purpose of linking the exterior and interior spaces, to expose part of the structure, and to create illusions as to how the building works. It is for these reasons that most external doors are glazed. Most glazed areas are on the southern and northern edges of the building to maximize natural light and to limit heat gain.

Where glazing has been used on the eastern and western edges, overheating has been controlled by using walls, overhangs or vegetation to block the amount of direct sunlight entering the building.

LIGHTING REQUIREMENTS
During the day, indoor activities are to be naturally lit, as far as possible. Direct light into the interior cavity space is not recommended as it often causes glare and increases the internal air temperature. It is for this reason that the building employs a layered façade.

The following lighting requirements have been established and the building facades have been designed in response to these:

Ablutions: 50 lux
Kitchens: 100 lux
Library and computer areas: 150-200 lux
Allied services facilities: 250 lux
Pharmacy and Treatment rooms: 300 lux
Trauma areas: 350 lux
Laboratory and offices: 500 lux
Foyers: 200 lux
Restaurant: 200 lux
Laundries: 300 lux
LIGHTING SYSTEMS
Restaurant, library and atrium spaces
low voltage pendant light with GY 4 Halogen bi-pin 12V 20W lamp in satin chrome finish, complete with 3 metre cabtyre and 6A plug top, bearing the SABS 1464 safety mark.

Allied services consultation rooms
low voltage pendant light with GY 6.35 Halogen bi-pin 12V 50W lamp in satin chrome finish, complete with 3 metre cabtyre and 6A plug top, bearing the SABS 1464 safety mark.

Ablution and Change rooms
low voltage 12V 50 W down light luminaire in die cast aluminium ceramic lamp holder and teflon wiring.

Clinical Treatment and consultation rooms
compact fluorescent suspended lights with 12V 100W lamps. satin chrome finish body with silver reflectors, complete with 3 metre cabtyre and 6A plug top, bearing the SABS 1464 Safety mark.

SITE LIGHTING
The playground and surrounding exterior spaces will be lit with BEKA BT 400W HPS Luminaires in single arrangement as indicated on image. Features of this light include a 10m steel pole with high performance ip66 Sealsafe reflector system and removeable control gear, complete with surface mounted base plate.

The interior information counters as per detail will be lit with BEKA LEDrail 630mm accent lighting with 2x15 Power OSRAM LED’s per 630mm length. Drawings indicating wall mounting bracket are illustrated in the drawing above.
inclusive environment
A democratic approach to the building is followed, and therefore the structure aims at being open and inviting.

01 - PUBLIC TRANSPORTATION AND ROUTES
Boom Street and Soutpansberg Road are well-used public transportation routes. This intersection creates a gateway site from Pretoria north into the CBD of Pretoria, from where users can easily move across the proposed pedestrian crossing to the clinic.

02 - PARKING
Most of the time, a vast number of parking bays are not required, because the user base will mostly be using public transportation or arriving on foot or by bicycle. The majority of parking spaces will be occupied by staff use.

03 - BUILDING ENTRANCE
The building entrance and foyer should be open, legible and articulated. The entrance should have landmark qualities and thereby orientate users towards the access and information points.

04 - ROUTES
All routes in and around buildings should have smooth surfaces and be handicapped friendly. Level changes are important considerations.

05 - CIRCULATION ZONES
Circulation zones within the building will be visually and physically well connected with different functions for legibility.

06 - ABLUTION FACILITIES
Ablution facilities are placed centrally to achieve maximum usage. This implies that the facilities are placed in circulation zones to maximise usage and monitoring of the spaces. Ablution facilities will be placed within or near circulation zones to increase the numbers of the user group. The prominent position will ensure passive monitoring of the facility.
accessibility and circulation
The building should appear accessible and inviting to the public. The entrance should be easily identifiable and accessible. Quick and easy exit is required in case of emergency. People must be able to see how parts of the building fit together and be able to find their way around psychologically needs to be met: Need for privacy
Social contact
Freedom of choice
Autonomy

MOVEMENT AND ACCESS
The building, explodes itself into the site, forming an architectural extension of the natural landscape and of the new proposed framework for the north eastern border of the CBD. Most of the pedestrian movement on the site occurs on the street edge and will be strengthened through landscaping and pedestrian orientated design. The choice to create a movement route rather than a square or a piazza follows from the desire to create an area rich in opportunities for accidental meeting and spontaneous activities. In Tshwane, most activity takes place informally along building edges and street fronts. Most open public squares are not utilized to the same extent as the sidewalks are. These factors influenced the design of movement routes versus courtyards in the proposed building.

SAFETY
The spaces concerned will, however have to provide adequate safety, so apart from being properly lit at night; they will also be observed through passive surveillance during the day. Where buildings have views onto these spaces, a relative degree of control is established. The openness of the design on plan is extended into the vertical plane by creating openings which promote views into and out of the building.
greening strategies

The greening strategies employed in the building that will minimise the energy consumption include:

- Building orientation allows for natural cross ventilation and natural daylighting
- Rainwater harvesting, storage and use for irrigation purposes
- Operable windows and shutters throughout the building to promote natural ventilation
- Recessed walkway areas shaded from excessive direct sunlight
- Light coloured roof lessens heat island effect
- Natural vegetation providing shading from direct sunlight
- Overhangs are provided on northern facades
- Water efficient toilets and fixtures
- Permeable paving materials are used to allow stormwater to drain into soil

illus. 6.19 Sketch showing greening strategies employed in building
**SBAT rating**

The SBAT rating tool was used to evaluate the design. The Sustainable Building Assessment Tool provides an indication of the performance of a building or the design in terms of sustainability. Although the tool is ideally used on a building that has recently been completed, it can be used on other stages as well, but may not be relevant.

The tool was used with the assumption that all the requirements would be met once the building is completed, even though many factors such as local workmanship cannot be determined at this point. The rating tool is divided into three components namely, environmental, social and economic.

The environmental component deals with recycling of waste, water consumption and reuse, greening of site and the percentage of users who make use of public transport systems, etc. The social component deals with the social performance of the building in terms of sustainability, including aspects such as access to public transport, disabled access to functions, noise and air pollution. The economic component provides an indication of the economical performance including cost of construction and material and locally sourced materials and the use of local labour instead of specialized labour.

---

**RESULTS**

SOCIAL: 3.9  
ECONOMIC: 4.1  
ENVIRONMENTAL: 3.5  
OVERALL: 3.8

CLASSIFICATION: GOOD
WATER HEATING CALCULATIONS
Thermosiphon close-coupled solar geysers will be used to supply hot water to staff change rooms and patient ablutions. A 250L storage tank with 1 collector (2sqm) allows for 5 showers/3 hours.

Calculations are based on figures made available from SolarTech, a South African solar water geyser supplier.

The K250i indirect SolarTech water heating system is a close-coupled system (tank higher than collectors) using a natural thermosiphon method of water circulation. The average water consumption per shower is 30-50L. With the use of low-flow shower heads, shower water may be reduced by 50-75%, thus reducing the shower water to approximately 15-25L.

Hot water from a geyser is usually mixed with cold water to bring the shower water to an ambient temperature of between 30-40 degrees celsius.

Thus not all 250L of hot water in the geyser is used directly for shower water. Temperature within a solar tank may typically be 80 degrees celsius. Assuming ambient shower temperature is 37 degrees celsius, the ratio of hot water to cold water is 1:3. Assuming average water consumption per shower is 20L (12-25L), 5 of which is made up of hot water. Thus a 250L solar tank (at 80 degrees celsius) can supply hot water for 50 showers.

Assuming all showers are utilised in the building, there will be 84 staff occupants (of which half will use showers) and 36 patients, totalling 78 users all together.

The amount of water needed for showers will approximately be 78 people x 20L = 1560L

Hot water needed (1:3) = 390L
78 people/50 showers per 250L tank = 1.56, which equates to 2 units, allowing for other requirements.
RAINWATER HARVESTING
Rainwater on the roof is collected through downpipes and stored in water storage tanks located underground. From here, it is used for irrigation purposes.

According to Weather SA, the average annual rainfall in Pretoria is 647mm. Total roof area to be used for rainwater harvesting is 2981sqm.

2981sqm X 0.647 = 1928 kl water, available for harvesting. Only 73% of this water will be used due to evaporation. This result may not be accurate as numbers used in calculations are estimates.

WATER RUN-OFF
Permeable paving is an effective method of managing runo-off from paved surfaces and is used for the many paved surfaces around the buildings. Permeable paving surfaces keep pollutants in place in the soil or underlying roadway materials and allow rainwater to naturally infiltrate and recharge groundwater. Water which seeps through the porous surface can also be directed to underground tanks for subsequent re-use, reducing the capacity requirements of stormwater attenuation systems and providing a low cost store of harvested rainwater.

The drawing above shows the construction process. The 32mm stone base gives the layer beneath both structural integrity and storage space, while the intebox green geofabric separates the coarse stone from the fine bedding stone and has fibres which are cupped to host “good bacteria” which feeds off pathogens and microbes. Above that is the 2-6mm bedding sand which filters the water and beds the blocks, and finally the permeable pavers which have exaggerated gaps in the sides for rainwater collection. The blocks are then locked into place using 1-2mm crushed stone in the joints which give an incredibly strong bond while still allowing rain filtration.
**fire control**
The public and communal nature of the building calls for a high degree of safety in the event of a fire. The specifications set by the NBR TT have been followed. Communal areas require a 120 minute fire resistance rating and offices need 60 minutes. Therefore, the concrete work will satisfy this rating, and steel members will be coated and thickened to accommodate the safety requirements.

Because the building is spread across the site, the actual design areas and dimensions allow for a higher degree of control over spaces. An escape route is located every 25m on straight movement routes and where a change of direction occurs, this distance will not be more than 15m. Escape routes are clearly indicated and in most cases, because in essence the building only rises two storeys, most escape routes exit onto the ground floor.

All structural steel components will be coated in a thin-film mastic intumescent coating which will provide adequate protection in the event of a fire. The steel members in the design are mostly located on the ground floor, which ensures that appropriate escape routes are available within the required time limits. Further design measures include increasing the size of the structural members to improve their fire resistance.
product drawings
ground floor plan
DEVELOPMENTAL BENEFITS OF PLAY STRUCTURES

- Co-ordination
- Agility
- Motor planning
- Co-operative play
- Core strength
- Upper body strength
- Gross-motor skill development
- Hand-eye co-ordination
- Balance
- Muscle endurance
- Social skills
- Sensory input
- Auditory stimulation
- Tactile stimulation
DETAIL WALL SECTION 1
SCALE 1:20
PAINTED STEEL CANOPY SUPPORT FROM 2No. 50x50x6mm MILD STEEL EQUAL ANGLE SECTIONS WELDED TOGETHER, CHANGED TO DIMENSIONS SHOWN. FIXED TO WALL WITH 50x50x4mm PAINTED MILD STEEL ANGLE FIXED TO WALL WITH 2No 8mm DIA EXPANSION BOLTS.

22x96mm SALIGNA HARDWOOD SLATS WITH TOP EDGES 6mm ARRIS ROUNDED CORNERS SCREW FIXED WITH SALIGNA SPACER IN-BETWEEN, FROM OUTSIDE TO STEEL T SECTION FRAME

DETAIL OF CANOPY CONNECTION
Scale 1:2
STAIRCASE DETAIL
SCALE 1:20

50 x 50 x 4 mm GALVANISED MILD STEEL ANGLE FOR BEAM FRAME
50 x 50 mm STEEL REINFORCED CONCRETE BEAM
50 x 200 mm GALVANISED MILD STEEL ANGLE FASTENED TO LAMINATED WOOD WITH 50mm COUNTERSUNK SELF-DRILLING SCREWS
OIL-RESISTANT STRUCTURAL UHMWPE SLIDE FLOORED TO BEAM AND WALL WITH 50 mm ANGLES
280 x 150 mm LAMINATED WOOD TREAD
WITH BOUGHY FLOORED ON TOP OF 50 mm WHITE POWDER COATED MS TREAD BASE WELDED TO 120 mm BASE PLATE AND ANCHORED TO CONCRETE BEAM WITH M12 EXPANSION BOLTS AS PER ENGINEER'S DETAIL
10mm DIA WHITE POWDER COATED MS RODS, WELDED TO MS TREAD BASE

500 x 240mm STEEL REINFORCED CONCRETE BEAM

250 x 900mm LAMINATED WOOD TREAD, WITH ROUGH FINISH FIXED ONTOP OF 8mm WHITE POWDER COATED MS TREAD BASE WELDED TO 12mm BASE PLATE AND ANCHORED TO CONCRETE BEAM WITH M12 EXPANSION BOLTS AS PER ENGINEER'S DETAIL

CUSTOM MADE STRUCTURAL HIGH DENSITY POLYETHYLENE SLIDE, FIXED TO WALL AND BEAM WITH MS ANGLES

50 x 50 x 4mm GALVANISED MILD STEEL ANGLE IRON FRAME

DETAIL STAIR TREAD
SCALE 1:10
DETAIL 3: WAITING BENCH AND BULKHEAD

SCALE 1:10

- **Concrete Floor Slab Above**
- **Donn SM25 Cornice**
- **Suspended Plasterboard Ceiling at 2230 AFFL**
- **Donn SM25 Cornice**

**50x30x5mm Galvanised Mild Steel Angle**
Fastened to Laminated Wood with 4.8mm Countersunk Self Tapping Screw.

**Custom Made Laminated Wood Seat**

**60x45x5mm Galvanised Mild Steel Channel**
Fastened to Laminated Wood with 4.8mm Countersunk Self Tapping Screw.

**J-Bolt Cast in Concrete**

**In Situ Cast Concrete Seat**

**40x40x4mm Galvanised Mild Steel Angle**
Fastened to Laminated Wood with 4.8mm Countersunk Self Tapping Screw, Welded to a Similar Angle Mechanically Fastened to Concrete with M10 Bolt.
50x30x5mm GALVANISED MILD STEEL ANGLE FASTENED TO LAMINATED WOOD WITH 4.8mm COUNTERSUNK SELF TAPPING SCREW.

CUSTOM MADE LAMINATED WOOD SEAT
60x45x5mm GALVANISED MILD STEEL CHANNEL FASTENED TO LAMINATED WOOD WITH 4.8mm COUNTERSUNK SELF TAPPING SCREW.
J-BOLT CAST IN CONCRETE

IN SITU CAST CONCRETE SEAT
40x40x4mm GALVANISED MILD STEEL ANGLE FASTENED TO LAMINATED WOOD WITH 4.8mm COUNTERSUNK SELF TAPPING SCREW, WELDED TO A SIMILAR ANGLE MECHANICALLY FASTENED TO CONCRETE WITH M10 BOLT.
120mm REINFORCED OFF-SHUTTER CONCRETE BENCH TO ENGINEER'S DETAIL AND SPECIFICATIONS
25x25mm JOINT WITH BOSTIK 22DS100 OR APPROVED EQUIVALENT JOINT SEALER

SECTION OF EXTERNAL COMPOSITE BENCH
Scale 1:20

PAINTED STEEL BENCH SUPPORT FROM 50x50x4mm MILD STEEL ANGLES SECTION, FOLDED TO DIMENSIONS SHOWN, CAST INTO CONCRETE SURFACE BED AND FIXED TO WALL WITH 50x50x4mm PAINTED MILD STEEL ANGLE FIXED TO WALL WITH 2No 8mm DIA EXPANSION BOLTS.

22x94mm SALIGNA HARDWOOD SLATS WITH TOP EDGES 6mm ARRAIS ROUNDED CORNERS SCREW FIXED FROM UNDERSIDE TO STEEL RECTANGULAR FRAME

REINFORCED CONCRETE FOUNDATION TO ENGINEER'S DETAIL

22x96mm SALIGNA HARDWOOD SLATS WITH TOP EDGES 6mm ARRAIS ROUNDED CORNERS SCREW FIXED FROM UNDERSIDE TO STEEL RECTANGULAR FRAME

DETAIL OF EXTERNAL TIMBER BENCH
Scale 1:5

PAINTED STEEL BENCH SUPPORT FROM 50x50x4mm MILD STEEL ANGLES SECTIONS, FOLDED TO DIMENSIONS SHOWN, CAST INTO CONCRETE SURFACE BED AND FIXED TO WALL WITH 50x50x4mm PAINTED MILD STEEL ANGLE FIXED TO WALL WITH 2No 8mm DIA EXPANSION BOLTS.

230mm PLANTER WALL 585 HIGH ABOVE UOFL WITH 1 OR 2 COATS PLASTER AS SPECIFIED WITH A 5:1 SAND CEMENT MIX WITH A STEEL TROWEL FINISH, PREPARE AND PAINT COLOUR ACCORDING TO ARCHITECT

"COPROX" MASONRY WATERPROOFING TO OUTER SKIN OF FOUNDATION WALL STRICTLY ACCORDING TO MANUFACTURERS

REINFORCED CONCRETE FOUNDATION TO ENGINEER'S DETAIL

PLAN OF EXTERNAL TIMBER BENCH AND PLANTER
Scale 1:20
30mm CEASARSTONE BAR COUNTER WITH SQUARED EDGES ON TOP OF 38x38 TIMBER FRAME SCREWED TO CUPBOARD CARCASS WITH COUNTERSUNK WOOD SCREWS

TEAL PLEXIGLASS PANEL IN CUSTOM MADE 40x40x3 MILD STEEL ANGLE IRON FRAME WITH 200mm STAINLESS STEEL KICKPLATE. COLOUR AS PER ARCHITECT’S SPECIFICATION

FLUORESCENT LIGHT TUBE AS PER ELECTRICIAN’S SPECIFICATION INSTALLED AGAINST FLOOR AND UNDERSIDE OF COUNTER

16 SUPAWOOD CUPBOARD CARCASS WITH DUCO FINISH. COLOUR TO BE SPECIFIED BY ARCHITECT. ALL HINGES SHALL BE OF THE CONCEALED TYPE.

CUPBOARD DOOR. PLEXIGLASS PANEL IN ARCTIC SNOW WHITE COLOUR IN CUSTOM MADE 25x25x3 MILD STEEL ANGLE IRON FRAME PAINTED AS PER ARCHITECT’S SPECIFICATION

30mm TIMBER CHILD STAND FIXED TO CUSTOM MADE 40x40x3 MILD STEEL ANGLE IRON ELBOWS WELDED TO FRAME WITH 200mm STAINLESS STEEL KICKPLATE. COLOUR AS PER ARCHITECT’S SPECIFICATION

50x50x3 MILD STEEL ANGLE IRON SCREWED TO FLOOR AND UNDERSIDE OF COUNTER

CROSS SECTION THROUGH RECEPTION COUNTER
Scale 1:10
30mm CEASARSTONE BAR COUNTER WITH SQUARED EDGES ON TOP OF 38x38 TIMBER FRAME SCREWED TO CUPBOARD CARCASS WITH COUNTERSUNK WOOD SCREWS

EPDM WASHER
SCREW WITH LARGE WASHER AND CAP NUT

PROTECTIVE SLEEVE

TEAL PLEXIGLASS PANEL IN CUSTOM MADE 40x40x3 MILD STEEL ANGLE IRON FRAME WITH 200mm STAINLESS STEEL KICKPLATE, COLOUR AS PER ARCHITECT’S SPECIFICATION

FLUORESCENT LIGHT TUBE AS PER ELECTRICIAN’S SPECIFICATION INSTALLED AGAINST FLOOR AND UNDERSIDE OF COUNTER

CROSS SECTION THROUGH RECEPTION COUNTER

Scale 1:2
**DETAIL 1: SKYLIGHT**  
**SCALE 1:10**

- 230 mm THICK REINFORCED CONCRETE WALL EXTENDING INTO A 400 mm HIGH PARAPET.
- 15 mm THICK SINGLE LENGTH LAMINATED SAFETY GLASS LAYED AT A 45 DEGREE ANGLE WITH 30 mm OVERHANG ON NEOPRENE RUBBER STRIPS, FIXING ACCORDING TO SPECIALIST.
- SILICON SEAL.
- 25 mm x 25 mm RECESS IN CONCRETE WALL.
- 155 a LIGHT COLOURED GRAVEL.
- WATERPROOFING: ABE TORCH-ON.
- WATERPROOFING MEMBRANE LAYED ON SCHEDULED TO FALL 1.70 mm TOWARDS FULL BORE OUTLET.
- 355 mm REINFORCED CONCRETE SLAB AS PER ENGINEER’S DETAIL.
- 370 mm HIGH CONCRETE REINFORCED CROSS BEAM.

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**DETAIL 2: GREEN ROOF**  
**SCALE 1:10**

- 230 mm THICK REINFORCED CONCRETE WALL EXTENDING INTO A 1200 mm HIGH BALUSTRADE WALL (1 m ABOVE PLANTED SURFACE).
- 40 x 40 mm EQUAL ANGLE GALVANIZED MILD STEEL ANGLE.
- PLANTING MEDIUM.
- FILTER FABRIC.
- 75 mm AGGREGATE AS DRAINAGE MEDIUM.
- PERMEABLE FILTER CLOTH TO CONTAIN PLANT ROOTS.
- BASF MASTERTOP 1330.
- WATERPROOFING ON 25 mm MINIMUM CEMENT SCHEDE WITH 1.79 MM FALL TOWARDS FULL BORE OUTLET.
- 255 mm REINFORCED CONCRETE SLAB AS PER ENGINEER’S DETAIL.
- 25 mm Drip Joint.
conclusion
Our experience in this world, from a very young age, is formulated by the amalgamation of the senses. To experience something one should be able to touch, see, taste, hear and smell it. Therefore, architecture, to truly engage the minds of the user, should be designed with intangible sensory aspects in mind. The sensory realm of architecture goes further than appearances. What a building looks like becomes less significant, but how it feels and stimulates our minds are essential.

Children’s functioning and development is shaped by interaction with their surroundings and spaces designed for them must conform to their physical, cognitive and social needs. The design proposal is based on a search for an architectural solution which offers exploration and stimulation to children. Through the design of multi-sensory environments, people’s well-being can be improved.

Life materializes within buildings and it has been demonstrated that buildings can significantly affect people. Architecture is far more than just a building, its influential effect on humans, makes it an essential part of shaping lives.
acknowledgements

To God, the architect of my life, for this opportunity and inspiration in everything I do. My mother, for all the love and encouragement, I dedicate this in your loving memory. To my father, for being my voice of reason, my steadfast support and for always believing in me. To Gary and Jacques, for the endless guidance and understanding. Thank you to all my family and friends, for the love and loyal support.