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I further state that no part of my thesis has already been, or is currently being, submitted for any such degree, diploma or other qualification.

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Muhammad Saadiq Omar
October 2012

ABSTRACT

This dissertation aims to promote healthy living for people residing in a disadvantaged area. Physical activity, social interaction a connection with nature are key aspects in this project. The proposed facility would thus include amenities for recreation and health services to assist in achieving this goal. The architecture will be used to stimulate the senses and thus bring into consciousness the presence of the human body in its interaction with the surroundings.

The motivation for the project is the fact that many of the health problems experienced by the population of the country are caused by obesity. A lack of physical activity and poor eating habits has resulted in obesity and its associated illnesses being quite common in all communities around the world. Another reason for the project is the accelerated damages that are occurring to the natural environment. People have become unaware of the importance of natural environment and this ignorance has lead to polluting and general mistreatment becoming common place.

The proposed site is in the township of Olievenhoutbosch, south of Tshwane. The township lacks many public facilities so the proposed design should also consider the intervention being more than just a health and recreation centre, but one that serves as a hub for the people of the community.

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CHAPTER 1

Introduction

"Electric light, heating and air-conditioning obscure the annual and daily rhythms of the natural world. We enjoy heat in winter and cold in summer, foods out of season, nights bathed in fluorescent light. (James 2009: 25)"

Background

The present day world sees a society that is physically unhealthy and indifferent to nature[1] and its environments. The built environment plays a role in this current condition in that there is a lack in diversity of typologies and activity centres for public use in residential areas (Verity & Poulton 1995:164). The planning of cities requires people to travel distances in order to get to work and the work environments are altered and climatically controlled by technological devices. Relaxation and entertainment are mainly gained through the use of electronic devices such as the TV, computers, cellular phones etc.

A facility promoting healthy living through recreation and health services is proposed to address these problems. It will create opportunities for physical activity, social interaction and an awareness of the human body in its surroundings through the use of sensory architecture. The environment of a recreation facility is that where people come to have fun, exercise and make friends. It is where the mind of the person is connected with the body in the present and being aware of the experience, not concerned about the past or the future (Geba 1985: 34).

The proposed site for the project is in Olievenhoutbosch, a township to the west of Centurion in Tshwane, Gauteng. It is a poor community which lacks many facilities and services (Pila & Mashishi 2011). People have to travel distances to get to work, school and rely mainly on public transport. Most of the residents have come from informal settlements where they experienced the extremities of the weather conditions.

Figure 1.1- Forgetting the present moment

Figure 1.2- Reliance on public transport

Figure 1.3- Informal settlements

[1] The term nature used in this dissertation encompasses "the phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth as opposed to humans and human creations. (oxforddictionaries.com)"

Figure 1.4- Shops run from residences

Figure 1.5- Shacks rented out on property

Figure 1.6- South Africa's obesity statistic

Aims

The aim of the dissertation is to promote healthy living of the people residing in Olievenhoutbosch by raising their conscious levels. This is done in three stages. Firstly, people need to be aware of their own bodies and senses. Secondly, this awareness would then extend to the people around them and how they interact with each other. Lastly, the surrounding environments, both the built and the natural environments, would be in the consciousness of people. Being conscious would affect the relationship and treatment of these entities, which is hoped would result in mutual respect.

Problem Statement

The planning of suburbs and residential areas do not fulfil all the needs of the residents. A lack of diversity in typologies results in people having to travel distances to get to work and to access other facilities. The importance of activity centres which encourage social interactions is overlooked with public spaces being allocated without sufficient thought. (Verity & Poulton, 1995). Olievenhoutbosch fits into this general critique. However, the residents have taken it upon themselves to fill in the gaps by opening shops and other necessary services as attachments to their houses. Activities develop around these interventions, the existing community centre and surrounding parks and open spaces. Apart from the existing community centre where the activities are generated due to a need, there are no facilities available that are suitable for people to come and interact with each other.

Most of the people that own houses in Olievenhoutbosch rent out shacks on their property. This results in two contrasting experiences with nature and its elements. Those living in the shacks experience nature as an enemy as they experience the various climatic aspects and need to overcome these in order to experience comfort. On the other hand, those living in the houses and have electricity and other services and therefore experience the climatic aspects of nature very differently. The artificial environments of the electrical systems available have alienated people from nature. Nature has

become reduced to a mere resource that supply the raw materials needed to produce the technological devices that are wanted and it is therefore seen as just a means to an end. "They show up in our lives only to the extent that they are useful. (James 2009: 70)"

These lack of facilities and the corresponding physical inactivity, together with a reliance on technology and bad eating habits have resulted in a society that has 30% of the men and 55% of the women classified as obese (Day & Gray 2008: 329). Excess weight and physical inactivity showed, from a study conducted, an increase in the risk of heart disease, stroke, diabetes and many cancers. The study also found that South Africans are more inactive than other countries with the females almost twice as more at risk of contracting disease than the males (Day & Gray 2008: 330).

Therefore, it can be seen that there is a need for a facility in Olievenhoutbosch that would encourage people to visit to take part in activities as well as to interact with others. The proposed facility could help prevent the development of sicknesses as it promotes healthy living through the provision of amenities for physical activities, healthy eating and professional guidance of these. The facility would also facilitate in the raising of awareness of the need to care for nature and its environments by providing a setting where nature can be enjoyed and interacted with.

Main research question

How could a facility for the promotion of healthy living enable the users to become conscious of themselves and of their surroundings?

Sub research question

What other issues concerning the Olievenhoutbosch community can the facility address?

Research Methodology

The approach to this dissertation follows a pragmatic and process driven method. Firstly, the major health problems of the South African society was identified. Secondly, theories related to the problems were researched and possible links established to create a cohesive understanding that can be taken forward into the design. A set of guidelines were drawn from these theories to influence the design decisions.

In addition, relevant precedents relating to programme, context and theory were looked at with a focus on projects completed in South Africa. The process undertaken in applying the guidelines into the development of the concept can be seen in detail in Chapter 6 of this dissertation.

CHAPTER 2

Theory

"Human life is not intended to oppose nature and endeavour to control it, but rather to draw nature into an intimate association in order to find union with it."
(Ando 1991: 460)

Background

Humans have the ability to adapt and change their environments to satisfy their needs, whereas plants and animals have to adapt themselves to their environments in order to survive (Neutra 1954: 82). This ability has resulted in the misuse of the natural resources and insensitive practices that have led to the damage to the natural environment. Should these unfriendly practices continue, the harm done would be disastrous mainly to humans, because the planet would become unsuitable to sustain human life. Other forms of life are able to survive in conditions that humans cannot and thus life would go on without humans. (Davey 2001: 34)

Furthermore, this attitude is not restricted only to the large industries but stems from the everyday experiences of people. Due to the continuous engagement with modern technologies, the human senses and thinking patterns have attuned to them resulting in a lack of awareness to their surroundings including nature. (Abram 1996) The body is in constant interaction with its surroundings but the built environment doesn't allow for the users to be aware of the transactions of the body in the space (Pallasmaa 2005: 17). "The breathing, sensing body draws its sustenance and its very substance from the soils, plants, and elements that surround it; it continually contributes itself, in turn, to the air, to the composting earth, to the nourishment of insects and oak trees and squirrels, ceaselessly spreading out of itself as well as breathing the world into itself, so that it is very difficult to discern, at any moment, precisely where this living body begins and where it ends. (Abram 1996: 46)" The above statement asserts that humans are interrelated, connected and a part of nature.

However, the bringing to awareness of the relationship that humans have with the surroundings is possible with careful design of the built environment. The architecture should stimulate the senses and thus bring to awareness the presence of the body in the environment. "The compounding of sense impressions produces our generalised consciousness of the environment, be it natural or designed and constructed. (Neutra 1954: 155)"
The main research question asks: "How could a facility for the promotion of healthy living enable the users to become conscious of themselves and of their surroundings?" The programme alone would not be able to realize this goal, but the environment in which the activities take place is capable of achieving it through the use of architecture that stimulates the senses. Thus, one broad category in this chapter would deal with theories relating to environmental

Figure 2.1- Just another piece of the puzzle

Figure 2.2- Architecture for all the senses

"Architecture articulates the experiences of being-in-the-world and strengthens our sense of reality and self; it does not make us inhabit worlds of mere fabrication and fantasy." (Pallasmaa 2005:11)

Figure 2.3- The various colours in nature

consciousness citing the works of Juhani Pallasmaa and Richard Neutra among others.

The other research question asks: "What other issues of the community the facility can address?" In order for recreation to happen and for the general well being of people, interaction between people is needed. Thus, the other broad category will look into theories dealing with the social context citing the work of Jan Gehl.

Environmental Consciousness

The human understanding of the world is formed through our senses and our experiences of the world is through architecture. Architecture also makes a person conscious of his existence in the world. It is "an extension of nature into the man-made realm (Pallasmaa 2005: 41)". However, this point of view does not seem to be coherent with the general experience of most people in the current society. The technological driven society does not consider stimulating the human bodies and senses in the designs apart from the visual (Pallasmaa 2005: 19). The non-visual senses need to be brought to the user's attention in the built environments as they may assist in bringing the environment into consciousness (Neutra 1954: 143). There are potential transactions that our bodies make with the surroundings that are missing in the buildings of today. (Pallasmaa 2005: 41) For these transactions to occur various stimuli are needed.

A good example of a stimulus which is commonly found is the use of colour. Colour in the natural environment changes with the seasons and is dependent on light (Neutra 1954: 183). Colour, natural light and good views are necessary elements that contribute to improving the health of the users (Anonymous 2006). People are affected by colour both physically and psychologically with light playing an important role. It has shown through studies that certain colours may affect the chemical balance in humans and aid in relaxation of the muscles (Fehrman & Fehrman 2004: 14). The creation of healing environments

which are also spiritually restorative was the focus of Erik Asmussen, a Swedish architect. The use of colour, materials, and forms of spaces were key elements in his designs from which he developed seven principles of life enhancing design (Coates 2001: 239). He also asserted that "a stimulating environment, which through its special atmosphere can act as an inspiration to just the activity for which the building is intended" (Coates 1991: 70).

An example of buildings constructed with a focus on healing environments are the sanatoriums of the early twentieth century. These were mainly used for the treatment of tuberculosis patients. The circulation of fresh air, admittance of sunlight and outdoor relaxation areas were key features in these buildings. The Sanatorium Zonnestraal in Netherlands by Jan Duiker was designed to make the building feel as light as possible and also attempted to integrate the users with the natural environment (Campbell 2005). The use of colour was a feature in the Tuberculosis Sanatorium designed by Alvar Aalto in Finland. Different colours were used in the patients' rooms, public areas and other building elements, although the outside was painted white (Lahti 2004: 26). The sanatoriums were well used because of their designs which focussed on sunlight admittance, fresh air and hygiene which was the accepted treatment of tuberculoses until the medical findings in the 1950's (Campbell 2005). Both these sanatoriums were later used for other medical purposes and were altered accordingly. Even though the Sanatorium Zonnestraal was intended for a short term use, it has been resored due to these buildings being important examples of modern architecture (Ehrstrom *et al.* 2005).

Although the sanatoriums focussed on treating the ill, the proposed facility that aims to promote good health and prevent illness should use the same principles in design. The use of various stimuli could add to the success of the facility. However, the stimuli need to be carefully implemented to produce the desired results and not be the cause of illness. Overstimulation or even poor assembly or the selection of dimensions and forms of stimuli can

Figure 2.4- The Sanatarium Zonnestraal

Figure 2.5- Sanatorium by Alvar Aalto

Figure 2.6- Perceiving the surroundings

Figure 2.7- Limited facilities available

cause irritation and listlessness and could thus contradict the intention of bringing about awareness. The overuse of stimuli can also lose its effectiveness due to fatigue. The stimulus can be used rhythmically as well but at not too brief intervals (Neutra 1954: 188).

Hence, the correct implementation of the various stimuli is necessary to cause the user's mind to be aware of the body in the present. The mind-set of people today is always concerned either about the future or dwelling in the past. In order for recreation to be successful, it is necessary for both the body and the mind, or awareness, to be in the present (Geba 1985: 34). Besides, the brain is required for the senses to be processed. "The brain expands its neurological network throughout the body and its perceptive organs are in touch with its surroundings (Geba 1985: 99)" It is this state of being, where the mind is conscious of the body that would enable recreation to bring about the awareness of the nature and its environments to the user.

Social Context

According to Gehl (1987: 11) activities that occur in public spaces are either necessary activities, optional activities or, the resultant of these two, social activities. In the township of Olievenhoutbosch, the optional activities occur in the parks, unused open land or at the shebeens. The existing community centre attracts many people, however it is due to a need for specific services. There isn't a facility that encourages people from the community to meet and where activities can develop spontaneously.

In order for interaction to develop and for the facility to be welcoming to the public, the boundary condition is very important. The boundary is a transitional zone and needs to be

flexible to allow for easy movement into and out of the facility on both the physical and psychological level (Gehl 1987: 115). The boundary condition is also important in bringing to attention the presence of nature. According to Tadao Ando (1991: 460), the physical boundary between the natural environment and the building needs to be de-emphasised. It attempts to draw in the natural environment and allows the building to diffuse into it. This boundary or threshold space is also referred to by Glen Murcutt (2001: 124), who states that the gradual transition from inside to out by breaking down the light by shading devices also stimulates the senses by giving life to the surrounding walls.

The various senses play a role in the social interaction of people even though it may be at a different level to the experiences of people to the surroundings. There are different distances where the senses of smell, hearing and sight affect the level of interaction with others. Smell is experienced in near proximity whereas visual could be from a distance (Gehl 1987: 65). The emphasis on the visual promotes isolation as the visual can be experienced from a distance (Pallasmaa 2005: 19). This is applicable to both the experience with a space as well as with social interaction.

However, engagement through other senses may have positive effects both with the personal experience as well as with social interaction. The sense of smell is linked strongly with memory and the experiences (Neutra 1954: 145). Through the engagement of the various senses with the built environment, buildings would become places that are remembered for the unique experience the person would have stored in memory (Pallasmaa 2005: 67). This influence with memory is needed in Olievenhoutbosch where there does not exist a landmark for identification or orientation. The identification and orientation of people to places goes back to their childhood experiences. Children interact with their environments in a very sensory way and thus build strong relationships with their environment which is stored in their memories. (Norberg-Schulz 1980: 21)

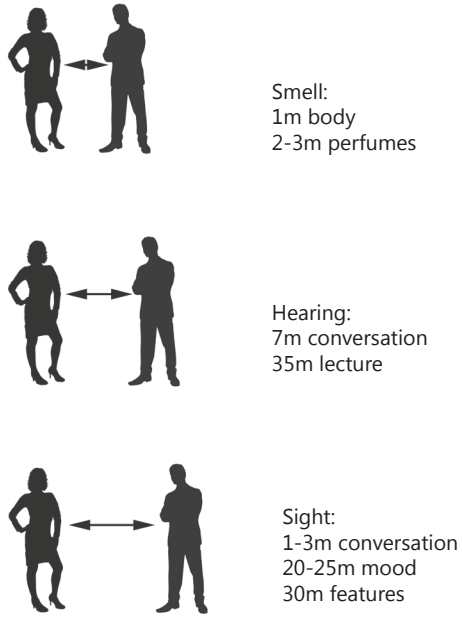


Figure 2.8- Social interaction and the senses

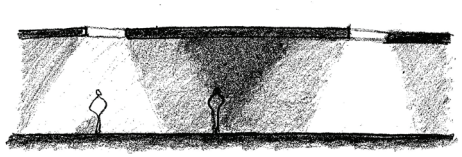


Figure 2.9- Varying light conditions

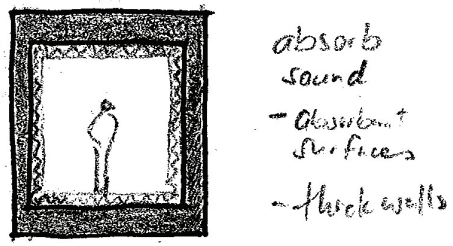


Figure 2.10- Responding to sound

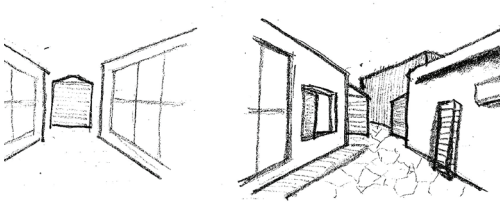


Figure 2.11- Single vs peripheral vision

Theory Outcomes

From the theories studied, a set of guiding principles have been established:

De-emphasise the physical boundary-

There should be no clear demarcation between the interior and exterior of the building. This allows for the natural environment to be diffused with the built environment (Tadao Ando 1991: 460).

Abstracting Nature-

A reactivation of the senses can be achieved by abstracting elements of nature in architecture. This is due to the tension created by the abstraction of nature which causes an unfamiliar relation (Tadao Ando 1991: 459).

Peripheral vision-

To be able to be integrated with the space, the views shouldn't be focused on a single element but allow for the eyes to wander around. This would allow for the user to feel integrated into the space (Pallasmaa 2005: 13).

Natural Materials-

The wearing and aging of natural materials such as wood, stone and brick unfolds their presence. Takes into consideration time and gives the users a confirmation of their existence (Pallasmaa 2005: 31).

Shadows-

Varying light conditions stimulates peripheral vision, daydreaming and allow for people to think. It also helps in creating a sense of place for the users (Pallasmaa 2005: 46).

Hearing-

Sound helps in the understanding and experience of spaces as it is multidirectional. It is a receptive sense which allows for a feeling of inclusion and stimulates imagination (Pallasmaa 2005: 50).

Smell-
Allows the user to access forgotten memories and association to places (Pallasmaa 2005: 54).

Skin-
The skin is able to detect the textures of materials and changes in temperature. This helps build the experience in the memory (Pallasmaa 2005: 58).

Surface-
The colour and texture of a surface evokes the oral and tactile senses to be engaged (Pallasmaa 2005: 59).

Unity of form and function-
The forms in the building need to express the life within and support the activities. This is not only limited to the spaces but to the various elements as well which should be designed according to the intended use (Coates 2001: 241).

Polarity-
Contrasts in colour, material and form can create rhythm and also reflect the compositions of natural environments. Contrasting spaces can be placed adjacent to one another without necessarily having a transition to create tension. This tension between opposite forms or spaces can be used to give the building life (Coates 2001: 242).

Metamorphosis-
A relationship between spaces and a unity in the building is achieved with a metamorphosis of forms, surfaces, spaces and colours. Metamorphosis can be used in achieving a hierarchy in the design (Coates 2001: 43).

Harmony with nature and site-
The building should relate to the natural elements to create positive outdoor spaces. It could also be used to reflect the qualities of the natural environment. This allows the users to be conscious of their natural surroundings (Coates 2001: 245).

Living wall-
The walls and ceilings of spaces should create a sense of enclosure and exposure which reflects the space that

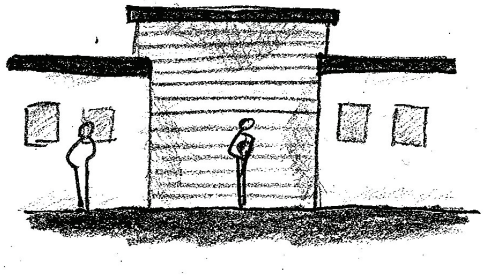


Figure 2.12- Contrasting volumes/ materials

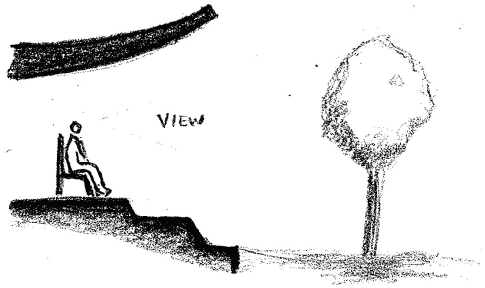


Figure 2.13- Relating to natural elements

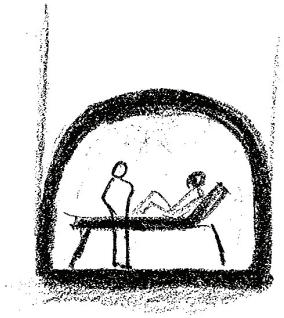


Figure 2.14- A sense of enclosure

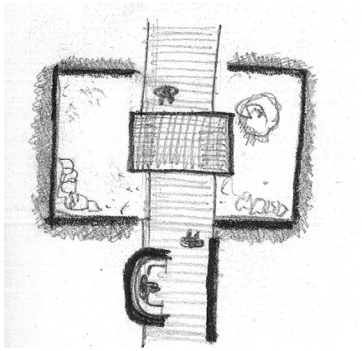


Figure 2.15- Changing the balance

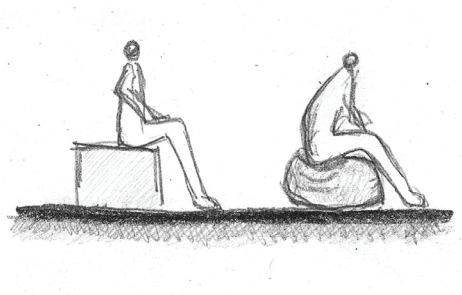


Figure 2.16- The body responding to material

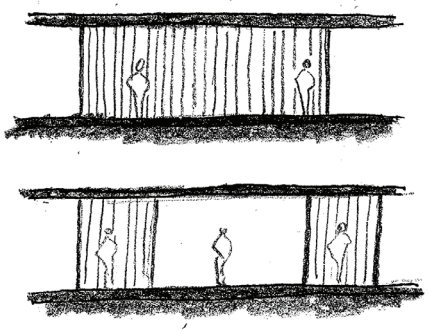


Figure 2.17- The use of rhythm

they contain. They should not merely be a dividing membrane but can be have plastic qualities of continuity to give a sense that it is a living organism (Coates 2001: 248).

Colour-

The colours need to be associated with the experience and activities and support the mood required. Transparent colours gives life to spaces as it adjusts to the changing of lighting conditions as opposed to opaque colours which seem lifeless. It also allows for the materials of construction to be expressed (Coates 2001: 249).

Equilibrium of spatial experience-

The balance must be constantly changing through the use of symmetry and asymmetry, intimacy and openness, movement and rest. It creates a sense of freedom of movement and perception (Coates 2001: 252).

Tactile stimuli-

The material choices affect the human body in many ways. There are internal strains happening within a body as it adjusts to the various surfaces and deflections that they possess. Heat loss and temperature changes are sensed by the skin, due to the choice in material (Neutra 1954: 149).

Fatigue-

The duration of a stimulus affects nerve fibre recovery. Should it be over an extended period, it loses its effectiveness. Rhythm can be used, but at significant intervals, to allow for the body to recover (Neutra 1954: 188).

Inhibiting other stimuli-

In order for the desired effect to be achieved, other stimuli need to be suppressed. This should be permanent to prevent undesired effects. There should be a deliberate focus on a specific stimulus (Neutra 1954: 230).

Materials-

Allowing the materials to weather is an indication of life whereas low maintenance materials are static and indicates death. The choice of material should be able to reflect the weather

and light conditions outside (Murcutt 2001: 107).

Transition space-
A gradual change of light conditions from the inside to the outside creates a transition space. It can be done by using shading devices which also creates patterns on the surrounding walls, giving them life (Murcutt 2001: 124).

Brise soleil-
The user can perceive the climate within the building which allows for the movement of air through the building. Using a lattice allows for this as well as it acts as a control for sunlight. It also allows the user to know what is beyond and allows for an easier transition between the spaces (Murcutt 2001: 141).

Flexible boundaries-
Transitional zones are necessary to facilitate the easy movement of people and to encourage interaction (Gehl 1987: 115).

Open up or close in-
Being able to see the activities from outside invites participation of more people. Windows on the street brings the activities to the public (Gehl 1987: 123).

Spaces for lingering-
There should be spaces and elements around the building that allow people to sit, stand or just walk around. This allows for a place where people can go to, and activities can develop on different scales (Gehl 1987: 161).

Edge effect-
The outer ends of spaces need to be stopping spaces where people are able survey the surroundings. These spaces are not in the way of others, and offer a sense of territory and safety where their backs are protected. This can be done by having irregular facades, stairs or plant boxes where people can sit (Gehl 1987: 151).

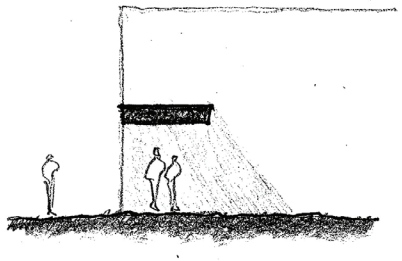


Figure 2.18- Transitional space

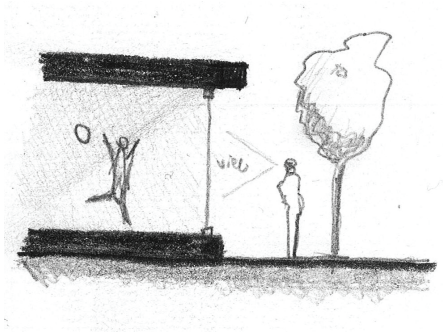


Figure 2.19- Windows on the street

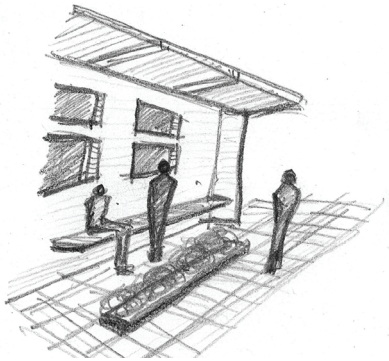


Figure 2.20- Stopping space

CHAPTER 3

Precedents

Thermal Baths

Location: Vals, Switzerland

Architect: Peter Zumthor

Client: Municipality of Vals

Programme: Thermal Baths and spa. Various chambers are used to give a different experience that assists in stimulating the senses.

Figure 3.1- Internal view 1

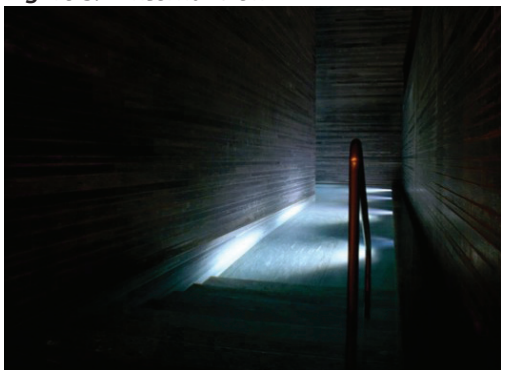
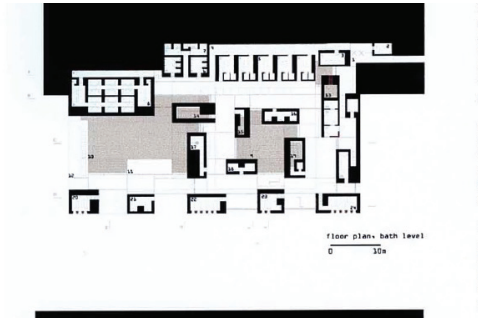


Figure 3.2- Internal view 2

Figure 3.3- External view



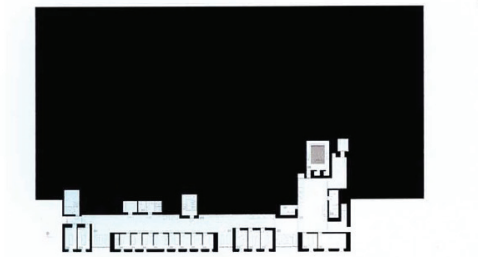


Figure 3.4- Plans

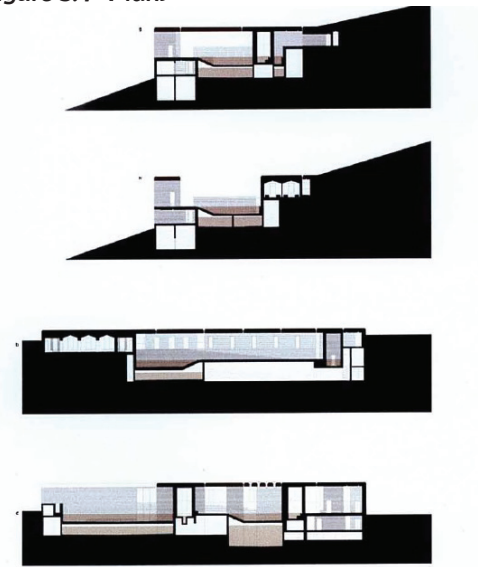


Figure 3.5- Sections

Outcomes:

- The coming together of separate entities like a puzzle can be used for focussed spaces for different senses.
- Construction method for using stone more than for just cladding (http://www.scribd.com).
- Large openings to connect to surroundings.

Yeoville Recreation Centre

Location: Yeoville, Johannesburg

Architect: Ntsika Architects, Urban Works Architecture

Client: Johannesburg Development Agency

Programme: Recreation and community centre. Facilities include classrooms, community hall, gym, day care and kitchen.

Figure 3.6- View towards the entrance

Outcomes:

- A large plaza before entering creates a space to hold the public.
- The stairs and shading around the plaza allows for people to linger.
- The large window in the room on the street edge allows for views of the activities from the street.

Figure 3.7- Covered entrance

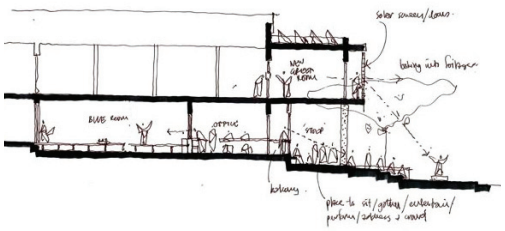


Figure 3.8- Section

Ubuntu Centre

Location: Port Elizabeth

Architect: Field Architecture

Client: Ubuntu Education Fund

Programme: HIV testing and treatment centre. Facilities include multi- purpose hall, computer centre, classrooms and rooftop gardening.

Figure 3.9- Birds-eye view

Figure 3.10- Plan

Figure 3.11- External view

Outcomes:

- The use of large expanses of glass instead of solid walls make the building less of a barrier.
- Benches on the building edge and the angled walls allow for people to feel less intimidated by the building's scale.
- The preservation of existing footpaths and no fences or walls invite people in (http://www.fieldarchitecture.com).

Zolani Multi- Purpose Centre

Location: Nyanga, Cape Town

Architect: CS Studio Architects

Client: Nyanga RDP Forum

Programme: Community centre. Facilities include indoor sports and recreation hall, auditorium.

Figure 3.12- External view

Outcomes:

- Its an example of an urban scale in a township area.
- Used the idea of pathways to create internal streets that encourage interaction between users.
- Buildings arranged to respond to external space use (http://www.csstudio.co.za).

Figure 3.13- Internal View

Figure 3.14- Plan

Thusong Service Centre

Location: Khayelitsha, Cape Town

Architect: Makeka Design Studio

Client: City of Cape Town

Programme: Municipal offices and services, Multi-- purpose sports hall.

Figure 3.15- External view

Figure 3.16- Internal view

Outcomes:

- Building has a strong civic presence.
- Suitably scaled for people to feel less intimidated.
- Varying facades prevents monotony.
- A relationship created between inside and outside by the use of glass. (http//www.informalcity.co.za)

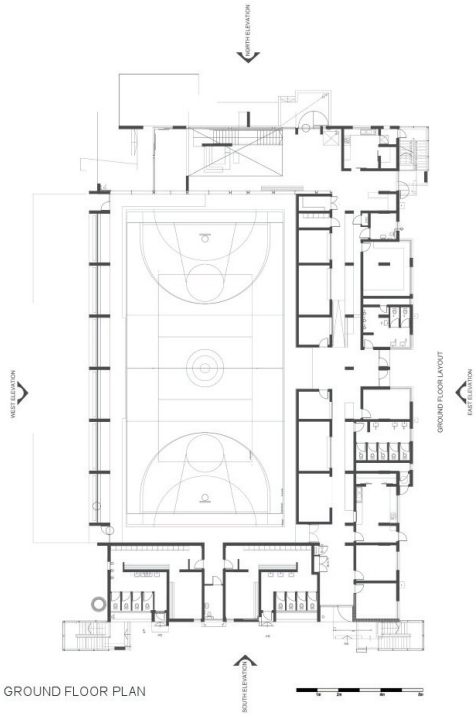


Figure 3.17- Plan

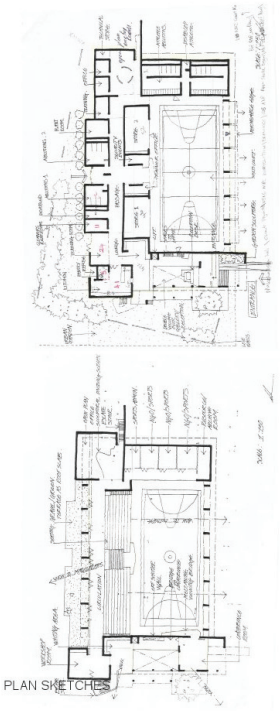


Figure 3.18- Sketch plans

CHAPTER 4

Context

Figure 4.1- View of Olievenhoutbosch

History

Olievenhoutbosch was established as a township in 1996 after being an informal settlement since 1989 (Pila & Mashishi 2011). It is located to the west of Centurion and forms the southern boundary of the Tshwane municipality. The location allows for the inhabitants to seek jobs in Tshwane, Johannesburg and Midrand which could be a reason for the fast growth in population size. Olievenhoutbosh was originally part of the Centurion Municipality and being a poorer area in the municipality, benefitted with the construction of housing and a community centre with a clinic and library. Since becoming part of the Tshwane Metro, development has slowed down due to there being many other areas requiring attention as well (Landau & Polzer 2007: 10).

Due to most of the population coming from the background of informal settlements where they didn't have proper facilities and services, the habit of dumping waste into open spaces and streams is still prevalent. Not many job opportunities are available within the township, resulting in a lot of time of those employed being spent away from the community and not much social interaction happens. The public facilities are inadequate with people going to the community centre mainly due to need rather than for relaxation and interaction.

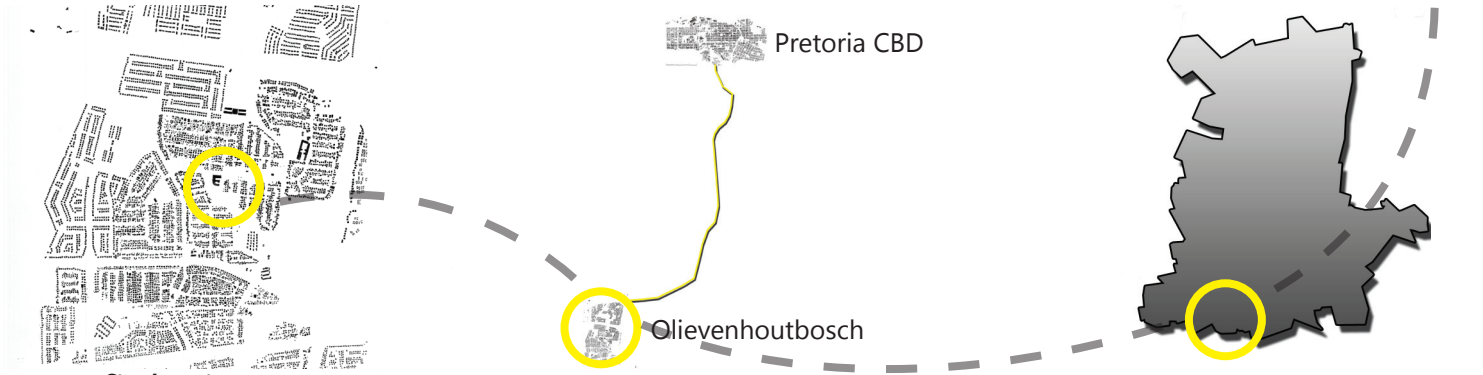


Figure 4.2- Site location

Figure 4.3- Depiction of various cultures

Figure 4.4- The existing community centre

Figure 4.5- Poor sporting facilities

Demographics

As a result of the township being formed after the democratic elections of 1994, the population consists of citizens from various parts of the country as well as foreign nationals from Zimbabwe, Mozambique, Zambia, Malawi and Pakistan (Landau & Polzer 2007: 9). The largest population groups are thought to be from the Sepedi, Ndeble and Zulu people (Pila & Mashishi 2011).

Due to the various ethnic groups in the area interaction in a relaxed environment is required for the community to strengthen understanding between the different cultures.

Services

Community services in Olievenhoutbosch are lacking with there being a police station and only one community centre which houses the clinic, library, hall and offices for some social services. There are seven public schools in the area, of which only two are permanent structures and have sports facilities. Two parks and a few open sandy surfaces serve as soccer fields and netball courts. Most of the trade happens informally with there being only three built up shopping areas. Public transport is relied on with taxis serving the Johannesburg areas and busses, introduced recently due to taxi violence, to serve the Tshwane areas. Other social services are done by volunteers, NGO's and church groups to fulfil the needs of the area.

It is clear that the facilities in Olievenhoutbosch are inadequate and that many services are still needed. There are no facilities available for sports and recreation or for the promotion of healthy living.

Critical regionalism

Kenneth Frampton (1983: 473), a proponent of critical regionalism asserts that buildings need to respond to the climatic conditions and topography of the local area being dealt with rather than being a generic solution that can be anywhere in the world. It is more than just a response to the natural conditions as in vernacular architecture; it considers influences from other regions of the world that are applicable. Using the method of defamiliarization, regional elements can be used in an unfamiliar way to make the user aware of it as well as its original use from memory.

The materials used for construction in Olievenhoutbosch are fairly limited, but should influence what is to be used in the proposed design. The walls of the houses are constructed from concrete blocks and are usually plastered and painted. The formal buildings are constructed from facebrick. Roofs are either constructed with clay tiles or corrugated steel. Corrugated steel is used for the shacks as well.

Climate

Tshwane has a temperate climate with a relative humidity of less than 50%. Summers are warm to hot with average temperatures around 25°C. Winters are sunny but cool with temperatures ranging from 10°C to 15°C. Rain, including thunder storms, are mainly in the Summer months amounting to 125mm to 375mm. Prevailing winds come from the North-East in Summer and Winter winds vary from North-East to North-West (Napier 2000: 9.8).

Figure 4.6- Facebrick structure

Figure 4.7- Corrugated metal structure

Figure 4.8- Concrete block and plaster

Roads and Pathways

Most of the movement in Olievenhoutbosch is on foot. This is evident from the numerous paths seen cutting through open space. The streets in the northern and eastern parts of the township are tarred, the rest are still gravel. The streets that are connected to those at the two entrances are the busiest and also part of the public transport routes.

Figure 4.9- Roads and Pathways

Transport and Services

Public transport is relied on for travelling out of Olievenhoutbosh. The transport nodes are located in the eastern parts, close to the entrances. The schools are distributed all around the township, many of them in temporary structures. The community centre is located centrally.

Figure 4.10- Transport and Services

Density and Identity

Three distinct areas can be identified in Olievenhoutbosch, correlating to the density. These are separated by the power lines. The south is the most dense, with many people staying in shacks and there are no tarred roads. The central area is less dense and has many RDP houses and some of the roads are tarred. The north is fairly new with all the roads tarred and many houses being built.

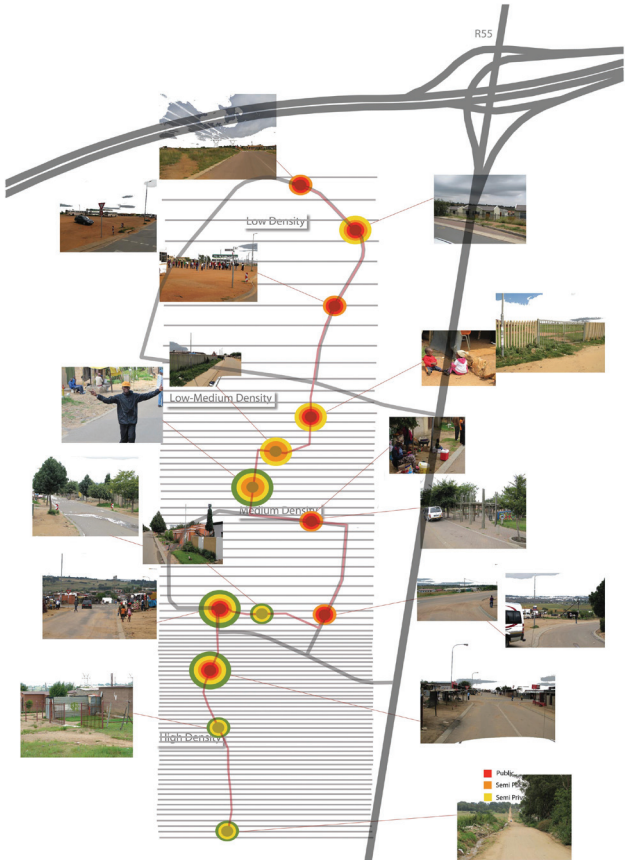


Figure 4.11- Density and Identity

Open and Green Spaces

There are only two official parks in Olievenhoutbosch, both which are in close proximity to the community centre and along a stream that runs though the area. Power lines run from east to west and along the western boundary, creating large spaces that are unused. There is a lot of land which is unbuilt, especially in the north. Only two schools have proper sports facilities. Other sporting activities occur on open gravel. Agricultural activities happen sporadically in the area.

Figure 4.12- Open and Green Spaces

CHAPTER 5

Framework and Site Analysis

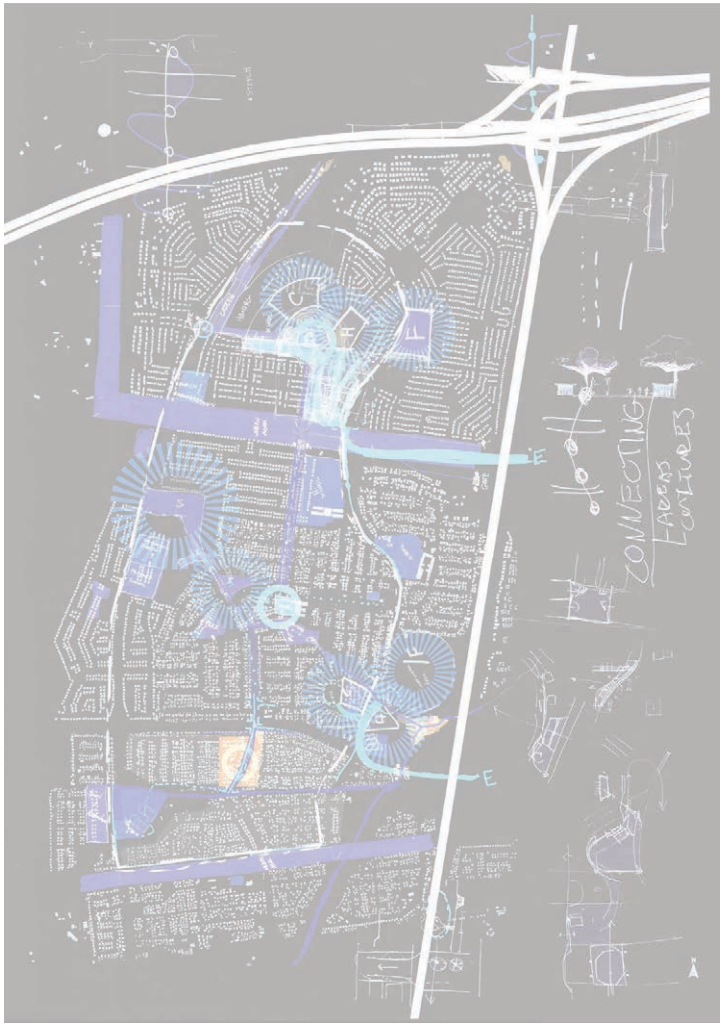


Figure 5.1- Framework sketch

Framework Intention

Through the analysis of the township, many areas were identified that are in need of improvement. A major issue was the power lines that created three separate areas. Thus, the intention was to bring the people from these areas together and to encourage interaction between them.

The existing municipality framework for the northern area was assessed and some adjustments made. A major intervention is the creation of a pedestrian boulevard with informal trade along it, connecting the existing community centre to the proposed additional one in the north.

A public transport route in a form of a ring road is proposed with the intention of allowing equal access and also a binding element between the three areas.

Recreation facilities are proposed along the stream to tie in the existing parks and to create a green strip connecting east and west.

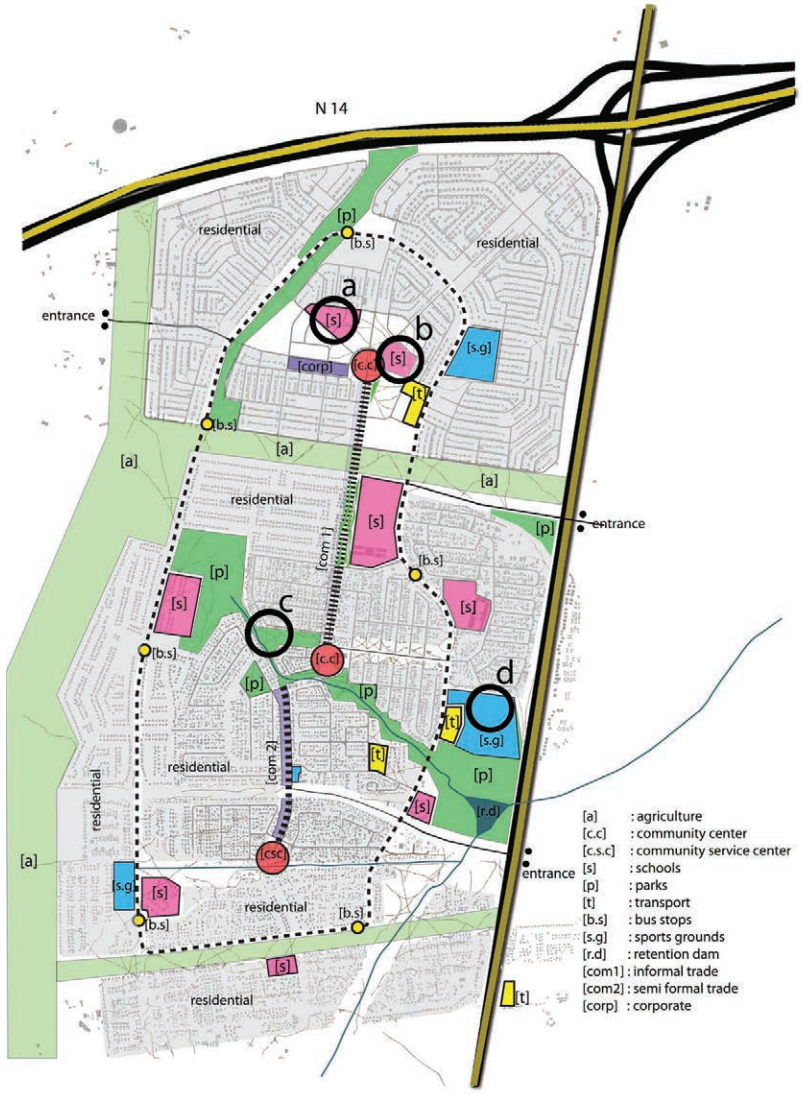


Figure 5.2- Proposed framework

Figure 5.3- Existing municipal framework

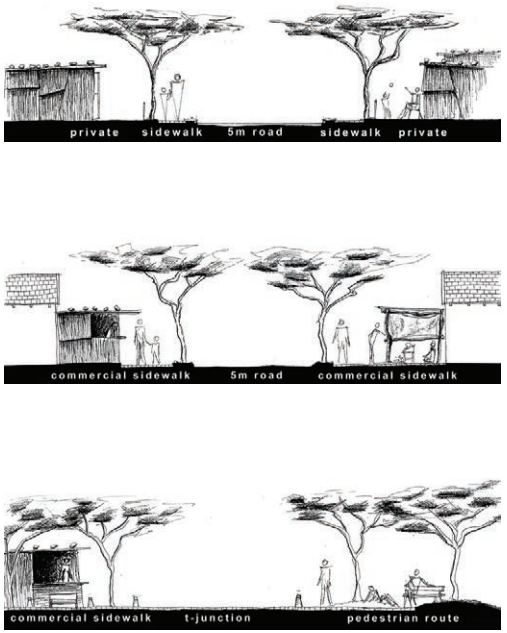


Figure 5.4- Proposed street sections

Response to Existing Framework

The existing Municipality framework which has begun implementation focussed solely on the northern section. This makes it isolated from the rest of the area. However, all the facilities of that proposal would be needed as there is an overall lack of these in Olievenhoutbosch.

It is proposed that the main spine in the municipality's framework be extended to link with the current community centre as it is already on the same virtual axis. This would create an additional link with the other areas apart from the main ring road. A further rearrangement of the other facilities is proposed and a commercial zone is added as well.

Street Sections

The sections above depict the typical street sections along the proposed ring road. Sidewalks vary according to the activities alongside and trees provide shade.

Framework in Detail

Transport

Current: Public transport is the major mode of transport in the area. These are served by two taxi ranks focusing on transport to Centurion, Midrand and Sandton. Busses were brought in to serve the Tshwane area after taxi violence caused disruptions in the area.

Proposed: The bus depot to the North is to be formalised and would assist in creating the community node in that area. It is proposed that the existing taxi ranks should be upgraded with formalised waiting areas and ablution facilities.

Roads

Current: Not many of the roads in the central and southern areas are tarred. There are two ring roads in the area- one in the northern section and the other around the central.

Proposed: A ring road is proposed to connect all three areas. Bus stops are allocated along this road close to the schools and other points to facilitate easy access.

Figure 5.5- Transport and roads

Sports Grounds

Current: Apart from the some of the schools, the sports grounds are created by the community due to the need, on dusty open fields and are inadequate to provide for the entire community. Soccer and netball are the main sports catered for.

Proposed: A center that would cater for competitive sports and training is proposed in the central area, near to the existing stream. Existing sports grounds in the North, and new satellite sport grounds in the South will support this new center.

Schools

Current: There are seven public schools in the area, of which two are secondary schools and a private school for the foundation phase. Only two of the schools have a permanent structure with sport facilities. The others schools are temporary structures constructed within the past two years. There are currently no schools in the North.

Proposed: A primary school and a school for music and art are proposed in the Northern section. The existing temporary structures would need to be upgraded and additional facilities, including sports grounds provided.

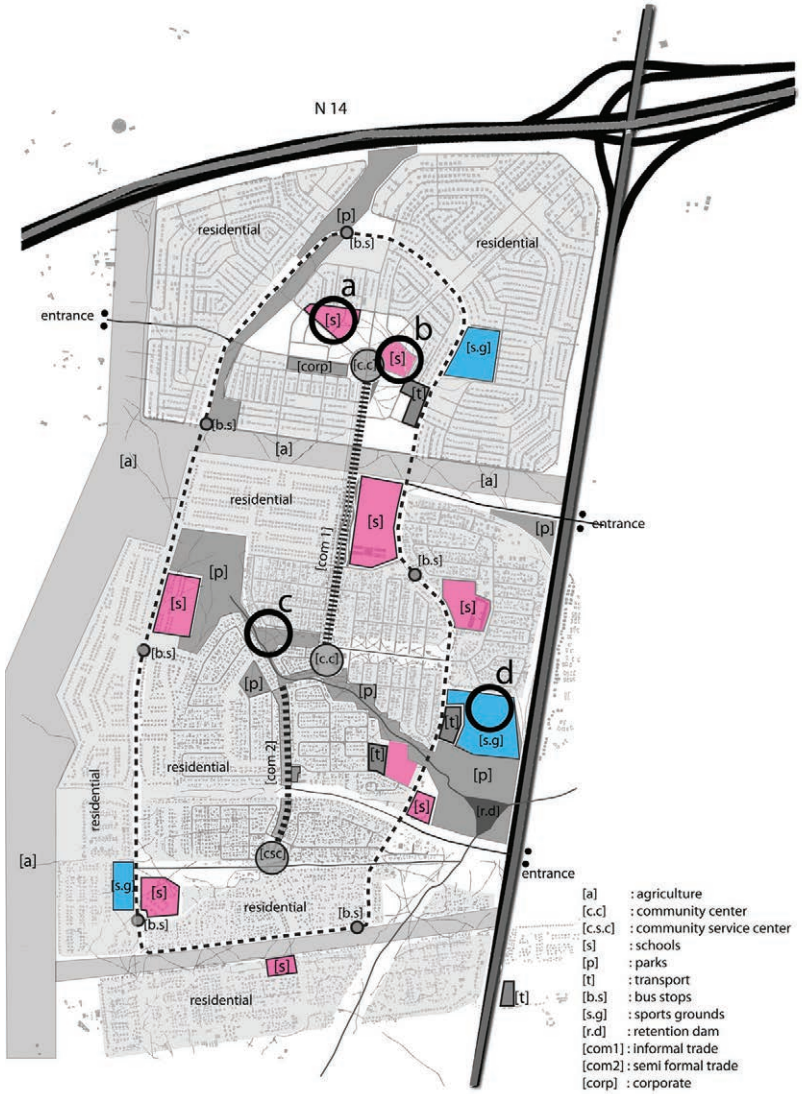


Figure 5.6- Sports grounds and schools

River

Current: There is a river running through the area from West to East, which ultimately joins the Rietspruit River. There is pedestrian movement along the river. Most of the river is contained in a concrete canal, which creates yet another barrier.

Proposed: It is intended to establish a pedestrian link between the East and West of the area using the river and adjacent green space. This green belt will double as an educational route and recreational park. The concrete channel is to be removed so that nature can reclaim its space as well as to allow for social activities along its banks.

Retention Dam

Current: An area on the eastern side where two steams meet, is unused and inaccessible.

Proposed: Creating a dam at the intersection of the streams would create a recreation area that would be an appropriate termination of the east west activity axis. The water could be used for community gardening and the irrigation of sport fields.

Figure 5.7- River and retention dam

Community node

Current: The single existing community center struggles to sustain the continuous pressure from the community. This entails a single clinic with no permanently employed doctors, a small pharmacy, a library, a community hall and ablution facilities.

Proposed: to create a secondary community node that will alleviate the pressure of the existing community center. Ultimately a pedestrian spine that incorporates park space and trade will connect these two community nodes.

Community service center

Current: The business district, otherwise known as 'Marabastad' creates an activity spine. This entails activities such as retail, car washes, metal recycling and other activities that contribute to the gross income of the community.

Proposed: To establish this spine as the community service center that forms the third and most southern community node. Accordingly, this activity spine will be strengthened as it is connected with the existing community center.

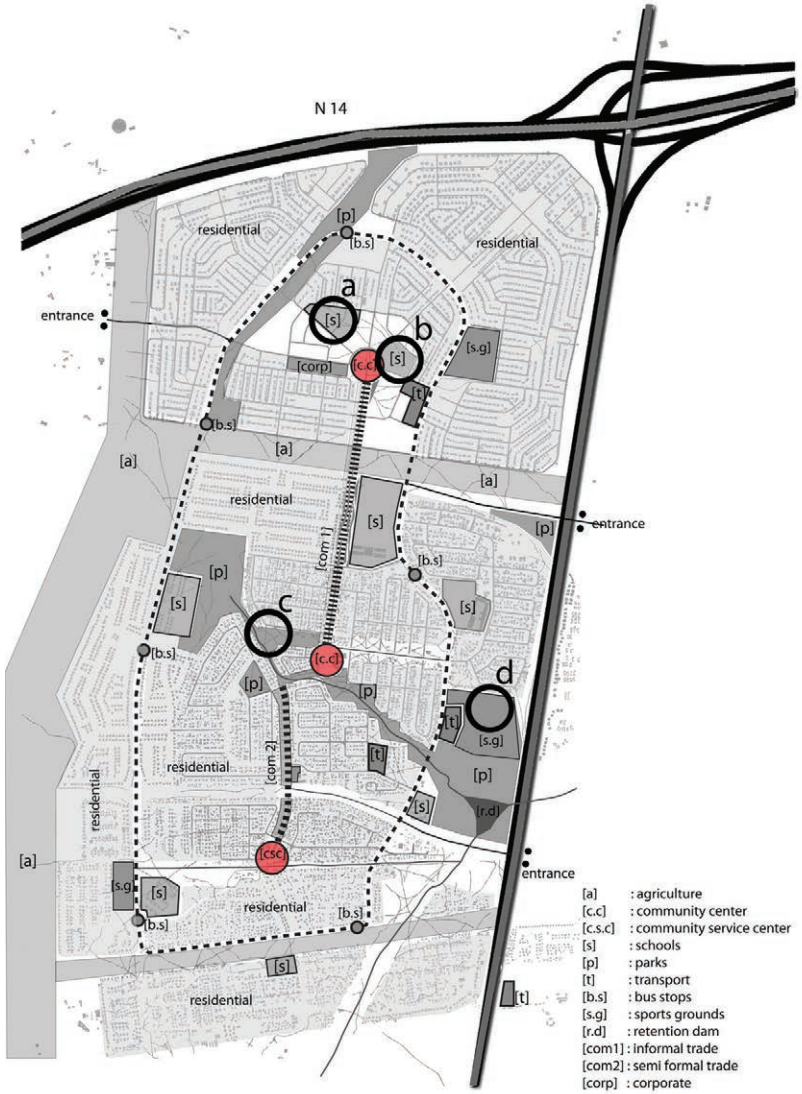


Figure 5.8- Community nodes and services centre

Parks

Current: The parks within the township are currently very efficiently used but in a state of decay. Parks are liminal spaces that form routes between destinations. Some parks pose potential safety hazards in terms of crime and natural hazards. The river that runs through some parks has been canalized which resulted in an increase in the velocity of water in flash floods.

Proposed: The park spaces should be rehabilitated and linked together as far as possible, to form a continuous green strip.

Power line servitudes

Current: The power lines divide the community of Olievenhoutbosch into three different zones. When looking at the definition of Osmosis, the power line servitudes are the physical membranes through which a "fluid" (people and their identity) should move to create equilibrium within the community. The servitudes are currently vast open space with no character or function.

Proposed: To use the ground under the power lines for community farming. Where the servitudes were once a place of segregation, it is now a place of community interaction and self-sustainability.

Figure 5.9- Parks and power line servitudes

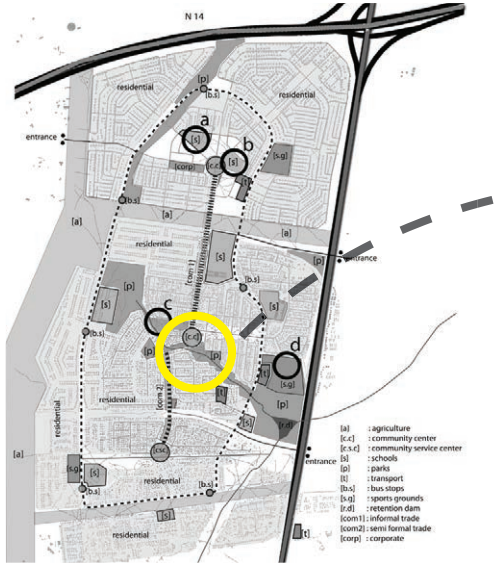


Figure 5.10- Proposed site

Site Selection and Analysis

The site selected was originally to the west of the proposed site. There were a few factors that influenced the change of site. The initial site choice was too far away from the community centre to and would have created a fragmentation of a community precinct rather than strengthening it. In addition, the proposed site benefits from more pedestrian movement as well as being at the culmination of the proposed pedestrian boulevard.

Figure 5.11- Initial proposed site

Figure 5.12- Panoramic to proposed pedestrian boulevard

Figure 5.13- Panoramic of site from West

Figure 5.14- Panoramic of site from South

Figure 5.15- Nearby retail

Figure 5.16- Cycad Park

Figure 5.17- Bus stop

Figure 5.18- Main vehicular road

Figure 5.19- Activity generators around site

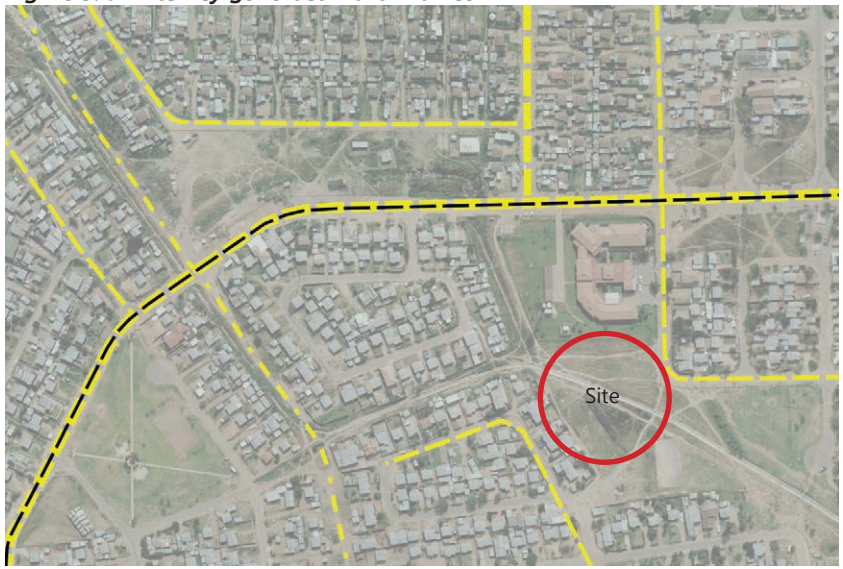


Figure 5.20- Road conditions

Figure 5.21- Stream running through site

Figure 5.22- Storm water channel

Figure 5.23- Urban agriculture

Figure 5.24- Pedestrian routes through site

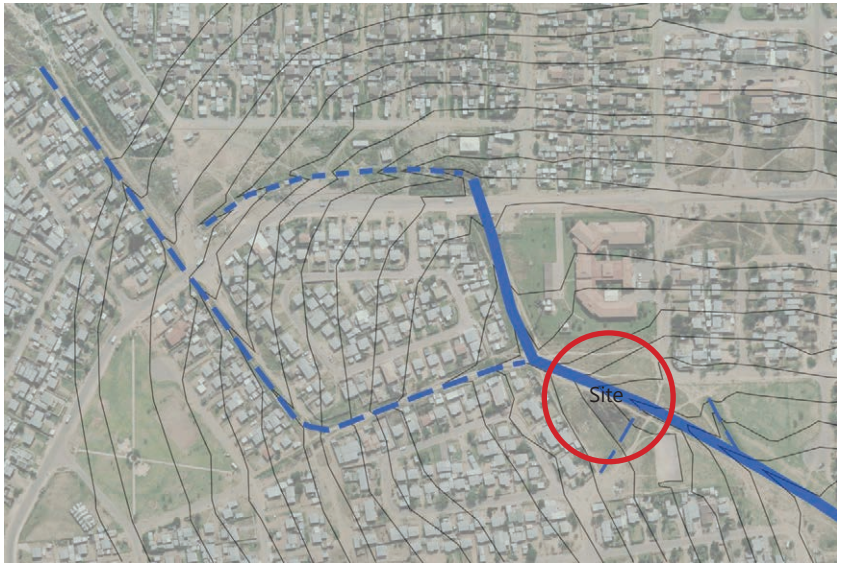


Figure 5.25- Water and contours

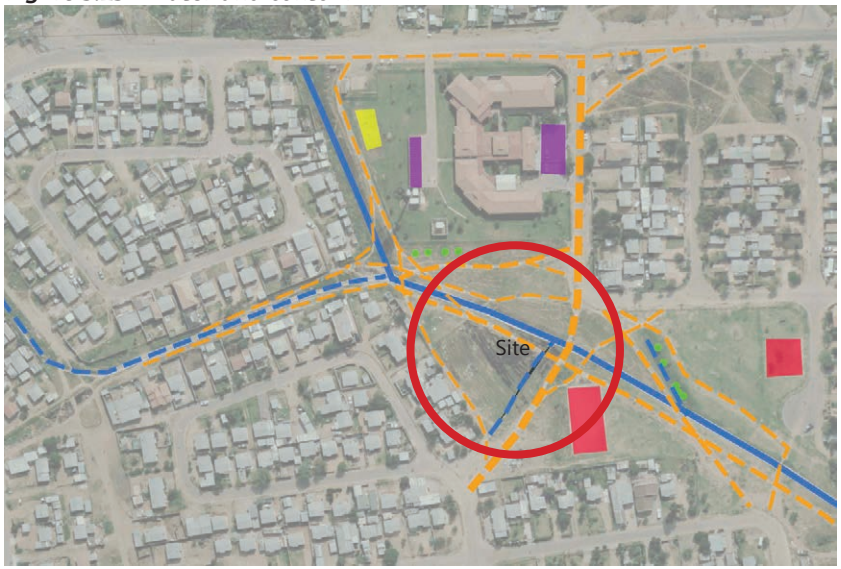


Figure 5.26- Activities specific to site

CHAPTER 6

Design Development

Programme

The design in the context of Olievenhoutbosch would need to have a diverse programme. With the aim of this dissertation primarily being that of promoting healthy living, three areas of healthy living are catered for:

a. Physical activity and recreation
   - Multi- purpose hall
   - Swimming pools
   - Gym
   - Studio
b. Healthy eating
   - Cafeteria serving health foods
c. Health services
   - Dietician
   - Homeopathy
   - Physiotherapy
   - Biokinetics
   - Dentistry
   - Pharmacy

Spatial Arrangement

The physical site conditions, current usage as well as the urban framework would influence the arrangement and allocation of the various programmes. Access to the site, both pedestrian and vehicular, major routes and the stream are among the major influences.

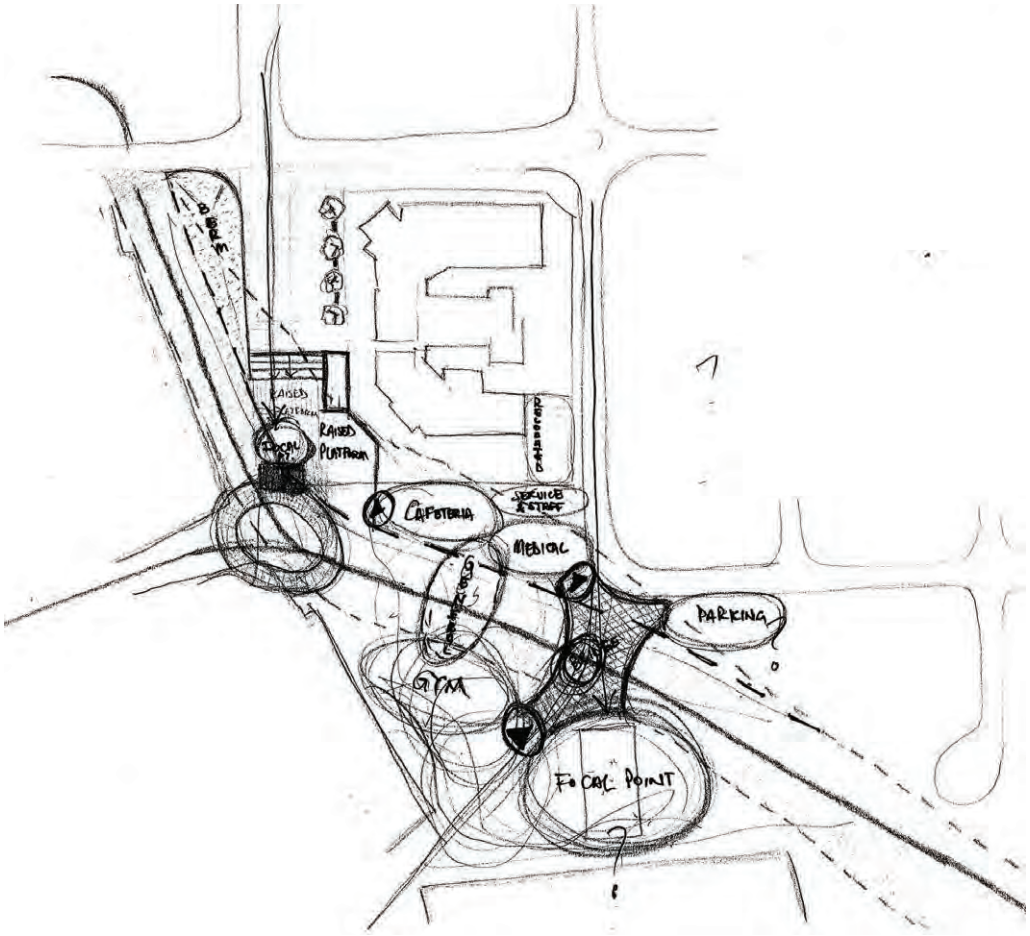


Figure 6.1- Programme allocation

Site Influences

The various conditions on the site would influence the orientation, circulation patterns, scale and spatial arrangement of the design.

The contours converge towards the stream and would affect level changes and possibly orientation.

The scale of the neighbouring buildings and the human scale would also need to be considered along the edges.

The existing pedestrian pathways give clues as to the circulation patterns and important routes may need to be respected in order for the building to enhance the surroundings rather than be seen as a barrier.

The stream being the most significant element of nature on the site would need to be integrated into the design and would affect the orientation of the building as well as circulation.

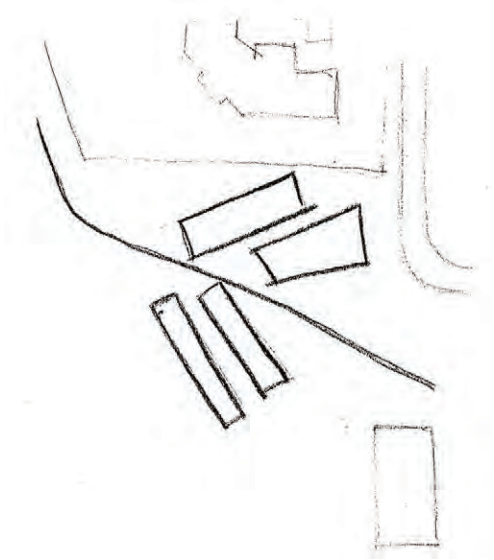


Figure 6.2- Influence of contours

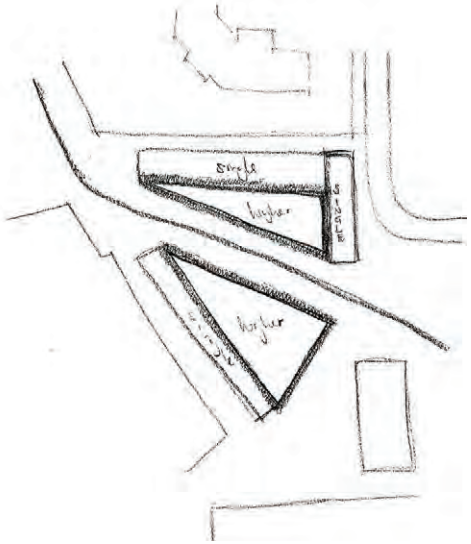


Figure 6.3- Influence of other buildings

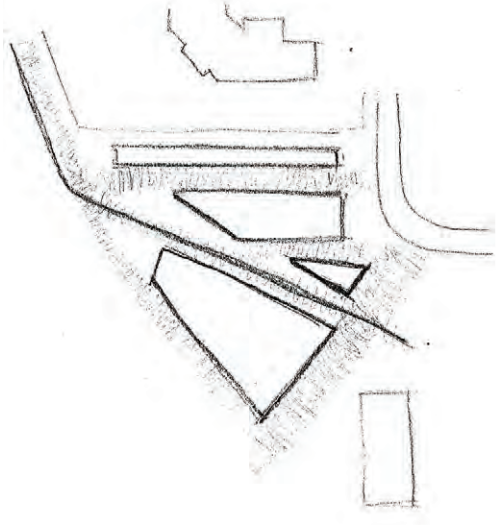


Figure 6.4- Influence of pedestrian routes

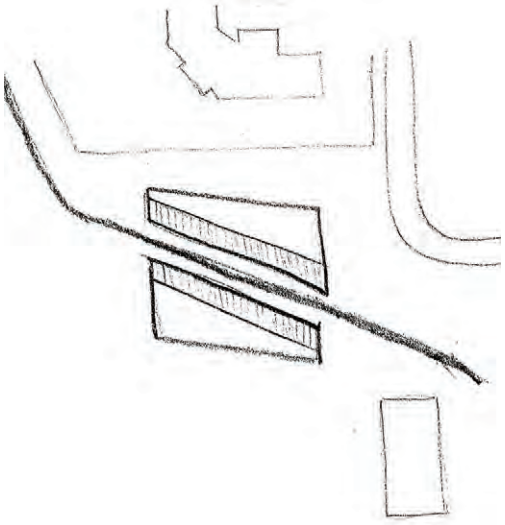


Figure 6.5- Influence of stream

Design Response

Figure 6.6 illustrates how the design could potentially respond to the various conditions. The side facing the existing surrounding structures is a harder edge and has a regular geometry and finishes. This contrasts to the edge that faces the stream which is more open and can accommodate various wall finishes. The ground floor also has multiple levels to respond to the contours, whereas the first floor is flat.

Treatment of the stream

The volume of water in the stream is not sufficient to be retained for a pond. The water from the storm water channel that joins the stream could possibly be diverted and used as a feature in the design.

Gabion walls could be used to contain the flood plain and step down from the building to the stream. These steps can be used for planting, walkways as well as seating along the edge of the stream.

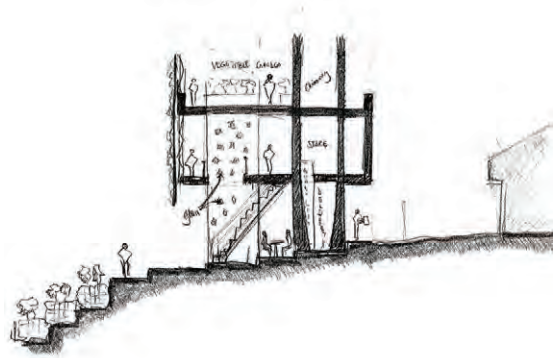


Figure 6.6- Response to various conditions

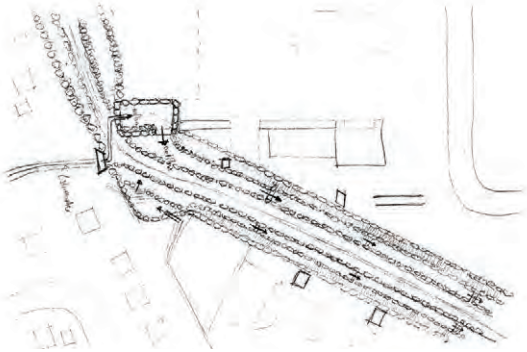


Figure 6.7- Designing with the stream

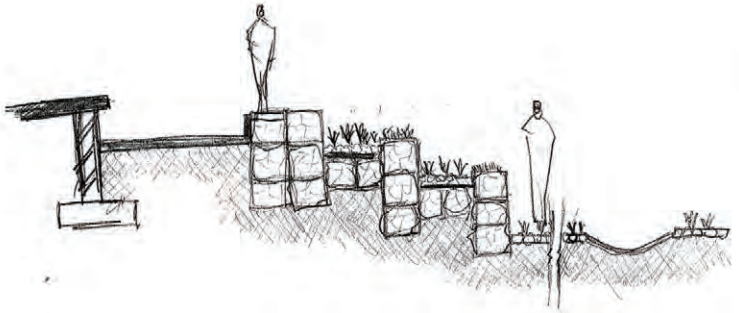


Figure 6.8- Response to flood lines

Key Phases in Design

Initial Design

The existing urban fabric and the orientation of the stream were seen as major influences in orientation. This resulted in the formulation of two grids that overlap each other. Major circulation routes could be used as target areas or meditation spaces to focus on amplifying a particular sense or natural element. The ground floor would be open and accessible to all users.

Issues raised: There was no coherence of structural system. Let the design as a whole stimulate the senses and not just the meditation spaces through forced circulation.

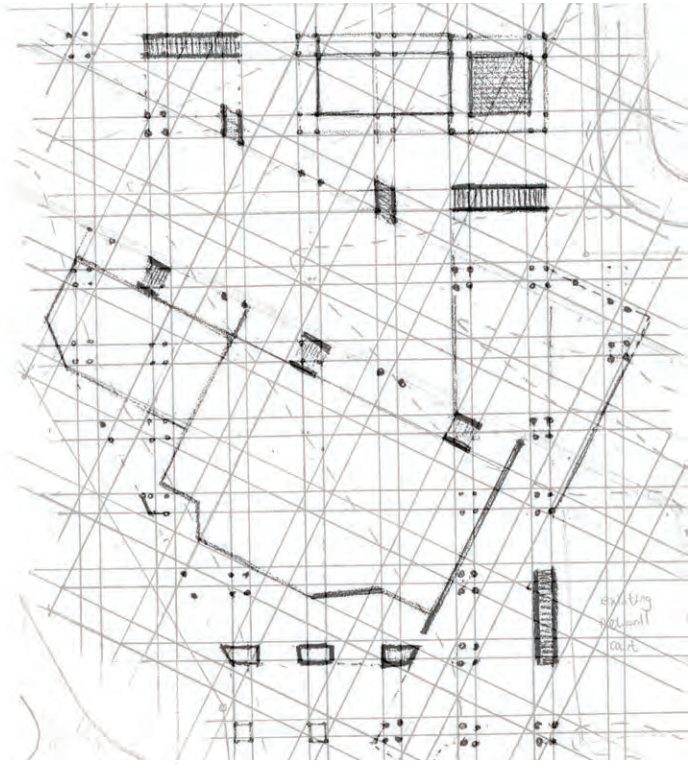


Figure 6.9- Ground floor plan

Figure 6.10- View from South

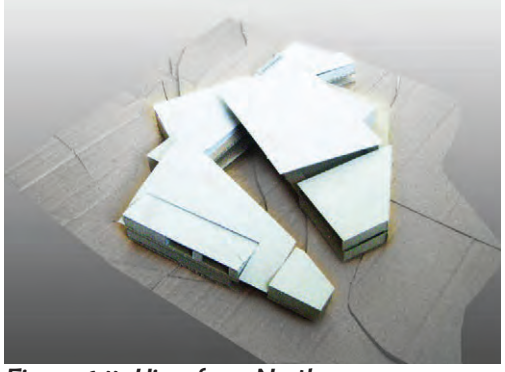


Figure 6.11- View from North

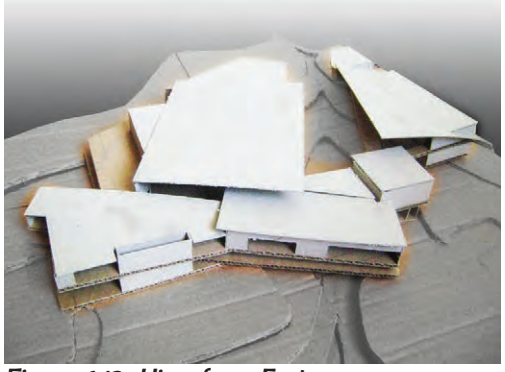


Figure 6.12- View from East

Iteration 1

Developing the design further with the addition of services and vertical circulation points. The volumes of the different floors were also rotated to create contrasting spaces. The circulation route from South to North over the stream became a more prominent feature of the design. Two separate structural systems intended for the two grids.

Issues raised: Too much porosity creates security issues and lacks hierarchy. The stream and surrounding spaces should be integrated more into the design. The grid limits the design and creates unnecessary complexity.

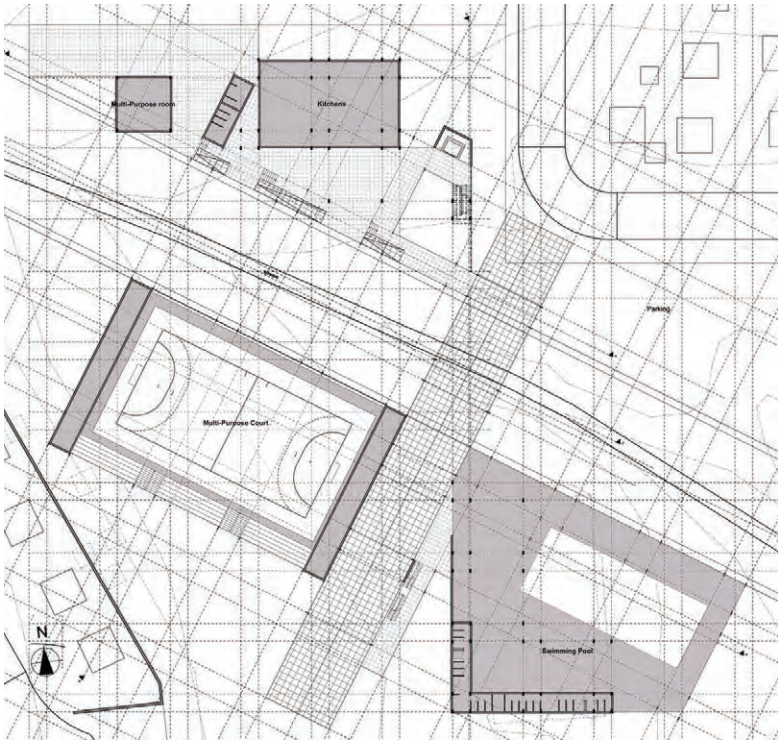


Figure 6.13- Ground floor plan

Figure 6.14- View from North

Figure 6.15- View from East

Figure 6.16- South entrance

Iteration 2

The grid system was simplified with the orientation perpendicular to the stream. The structural system was based on concrete walls and columns placed at angles to evoke some emotion from the users. The entrances to the building became more controlled and some shuffling of spaces occurred.

Issues raised: The relationship between the internal and external spaces and edge conditions need to be explored. The grid was limiting.

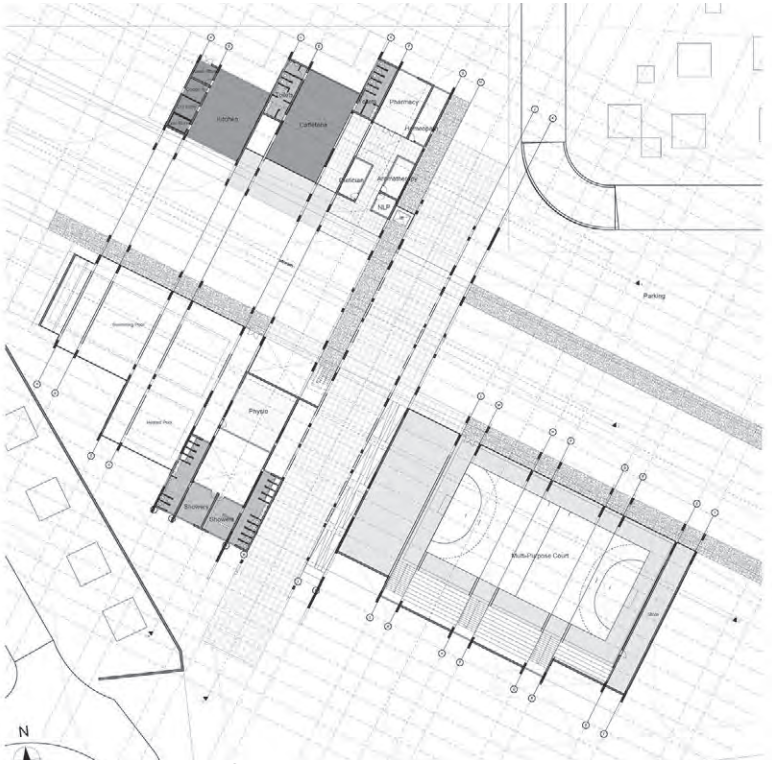


Figure 6.17- Ground floor plan

Figure 6.18- View from North

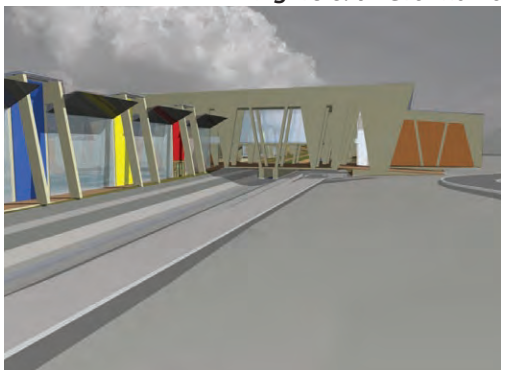


Figure 6.19- View from East

Figure 6.20- North entrance

Iteration 3

The grid system was less rigidly followed allowing for more options in space making, particulatly in the northern section. The building edges were softened to connect the exterior and interior spaces. The structural system for the larger spaces following the grid system was tectonic and stereotomic with load bearing walls for the remaining spaces.

Issues raised: The vertical circulation and services needed to be further explored. The end conditions of the southern section relationships between the tectonic and stereotomic elements to be resolved.

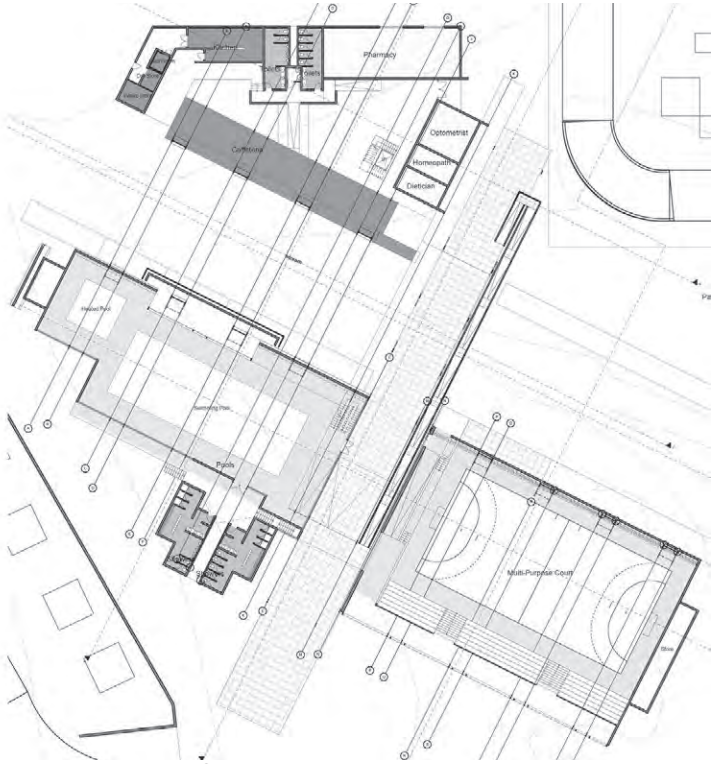


Figure 6.21- Ground floor plan

Figure 6.22- View from North West

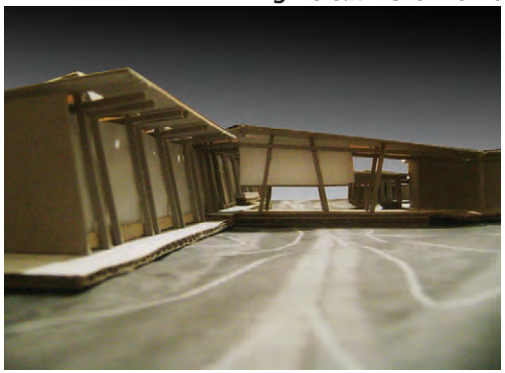


Figure 6.23- View from East

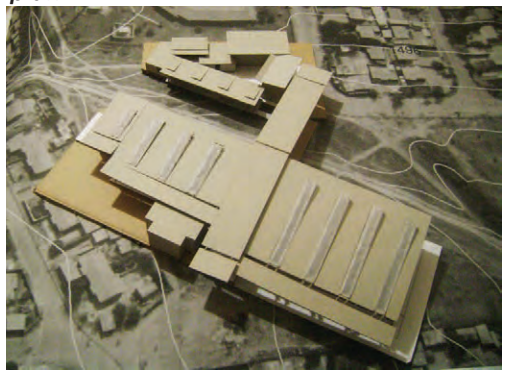


Figure 6.24- View from South

Design Synthesis

The following section will illustrate how the outcomes from the theory and precedent studies have been translated into the design.

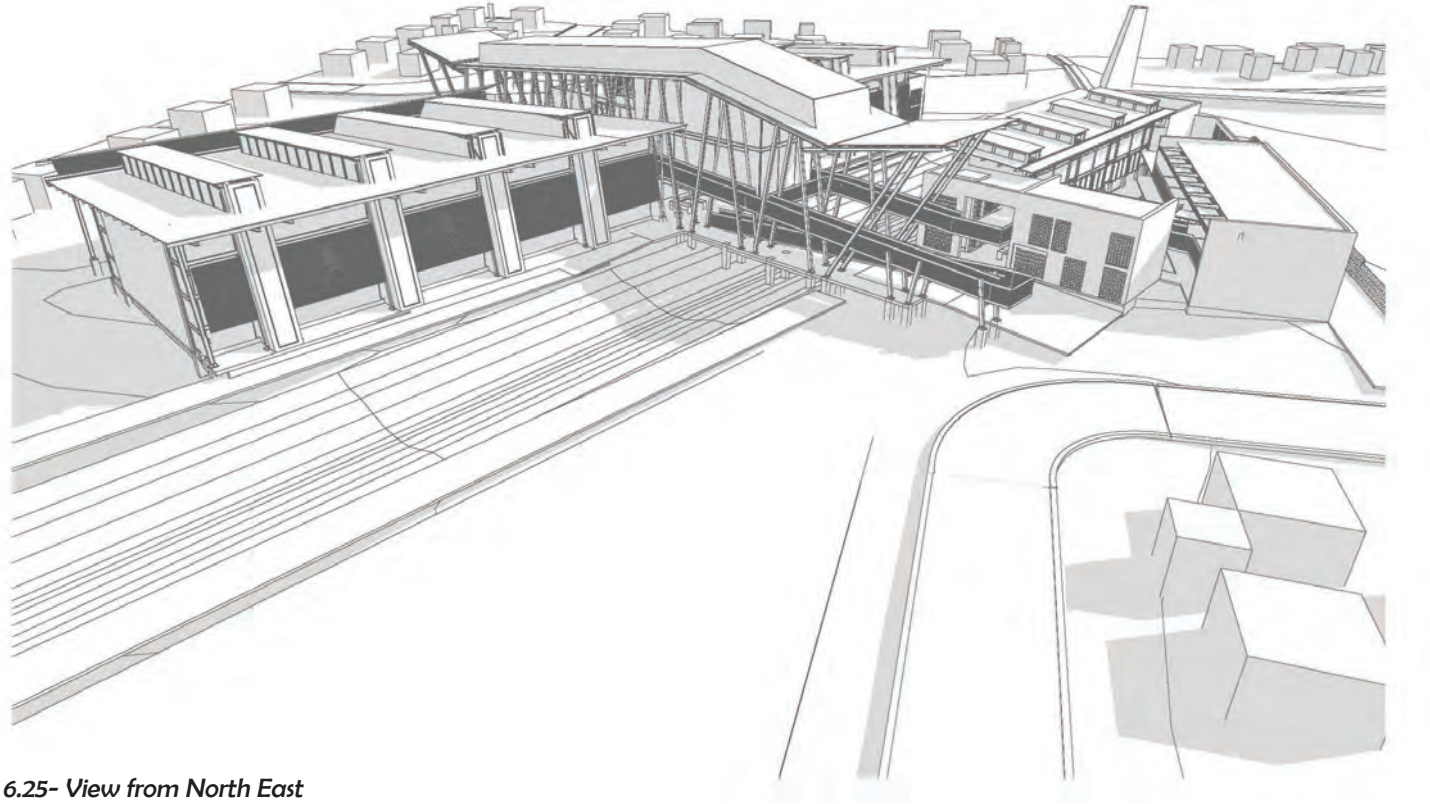


Figure 6.25- View from North East

De-emphasise the physical boundary-

The walkway connecting the northern and southern sections is also the main entrance to the facility. However, there is no indication of a boundary beside it being roofed.

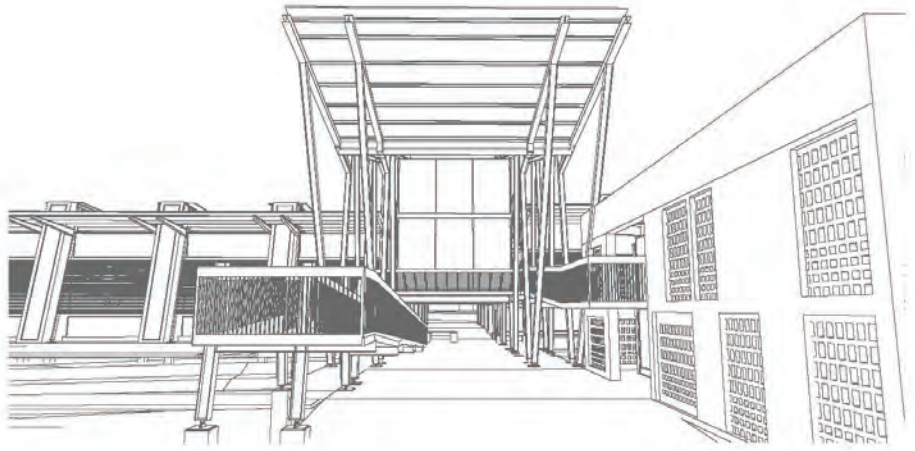


Figure 6.26- No clear boundary

Peripheral vision-

The views offers various elements that can be focussed on. The rhythm of structural elements, shadows, material finishes and scale differences all contribute in achieving this.

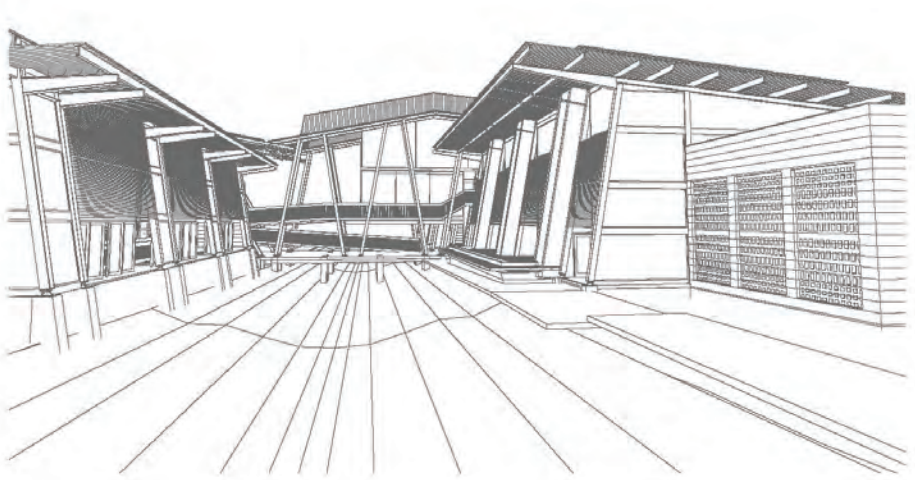


Figure 6.27- Peripheral vision

Shadows-

The overhangs, brick screens, shading devices and rhythm of the structural system all create varying shadows and light conditions.

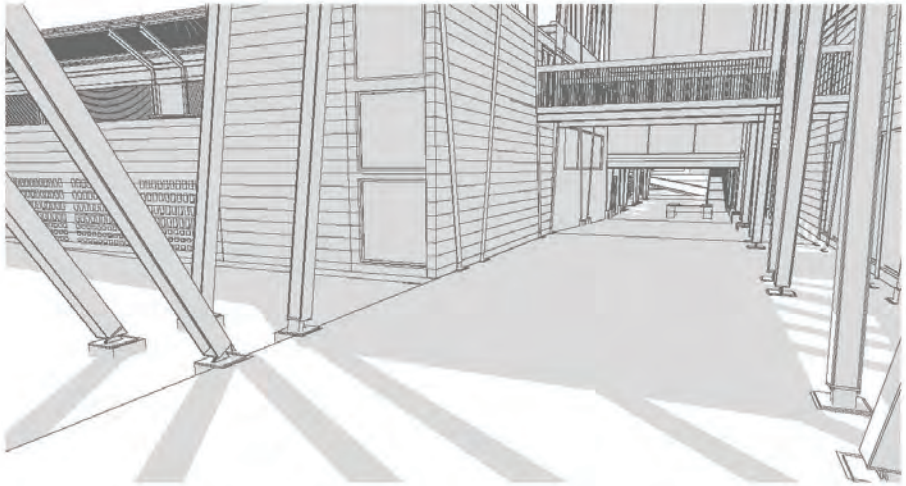


Figure 6.28- Shadows

Hearing-

The sharing of space between the gym and pool, as well as the capability of opening the eating space to both the stream and courtyard helps connecting different spaces through sound.

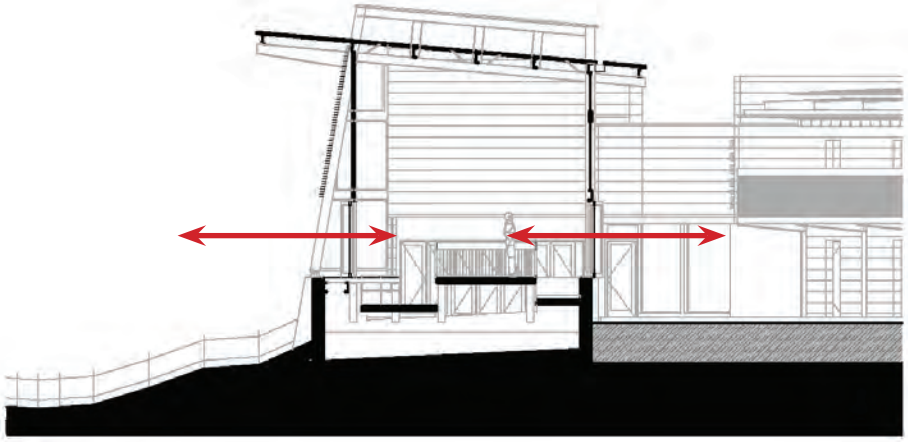


Figure 6.29- Sound connections

Polarity-

Adjacent spaces with contrasting volumes and material finishes are best demonstrated by the differences between the two pools.

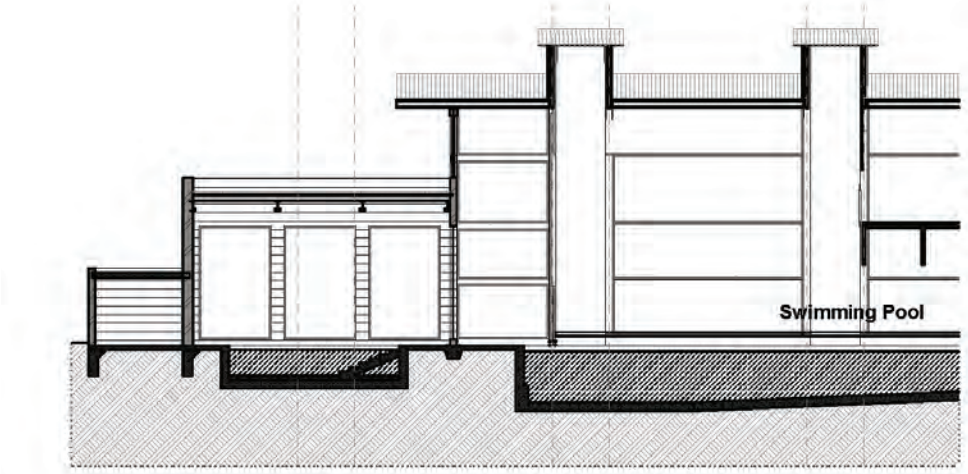


Figure 6.30- Polarity

Metamorphosis-

A hierarchy can be seen developing in the metamorphosis of the roofs from over the eating area, activity areas and to the main walkway.

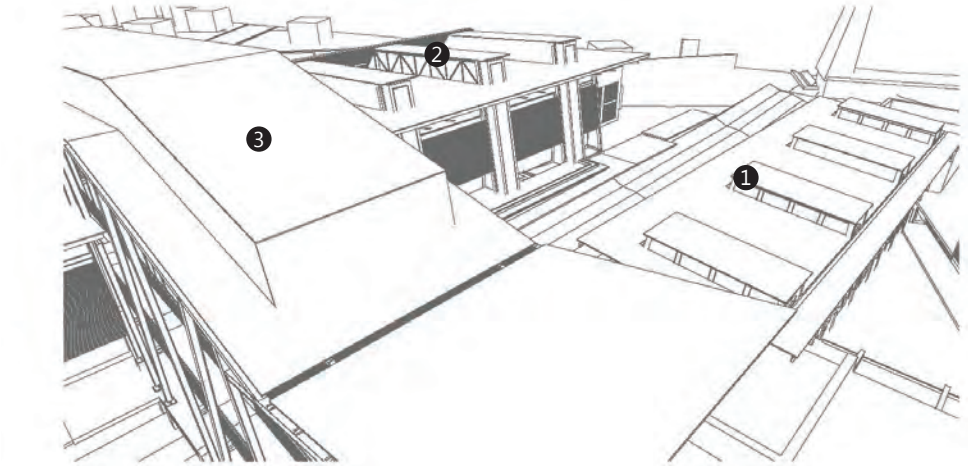


Figure 6.31- Metamorphosis

Harmony with nature and site-

The stream, being the strongest natural element on sight results in it being a strong influence on design decisions.

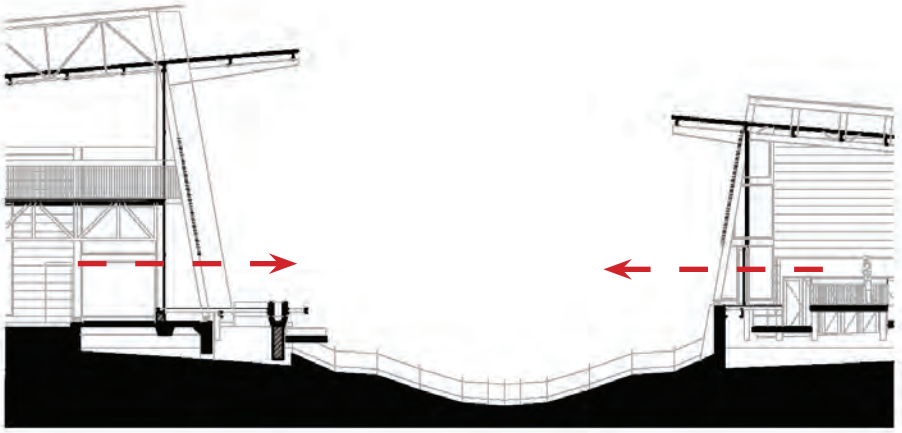


Figure 6.32- Views to the stream

Living wall-

In order to create a sense of enclosure and exposure, the facades facing the stream are slanted.

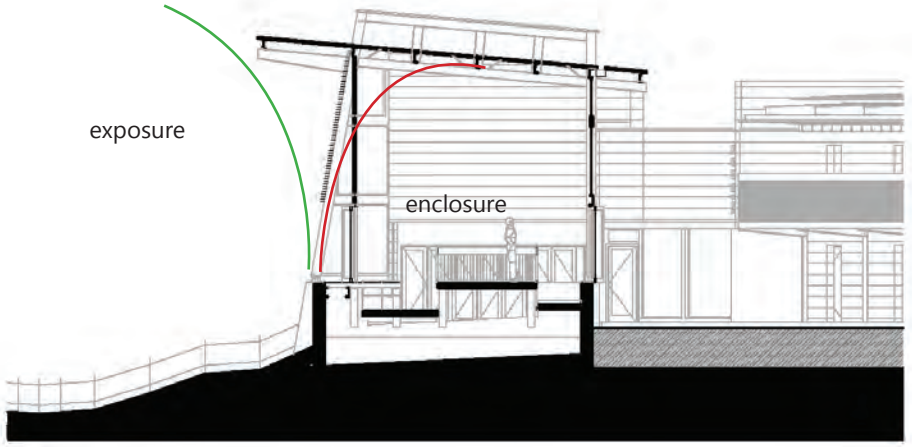


Figure 6.33- Exposure vs enclosure

Colour-

The colours chosen are intended to support the activities occurring in the spaces.

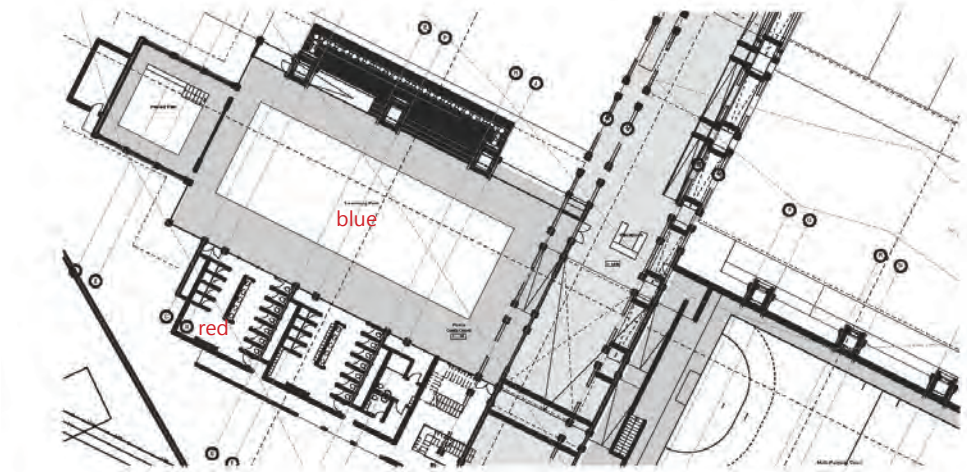


Figure 6.34- Use of colour

Equilibrium of spatial experience-

The walkway demonstrates the changes in symmetry/ asymmetry and open/ closed spaces.

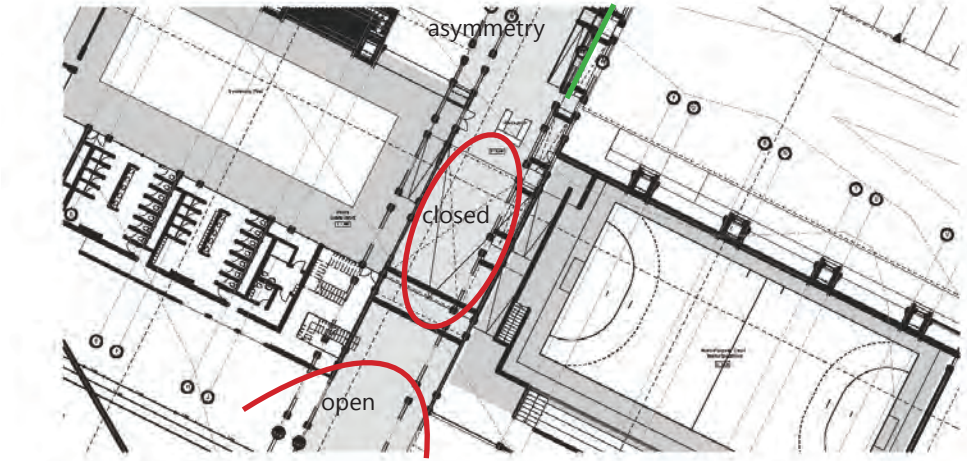


Figure 6.35- Spatial experience

Tactile stimuli-

Hard and soft surfaces used for seating allows the users to experience the differences in the material properties in terms of temperature and deflection.

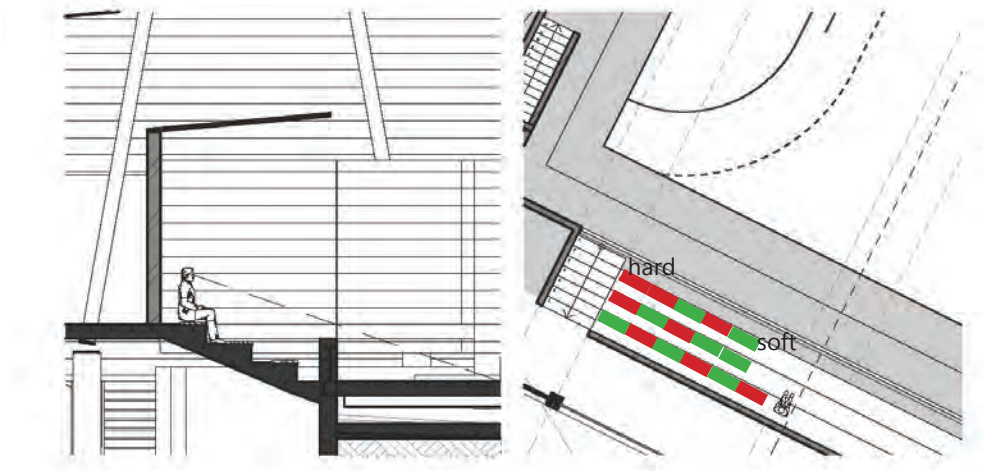


Figure 6.36- Different seating surfaces

Fatigue-

Rhythm is used to vary the experience of the user in order to avoid fatigue of the stimulus.

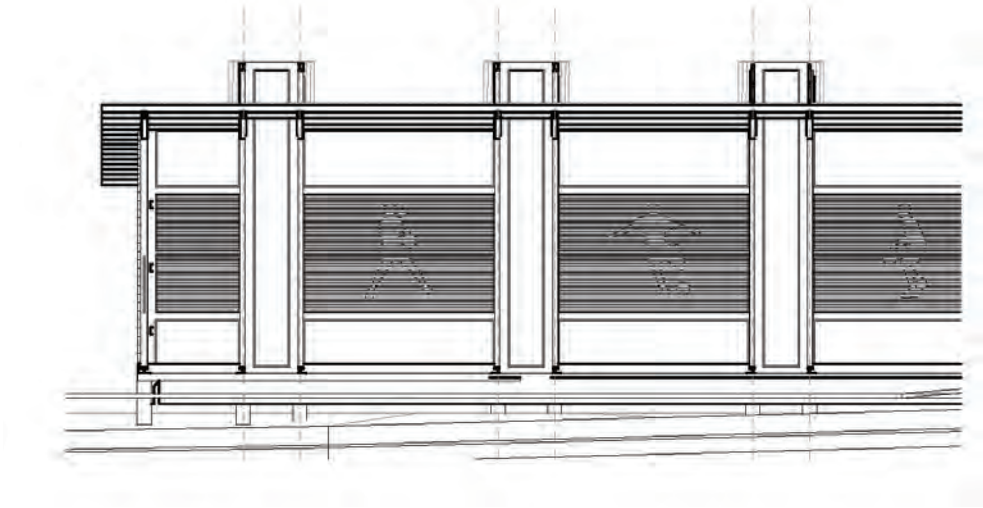


Figure 6.37- Rhythm

Transition space-

The main walkway is not closed allowing for gradual changes in light conditions.

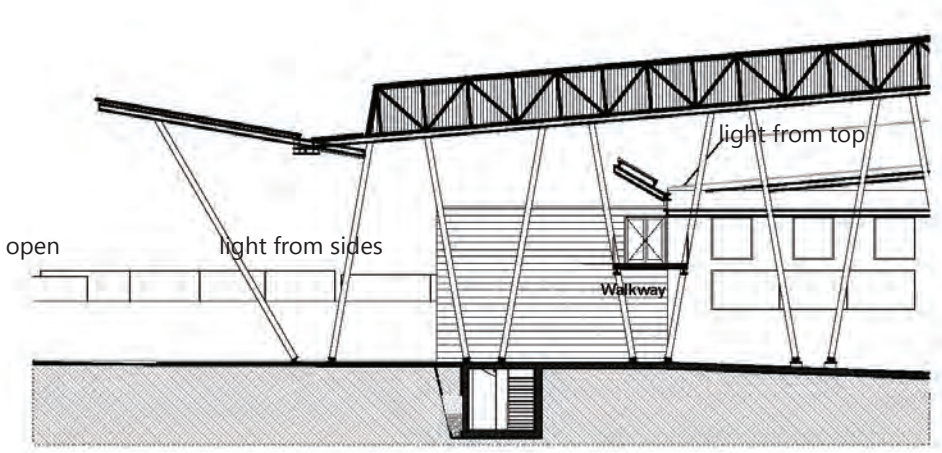


Figure 6.38- Gradual light changes

Brise-soleil

The brick screens allow for the users inside to be aware of the time of day, weather conditions and activities happening outside. In addition, they sunlight serve as sunlight control.

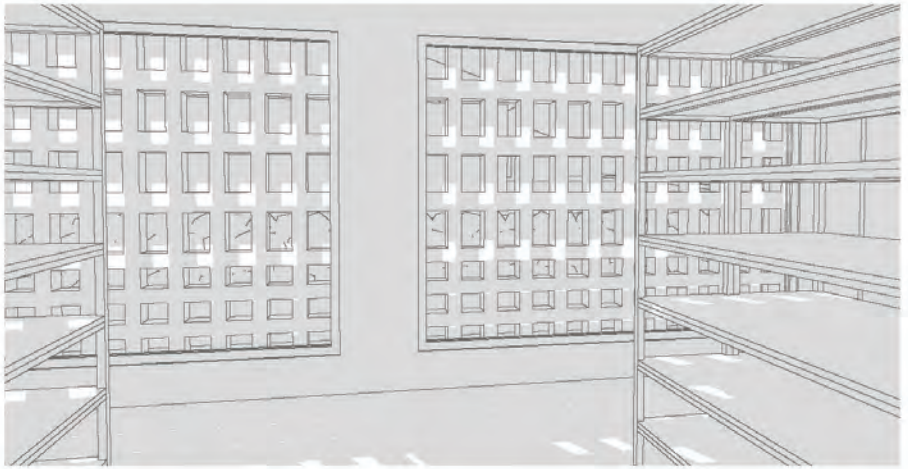


Figure 6.39- Brise-soliel

Open up or close in-

The large area of glazing allows for views both in and out of spaces and attracts people to the facility.

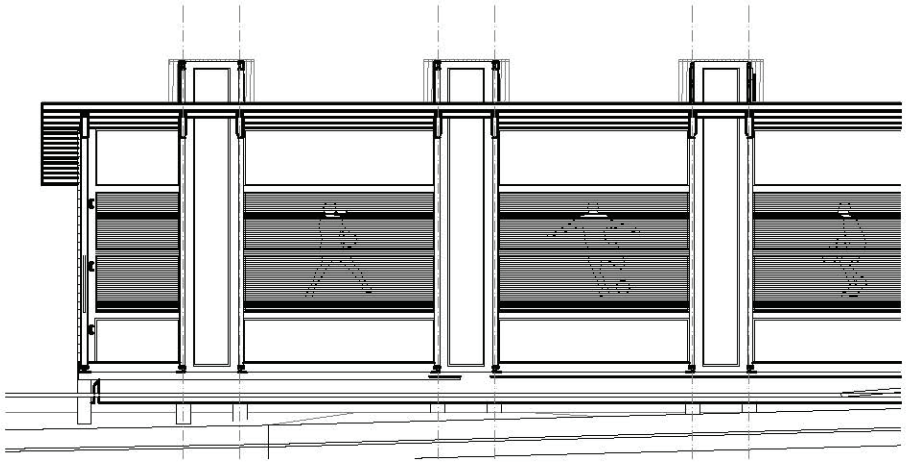


Figure 6.40- Inviting interaction

Spaces for lingering-

The landscaping elements allow for people to sit around the facility without being involved in the activities inside.

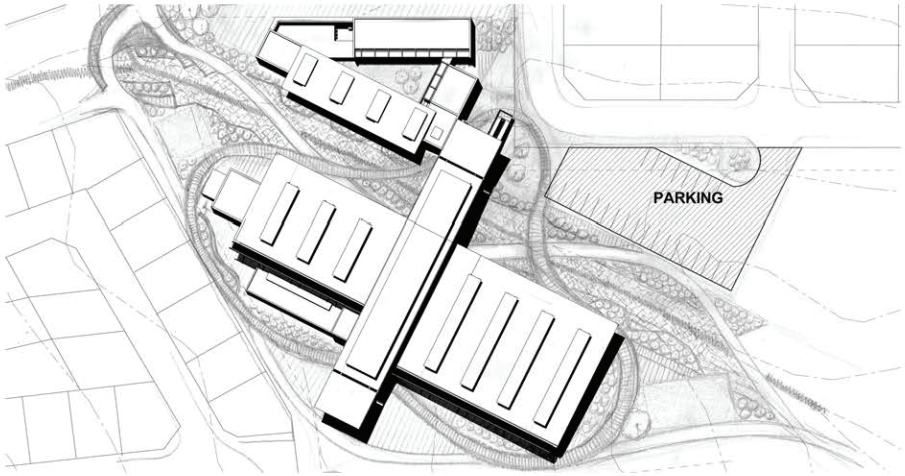


Figure 6.41- Outdoor seating

Edge effect-

The protrusion of the trombe stacks and setback of the glass facade creates niches which allows people to observe their surroundings without being in the way of others.

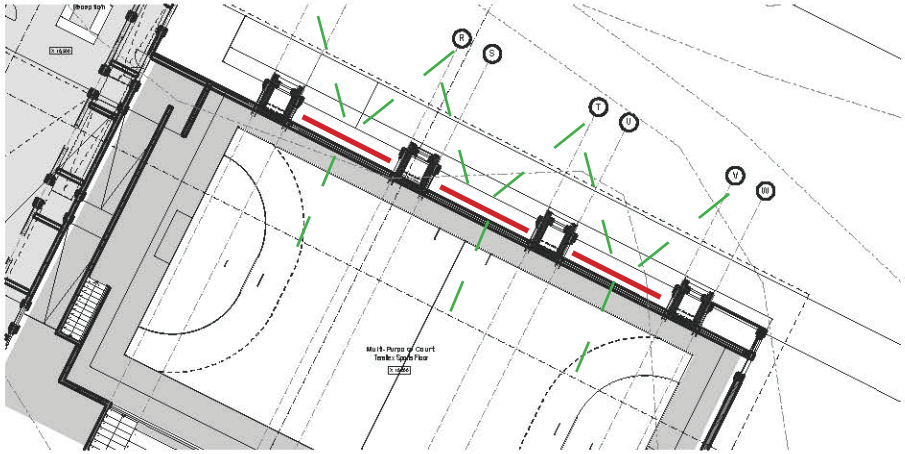


Figure 6.42- Places for watching

Holding Space

Large external spaces where people can gather was learnt from the Yeoville recreation Centre. This is available on either ends of the main walkway and along the stream.

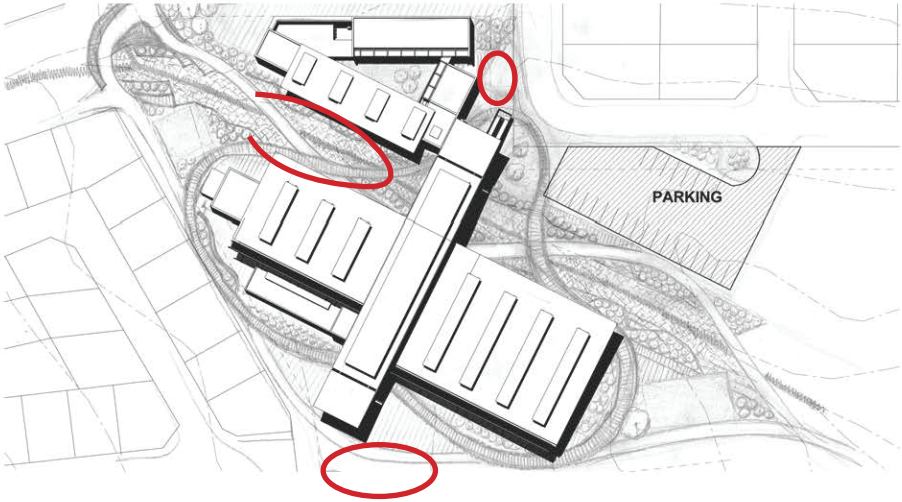


Figure 6.43- Holding spaces

Preservation of Existing Footpaths

The main walkway and circulation paths along the stream were genarated from the existing pedestrian paths, and was learnt from the Ubuntu Centre.

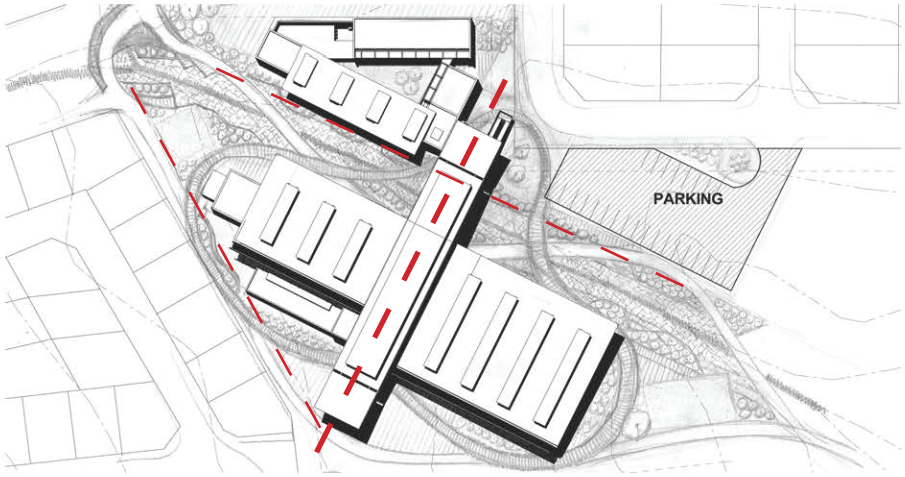


Figure 6.44- Preserving pathways

Arrangement of buildings

The arrangement of the Northern parts of the facility to create positive external space was learnt from the Zolani Multi- Purpose Centre.

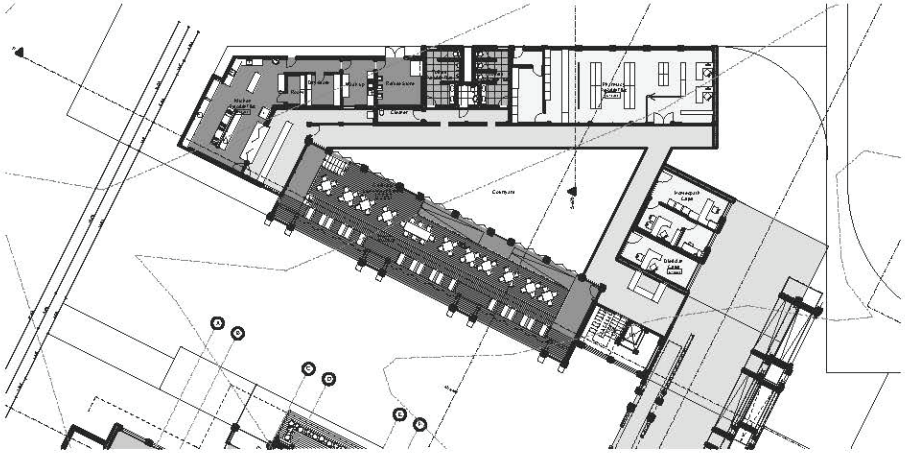


Figure 6.45- Positive external space

Varying Facades

All the facades of the building are different. This was learnt from the Thusong Service Centre.

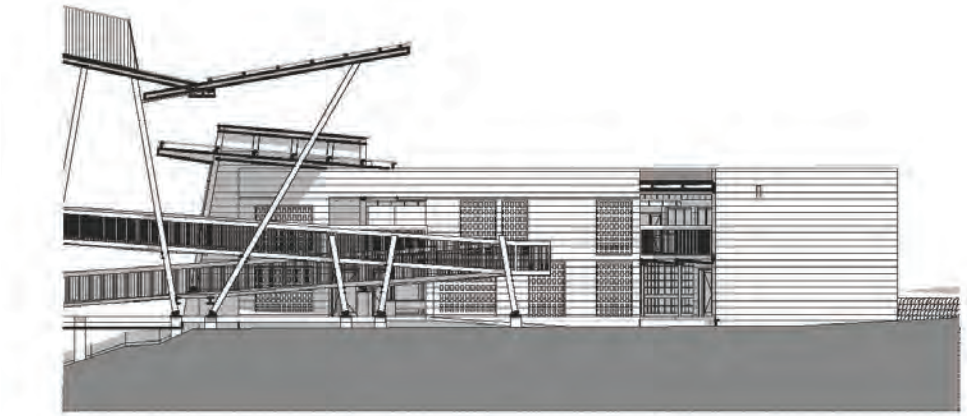


Figure 6.46- Different facades

Large openings

A lot of glass is used to connect the inside to the outside. This was learnt from the Thermal Baths in Vals.

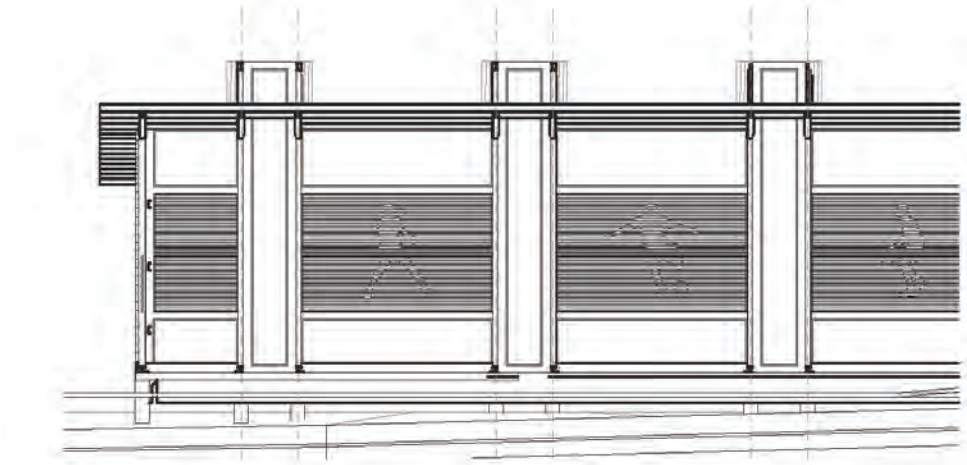


Figure 6.47- Large areas of glass

CHAPTER 7

Technical Development

Overview

Figure 7.1 below indicates the various aspects that will be covered in this chapter

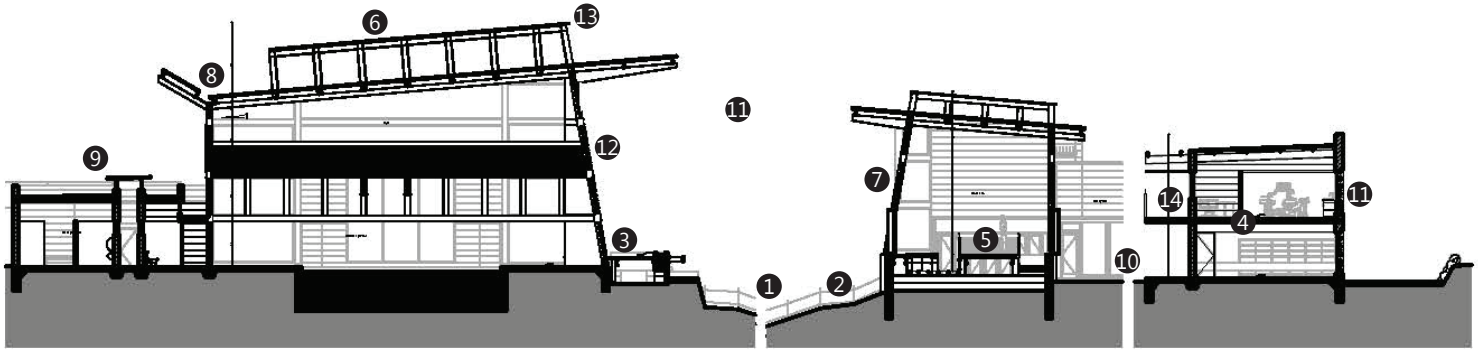


Figure 7.1 - Technical section

1. Flood lines
2. Landscaping
3. Structural Systems- Tectonic
4. Structural Systems- Stereotomic
5. Floor Finishes
6. Wall and Roof Finishes
7. Colour
8. Gutter Sizing
9. Rainwater Harvesting
10. Storm Water Disposal
11. Orientation
12. Shading Devices
13. Ventilation System
14. Fire Protection

Flood Lines

When working in close proximity to a water body, the flood lines are an important factor to consider. The 1:100 year flood line of the proposed site shows it covering a large portion of the site. In order to adjust the flood lines, the cross-sectional area of the flood plain was calculated to determine the largest volume of water flowing through. The adjusted flood lines would thus need to have a cross-sectional area equal to or more than the existing. Adding landscaping and changing the surface materials as well as considering future expansion in the township, the cross-sectional area should be up to 30% more (Vosloo 2012).

Figure 7.2 - Existing flood lines on site

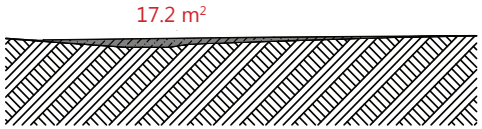


Figure 7.3 - Existing areas of flood plain

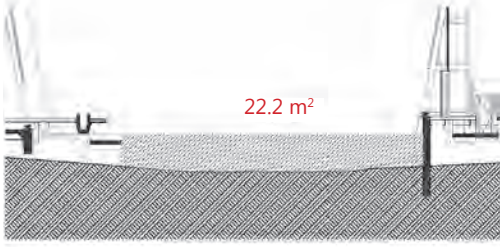


Figure 7.4 - New area of flood plain

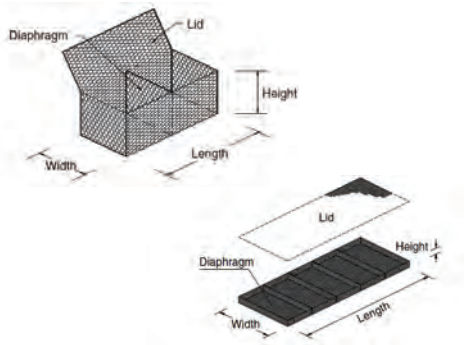


Figure 7.5 - Gabions and reno mattress

Landscaping

The surrounding landscape plays an important role in achieving the goals of this dissertation. It helps in reminding the community of the beauty that exists in nature and strengthens the stream as an important element in the design as well as in the township. Additionally, it allows for people to linger around and compliments the facilities of recreation.

The design incorporates two major paths. The first loops around the building, facilitating pedestrian movement and allowing it to be used as a jogging track. The second begins at the junction of the stream with the pedestrian boulevard, and facilitates movement downstream.

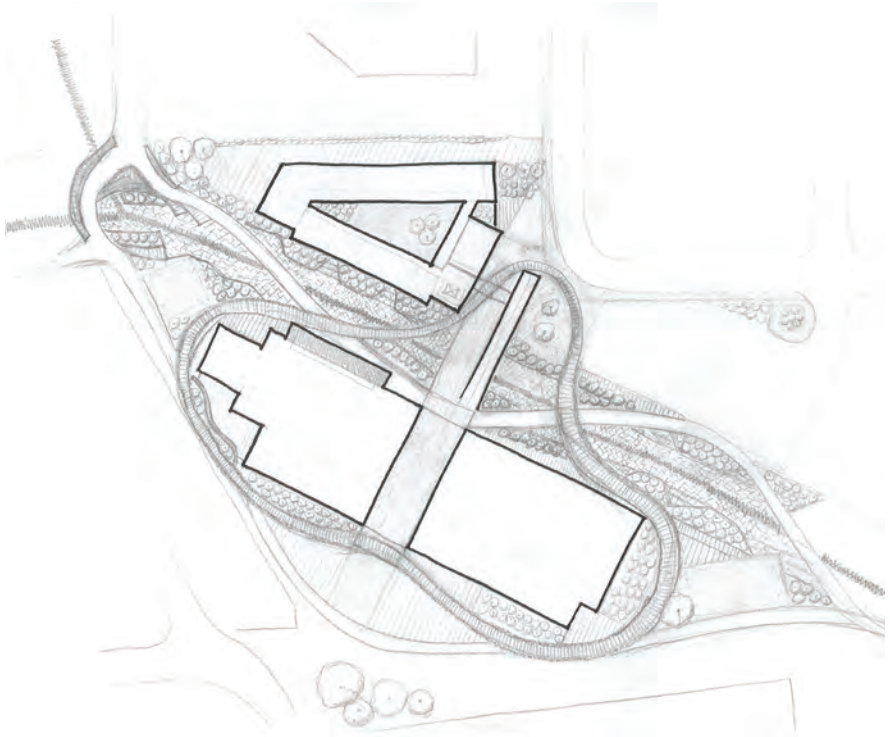


Figure 7.6 - Landscape design

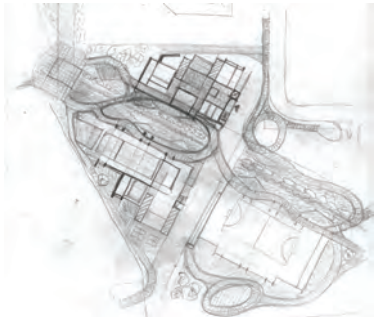


Figure 7.7 - Landscape concept

Figure 7.8 - General Maister Memorial Park

Structural Systems- Tectonic

Large spaces are required to accommodate indoor sporting and recreational facilities. Thus, a steel structure was chosen as it is able to span larger distances. It also allows for ample natural light to be brought into the space.

A rhythm was created by varying the spacing between the primary structural elements. Prestressed Echo Slabs was selected for the upper floors due to it being able to span large distances, while still having small thicknesses.

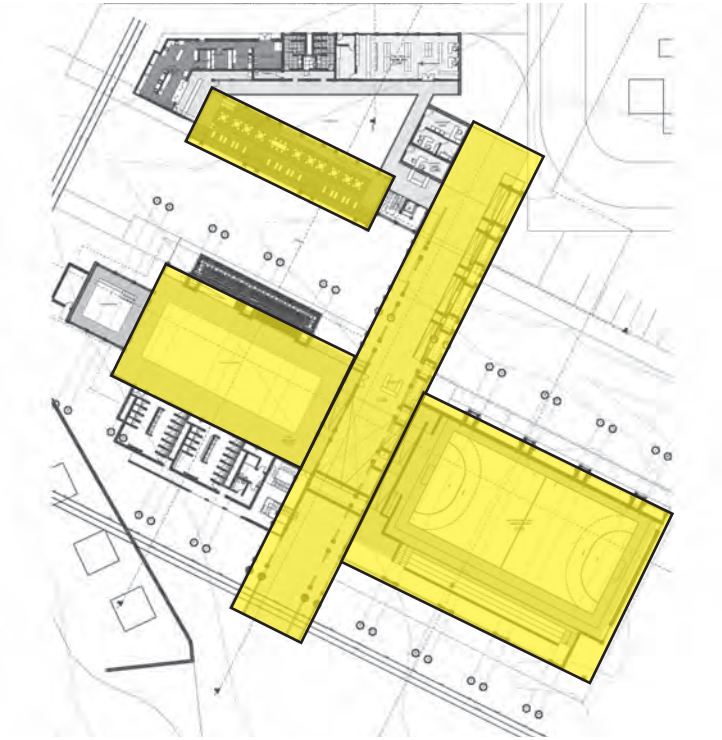


Figure 7.9 - Indication of tectonic structure

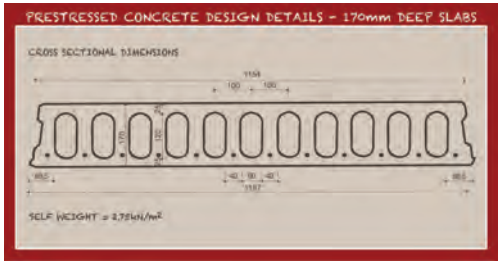


Figure 7.10 - 170 mm Echo slab

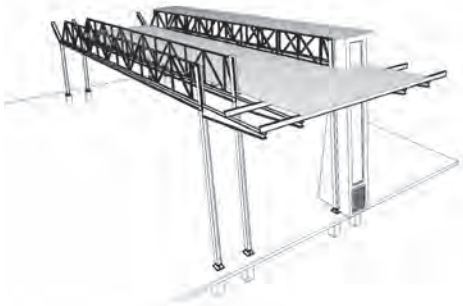


Figure 7.11 - 3D of tectonic structure

Structural Systems- Stereotomic

The smaller, more private areas of the building that accommodates the medical facilities requires a different structural treatment.

Load bearing brickwork was chosen for the outer walls as the spaces contained are relatively small. It also relates to the urban fabric, sharing the boundary with the existing community centre. The floor slabs and flat roofs are constructed from prestressed Echo Slabs as well to keep the variance of construction systems minimal.

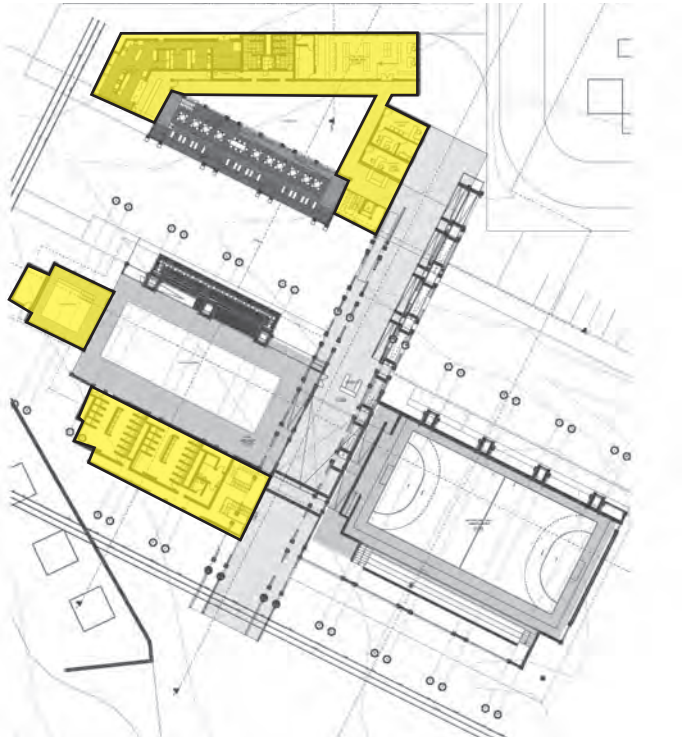


Figure 7.12 - Indication of stereotomic structure

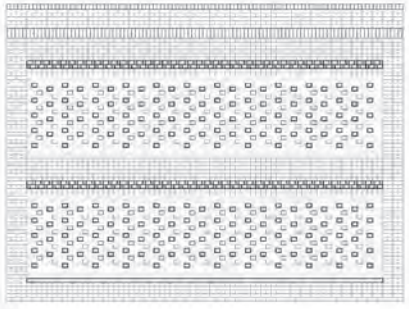


Figure 7.13 - Elevation of brickwork

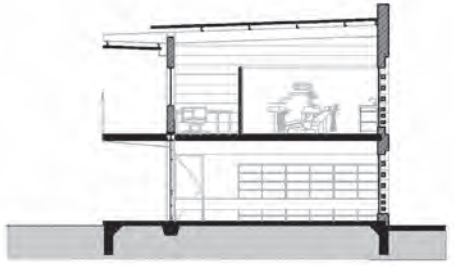


Figure 7.14 - Section of stereotomic structure

Floor Finishes

The various programmes require different properties for the floor finishes. Where possible, the same finish is used to maintain a sense of coherence. Durability, low maintenance and colour options were important factors in selection of the materials.

Figure 7.15 - Crete Cote surface

Crete Cote

1.5mm finish

Colour options

Durable, waterproof

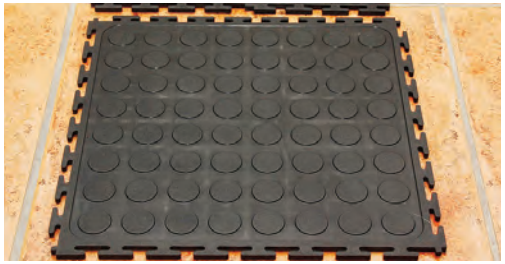


Figure 7.16 - PVC tile

PVC Tile

333mm x 333mm x 6.2mm

Made from recycled PVC

Easy to maintain

Figure 7.17 - Eco Wood decking

Eco Wood Decking

4000mm x 110mm x 22mm

50 % PVC, 50 % Pine Dust

Easy to maintain, no rotting

Figure 7.18 - Slate tiles

Slate Tiles

mm x mm x mm

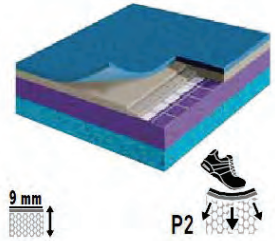


Figure 7.19 - Teraflex Sport M Performance

Teraflex Sport M Performance

9mm thick

35 to 45% Shock Absorption

Low maintenance and long life span

Wall and Roof Finishes

The wall finishes are determined largely by the structural system used. Other considerations are the material's performance with regard to environmental sustainability. The sloped roofs consist of insulated metal sheeting, while the flat roofs are constructed from prestressed Echo Slabs.

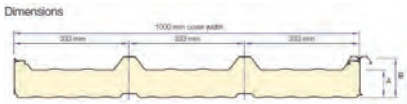


Figure 7.20 - Insulated roof panel

Kingspan Insulated Roof Panel

Minimum pitch: 1.5 degrees

Secret fixed

U-Value: 0.46 W/m^{2}K

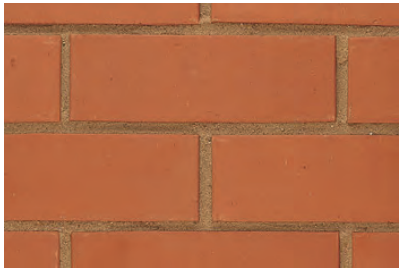


Figure 7.21 - Firelight Satin FBX

Clay Face Brick

Firelight Satin

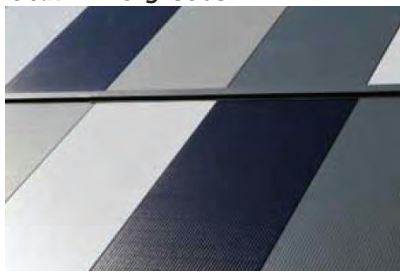


Figure 7.22 - Insulated wall panel

Longspan Insulated Wall Panel

4000mm x 110mm x 22mm

Up to 8.2m Span

U-Value: 0.15 - 0.3 W/m^{2}K

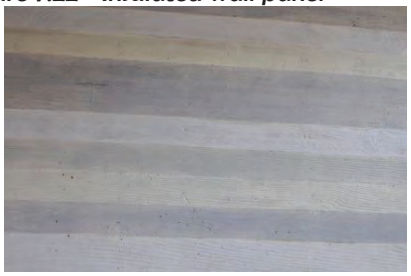


Figure 7.23 - Textured Concrete

Off-shutter Concrete

Timber shuttering pattern

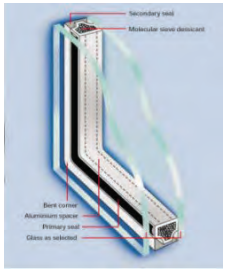


Figure 7.24 - InsulVue double glazing

Double Glazing

InsulVue 25mm thick

U-Value: 3.2 W/m^{2}K

Colour

From the theory, it was learnt that colours need to be chosen to support the activities and can affect the mood. It can also be used to influence the perception of space.

Colours that are described as cool will be used for places that have a lot activity. This is so that the users are more calm and reduces the risk of overstimulation. These colours inlcude shades of green, blue and even purple (Libby 1974: 59).

Shades of red and yellow are said to be warm colours and will be used in areas to encourage the users to be active. These colours, especially when of darker shades can also allow the spaces to feel smaller and more intimate (Libby 1974: 60)W.

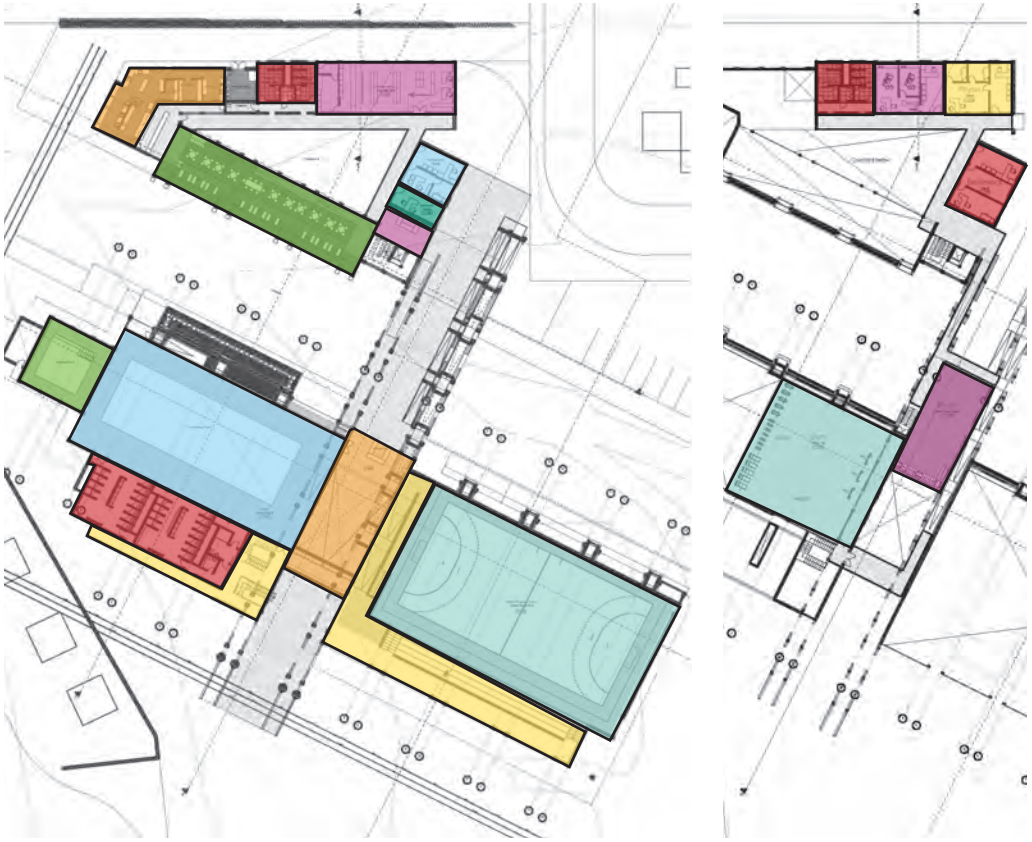


Figure 7.25 - Colour indications per room

Gutter Sizing

The sizes of the gutters were determined by using the guidelines available in the SANS 10400 Part R. The down pipes run in-between the steel columns.

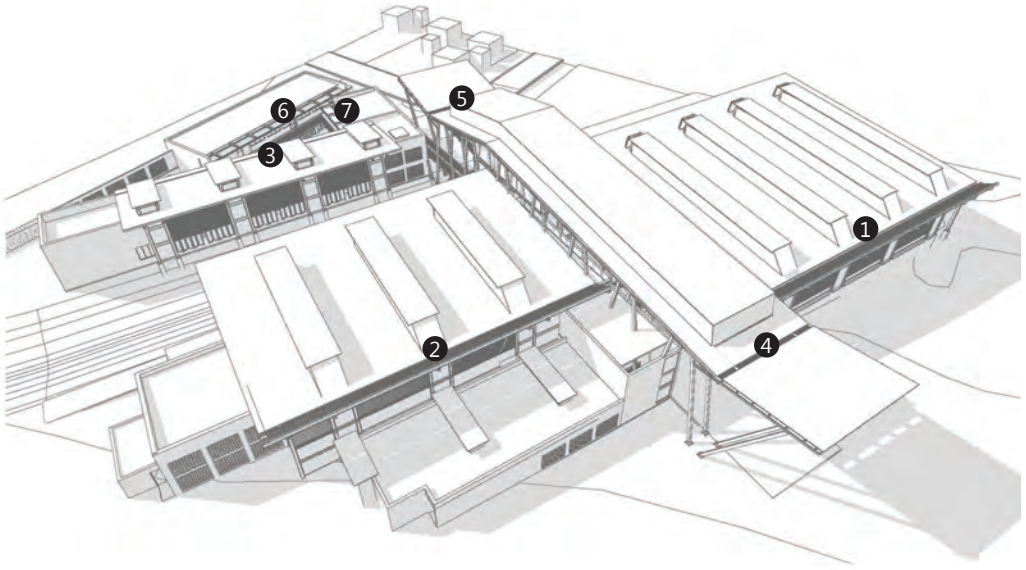


Figure 7.26 - Gutter positions

1. 1250 x 140 = 175 000
   √175 000 = 418.33
   ~600 x 300

2. 685 x 140 = 95 900
   √95 900 = 309.67
   ~600 x 300

3. roof area : 350m² ~ 250 x 200

4. roof area : 510m² ~ 600 x 300

5. roof area : 260m² ~ 600 x 300

6. roof area : 230m² ~ 250 x 200

7. roof area : 150m² ~ 250 x 200

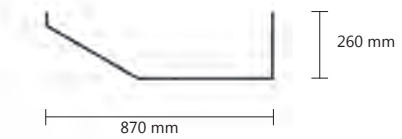


Figure 7.27 - Gutter profile

Rainwater Harvesting

Rainwater is harvested to supplement the water supply from the municipality. It is used for the hot water in showers and for the heated pool.

The collection is from the roofs of the building south of the stream. First flush diverters are used to reduce the amount of contaminants in the stored water. The water is stored underground in a high density polyethylene tank. A sediment filter as well as a ultraviolet filter are used to purify the water. The water is then heated by evacuated tubes and stored in a tank above the roof.

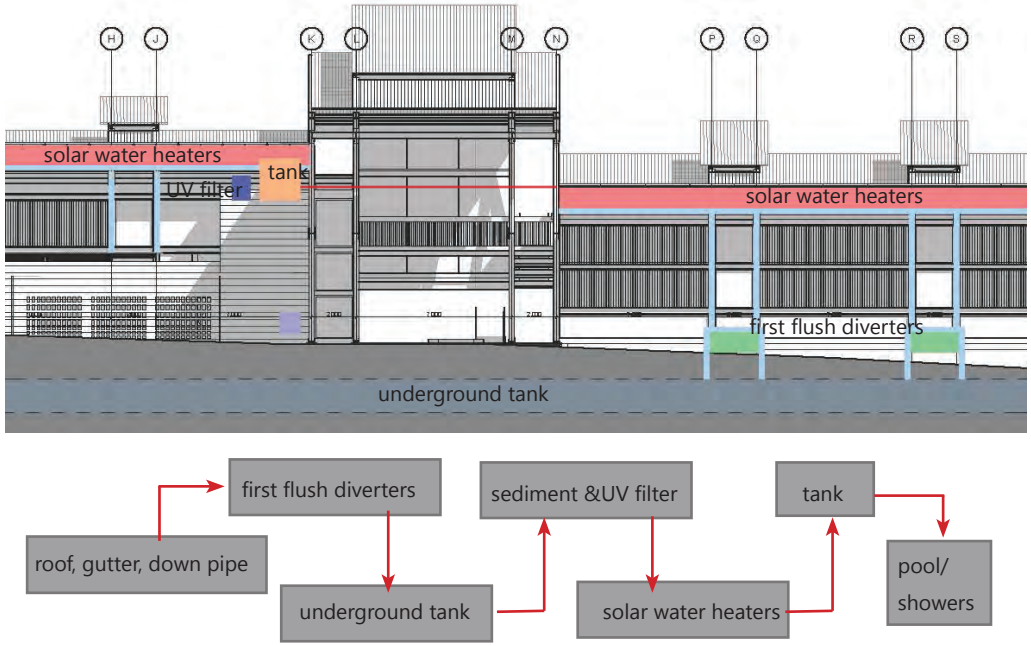


Figure 7.28 - Rainwater harvesting system

Figure 7.29 - Underground storage tank

Figure 7.30 - UV filter

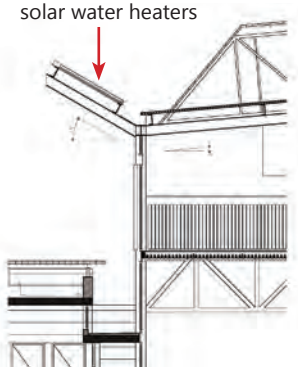


Figure 7.31 - Position of solar water heaters

Storm Water Disposal

Rainwater from the larger roofs on the Southern end of the building is collected in the rainwater tank underground. Should there be an overflow, it would be allowed to run into the landscape close to the stream.

On the Northern side of the building, the rainwater would be collected in storm-water drains. From there, it would run into the municipal drains.

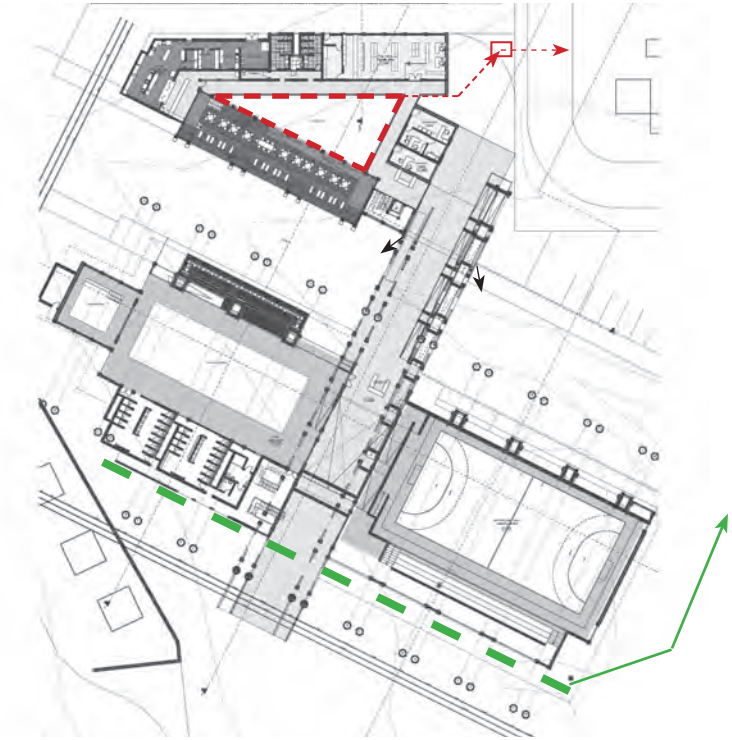


Figure 7.32 - Storm water disposal

Orientation

Due to the stream being the major element determining orientation, the building doesn't face directly North. This raises concerns of Eastern and Western sun entering the spaces. A sun study was conducted, proving that appropriate shading systems can prevent the sunlight penetration.

Eastern sun affects the Norther facades of the building between the equinoxes and the Winter Solstice. Western sun affects the Southern facades in the Summer months.

From the study, it was learnt that horizontal louvres are needed on the Northern facades and vertical louvres on the Southern facades.

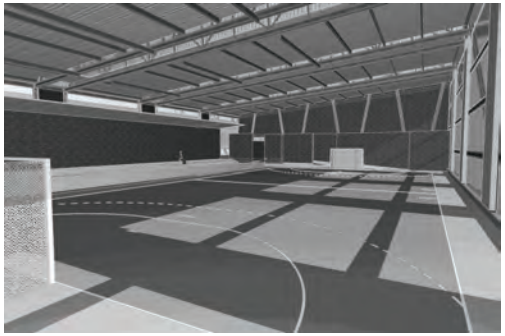


Figure 7.33 - Court, no shading

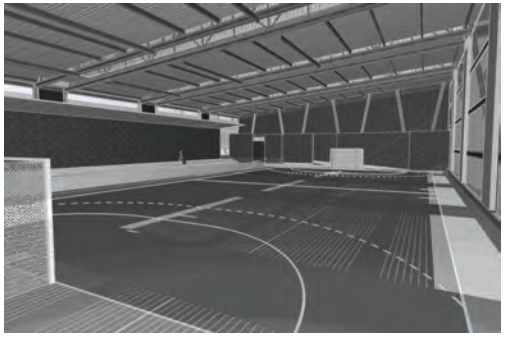


Figure 7.34 - Court, shading type 1

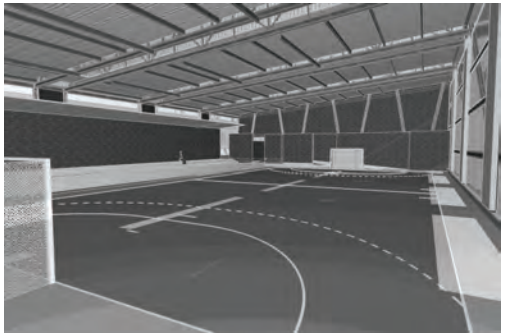


Figure 7.35 - Court, shading type 2

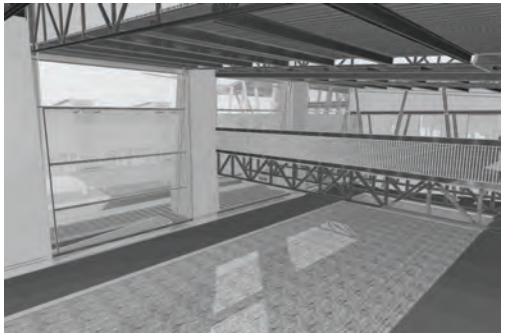


Figure 7.36 - Pool, no shading

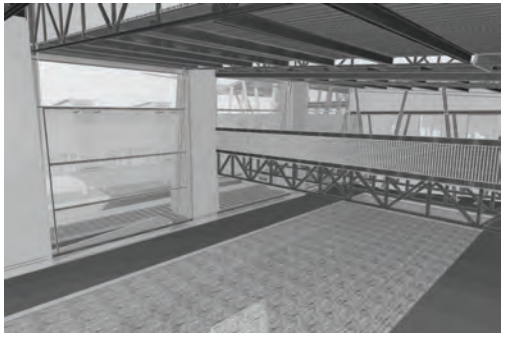


Figure 7.37 - Pool, shading type 1

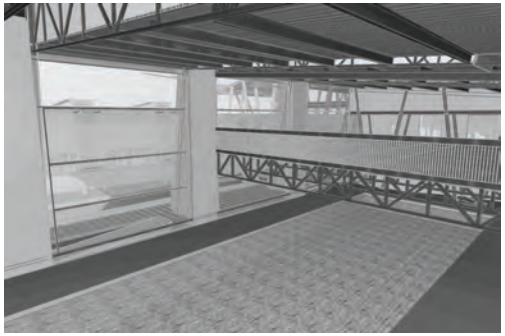


Figure 7.38 - Pool, shading type 2

Shading Devices

From the sun studies conducted, the shading devices are important elements in the design. The shading devices also corresponds to the structural systems.

Screen walls constructed from brick are used for the Medical facilities. The steel structures have horizontal and vertical shading devices made from fibre cement. These are positioned according to the results from the sun studies. They are also used as signage incorporating silhouettes of the different activities that take place in the facility.

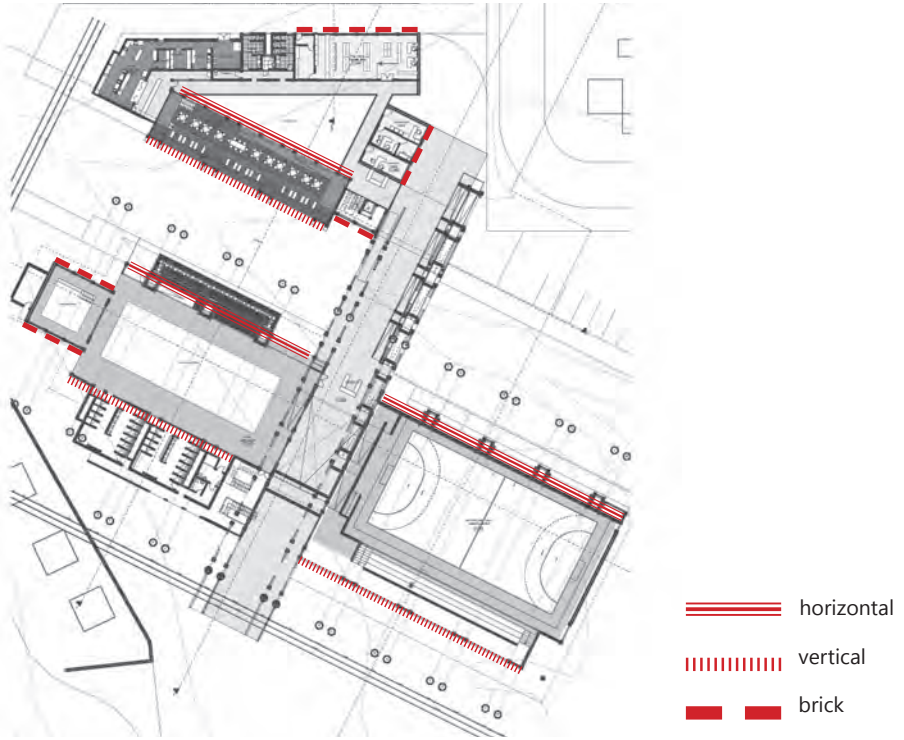


Figure 7.39 - Positions of shading devices

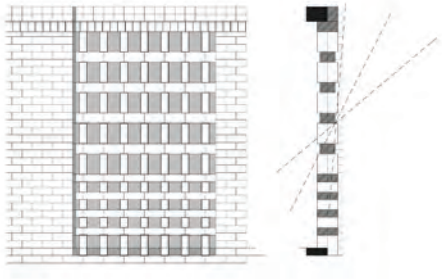


Figure 7.40 - Brick shading screen

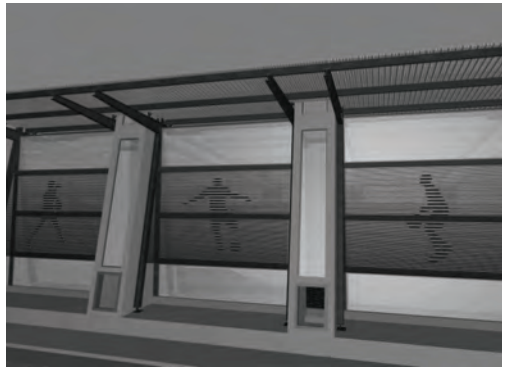


Figure 7.41 - Signage on shading screen

Ventilation System

The section of the building North of the stream has a narrow floor plate and is ventilated naturally. The kitchen has mechanical ventilation to comply with health and safety standards.

The building South of the stream has much deeper spaces. Natural ventilation is achieved by the use of trombe stacks.

In the summer, the roof overhang blocks the sun reaching the bottom of the stack but allows the top to heat up. Cool air is brought in from the stream side through a plenum under the floor and is extracted out through the top of the stack. In the winter, the top of the stack is closed allowing the heated air in the trombe wall to be circulated back into the space.

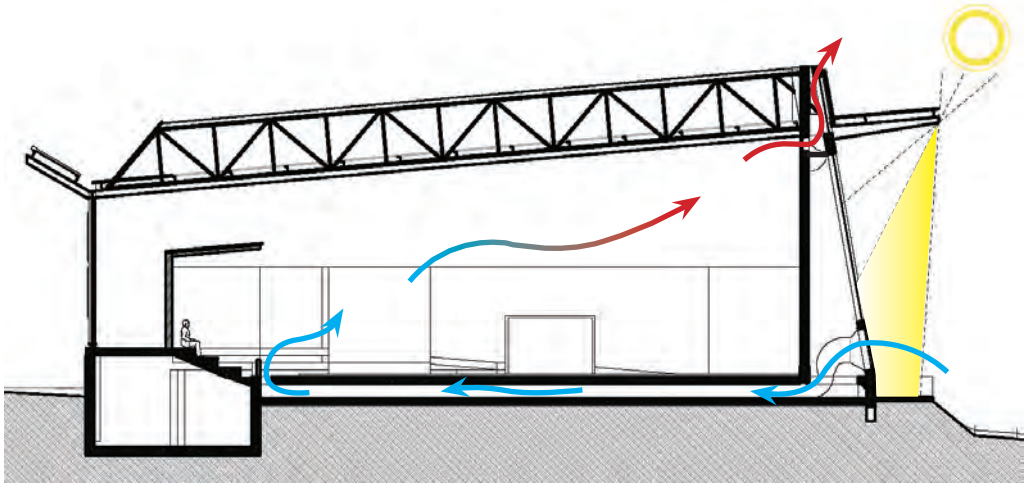


Figure 7.42 - Summer ventilation

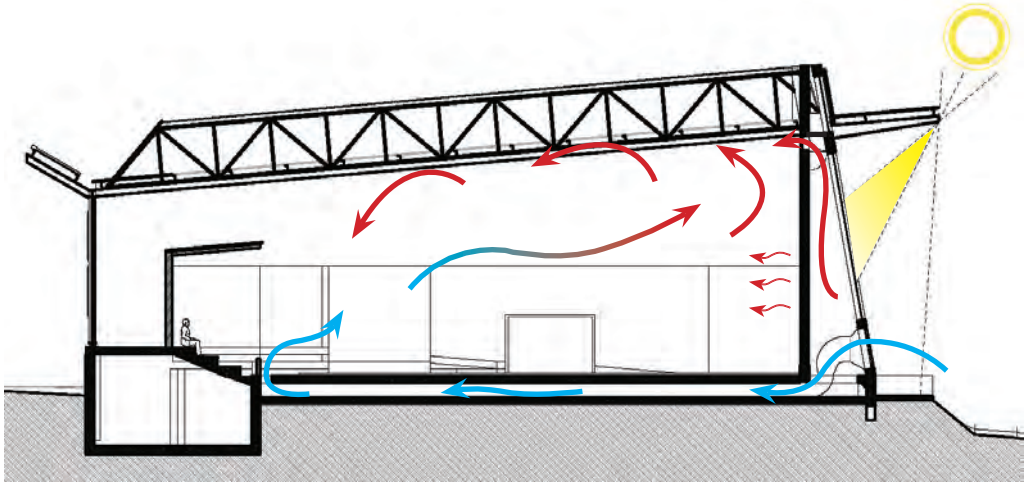


Figure 7.43 - Winter heating

Fire Protection

The building is required to conform to SANS 10400 Part T in terms of fire protection. The fire-fighting equipment required includes fire hose reels, two hydrants and 4.5 kg dry chemical powder portable extinguishers. A manually activated fire alarm system would also be installed.

Key:
H: Hydrant
F: Fire Hose Reel
D: 4.5 kg DCP extinguisher

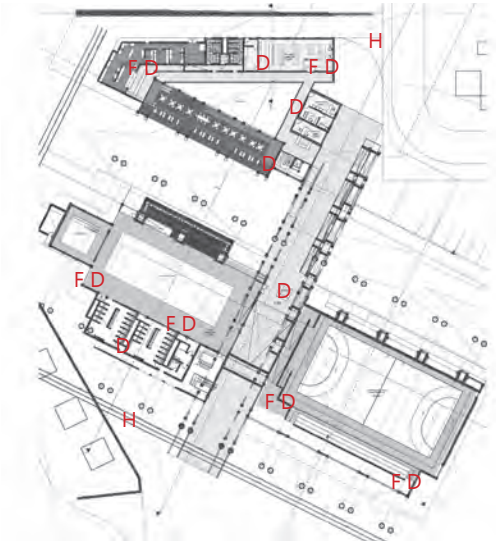


Figure 7.44 - Fire protection, Ground

Figure 7.45 - Fire protection, First

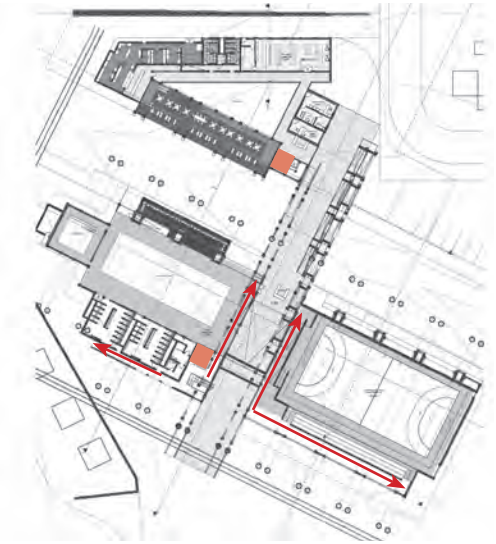


Figure 7.46 - Escape route, Ground

Figure 7.47 - Escape route, First

Plans

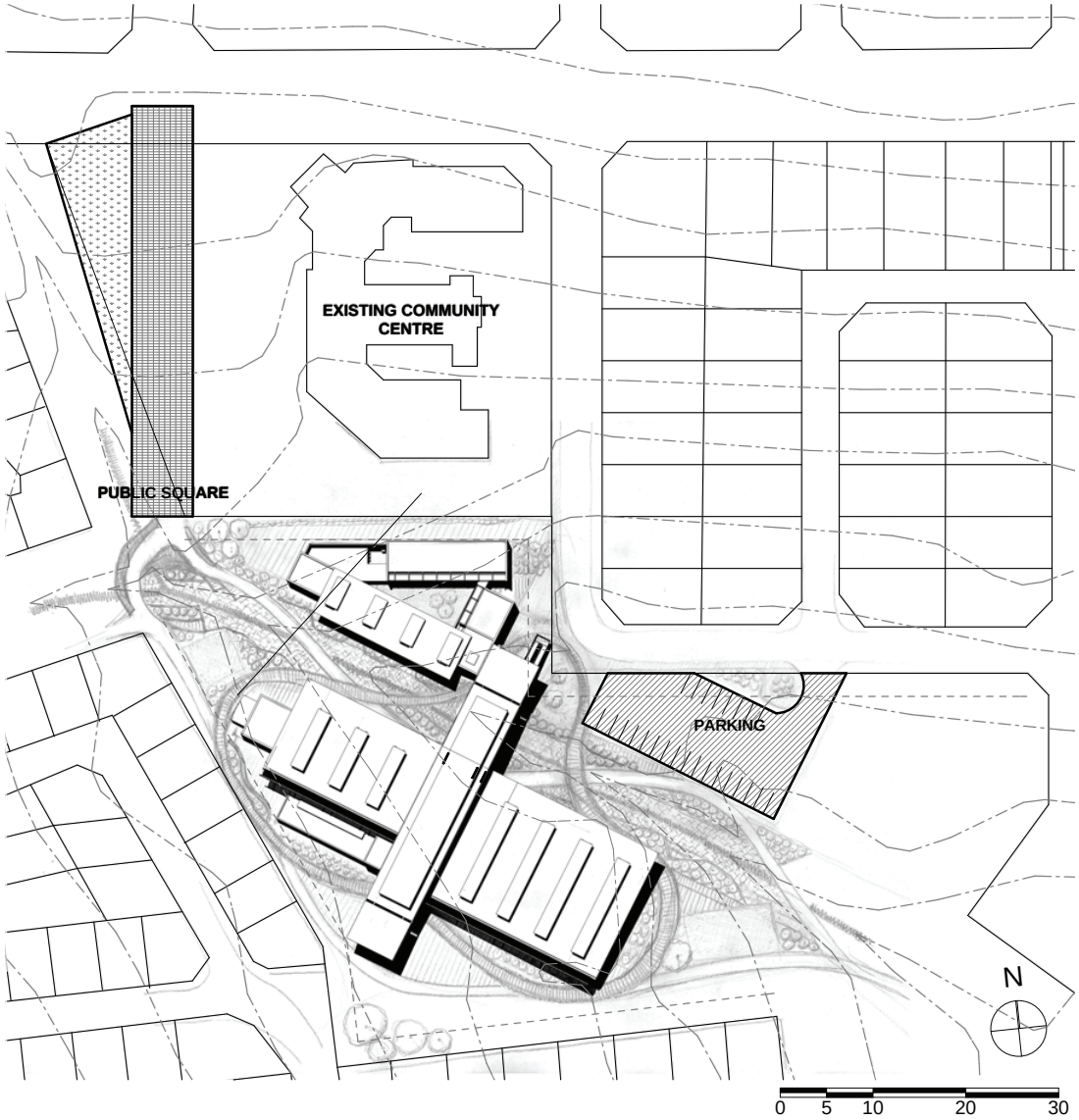


Figure 7.48 - Site Plan

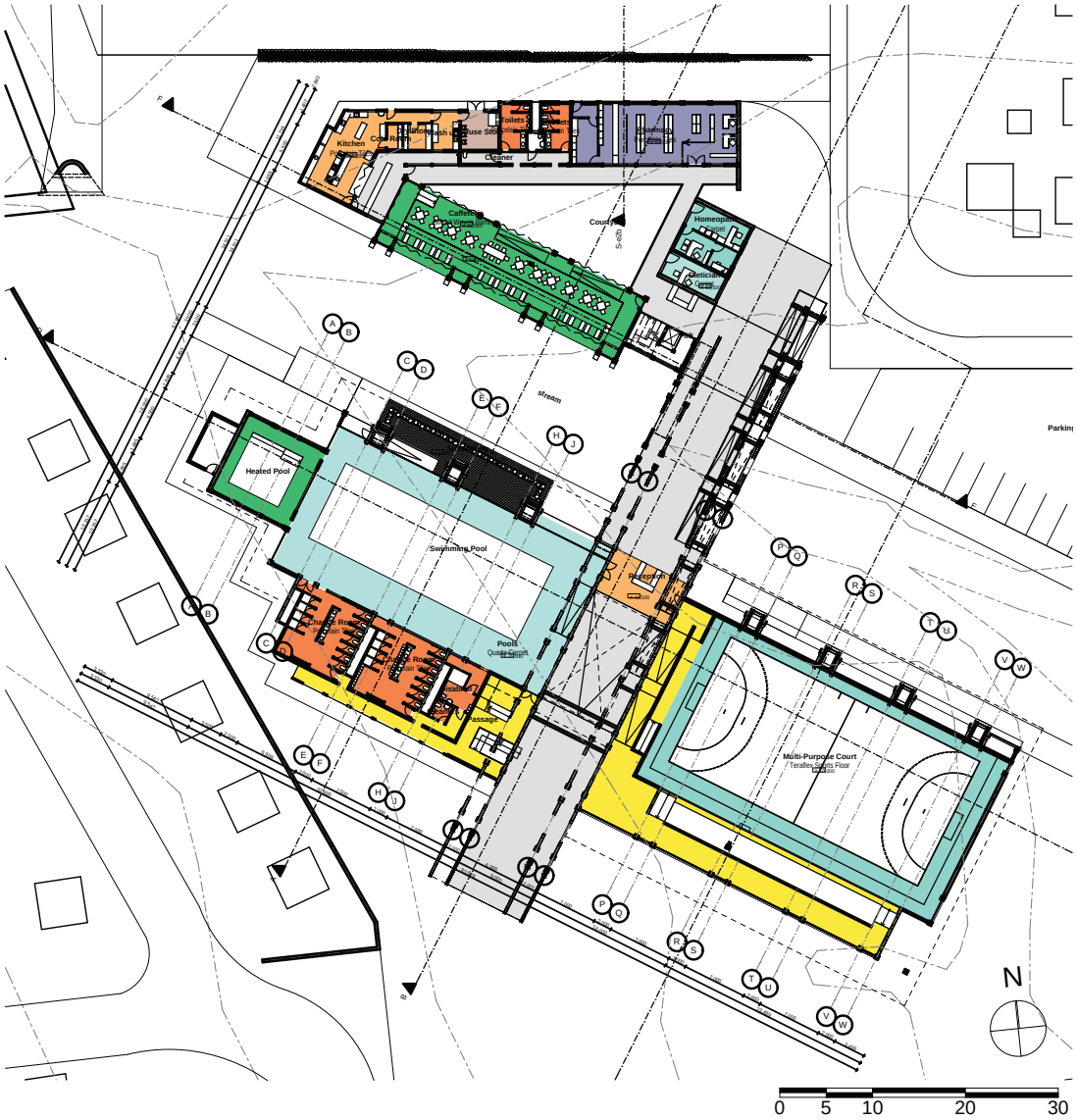
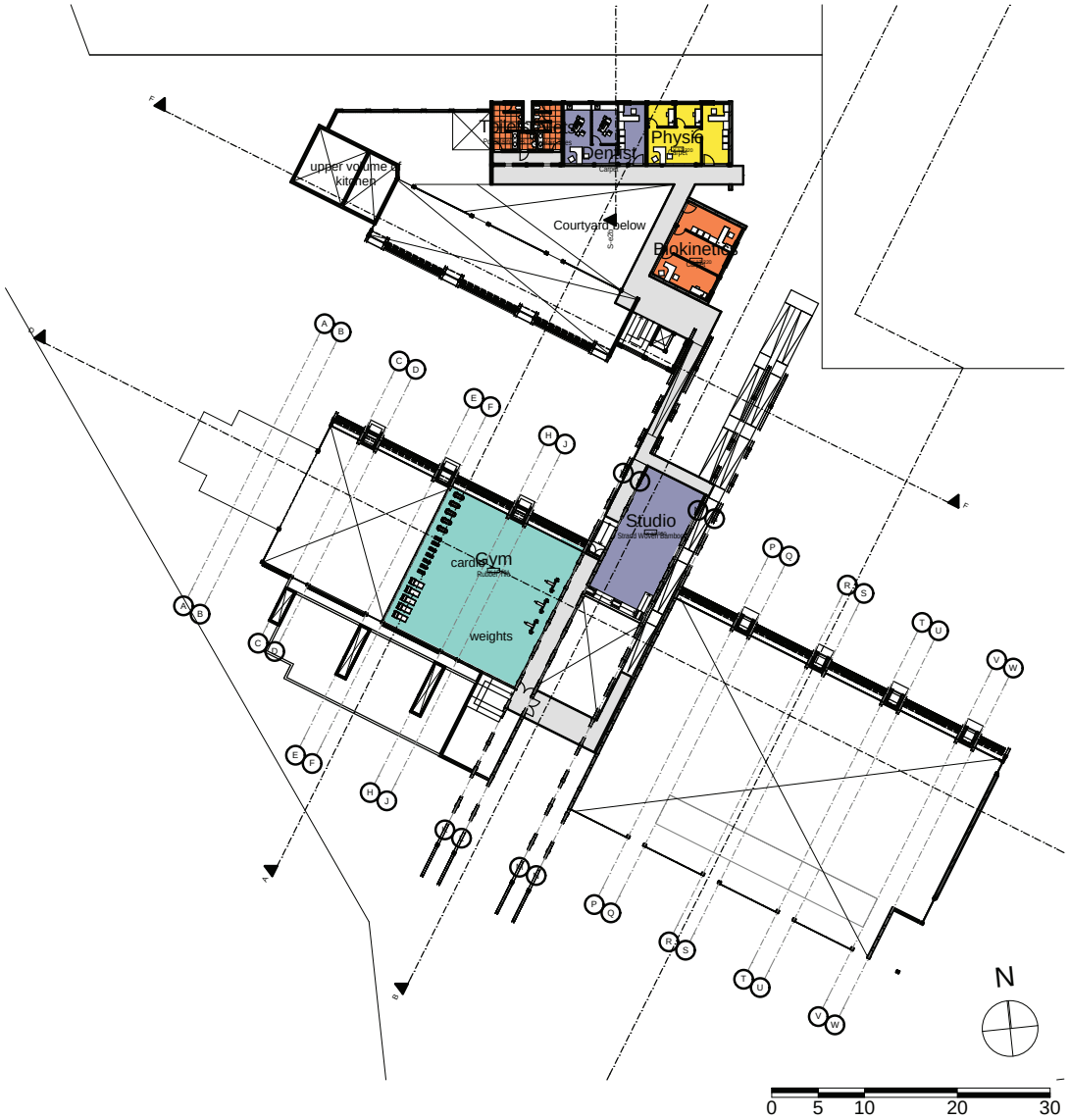


Figure 7.49 - Ground Floor Plan


upper volume of kitchen
Courtyard below
Physio
Dentist
Biokinetics
Studio
Gym
cardio
weights
N
0
5
10
20
30

Elevations

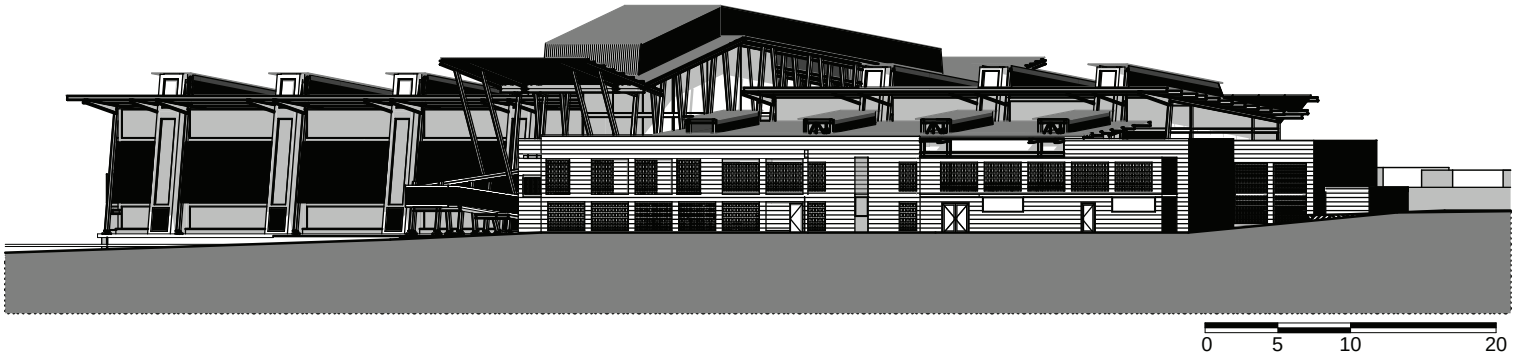


Figure 7.51 - North Elevation

Figure 7.52 - South Elevation

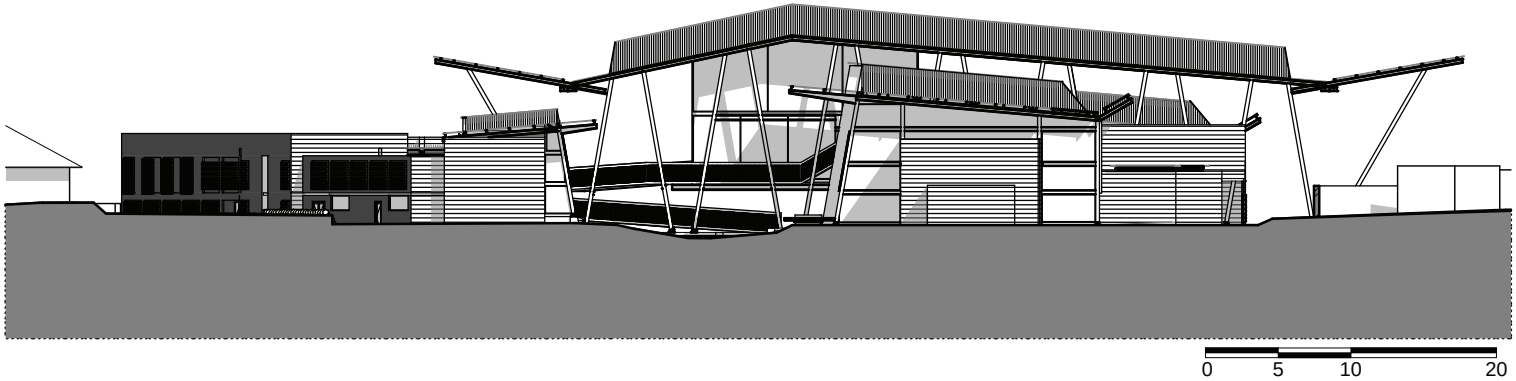


Figure 7.53 - West Elevation

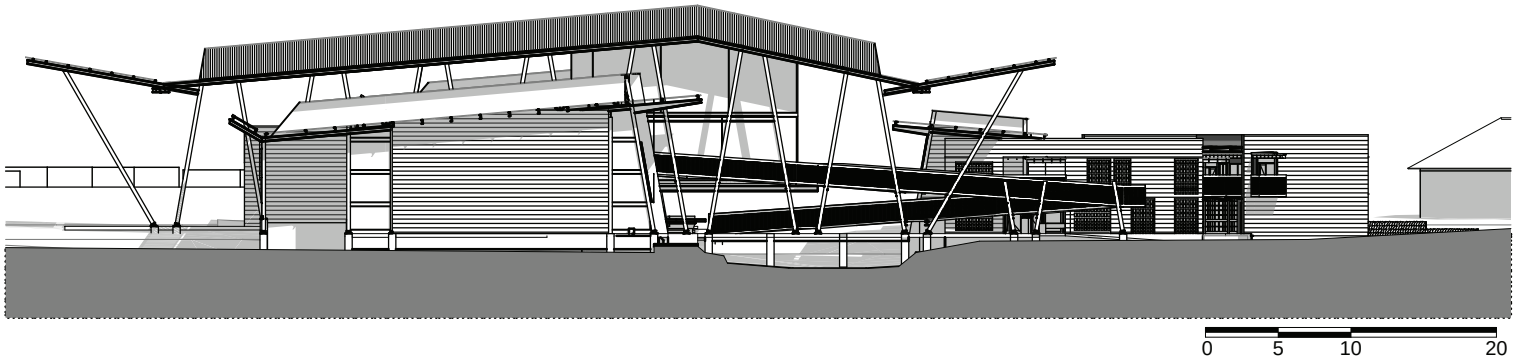


Figure 7.54 - East Elevation

Sections

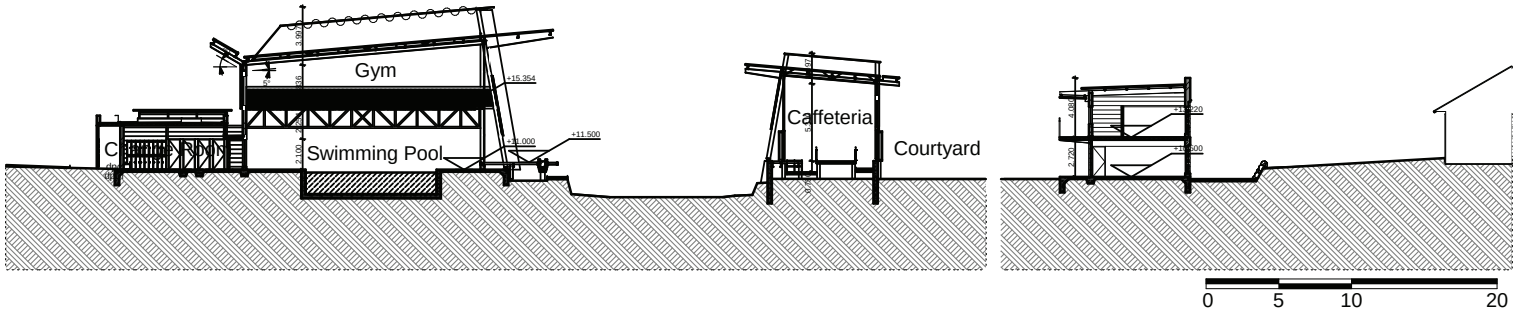


Figure 7.55 - Section A-A

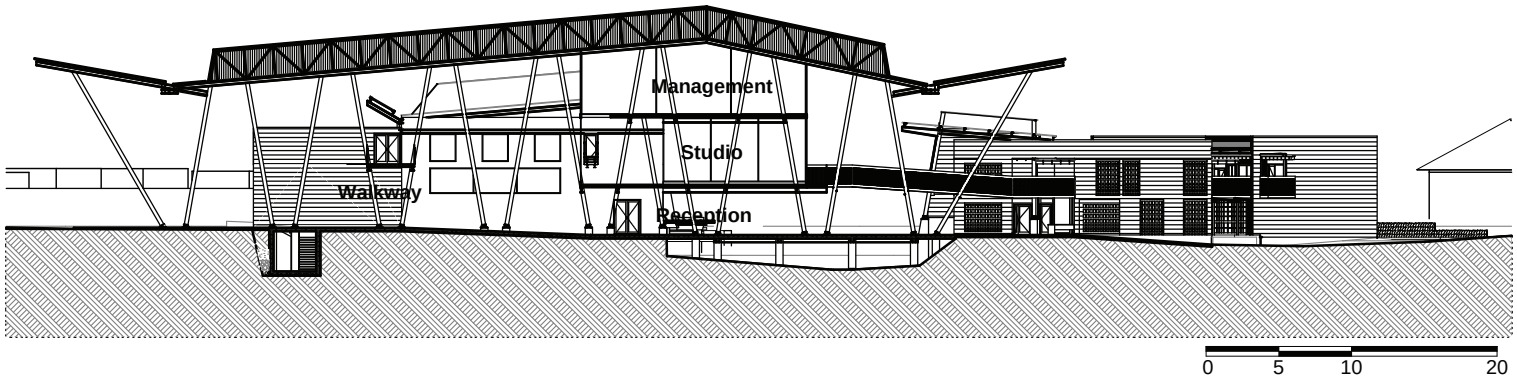


Figure 7.56 - Section B-B

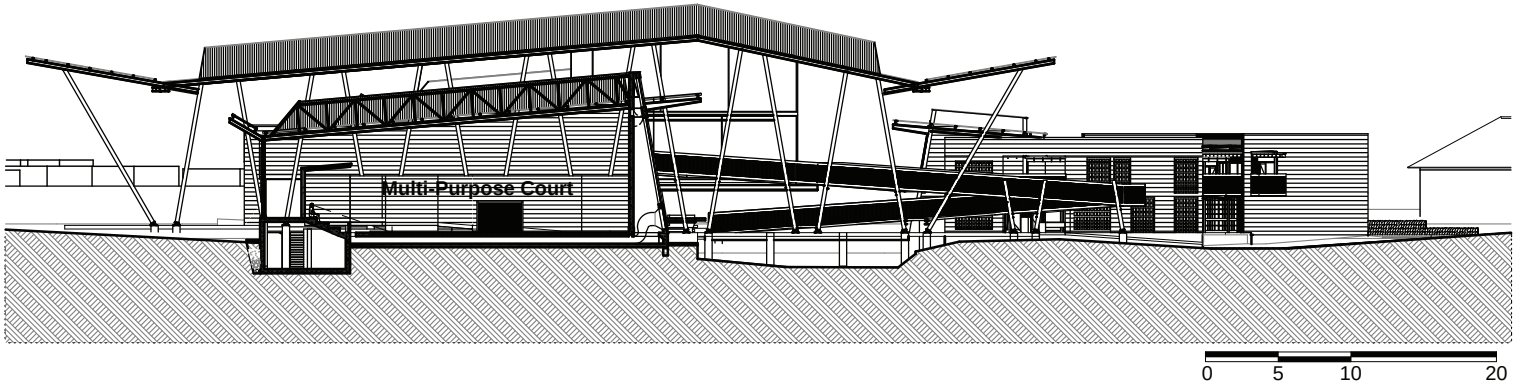


Figure 7.57 - Section C-C

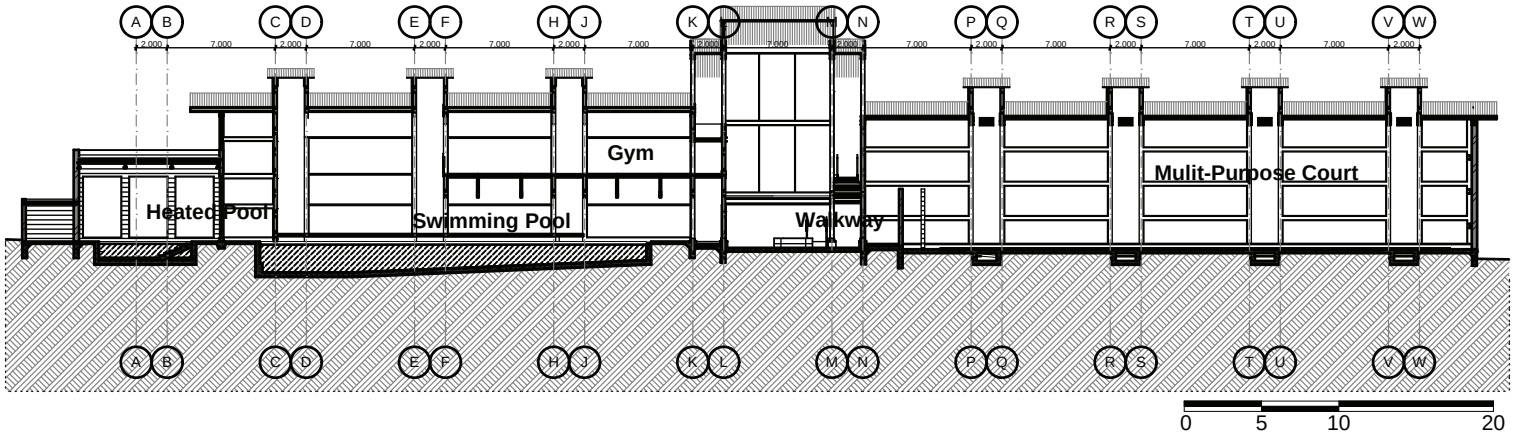


Figure 7.58 - Section D-D

Details

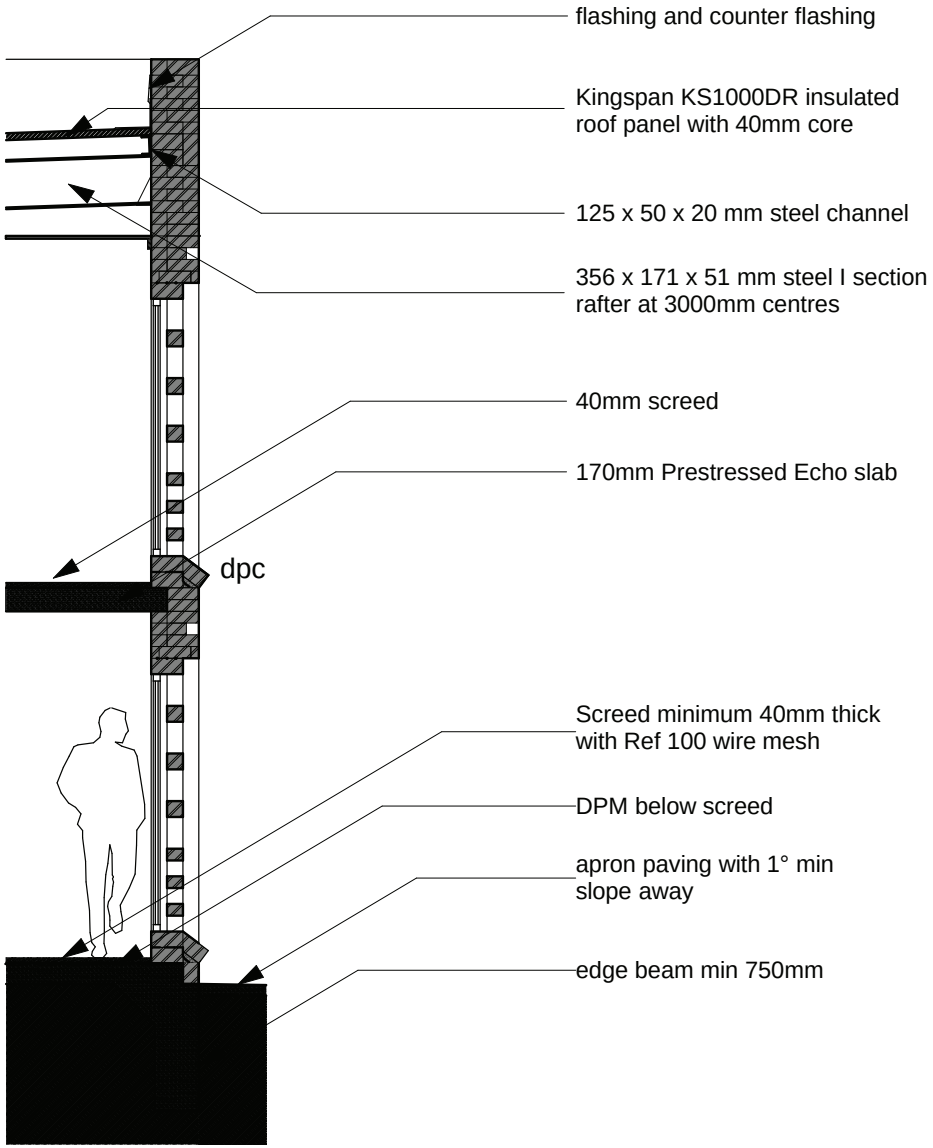
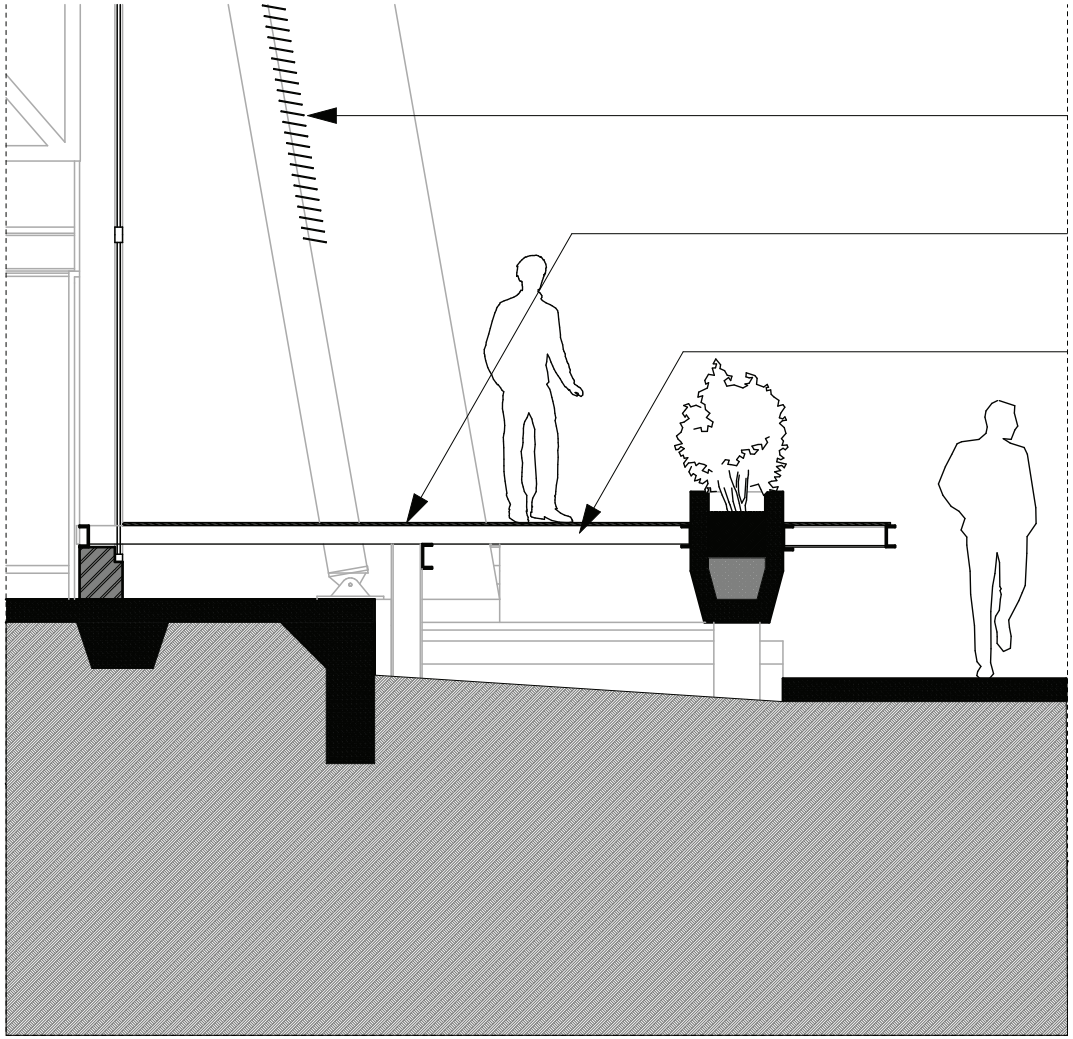


Figure 7.59- Brick Wall Detail



3600 x 150 x 0.5 mm Chromadek suncontrol louvres at 10° angle

4000 x 110 x 22 mm composite decking clipped to metal fixing clip

125 x 50 x 20 mm steel channel at 400mm centres maximum spacing

Figure 7.60- Deck Detail

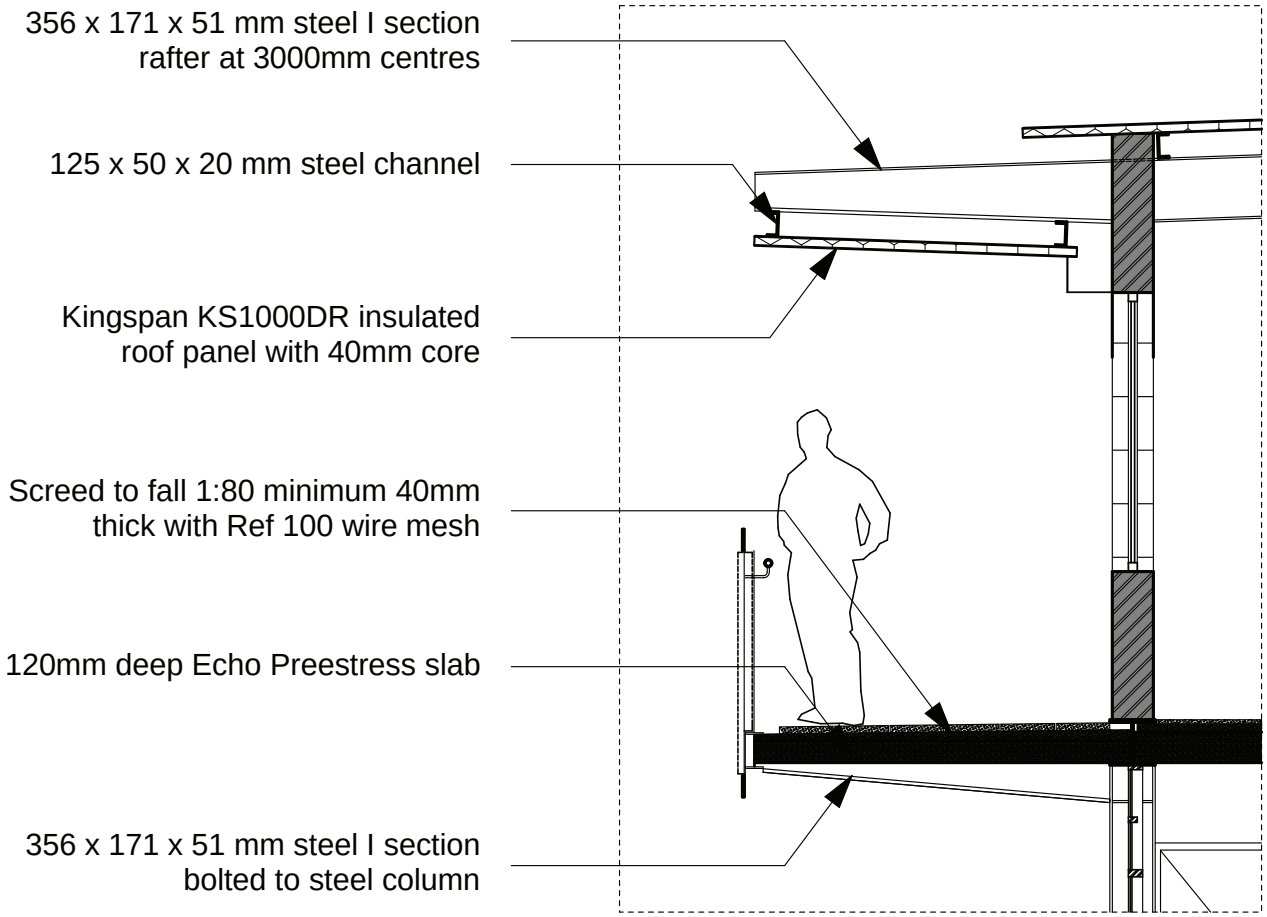


Figure 7.61- Walkway Detail

CHAPTER 8

Conclusion

"The world is reflected in the body, and the body is projected onto the world. We remember through our bodies as much as through our nervous system and brain. (Pallasmaa 2005: 45)"

The above quote summarises what this dissertation aims to achieve. Promoting a healthy lifestyle through physical activity and healthy eating leads to a healthy body. It is hoped that caring for ones own body would reflect in the treatment of nature as well.

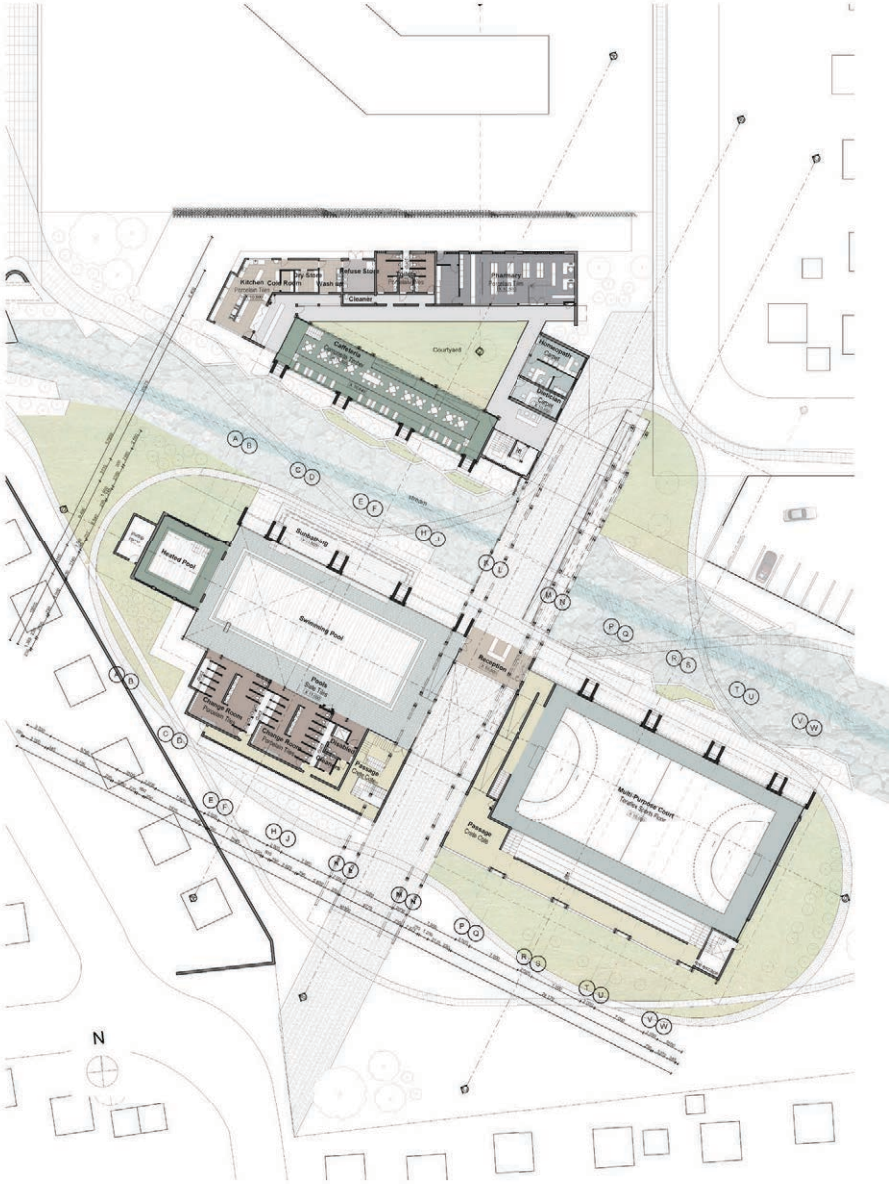
The lessons learnt from the theory and precedent studies were interpreted and adapted to suit the context and programme. However, not all the guidelines could be implemented successfully. Working with a water body running through the site poses many challenges, but also has the benefit of being a strong influence in design. It allows for the building and the landscape to have a greater connection and assists in establishing a close connection to nature.

To conclude, facilities of this nature are necessary in residential areas, especially in underprivileged areas. Placing it on a site that has strong natural elements should also be a criteria in choosing the site as it adds a new dimension to indoor sport and recreation.

APPENDIX

Final Drawings

Site Plan (not to scale)

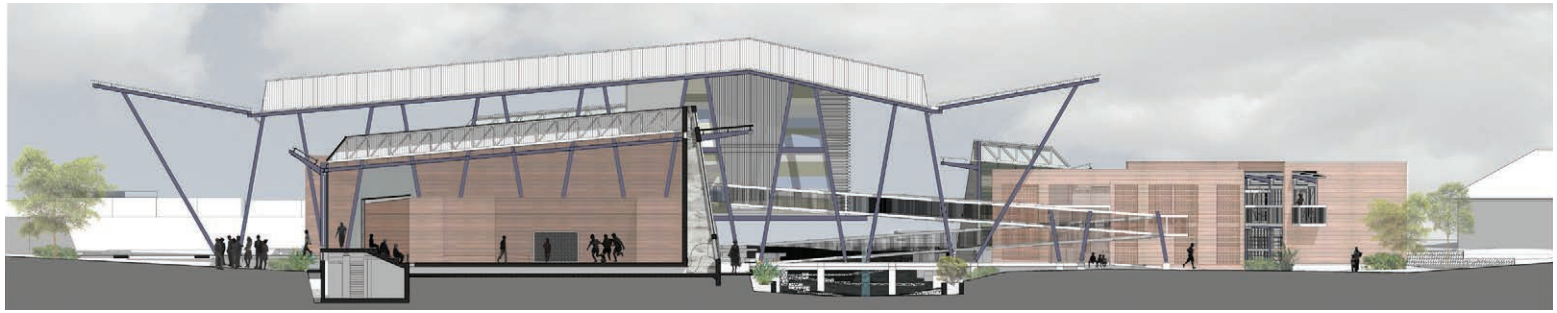


Ground Floor Plan (not to scale)

First Floor Plan (not to scale)

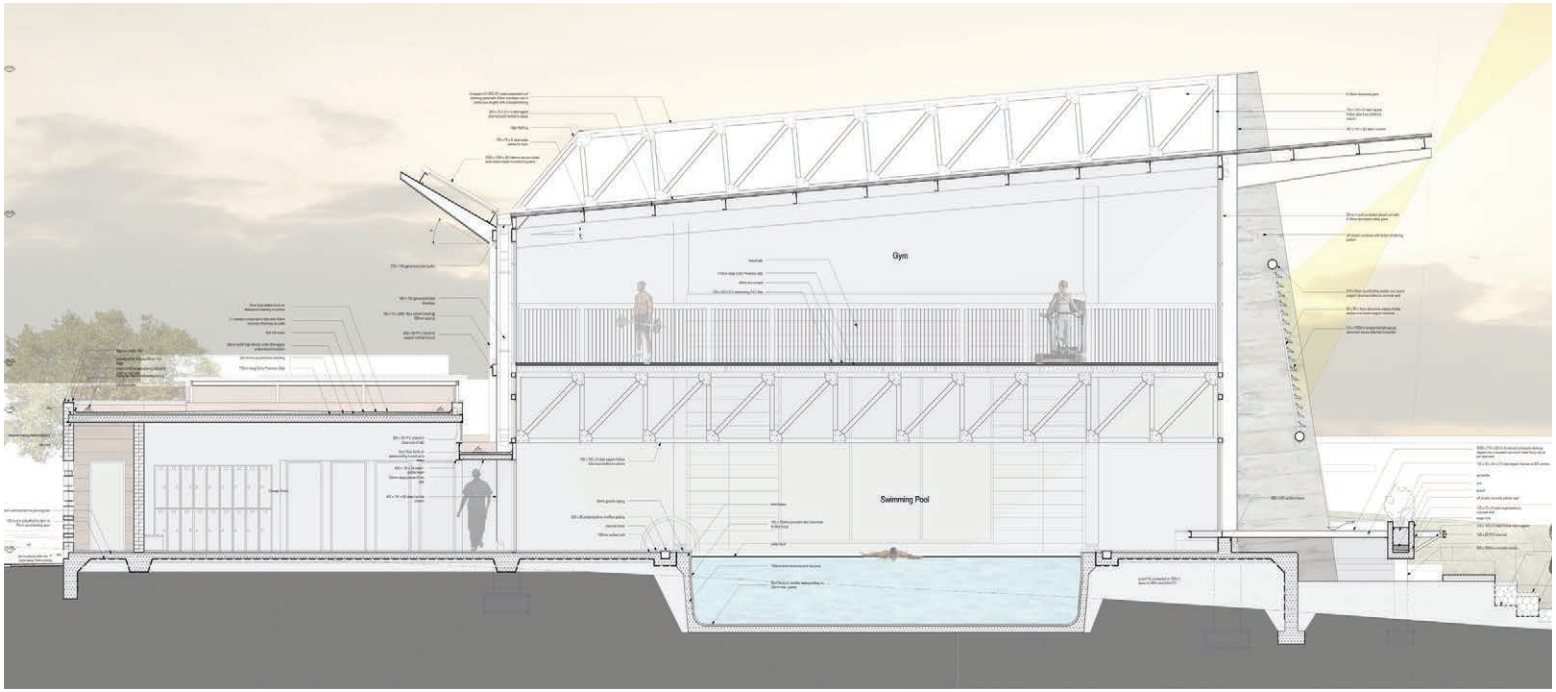
North Elevation (not to scale)

Section B-B (not to scale)

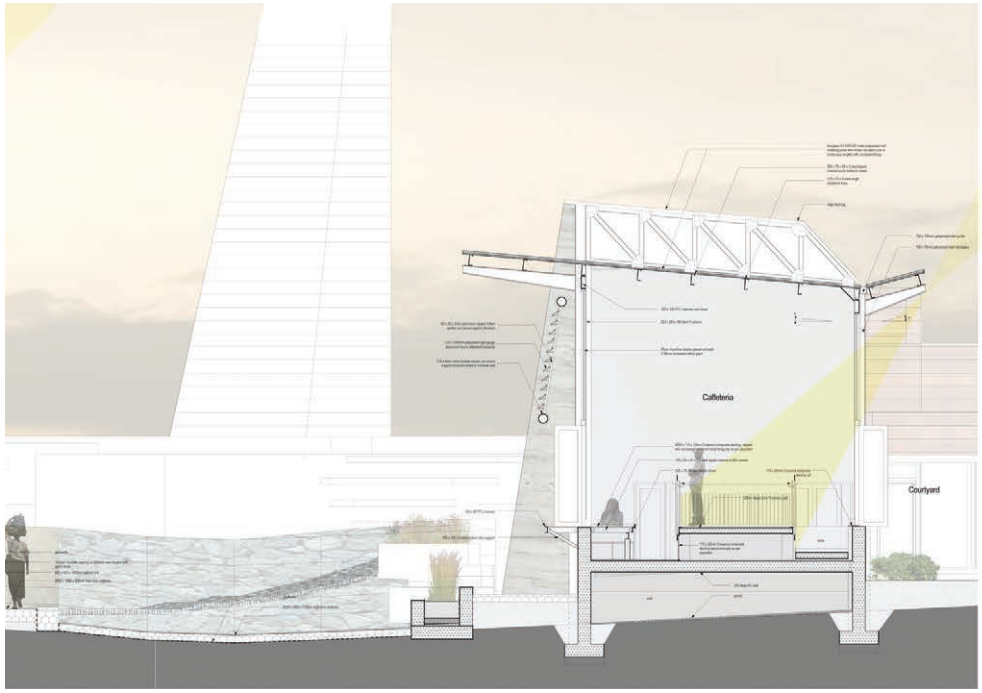


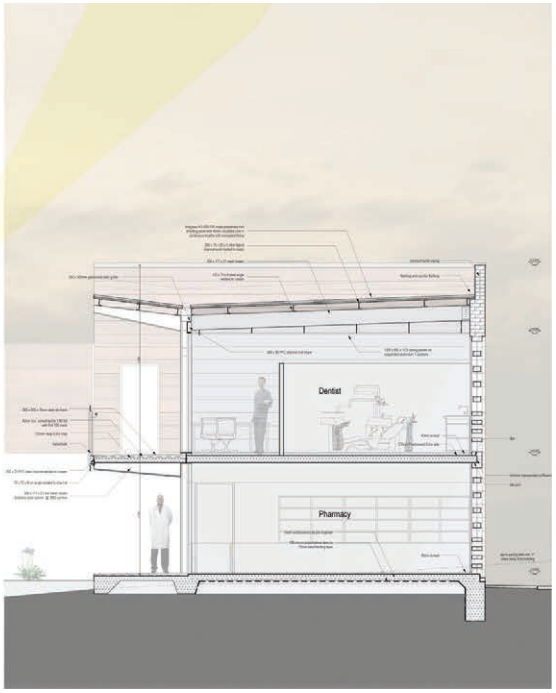
Section C-C (not to scale)

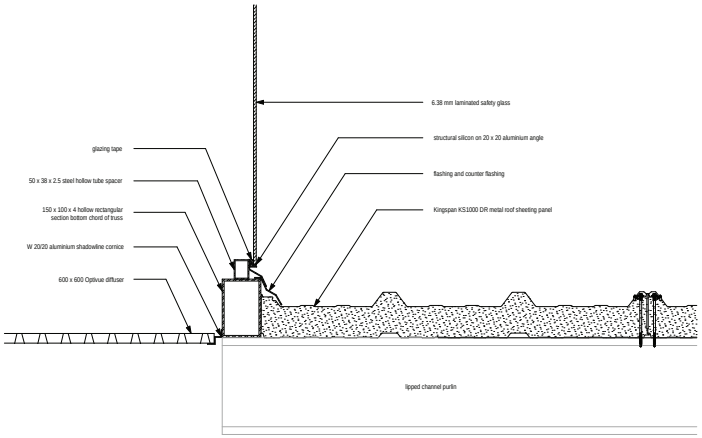
Section D-D (not to scale)



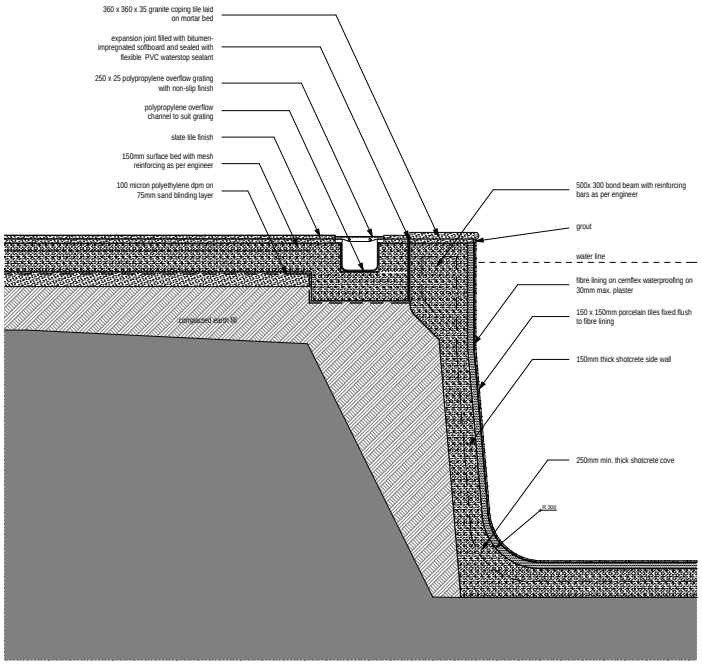
Detail Section A-A (not to scale)


Cafeteria
Courtyard

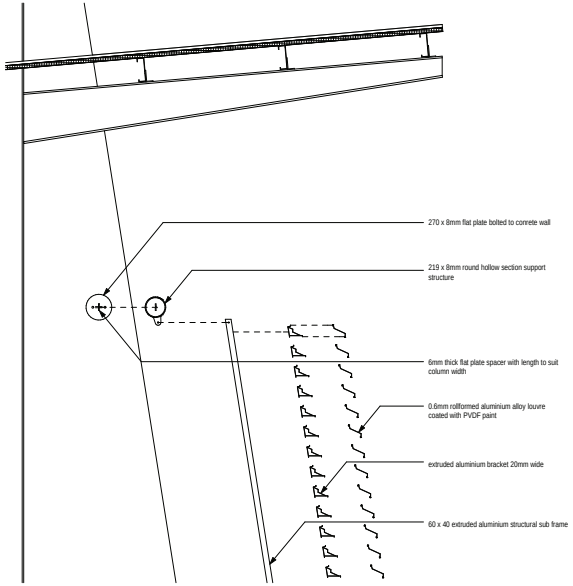

Dentist
Pharmacy

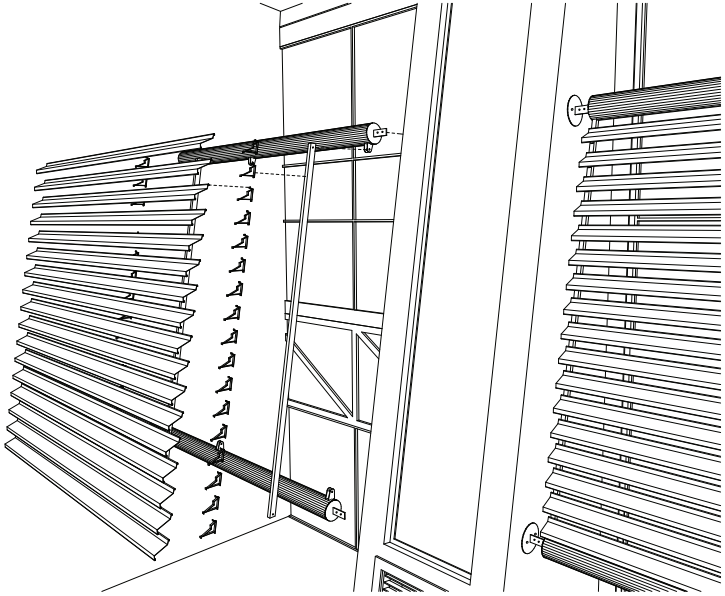


Roof Light Detail (not to scale)



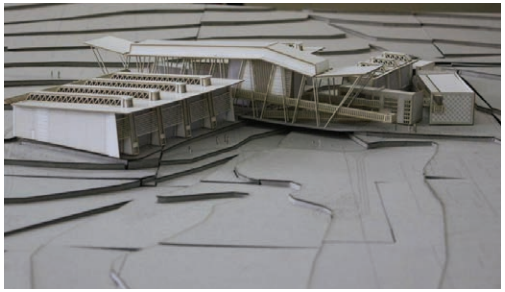
Pool Detail (not to scale)

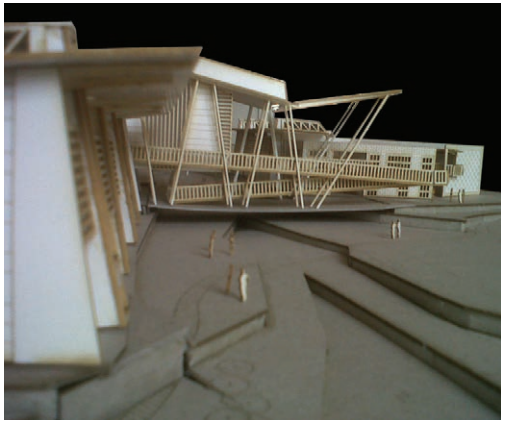


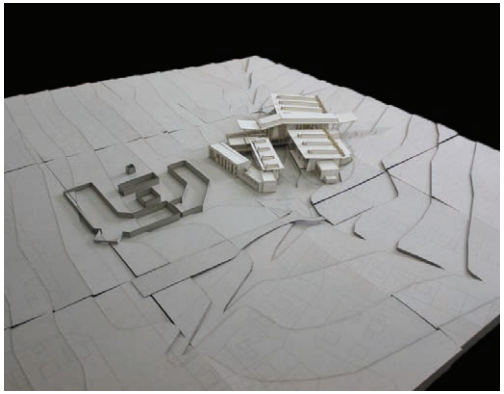


Sun Screen Detail (not to scale)

Model







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