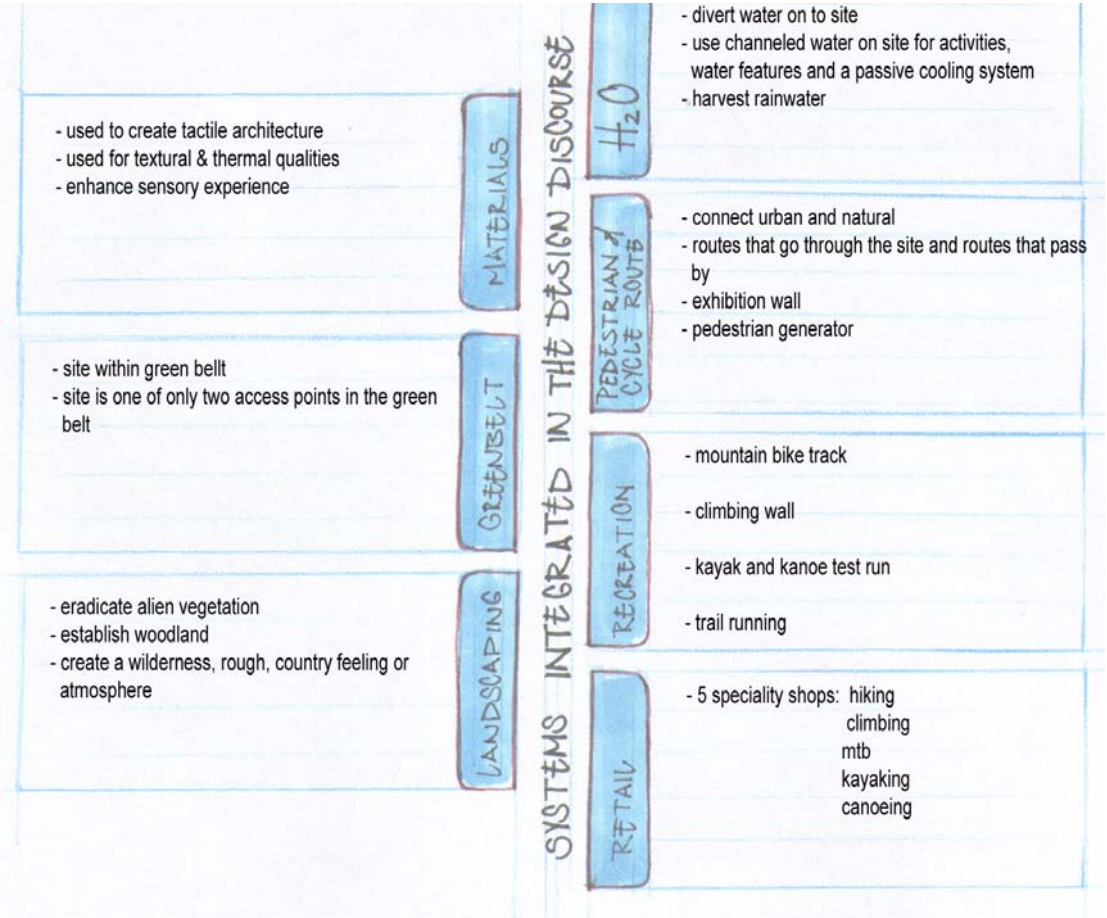
The concept of an indoor-outdoor system that intertwines and a design discourse that investigates tactility in architecture will guide the design thinking. The view that sustainable environmental design nourishes the senses will also influence the design decisions. The document should be read with this methodology in mind.

Integrated in these concepts are systems on which the design will focus:



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01.1 OCCUPANT COMFORT

All buildings modify the human environment. It is not only the characteristics of buildings as inert solids that effect their occupants. How they are designed, what they are built of, how they are built, maintained, furnished, cleaned and ventilated are significant and involve the owners, builders and users.

01.1a LIGHTING

For proven physiological reasons, people can feel ill if they work all day in artificial light. Inadequate light can cause disorders associated with depression. Yet too much light in a room requires it to be too open, unprotected. The design will incorporate a combination of daylight and artificial light to ensure that the environments are well lit. Windows will be screened to minimise daylight glare.

Required lighting:
Retail and reception area: 200 lux

Changing rooms and toilets: 150 lux
TV studios: 200 lux
Deliveries and storage: 100 lux
Workshop for bikes: 1000 lux

01.1b VENTILATION

Buildings will be designed so as to enable natural ventilation except for the showers, toilets and changing rooms where mechanical ventilation will be used, as well as the TV studios where suitable acoustics is required.
Ventilation requirements:
Changing rooms and toilets: 20 l/s per shower, wc pan or urinal
TV studios: 5 l/s per person
Deliveries and storage: 5 l/s per person
Workshop for bikes: 5 l/s/ person
Retail 5 l/s per person
Offices and reception 7,5 l/s per person

01.1c NOISE

Anything that reduces noise improves the urban environment, especially those reductions which shift the focus from mechanical to human sounds. Cyclists racing on gravel, dust roads and elevated

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wooden paths; water features; birds in the woodlands; climbers expressing themselves exuberantly and the sounds of kayakers rowing on the rapids will enhance the sensory experience of visitors and reduce the noise to human scale.

01.1d VIEWS

Buildings will be designed to enable visitors of the centre to have views on the cyclists racing through the building, climbers and kayakers, look-out points will enable pedestrians passing by to have a scope of the activities on site. Quiet, more serene places, with a view into the woodlands, will also give a place of rest and calmness to the visitors and pedestrians.

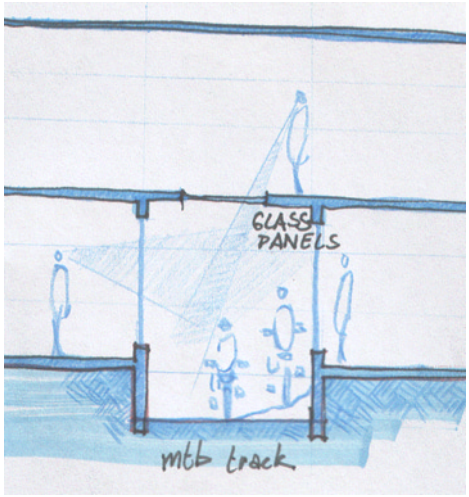
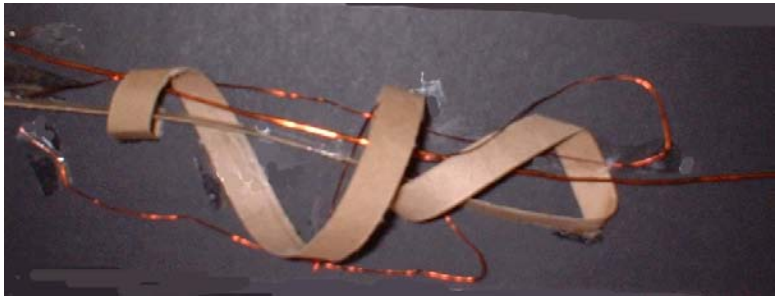


Fig. 041 Views of activities from out the building

01.1e ACCESS TO GREEN OUTSIDE

The concept of the design is that of an indoor/outdoor connection, where visitors will be confronted with the outdoors while shopping. The indoors and outdoors will be intertwined.



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01.2 INCLUSIVE ENVIRONMENTS

01.2a PUBLIC TRANSPORT

The Pretoria Station is within 800m from the site and a proposed tourist and public bus stop is just across the street from the site. New pedestrian and cycle routes will be incorporated in the design and connected with the existing inner city routes. There will be pedestrian routes that linger through the site as well as pedestrian routes for passing by.

01.2b ROUTES

Routes will be designed to be a civic investment, places of rejuvenation, places for people. This can be achieved if they are of appropriate materials, colours and textures [under foot as well as on the wall], small in scale, varied as one passes along and never quite straight, also easily accessible for disabled people. The routes from the city will split into 3 levels where these routes meet the site boundary:

A route to the surrounding neighbourhood
A route to the Fountains Valley green belt
A route through the site

01.2c CHANGES IN LEVEL

In order to enhance the sensory experience of the visitors, they will be faced with bursting activity, sound and views. One of the ways to achieve this is by sudden changes in level inside and around the building. These changes in level, however, will be designed to be apparent and accessible for the disabled.

01.2d TOILETS

The design enables the centre to have a central changing room, toilets and showers, with separate toilets for the employees. Public toilets will be provided at the tourist and public bus stop across the street.

Fig. 043 Pedestrian routes through the site

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01.3 ACCESS TO FACILITIES

Visitors and employees will have access to banking and other retail facilities at Berea Retail Park that is adjacent to the site. Communication facilities [postal, telephone and e-mail facilities] will be available in the reception building.

01.4 PARTICIPATION AND CONTROL

The social spaces in the building must be life enhancing and -supporting. It must be places, like a widening in a corridor with a window seat, that induce casual social meetings, and places, like stairs, that stifle such interplay. Social spaces will be invitingly textured and well lit to welcome social interaction; it must offer interest, activity, durability and views. Pedestrian routes that linger through the site will have seating, lookout points and more serene spaces. A restaurant, next to the reception building, will be situated where public and private meet, over looking the Apies.

"If we look at the world around us, the places which are most rich in life are meeting places. In nature, life is the most vigorous where the elements meet - we are drawn to these places." [Day, 1990].

The design system will enable users to open and close windows in order to control their environment. Offices and retail spaces are designed to allow for rearrangement, especially of retail displays.

The concept that site activity and building activity must intertwine enables the visitor to participate in the outside activity through sound or by views. At the touch screen interactive stations visitors will be able to search the web and to find out about the architecture of this centre.

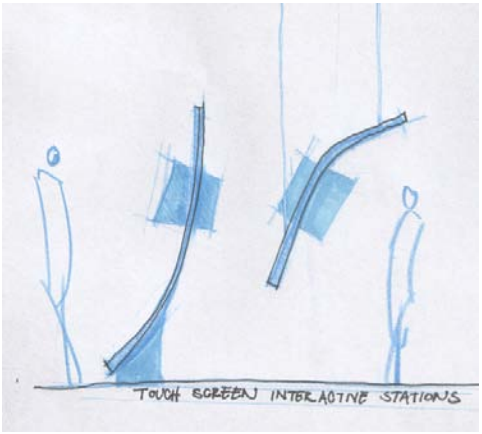

Fig. 044 Concept sketch of touch screen interactive stations

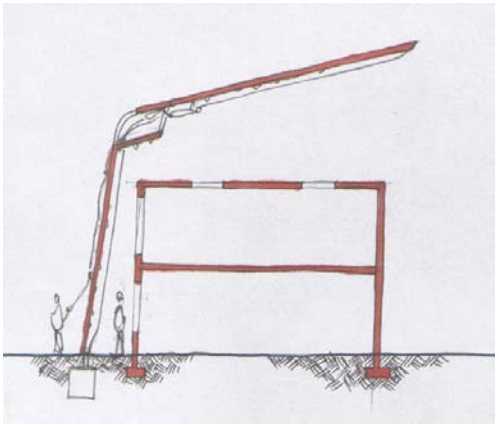

Fig. 045 Concept section through the climbing centre

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The exhibition space [which will exhibit information on the history of sport in Pretoria and on adventure sport in general] are extended to the outdoors space where it will take on the form of an exhibition wall along the pedestrian route.

This centre will also play an active role in the development of outdoor sports in the local community by organising workshops and group events, leadership and teambuilding programs as well as youth programs. [Refer to brief document]

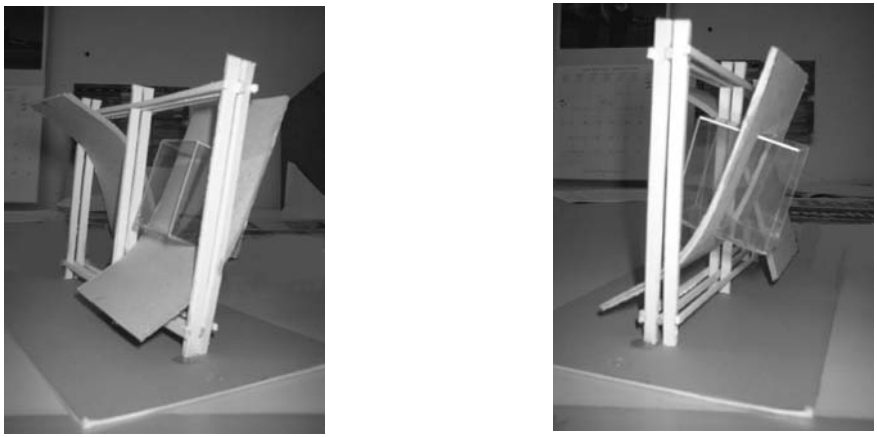

Fig. 046 Concept of exhibition wall panels

01.5 EDUCATION, HEALTH AND SAFETY

Day and night activities on site will assist in the safety and security of the centre. Due to the fact that the buildings are fragmented, to enclose public space, each building will have its own security system The pedestrian route that moves through the site will be closed off at night, leaving the route that passes by open for pedestrians, to ensure the security of the buildings on site. All spaces between buildings will be well lit, using solar power generated street lights. All outdoor activities will have safety precautions and these areas of activity will also be well lit by solar generated lights.

Training in an Outdoor Adventure Guide courses [from institutions like ETA and Reebok] will be held monthly for employees as well as the local community, using the centre's facilities.

01.6 CULTURAL DIFFERENTIATION

Although outdoor adventure related activities are mostly considered to be a westernised sport, this centre will give ample opportunity to expose a large part of our society to this sport and to the concept of an active lifestyle.

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02.1 LOCAL ECONOMY

Due to our topographical location and climatic conditions, there are a magnitude specialists to assist in the construction of an outdoor adventure centre. Local specialists on kayaking, canoeing, mountain biking and climbing are highly trained and are of the best in the world. Because the outdoor adventure society is relatively small and elite, the opportunity to have the latest and best equipment and training is readily available. Materials to construct these activities are also locally available. Local specialists also give the opportunity for easy and regular repair and maintenance.

02.2 EFFICIENCY OF USE

Because of the functions of this building and the fact that this centre incorporates public spaces, working and activity spaces will be occupied frequently.

The usage of space in retail buildings are normally very high due to the fact that floor space equals money, thus every possible floor space will be used for the display of stock.

The retail industry is dependent on a number of socio-economic factors like the aging of the population, retirement rates; mail, phone and online sales; concern for health and fitness and an increase in the multicultural society. These factors force the retail industry to have a space management system that will alter seasonally.

02.3 ADAPTABILITY AND FLEXIBILTY

The retail and display needs of an outdoor centre are quite specific. To make the display and retail space as adaptable and flexible as possible the minimum floor to floor height will be 3m. This will also allow for

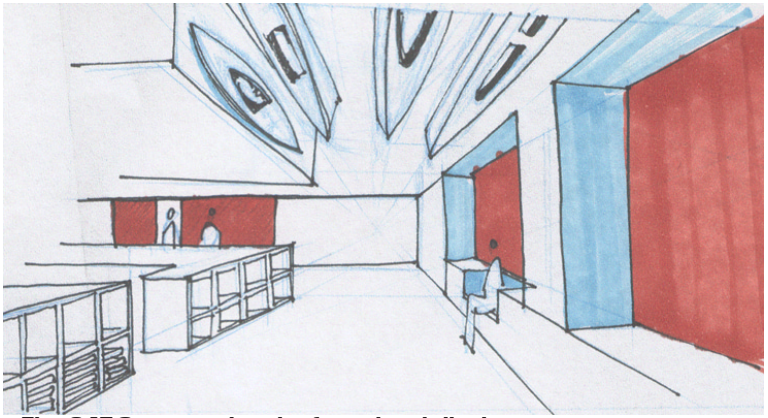

Fig. 047 **Concept sketch of overhead display space**

the overhead display of larger recreational equipment.
Due to the fact that this type of building requires specific design needs, like for instance a climbing wall, the challenge will be to design this building adaptable and flexible for future other usages.

02.4 CAPITAL COSTS

02.4a CONSTRUCTION AND BUILD-ABILITY
The design approach of creating a tactile and multi sensory space and the construction of an outdoor centre with specific needs will lead to high capital costs. This can be argued by the fact that a tactile, multi-sensory building with circulation of people, colours, spatial aesthetics and inspiring construction detailing, gives more to society than a cheaply built building that only fulfils its function.

To create such architecture one needs to challenge the "commodification and standardisation of building production" [Day, 1990] and find a way of building construction that "finds its expression in the physical and material attributes of construction, enhancing the body's experience of space and incorporating sophisticated and sustainable technologies". [Day, 1990]

This can be done by using materials as much for their senate qualities as for economy and utility. Like using raw materials, the juxtaposition of rough and smooth, heavy and light and using prefabricated elements in a creative way.
The fragmentation of the buildings on site allows for the phasing of construction. Finished buildings can start operating and generating money, whilst the rest of the buildings will be under construction.

Another aspect which standardisation in construction ignores is the fact that humans experience dimension anthropometrically. "Our main concern is how many body heights something is, how much above the eye level or how many paces away. Small measurements in relation to eye level are critical to views and privacy and a few centimetres in the height of a wall profoundly alters our spatial experience". [Day, 1990]
This type of "sensitive" construction can be achieved if the design process can be continued right through the construction phase. This though depends on hands-on construction. Although the mechanical construction system will still be used in the construction of the buildings, hand construction will come into play where sufficient flexibility in the construction is needed. This type of construction not only gives textural scale, but also suits our socio-economic situation where intensive labour is needed to create work opportunities and to learn new skills. Builders have the opportunities to become artistically involved in their work. Such buildings have a distinct soul even before they are occupied. The spirit of the place can develop because of, and not in spite of, the buildings.

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03.1 GREEN BELT

Due to the locality of the site, the design will become the link between urban pedestrian and cycle routes and the natural mountain bike routes,as well serving as an activity generator for the rest of the Nelson Mandela corridor development. The green space just south of the site was identified as the only access point into the historical greenbelt of the Fountains Valley and the rest of the Groenkloof Nature reserve, other than the access point at the Fountains Valley Resort. This green belt with its cultural resources like the indigenous vegetation, archaeological sites and the remains of the first pioneer dwelling in the Pretoria area is a major focal point.

03.2 WATER

The design supports the idea of reinstating the Apies River to its original form of an active river that runs through the city. Water will be channelled from the river into the site's own water channel that will be used and re-used as kayak and canoe test runs as well as landscape features on site. Rainwater will also be harvested [on site and from the roofs], stored and used for irrigation and for the "rain room" of the climbing & outdoor speciality shop. Wheathertight gear will be tested in this room.

Grey water will also be recycled for the same reasons as above and will service wc and urinal flushing. Landscape surfaces will as far as possible be designed to be absorbent to minimise rainwater runoff and water efficient devices will be specified.

Water usage per day [estimated]:
Visitors/day [users & public]: 150 people
Female: 150 x 45% = 67.5
[3 x 6l(flush) + 3 x 1.36l(wash hands) x 67.5= 1485l

Male: 82 [55% of 150]
[3 x 6l(flush) + 3 x 1.36l(wash hands) x 82= 1804l
Total: 3289l water = 3.2m³

03.3 ENERGY

The design will not only encourage and enable walking and cycling in the urban surroundings, but also create an awareness of the importance of an active lifestyle for the people living in the precinct. The site is situated in close proximity of the Pretoria station and it is also situated within a green belt that will be developed as an active spine through the city.

The aim of the design is that the building climate systems should be simple but effective, maintaining a comfortable working environment; showing that by using a "best practice" design approach the end product will be sustainable. The buildings should merge with their environment by analysing the possibilities on site for passive designs. By modifying the indoor climate in using optimum solar orientation and by using relevant planning and form, one can achieve this. In the Pretoria climatic zone typical plans should include "buildings arranged around courtyards with small openings on outer walls and large openings in the courtyard". [Holm, 1996]

"Passive solar design means achieving indoor comfort by designing with nature, using wind, sunshine and night cooling together with the building materials. Energy flows naturally while the building responds passively, needing a minimum of imported energy." [Holm, 1996]

The design approach will concentrate on 3 systems:
Solar control
Thermal massing
Natural ventilation

03.3a SOLAR CONTROL
In order to use solar energy to a maximum the building orientation, on site, must be analysed and utilised. In the proposed design the site is elongated in a north-south direction, leaving the building's most exposed facades on the east-west sides of the building. These facades will be screened from summer sun, but will use the winter sun to generate heat. External solar control devices will be used instead of internal solar control devices as they cause a green house effect between the glazing and the interior sun control devices. These solar control devices will be designed according to the sun angles. They will be just wide enough to screen summer sunrays, but still let the winter rays through.
Shading devices should have low thermal capacity so that they cool down rapidly at night. Shading devices placed at window head level will render the top portion of the window, an energy loser in winter because it is shaded during the period of maximum sunshine. A better strategy will be to place the shading device outside the maximum winter noon angle. [Holm, 1996]

The pedestrian and cycle routes will be protected from solar rays by tree canopies. Building facades that line/embrace hard or dark surfaces will be tree lined to protect them from high solar radiation during summer. Due to the fact that the south elevation of a building in Pretoria receives more radiation during a typical summer day than the north elevation, deciduous trees will line and protect these southern facades.

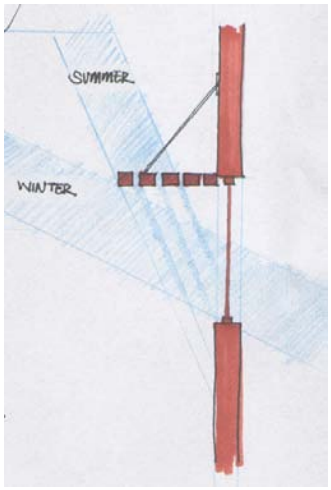

Fig. 048 Solar control devices

03.3b THERMAL SYSTEM

In this climatic region the design will utilise the combined effect of thermal massing and night ventilation to enlarge the comfort zone in a building. Roofs, walls and floors should have large thermal capacity [mass], for example materials like brick and concrete, to utilise the large daily temperature variation, this implies that massing will be considered with night cooling and solar heating. Internal heat gain, derived from lighting, appliances and heat given off by humans, will be countered by directing lighting systems towards the ceiling, making use of reflected light in the interior space. Insulation placed on the interior face of walls, ceilings and floors destroys the mass effect and will be avoided.

It is important to realise that solar radiation is not influenced by ventilation. Objects absorb radiation; the object's temperature rises and emits radiation and warms the adjacent air. Another way in which intense radiation can be countered is the water channel - that runs through the site and the kayak and canoe building - which will absorb radiation due to the fact that water's absorption ability is higher than concrete and bricks. On winter nights the emitted radiation will heat the air, but on summer nights the air will be cooled by ventilation.

03.3c VENTILATION

The main function of ventilation will be to cool warm air and to provide the building with sufficient fresh air. Night ventilation will be used to cool off the structure in summer times.

The buildings in proximity of the Apies River will automatically have a cooler microclimate that will

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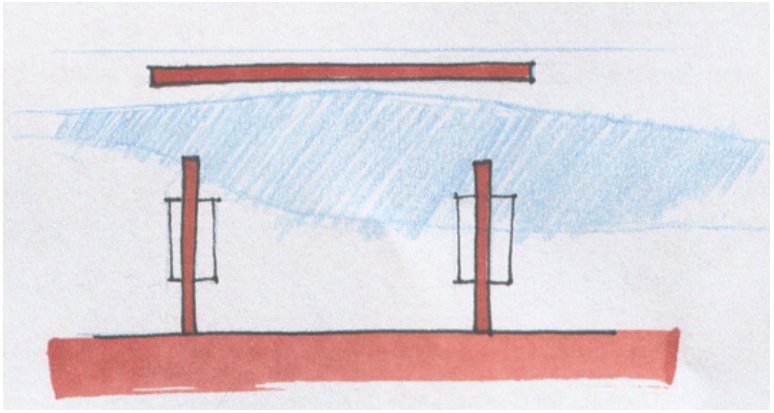

Fig. 049 Concept of ventilation

help cool the structure at night.

03.3d RENEWABLE ENERGY

All street lights for the pedestrian and cycle routes will be powered by solar generated energy, as well as the spot lights for the climbing wall and the other outdoor activities.

Calculation:

0.5m² of photovoltaic panel = 85W

" 1m² = 170W

Commercially available streets lights:

www.thru.to/architecture

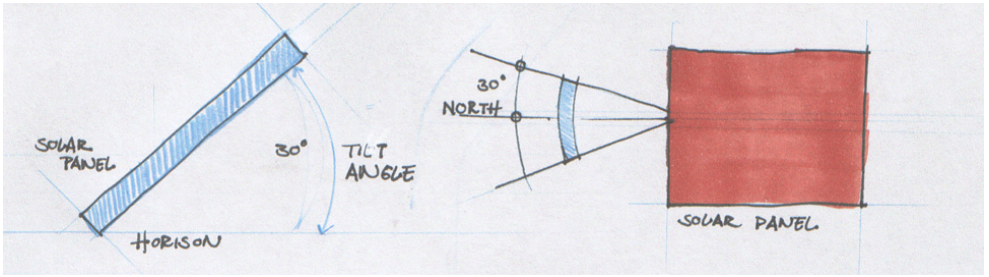

Fig. 050 Positioning of photovoltaic panels

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03.3e NATURAL LIGHT

Natural daylight creates a better environment to work in than artificial light; it is life enhancing. It will be used to create gentle, rhythmic light that will change colours and direction throughout the day.

To design several smaller windows instead of one large one is better, not only from an energy saving point of view, for the same heat loss there is a better distribution of light, avoiding quantative extremes, but also for quality.

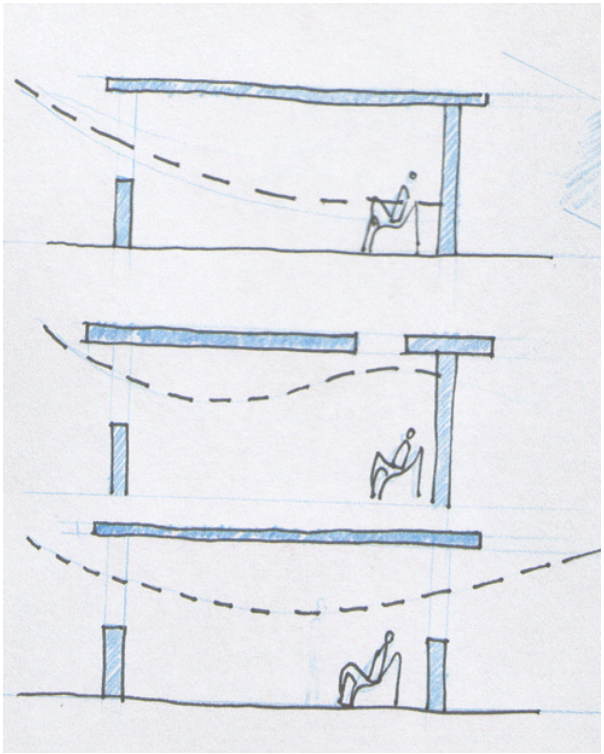

Fig. 051 Alternating lighting levels

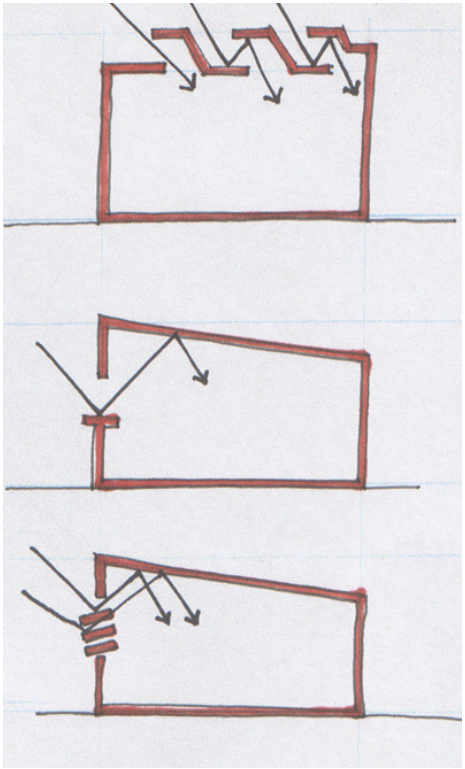

Fig. 052 Alternative means of light entry

03.4 RECYCLE AND REUSE

Inorganic waste will be sorted into paper, glass, cans, plastic and other waste. Arrangements will be made with companies like Environink that collects empty printer cartridges to recycle. Construction waste will be used to construct the mountain bike track and other "outdoor" landscape elements.

03.5 SITE

The proposed design will be constructed on a Brownfield site and the footprint of the development is smaller than the previous development, giving opportunity to rehabilitate the natural ecosystems. Trees will be planted on the areas of site not developed.
The proposed design will be developed on an open space with only a neighbouring building on the west side of the site. This building will not be affected by the development. All excavated ground will be used on site as ground fill.

03.6 VEGETATION

The site is located in the transition zone of the Rocky Highveld Grassland biome and the Savannah biome. Existing alien vegetation will be eradicated and replaced with indigenous vegetation from these biomes. Vegetation will be used to create a wilderness or rough country feeling on site, for example a strip of Red Autumn grass will run along the exhibition wall. Woodland will be established on the northern end of the site, near the bike retail shop, wherein elevated wooden tracks, built on gum poles, will be built for the mountain bikers. All the areas that will not be developed on site will be planted with indigenous trees. This will also create habitats for other animal species. Vegetation will be used to bring life, softness and seasonal rhythm into the urban surroundings. The seasonal growth of vegetation can make a striking difference in the apparent scale of things.

Fig. 053 Elevated wooden mountain bike tracks

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Fig. 054 **Seasonal changes in vegetation alters the apparent scale of things**

Vegetation that will be used in the design:
Rocky Highveld Grassland Biome:
Grasses:
Giant Speargrass
Broadleaf bluestem
Red Autumgrass
Andropagan Schirensis
Panicum natalense
Digitaria monodactyla
Trees:
Karee
Common Hook Thorn
White Pear
Mountain Karee
White Stinkwood

Savannah biome:
Grass:
Wool grass
Trees:
Red Bushwillow
Marula

03.6a LANDSCAPE INPUTS
Vegetation will be indigenous with low water requirements. Landscape design will consider ways of maximising apparent dangers and reducing real ones.

Fig. 055 Maximising apparent danger

The design will also consider ways in which sunlight, at different times of the day and year, creates significantly different moods, landscaping which makes visible the progression of seasons. These rhythmic changes will play over a durable topography.

03.7 MATERIALS AND COMPONENTS

Materials will be used extensively in creating a tactile, multi-sensory environment. Raw materials will be used instead of synthetic materials.

Even though synthetic materials will be the cheapest, most convenient to use, they can be very harmful for your health. In fires many, especially plastics, give off poisonous gases.

As Day [1990] says, "buildings are the third human skin. The skin performs many functions: it breathes, absorbs, evaporates and regulates as well as encloses and protects. A building, which through its fabric, is in a constant state of moderated exchange between inside and outside, feels, and is, a healthy place. A sealed-fabric building is full of dead air. Materials that create this healthy environment will be used".
The texture of materials is also important. Most of us don't go around deliberately touching buildings, yet without thinking about it we touch them all the time. Texture, which we walk on or feel with our hands and eyes, makes all the difference between places which are approachable and which are not.

Low embodied energy materials will be used in the design - concrete, wood, clay tiles and bricks. Research shows that concrete and brick's pollution/kg is minimal and have long life cycles. Of all the components concrete consists of, gravel is the largest part and water is only an eighth of the components. Gravel is the only component that can be recycled, of which only 20% can be recycled.

004 SUMMARY

It is important to realise that all of the above mentioned aspects would fall into a hierarchy, where more valued aspects will be of a higher priority. This does not necessarily mean that the other aspects will be ignored; they will merely be of a lower priority.
Aspects that sustain the concept of tactility and the idea of an intertwined indoor/outdoor system will be generally viewed as a higher priority than the other aspects. Environmental aspects like rainwater harvesting, solar control, thermal massing and ventilation will also take a high priority in the design.