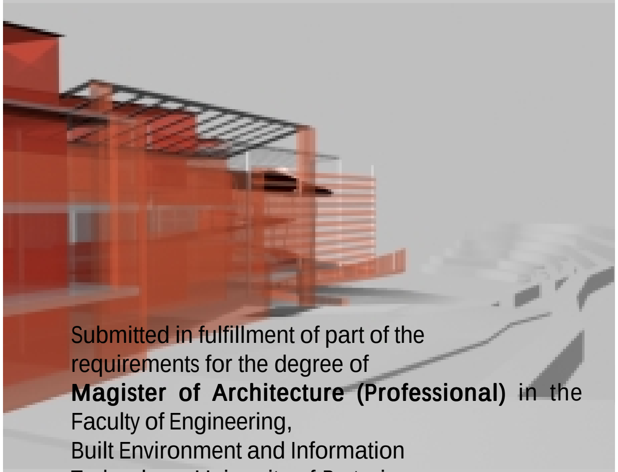
berea park learner's resource centre

by cornus strydom



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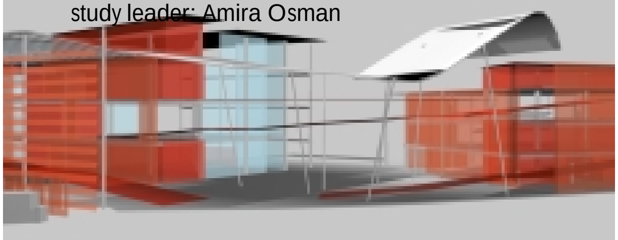

ABSTRACT

The designed building is a proposed **Learner's Resource Centre** situated in Berea Park. The development will be funded by the European Union and managed by a section 21 company of tertiary institutions and government departments. It creates a **community facility** that is needed in the Pretoria inner city, addressing lack of study space and **urban parks** in the CBD. The main building includes a **digital library, offices, auditorium, conferencing facilities** and a **restaurant**. This building forms the focus of the investigation, while the rest of the campus development forms part of an **Urban Design** scheme proposed for the Pretoria inner city. The functions included on the campus are overnight facilities, workshops, classrooms and a multi purpose hall. The thesis is introduced by an investigation into the theory of the **meaning in architecture**. This includes research in the fields of **semiotics** and **visual culture** and the conclusion of that theory into a designed building.

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This study will investigate the contemporary responsibility of an architect.

Architecture has always been seen as something static, but there is a need for a change. As in art the experience of diversity in a city makes more knowledgeable human beings.

Visual Culture is a relatively new discipline.

This is a visual event in which information, meaning and pleasure is sought by the consumer by means of visual technology. A building in itself will become a tool for visual technology: creating definite emotions in the user, orientating the user and informing the user.

Two important philosophies influence the study of visual culture and architecture: structuralism (through the discipline of semiology) and post-structuralism (through the introduction of time and difference).Through Semiology (science of signs) the full semantic potential of architecture is realised. Meaning of architecture is not fixed, but must be read inter- textually. This means a global architectural culture and information is possible, but the conditions are still local.

"The translatability of words into images and images into words, engenders an all consuming mediascape" Bernard Tschumi (Taylor, 1997: 256).

Through the investigation of the topic, the aim is to rediscover architecture. Meaning, re-addressing the visual aspect of architecture and urban design.As a result, architecture becomes more accessible and not so far removed.

Visual culture

This is visual events in which information, meaning and technology, and this includes any form of apparatus to be looked at or to enhance natural vision from an oil painting to television, internet and architecture(?) (The Visual Culture Reader, 1998: 3).

This is a characteristic of modern and post-modern culture to render experience in visual form. This makes linguistic discourse more comprehensive, quicker and more effective (The Visual Culture Reader; 1998; p.7).

Today our culture is disjunctured and fragmented visually, so the question arises what is real and what is not. This is because of the society of control in which we live **(Figure 1.1)**(The Visual Culture Reader, 1998: 8).

Towards the future visual culture will be read transculturally, with intertextuality as its basis (The Visual Culture Reader, 1998: 14). Design becomes a mediator, which involves mental- and social activity, and moves between cultures beyond specific cultural- and political location (The Visual Culture Reader, 1998: 22). In post-modern society the third world were steered towards the whole world "living the same historical moment": this is impossible in a society with layers of meaning (The Visual Culture Reader, 1998: 29). Today there is a tendency towards a polycentric visual culture:

"a multidimensional world of intertextual dialogism" (The Visual Culture Reader, 1998: 45).

If architecture is a sign, it is a function of its relations with other signs (Taylor, 1997: 52).

Philosophy

Two important philosophies influence the study of Urban Design:

01 introduction

Figure 1.1:
Barbara Kruger, 1987 - Shifting signifiers to create an active spectator.

In *Event-Cities 2* (2000), Bernard Tschumi is extensively influenced by the above mentioned philosophies (structuralism, post-structuralism). Tschumi talks about the need for seduction through the language of display (Tschumi, 2000: 229).

A "slow dance" begins between the dynamic body of the visitor/ consumer and the static body of the object of consumption (whatever is experienced visually). The result is architecture of display. The voids in such architecture become places of events, not programmed and open to appropriation (Tschumi, 2000:392). These public spaces are circulation spaces where events can take place (Tschumi, 2000: 514).

Urban design happens on the margin of social, economic and cultural density. Tschumi (2000: 519) talks about a "triple revolution"- informational, interdisciplinary and ideological.A global architecural language is created (Tschumi, 2000: 519). A building becomes a generator of events, a condenser of the city with cultural and social transformation accelerated (Tschumi, 2000: 521).

Bernard Tschumi explains in Hiding (Taylor; 1997; p.241) that the disguise (façade, street) indicates other systems of knowledge. Architecture encourages a movement of bodies in space: space activated by movement.

Architecture and semiotic theory explains that meaning and frame of reference differ (Taylor, 1997: 244). All we see around us is signs of signs, there is no signifier and signified. Meaning changes with context and according to Tschumi there is only the deregulation of meaning (Taylor, 1997: 248). This leaves an absence of "ground/ foundation" that stimulates a revisioning of architecture.

All production is reproductive co-production: the result is semantic plurality (Taylor, 1997: 254). How do you marry "historical' stable images and unstable images (eg. cinema, computer generated images)? There must be an interface where events are a matter of change (Taylor; 1997; p. 260). A non- programmed space for experiments and innovations. The building becomes an assemblage of superimposed surfaces (Taylor, 1997: 263). The meaning and experience will be subjective: the question arises if a wall is really a wall, or a roof a roof. Is it moved beyond its mere functionality?

Semiology

Semiology (science of signs) is an important part of this study; the signifier and the signified (The Visual Culture Reader, 1998: 61). People have the perception that they need signs to orientate themselves. This is because of the mass experience of modernity, the consequence of the intensity of capitalism **(Figure 1.2)**(The Visual Culture Reader, 1998: 125).

A social ordering of space came into being; as far back as colonialism, as a failure of European spatialising. The European rectified the raw African landscape by classifying it as "aesthetic" (The Visual Culture Reader; 1998; p.187). Classifying it into a order, making it readable and understandable. In the defining colonial order, the visual and the linguistic were needed for the endless exhibition that took place; the political culture of imperialism (The Visual Culture Reader; 1998; p.283).

Reflection

Architecture is a discipline, a science and an artform, the same as music and choreography to name only two. In today's visual world, where everything is contemporary, how does Visual Culture influence the profession of architecture?

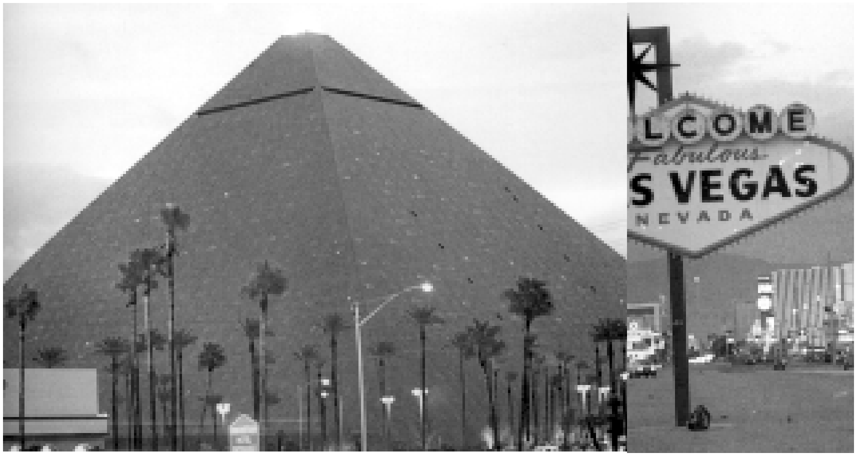


Figure 1.2:
Images of Las Vegas, Nevada - Show the power of Capitalism...
"Where is the architecture?"

Can architecture become a social artform in today's society? Can the same principles, for example in music, choreography and art be applied to urban design and the tectonics and typology of architecture? Can architecture be experienced again in a contemporary manner?

" Architects are going to be the fashion designers of the future, dressing events to come and holding up a mirror to the world…rethinking public imagination, public space and public forces is transforming architects into public scientists…(with) semi- conscious preoccupations of collective vision – glamour, meditation, advertising and celebrity…engage in the banal dreams of the contemporary world…explodes the hierarchy of the design process…input of different disciplines (with) technological, public and economic change"

(van Berkel et al; 1999; p.14).

Can architecture be experienced as art again here in South Africa; can it be contemporary and audacious? Can it be educational and psychological? Can it become a mouthpiece for contemporary society without excluding and without compromising sustainability?

Visual Culture and Architecture

The programme and type of building is based on the investigation of the Visual Culture- and Urban Design theory. A Learner's Resource Centre will create the landmark and gateway quality of the building and will enhance the image of Pretoria as the Capital of South Africa. The function of the building will be a digital information hub, educating the community in literacy: reading and computers. The building will become a mediasuit: people wearing this media suit "have the capacity of their brains expanded" (Ito, 2001: 36).

Parc de la Villette

Parc de la Villette is described as the largest discontinuous building in the world **(Figure 1.3)**(Tschumi, 1987: II).

The decision was made to base the design on an urban program of an abstract system; an intermediary (Tschumi, 1987: IV). For example, the ordinance survey grid overlaid on the site, marking points of events. There is a casual relationship between site and another concept and the program and architecture. In this case architecture is not the signifier and the programmatic not the signified.

With Superimposition a specific aspect is reinforced (points of events). The Cinegram (as a film analogy) explains the idea of a montage; the discontinuity, repetition, inversion, substitution and insertion (Tschumi, 1987: VI). The design becomes architecture: a montage of building elements.

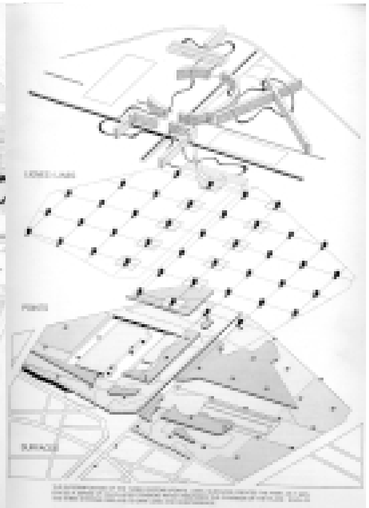
Inter-textuality is important, there's an overlapping of the abstract and figurative (Tschumi, 1987: VII). Meaning is dismantled, where the socially produced questions the humanist assumptions of style. Architecture as a refuge of humanist thought. In La Villette, a pure trace and play of language is practised. There is a semantic plurality (Tschumi, 1987: VIII).

The Urban Park is based on cultural invention, education and entertainment (Tschumi; 1987; p.1). Lines, points and surfaces create calculated tensions that reinforce the dynamism of the place **(Figure 1.4)**. The areas of intense activity are deconstructed according to existing site characteristics and use (Tschumi, 1987: 1). Objects, movements and spaces contribute to the dynamism of the park (Tschumi, 1987: 8). The Folie is a play of signs: a clear symbol of the park **(Figure 1.5)**.

A plurality of interpretations is the result. The signification is in the events occurring in the sequence where there is memory of the preceding frames **(Figure 1.6)**(Tschumi, 1987: 12). The Folie binds everything together and enhances the transference. The meaning is always a function of both the position and the surface (Tschumi, 1987: 26).

Figure 1.3: Site plan on Le Parc de la Villette.

Figure 1.4: Abstract system



Conclusion – the way forward

The impact of contemporary theories of visual culture on architecture are investigated. The intention is to achieve a different and fresh approach at a time when we are continiously bombarded by popular visual culture. The dynamism discussed in this document refers to the programme of the building versus popular semiology. Le Parc de la Villette is an example of this dynamism, where architecture can be experienced linguistically, but also visually. The semantics of la Villette is a play of signs, where the visitor is guided on a psychological level by physical elements.

The reason for investigating the relationship between Visual Culture and Architecture is to see if architecture can move from something static to something contemporary and dynamic: an “event-full” building within an “event-full” setting of a South African city. Something that can be a mirror of society here and now. Nothing is *hiding* **(Figure 1.7)**.

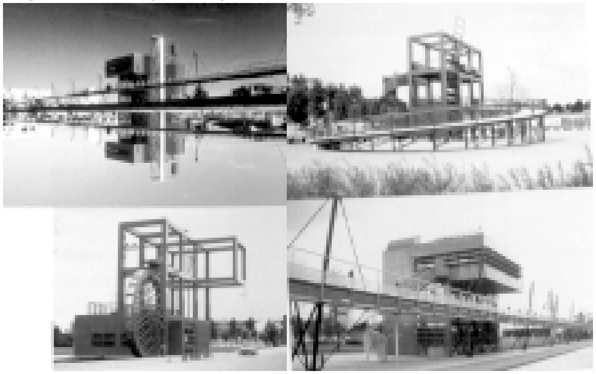
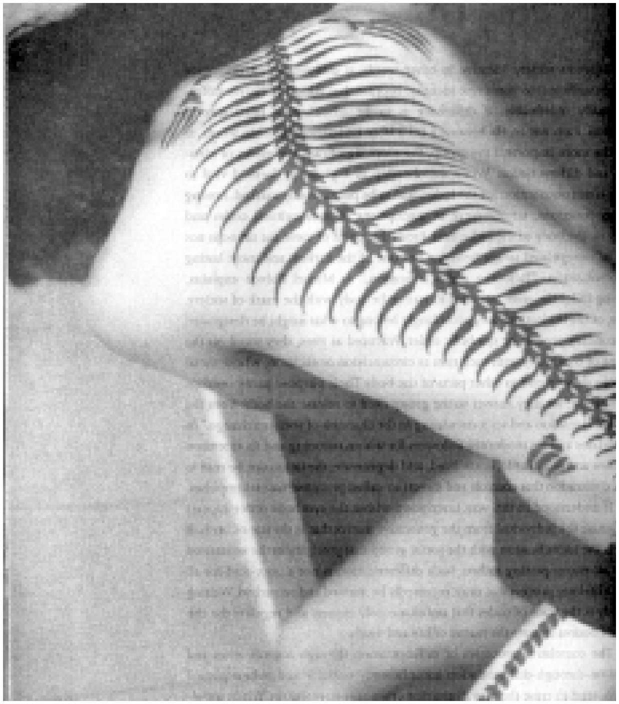


Figure 1.5: Folie as symbol

Figure 1.6: A wavy roof - memory of the preceding frame - Parc de la Villette

Figure 1.7: Nothing is Hiding. Photograph Laura Vida



02 inner city spatial development framework

The biggest problem in the inner city of Pretoria is the decentralisation to the east. Edge cities are created and with the political change the Inner city of Pretoria has been transformed.

After World War II office blocks sprung up in the CBD. People moved to the East. The Edge city was initialized: a Work city that increases in population at 9 a.m. In 1994 when the policies of segregation were removed the city got a new character and meaning, that of cultural diversity.

At the moment it is mainly people from Mamelodi and Atteridgeville that are utilising the inner city (Capitol Consortium, 1999: 1)

The Inner City Spatial Development Framework definition: a set of guidelines for the management and comprehension of the inner city of Pretoria. This is to promote growth and development of the inner city in a positive manner. This framework deals with both realities and imposed perceptions prevalent in the area (Capitol Consortium, 1999: 2)

Current condition

South Berea is the area south of Scheiding street and east of Railway street. This area functions as the Southern Gateway to inner city and CBD. At the moment there is a land use transition and an emergence of retail.

Berea Park is a major recreational node with sports facilities. It is neglected and mainly serves the population to east-Sunnyside.This area surrounds the Pretoria station and gives rise to major pedestrian activity. Berea is a high density residential area with parks, religious-, educational- and medical facilities. This area has weak links with Sunnyside (Capitol Consortium, 1999: 9).

West Berea also forms part of the Southern Gateway next to the Pretoria station. It has a low density stagnant land use which is State council related. There is major pedestrian movement and major informal activity.

Proposed condition

Berea is in need of social support services for the residential population by means of implementation policies. Transport types are needed to decrease major traffic routes and to facilitate pedestrian facilities and routes **(Figure 2.1)**. Integration with Sunnyside is proposed (Capitol Consortium, 1999: 23). New open space systems and nodes are proposed to ensure a safe, secure, viable and sustainable environment.

The uses proposed in this area include multi- functional spaces,commercial, offices, residential, entertainment, sports and education (Capitol Consortium, 1999: 33).

Berea Park is underdeveloped, derelict and underutilized. It could be transformed into a major attraction for visitors and investors in the context of the Open Space system of the inner city. Berea Park has small scale retail and residential opportunities for people living in Berea and Salvokop as well as Unisa workers and students. This area has

Figure 2.1:
Public transport and pedestrian movement

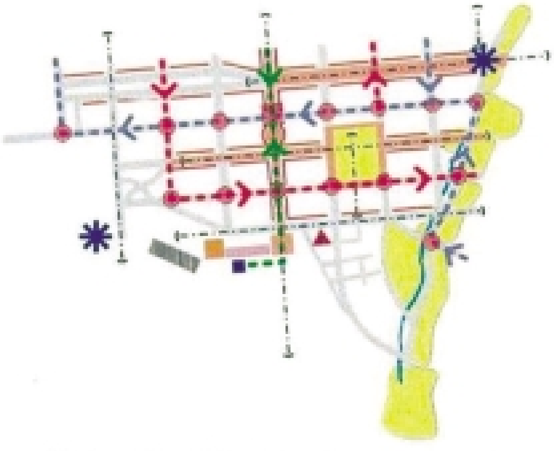
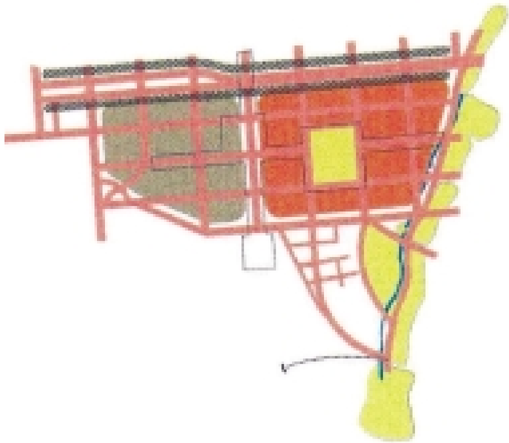


Figure 2.2:
ISDF development concept



the potential to become a major landmark and statement, as a gateway for the Inner city **(Figure 2.2)**(Capitol Consortium, 1999: 28).

South Berea has great potential for mixed land use. With the Pretoria- and Gautrain stations nearby, formal/ informal retail and tourist facilities like hotels are proposed. Resource facilities and parks for the residential population are of great importance and form part of the open space system **(Figure 2.3)**(Capitol Consortium, 1999: 23). West Berea is seen as the cultural precinct. The station is of importance for pedestrians and the informal sector and has the opportunity for extensive land use (Capitol Consortium, 1999: 28).

UNISA as an Institutional node needs to be integrated with Sunnyside, Berea and the neighboring residential districts to celebrate its regional function as an educational node.

The Development facilitation act needs to be studied to promote employment and residential activities close together in the Berea area.

The Pretoria Station Precinct needs an increase in residential use, social-, educational facilities, health care and recreational space. Formal- and informal trading will enhance this and make it more sustainable (Capitol Consortium, 1999: 23).

If this area is user friendly to visitors and tourists and attractive residential opportunities are initiated, an area with 24 hour activity will be created (Capitol Consortium; 1999; p.35).At the moment 230 000 commuters are using the railway line and a proposed 370 000 will be using it in future (Capitol Consortium, 1999: 35)

Proposed pedestrian streets will be Church-, Minnaar-,

Figure 2.3:
Main structuring elements

Esselen-, Paul Kruger- and Scheiding streets. The ring road vehicular system will include NMD east, DF Malan west, Jacob Mare Rissik (South), Scheiding/ Walker (South), Soutpansberg (North) **(Figure 2.4)**(Capitol Consortium, 1999: 39).

A unique image

To achieve the image of a Capital City all significant urban and natural spaces must be linked. Pretoria has outstanding features and with the possibility of the Parliament coming to Pretoria this will be enhanced. As a gateway city all resources, services and facilities must be adequate.To achieve a marketable image as a world class city the urban fabric must be legible and aesthetically pleasing.

To create a people's place the sense and perception of the users of the city need to be enhanced. There must be a constant awareness of context and history. A sense of order and unity through pattern and human scale (facades, arcades, courtyards, lanes) must be promoted. Permeability and physical legibility (landmarks, physical- and visual linkages) will enhance this (Capitol Consortium, 1999: 20).

The green, open space system will link the Apies river, Walkerspruit, Steenhovenspruit and the Ridges and Koppies by parks, trails and squares. An important continuous interlinked system which is accessible and activated for recreation and entertainment. This system will be dependant on pedestrian movement and public transport to create a productive and supportive institutional environment.

Accessibility to the Apies river through Berea Park creates the opportunity for activity nodes on the site. These green activity spines will be used for pedestrian movement, recreational and public facilities (Capitol Consortium, 1999: 30). Floods will be controlled through automatic flood control gates and a retention dam at Groenkloof (Capitol

Consortium, 1999: 48).

The image of Pretoria through branding can change perception and attitudes of users. The culture- and historical heritage, African ecology and the Gateway to Africa concept can be marketed. The link with the Museum Mall is of utmost importance **(Figure 2.5)**.

(Capitol Consortium, 1999: 20).

Mandela Development Corridor Urban Design Framework

The idea of this framework is to ensure maximum connectivity and maximum economic benefit for people using the city.

The City of Tshwane agreed the release of land into market place. A problem is degradation due to socio economic change and the flight of capital and activity from the CBD. The Apies river is seen as part of Pretoria's city life and viable urban change is needed (Holm Jordaan Group, 2001: 4).A vibrant and intense urban development will create a 24 hour safe, exiting and economic viable environment. Promotion of a Series of Corporate head offices along Nelson Mandela Drive will enhance the Capital image of the city (Holm Jordaan Group, 2001: 5).

The land facilitation of this framework has many different developers involved to make developments more viable, without one developer dictating everything . With the socio- economic change there are people reliant on public transport, pedestrian routes and housing in flats (Holm Jordaan Group, 2001: 6). The city council owns extensive areas of land in this area and this ensures maximum economic gearing and symbiotic land use (Holm Jordaan Group, 2001: 10). The Apies river system ensures an open space network with liveable urban spaces and positive spatial definition and ground floor activities. All ground floor uses will be orientated towards the river (Holm Jordaan Group, 2001: 13).

Placemaking elements

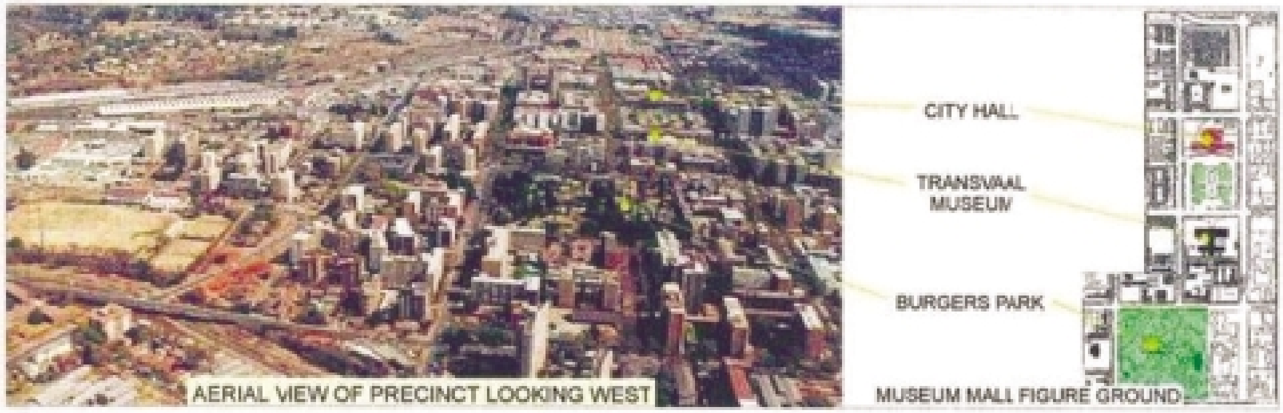
The idea is to enhance the legibility and quality of urban fabric and to create vistas to and from important places. Maximum frontage of the buildings with a coherent character will ensure that new addresses are created (Holm Jordaan Group, 2001: 20)

Ground floor retail is promoted to ensure a vibrant and safe development. The Apies interface will have colonnades with visual and physical access. The idea of a Corporate Image and headquarters will dictate a higher built form along the edges (Holm Jordaan Group, 2001: 22).

maximum connectivity maximum economic benefit

Figure 2.4:
Urban precinct

Figure 2.5:
Site integrated with the Museum Mall



The proposed framework along Nelson Mandela drive is that of a high density, mixed use corridor development. The result will be a democratic space where the inhabitants take ownership of private and public spaces.

Public transport becomes an integral part of the city fabric, generating more pedestrian movement and thus more activity on street level. Trading will happen along these connective routes.

The Gautrain proposal will have a positive influence on the inner city of Pretoria. This will result in an increase in job opportunities and an increase in the social and economic sustainability of the city. People will live close to modes of transport and economic activities will be enhanced.

03 urban design

Kevin Lynch in Image of the City discusses five aspects of a city: nodes, districts, routes, landmarks and edges (Lynch, 1960: 46). The links and crossings between these aspects are of importance to create an integrated city fabric **(See Figure 4.3)**.

Movement through a city can be visual, pedestrian, public – and private transport and the balance between those.

The image of Pretoria as a Capital City will be experienced mainly by visual means, and making spaces not accessible to pedestrians, for example the hard edge along Nelson Mandela drive, appropriate and rich.

The vision of this design is from *South African Cities: a manifesto for change*: the growth of South African cities must be managed so that it can accommodate the lowest social denominator; people dependant on pedestrian and public transportation movement and who seeks livelihood in small-scale, self-generated employment (Dewar et al, 1991: 88).

The two pillars of the planning philosophy according to Dewar and Uytenbogaardt are a humanist approach and the natural condition of a certain urban settlement (Dewar et al, 1991: 13). The human approach considers the fact that human settlements are created.

The natural condition of the setting addresses the conservation ethic of planning consciousness (Dewar; 1991; p.13). This stresses the basic resources in a setting, and the dynamic balance thereof with human activities.

Intuition is important and the variety of experience created, creates new horizons and opportunities (Dewar; 1991: 13).

A successful urban settlement can withstand any economic, political, technological and cultural change

Berea Park with its gateway quality is on the Nelson Mandela drive which creates a barrier, and divides the city in an east- and west portion. This makes pedestrian movement in the east-west direction difficult.

South African cities- a Manifesto for change:

Dewar and Uytenbogaardt (1991; p. 79) have certain elements defining structure in an urban setting:

- regional open spaces – this includes the reservation of nature rooms to retain the character of the context and to limit remedial action. Along the Apies River a green spine is created with pockets of larger green spaces along this spine. Berea Park in itself is such a green open space that will be used for recreation and education.

- site making actions – this makes way for future urban development for example the emphasis on public transport and pedestrian movement. These movement patterns will decide the function and use of the site. These actions guide the development in a certain direction, leaving enough freedom for the inhabitants to develop the Berea area (Dewar et al, 1991: 80).

- activity systems - along main routes like Scheiding-, van der Walt streets and Nelson Mandela drives there must be a mix of the most intensive economic and social activities

(Dewar et al, 1991: 80). This is possible if the area is compacted and densified. It will ensure the better integration of Berea Park into the city fabric and will minimise the degradation currently obvious on the site.

A grid of continious direct public transport reinforced by higher density mixed use must be encouraged, for example the expansion of the Pretoria Station and the Gautrain, a bus drop- off point in Nelson Mandela drive and a taxi terminal on the corner of Walker street and Nelson Mandela drive. This will promote pedestrian movement through the Berea area as well as movement in a North- South direction.

-**the spatial logic** of transportation channels must be enhanced by locating public spaces along these channels, coinciding with points of highest accessibility, for example Berea Park.

- **public facilities and social services** need to be located along these movement systems to celebrate its function and to create a sense of scale and hierarchical order, by placement of the institutional functions on Berea Park, and the commercial activity close to the transportation nodes (Dewar et al, 1991: 82).

- an activity mix of private sector activities along Nelson Mandela drive maximises the potential of strategically located land parcels, for example, placing the market area near the Gautrain station.

- by creating the Scheiding street link urban activities are integrated, a continuity of fabric is created and there is a definite response to movement. An example of this is the Scheiding street/ Walker street physical link from the station to Sunnyside.

- the vehicular routes are multi directional and are organised according to balanced land use. All vehicular routes are pedestrian streets as well. Although Nelson Mandela drive is a pedestrian street, it is an unfriendly street for walking.

Emphasis will thus be on east-west linkages, for example Scheiding street, and north-south linkages will be enhanced by public transport like taxi's and trams.

- public facilities – encourage the use of scarce resources. Public facilities and functions need to be accessible (Dewar et al, 1991, 84). The lack of public amenities will be rectified by introducing a library, resource centre and information centre. These have links with the existing schools, for example Berea High School and UNISA and are placed along pedestrian routes and links.

- urban spaces – connect a variety of open public social spaces with a variety of scales . This creates urban rooms with denser mixed use surrounding it. It creates a collective urban life with collective spacesas is evident along the Nelson Mandela drive (Dewar et al, 1991: 84).

Public infrastructure includes a systemic integration of public facilities, institutional facilities, small scale economic enterprises and decentralised wholesaling. Wholesaling is important, creating opportunity for light industrial manufacturing and definite links with the station and market area (Dewar et al; 1991; p.88).

Trancik's theory complements that of Dewar and Uytenbogaardt.The constraints of the site are viewed as unique opportunities and design generators. The barrier created by Nelson Mandela drive and the proposed Gautrain railway, running through the Berea Park site, creates an expanse of lost space. This space is not utilised and could create a monotonous, derelict, unsafe area. If utilised it can achieve integration with the existing city fabric (Trancik; 1986; p.219) **(See Figure 9.5)**.

Three theories are combined: The **figure ground theory** addresses spatial definition and the relationship between private and public space (Trancik, 1986:97); the **linkage theory** highlights the connective qualities of an urban settlement. Connecting parts of the city and relating buildings to spaces (Trancik, 1986: 106). The **place theory** addresses the social responsiveness of an urban settlement. The cultural and human characteristics of an area must be understood in order to turn it into a place with contextual meaning (Trancik, 1986: 112).

According to Trancik a mixed or integrated use assures greater richness and vitality than single-used spaces (Trancik, 1986: 220). The proximity between housing and employment are addressed and a vibrant community that could function on its own is established.

Finding Lost Space

Trancik poses an integrated approach to urban design (Trancik, 1986: 219). This comprises the following principles:

-Linking sequential movement- with the isolation of Berea Park caused by Nelson Mandela drive, an opportunity arises to unify the space. The new built environment will be integrated with the existing city fabric by the Scheiding/Walker street link and the green open space system along the Apies River. A vital spatial unity is created (Trancik, 1986: 220). Here the pedestrian can experience the movement from the station to Sunnyside and along the Apies River in a north-south direction. The pedestrian is placed in the forefront by extensive landscaping and " green fingers" as movement systems. The high vehicular movement will be kept along Nelson Mandela Drive, with pedestrian movement north-south limited to accessible area along the river. Main pedestrian movement will be enhanced in an east- west direction.

The public transport network is of utmost importance identifying nodes linked by pedestrian movement.

-Lateral enclosure and edge continuity – street level activities are important in newly designed areas, ensuring continued use and vibrancy (Trancik, 1986: 221). This is created by a hard edge with ground floor activities. Along Nelson Mandela drive the hard street edge is celebrated and this will enhance the Capital City Image of Pretoria experienced from the car. Open spaces along the Apies river will create "cooling- off" areas oriented towards the pedestrian. The public and private spaces are defined by hard-and soft landscaping . This enhances the exterior and interior link of the buildings (Trancik, 1986: 221).

Along the Nelson Mandela drive there is a flow of voids as one turns into the "green fingers". The building edge creates squares and landmarks.

- Integrated bridging-. Trancik explains this as a bridge becoming a "building" and vice versa (Trancik, 1986: 222). The Scheiding street link will become a "bridge" with commercial activity along it. This ensures 18 hour activity in the form of markets like mealie cooking and herb traders, for example the Warwick Junction in Durban (Dobson, 2001: 7). The architect placed the framework for development there, designing structure, but the functioning of Warwick Junction is due to the freedom of the users and that generated vibrancy.

This provides an uninterrupted mesh of activities along "passageways" (Trancik, 1986: 222). Spaces for movement are created through Berea to Sunnyside, where the urban space supports the street.

- Axis and perspective – this principle helps the user with visual orientation (Trancik, 1986: 225). Hierarchy is established in a space where it was not evident. Visual and physical importance is used to clarify block patterns. For example the visual axis of Nelson Mandela drive as an entrance into the city. The placement of the resource centre along Nelson Mandela drive and on the fork where van der Walt and Nelson Mandela split, establishes the space as a landmark and gateway. If simple organising geometries are used, the orientation in a setting is simplified . The historical grid pattern of the street layout in Pretoria is thus conserved.

- Indoor and outdoor fusion – this is important for creating new urban spaces. Landscape and urban fabric are integrated to ensure energy efficiency- and year round usage (Trancik, 1986: 225). Buildings on the Berea Park site are placed to create collective urban spaces. Passive surveillance and security are thus promoted.

This theory accommodates change and spontaneous evolving of outside spaces.

All these theories are based on a thorough understanding of context, place and spatial analysis. All decisions must take into account the existing fabric. As discussed above, Trancik, Dewar and Uytenbogaardt's theories influenced the design of the resource centre extensively.

The most important aspect of this space must be flexibility, adaptability, simplicity and directness (Dewar et al, 1996: 15).

The resource centre in Berea Park will be loose pavilion buildings creating a procession of spaces adding to its uniqueness and landmark qualities (Dewar et al, 1996: 20). Being a landmark, it should also respond to the surrounding spaces like the river and opening up to the western station area, creating a precinct on its own. The hard continuous edge on the eastern side responds to Nelson Mandela drive and creates a series of open spaces along the street (Trancik, 1986: 221, 225). This space could be used for community functions and recreation.

That ties in with the institutional functions of UNISA, private colleges and the Technikon **(See Figure 4.4)**. This designed space becomes a destination for people wanting information and education. Another theory applicable is that of Responsive Environments by Bentley et al (1985: 9 –11). This theory brings the above mentioned theories to a more specific scale. Principles are permeability, variety, legibility, robustness, visual appropriateness, richness and personalisation. The space is as flexible as possible.

Respect for the topography and environment is an important guideline in the framework. An urban space is created at this precinct, celebrating culture, equity and freedom of choice (Dewar et al, 1991: 84).

The site of the resource centre becomes a merger between the natural landscape and the formal landscape (built environment). "Green fingers" are created by the permeability of the resource centre. A safe place for recreational and religious activities is created.

How people address place-making over the years becomes crucial. The answering of human needs, the dignity of people and activities and the making of places are applied to a more contemporary society.

The supply of social services and public amenities to the lowest social denominator are important. The lack thereof makes it the driving force for the urban design framework. Creating a place where people can live, work and the pedestrian gets priority over the vehicle.

Creating Vibrant Urban Places

Three important functions applied to Berea became important while studying the theory of Vibrant Urban Places:

Multi- functionality – these types of spaces have an important social role (Dewar et al, 1996: 18).They allow a variety of activities to happen all through Berea. The market area has a variety of commercial activities ranging from cooking to arts and crafts. This will ensure that commuters from the train will use these facilities as well as people living in Berea. It enhances flexibility and increases overall usability of the area. Unexpected events and demands can easily be accommodated - the resource centre could be used for community meetings and information spreading.

Connections- Berea and Nelson Mandela drive will become a tracery of spaces where the public life of the community takes place (Dewar et al, 1996: 20). All these routes accommodate activity- the "green fingers" permeating the site become playgrounds for children. In the design of an urban framework social, humanist and environmental considerations become the driving force (Dewar et al, 1996: 20).

The range of opportunities and choices are enhanced by creating a place that embraces the user and that is environmentally conscious and usable.

Institutions- Social amenities like places of learning and recreation give structure to the area (Dewar et al, 1996: 20). This in turn is given form by universities and schools - Unisa on the southern side of the site and Berea High school on the site. An "Institutional Link" from north to south (Pretoria Technikon to Unisa) is formed. This institutional function is thus enhanced by movement patterns like Nelson Mandela drive and Scheiding street, with a range of informal/ formal activities along them. The resource centre has a unique character being a landmark and gateway building into Pretoria. It is important to have appropriate, supportive institutions (Dewar et al, 1996: 21).

Conclusion

"Change…related to accepting the realities of place. Accepting these realities is the superimposition of a construct, and constraint is a magnificent assistance to creativity."
– Roelof Uytenbogaardt (Nuttal; 1993; p.14)

Creating an environment that could function on its own, but is still linked with the greater inner city.

Positive urban environments are complex. Richness and diversity results because of freedom of action and iterative application (Dewar et al, 1996: 45). The result must be a balance between freedom and constraint, that is easily readable, logical and with predictable response. A minimalist structure creates a rich range of opportunities. The location, size and form of land parcels determine this guiding structure.

The most important aspect is which public elements and infrastructure should be provided (Dewar et al, 1996: 48). There must be integration and overlapping in these elements, ensuring convenience. These integrative social services and public amenities can accommodate a range of demands. Positioning of social services and functions are determinants of design, not the form. The result is broad, but specific, guidelines. In other words, a well thought through basis for further development.

The vision for Berea is to accommodate the lowest social denominator. This will be achieved by creating an urban settlement with the main function of education and commercial. With its existing high density residential component, people dependent on pedestrian- and public transport are accommodated. The other amenities are supportive in achieving this goal. **See the *Design Essay* at the end of the discourse for the design conclusion.**

The brief is derived from an initiative of the City Council of Tshwane to upgrade the CBD of Pretoria.This endeavour is initiated together with the ISDF (Inner City Spatial Development Framework), MDCUDF (Mandela Development Corridor Urban Design Framework) and the ARUDF (Apies River Urban Design Framework).

" living, stimulating and economically viable spine of the Pretoria Inner City"
(Hlahla; 23 –06- 2001).

" landmark, a pleasant environment for recreation and entertainment….walk along Apies River in a pleasant, vibrant and robust environment in contrast to the pseudo-urban environments which we find within enclosed and introverted shopping malls." Jaksa Barbir (AARI's chairman)
"Sparkling , clean water and a healthy ecological system…handsome buildings with shops, coffee bars and restaurants for passing pedestrians, green lawns and trees."
(Hlahla; 23 –06- 2001).

The City Council proposed the revision of the existing frameworks mentioned above. A more comprehensive Urban Design Framework along the Apies River and Nelson Mandela drive is envisaged. This framework has as its basis the pedestrian as the user of the city **(Figure 4.1)**. To rehabilitate the city as a chain of green spaces, where the most important is the Apies River **(Figure 4.2)**. A city is experienced by the way people move through it and use it.

To market Pretoria as the administrative capital of South Africa, the image of the City gets high priority from the City Council of Tshwane. Particular attention will be given to the landmark and gateway qualities of buildings in the city **(Figure 4.3)**.

The City Council of Pretoria through the ISDF identified certain sites with priority for development along the Apies River, because there is numerous state-owned land along the river.

Berea Park was identified as the site for a Learning Resource Centre. The site belongs to Transnet who put some of their land next to the Apies River up for sale (Capitol Consortium; 2002; p.68). This building will house bureau's of the Department of Environmental Affairs and Tourism and the Department of Education.

The reason for this is to function as an information centre for people coming into Pretoria, as well as a resource centre for the local community.

The information centre will inform people about Pretoria and its surroundings, and as this is the Southern Gateway into Pretoria it celebrates that function. An exhibition space displaying Modern South African Culture will be housed here. There is a physical link with the new Freedom Park development and the Museum Mall including Burgers Park and Melrose House.

The resource centre will function as an interactive library and study centre for people living in the CBD. This is needed because the State Library has insufficient space for study, and surrounding colleges and universities require a central visual library **(Figure 4.4)**. A Digital Library will function as a database with all the newest journals, magazines and excerpts from books of the last five years available on the computer. A central library wil thus be created. This will be especially useful to schools in the city, where research is a problem for pupils. Adult literacy classes (reading, writing and computer literacy) will be presented to the local community in the evenings.

Intermediary term clients will be from UNISA, Vista University, Pretoria Graduate College (on the site), University of Pretoria and the Pretoria Technikon. They will all be involved in running the resource centre. Their incentive is to create a digital library for their students and the community as a whole.

This will also function as an educational clinic, where the different institutions will have a first contact area with future students. Post graduate students from the different institutions will help to run these satellite offices.

The development will also be a recreational space for students, workers and residents in the community. It will be a "cooling-off" space for commuters using the Pretoria Station, and other means of public transport **(Figure 4.5)**.

A definitive pedestrian movement occurs along the site because most of the students of the mentioned institutions use public transport to get to class.

This "urban park" will include open green spaces next to the Apies River. Benches, litter bins and sufficient lighting will be provided to give this area 24 hour activity and security.

Linking in with this, is a small scale commercial activity node and a taxi terminal. Because of the nearness of the Pretoria Station and the Gautrain station, this becomes a stop over for commuters **(Figure 4.6)**. The existing taxi stop will be formalised and the small- scale commercial node will fit in with that. A bus drop-off point will be placed in Nelson Mandela drive to accommodate tourists visiting the site. This will also soften the monotonous eastern side of the site by lencouraging people to move over the river. This will be managed by the City Council.

A small overnight facility for visiting schools and a residential component for employees will be established. This will ensure 24 hour activity and the "eye on the street" concept.

According to the Integrated Spatial Development Framework of the Pretoria Inner City (Capitol Consortium; 1999; p.33), the Berea Node should have a multi- functional use including commercial, offices, residential, entertainment and education facilities. Southern Berea has a great link with

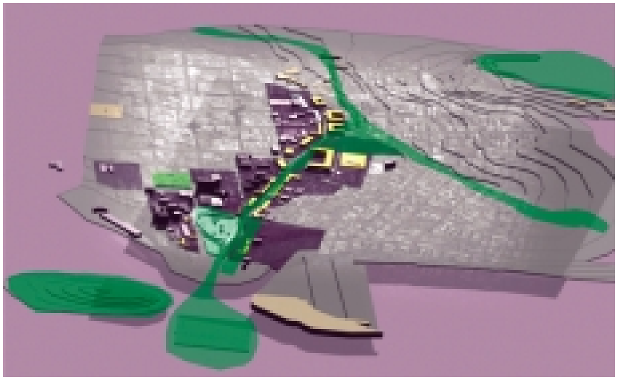


Figure 4.2:
Green spaces linking the movement through the city

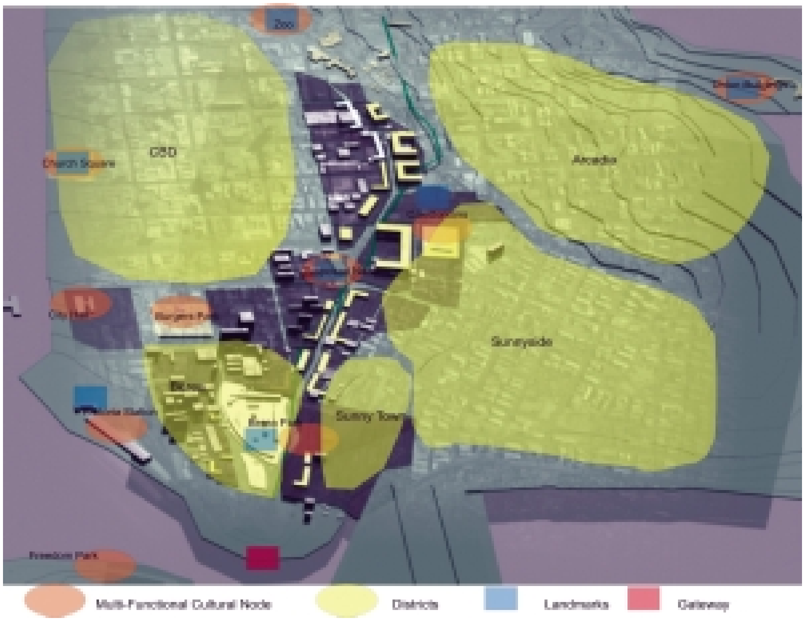
Figure 4.1:
Pedestrian movement in and around site

the Pretoria Station and serves as the southern gateway into Pretoria and must provide tourist facilities as well as resource facilities for the resident population (Capitol Consortium; 1999; p.28).

Berea Park more specifically is a major feature of the open space system in the inner city and an attraction for visitors and investors. This area has the potential to become a landmark and statement as a gateway for the Inner city (Capitol Consortium; 1999; p.28).

A Section 21 company, involving the government deparmtents and the tertiary institutions, will be established to the run this project. Funding will be provided by the European Union. The aim of the EU is to start programs in South Africa to better the social, economic and environmental state of the country. The sub-clients therefore become tenants.

Figure 4.3:
Nodes, districts, gateways



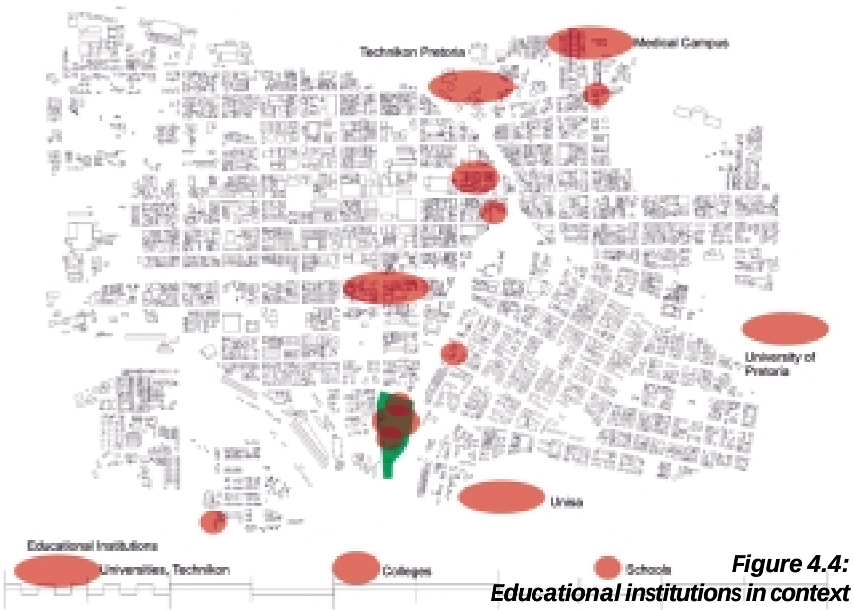


Figure 4.4:
Educational institutions in context

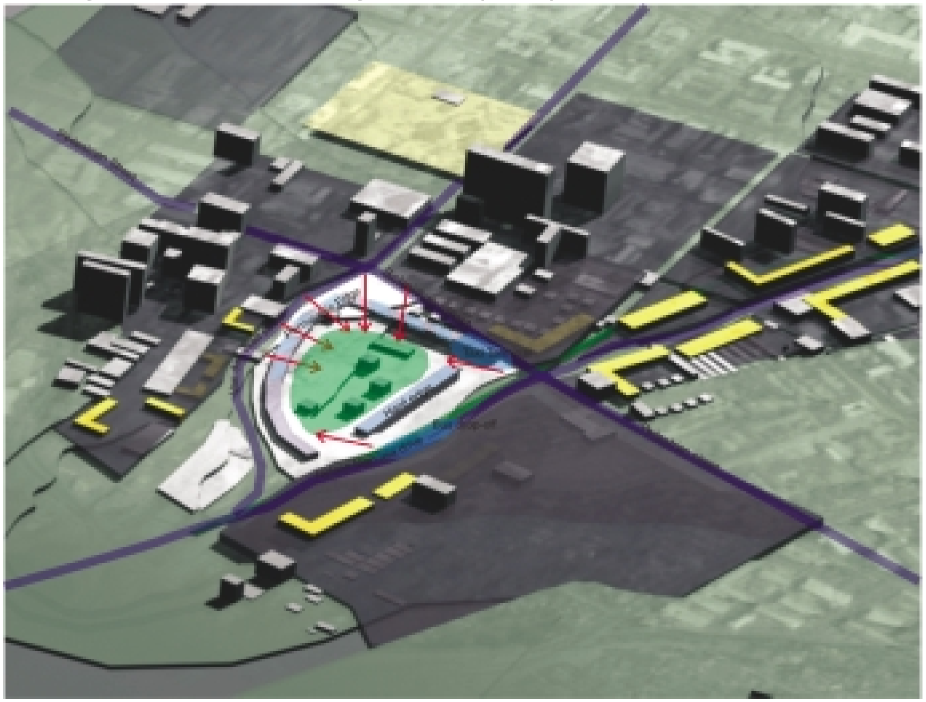


Figure 4.5:
Site as recreational node

Figure 4.6:
Transportation route

The European Programme for Reconstruction and Development (EPRD) has projects specifically aimed at bettering education and micro-enterprises in South Africa (www. EUSA.org.za/ annual report). The European Union is seen as "investors in People" and similar projects include the Labour Market Skills Development which assists and lends expertise to the Department of Labour to implement the Skills Development Act.

Particular attention will be paid to developing the capacity of both the national and provincial Departments of Education in relation to accessing and managing donor funds, and in the field of adult literacy through continued support to the SA National Literacy Initiative

EPRD projects in the education and training sector aim to assist the South African government in restructuring the delivery of education and training to previously disadvantaged groups. Key areas range from adult education and early childhood development, to school rehabilitation and tertiary- and technical education. The EPRD is currently implementing ten projects in this sector, to which the European Union has committed • 151,9 million. Support for this sector accounts for about 18% of EPRD funding.

05 implementation

Funding & Implementation

The 1996 EPRD was designed in close co-operation with the national Government. It focused on a small number of programmes, in order to reach a coherent developmental overall programme. Main beneficiary sectors were good governance and institutional strengthening and social sectors (education and health).

A Multiannual Indicative Programme (MIP) for 1997-1999 was prepared with the Government and agreed upon in May 1997. It provides guidelines for the EU/SA co-operation programming, with an average 125 million ECU to be committed every year.

Project implementation will be undertaken by the Government (under the responsibility of the Ministry of Finance), the private sector and NGOs.

The projects and programmes financed under this budget line should support the South African Government's strategy, and in particular the Growth, Employment and Redistribution (GEAR) Government programme, based on promotion of economic reforms, support to private sector and delivery of basic social services and infrastructures to the poorest.

Attention has to be given to coherence with MIP and South African policies, to sustainability of projects, and to monitoring of project implementation. The resulting Financing Proposals have to be submitted to the EU Member States before being endorsed by the European Commission and financed by the EPRD funds.

The implementation of the projects starts with the signature of a Financing Agreement between the European Commission and the responsible partner, who is required to submit annual workplans and regular technical and financial reports.

Project implementation will be undertaken either by the Government (concerned Departments) or by agents of decentralized cooperation (NGOs and other partners).

The South African Government agrees that NGOs and other partners should continue to implement projects with EPRD financial support, and 25% of financial resources will be devoted to programmes developed by these agents.

Participation may be extended to include other developing countries in duly substantiated cases and in order to ensure the best cost-effective ratio.

Expression of interest by firms can be made to the SA Department of Finance and the EU Delegation in Pretoria (www. EUSA.org.za/budget)

Other Related Projects

The 'Education Sectoral Support Programme' has three components, with weak links between the components: (1) a bursary programme, funding the National Student Financial Aid Scheme through TEFSA, a Government agency), accounting for 44% of funds, (2) management improvements, especially financial management at provincial and sub-provincial levels, accounting for 8% of funds, and (3) upgrading school infrastructure, accounting for 45% of funds. (www. EUSA.org.za/ report)

EDUCATION SECTOR SUPPORT PROGRAMME (www.EUSA.org.za/annual report)

Project No.	:	98-73200-01
Commitment	:	• 23,000,000
Increase 20%	:	• 4,600,000
EC Disbursement	:	• 26,559,893

Aim

The project aims to support the SA Government's programme and reforms for improving the conditions of education, particularly for the historically disadvantaged communities, through the provision of better educational facilities, access to tertiary education, and improved finance and governance.

Implementation

Department of Education

Status

Funds from the first tranche for the bursary component have all been allocated. This component was administered by the National Student Financial Aid Scheme (NSFAS) and enabled access to tertiary education for disadvantaged students. The implementation of the SA Schools Act component of the programme is in the final stages. This component assists the Department of Education in the implementation of the financial aspects of the SA Schools Act, and operates at both national and provincial level. In addition to training and capacity building at provincial level, provision is made for local technical assistance to be deployed in the provinces.

LIBRARY BOOKS AND TRAINING PROGRAMME FOR HISTORICALLY DISADVANTAGED INSTITUTIONS

Project No.	:	95-75070-09
Commitment	:	• 13,000,000
EC Disbursement	:	• 4,820,617

Aims

·To provide text books for undergraduates;
·To provide library books, audio-visuals, electronic serial and document delivery systems;
·To improve information technology;
·Capacity building of library staff.

Implementation

Department of Education

Status

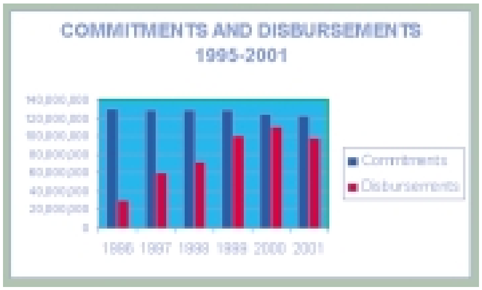
Work Plan 4 for 2001 – 2002 was approved in July 2001. A number of supply tenders were launched and these are:

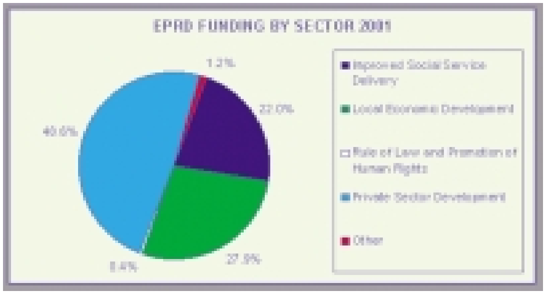
·Tenders for materials and textbooks were evaluated and contracts with suppliers were signed by the Contracting Authority (Department of Education) and endorsed by the Delegation. The delay in the award of contracts for the Materials and Textbook Tenders has set back implementation by 2 months;

·The Open International Tender for the back-sets of Journals was cancelled since no qualified bids were received. Consequently direct agreements were signed with a number of suppliers. The Direct Agreements for SABINET Online and CDROM Database were also signed and implemented;

·The Open International Tender for Information Technology (IT) was published on 6 November

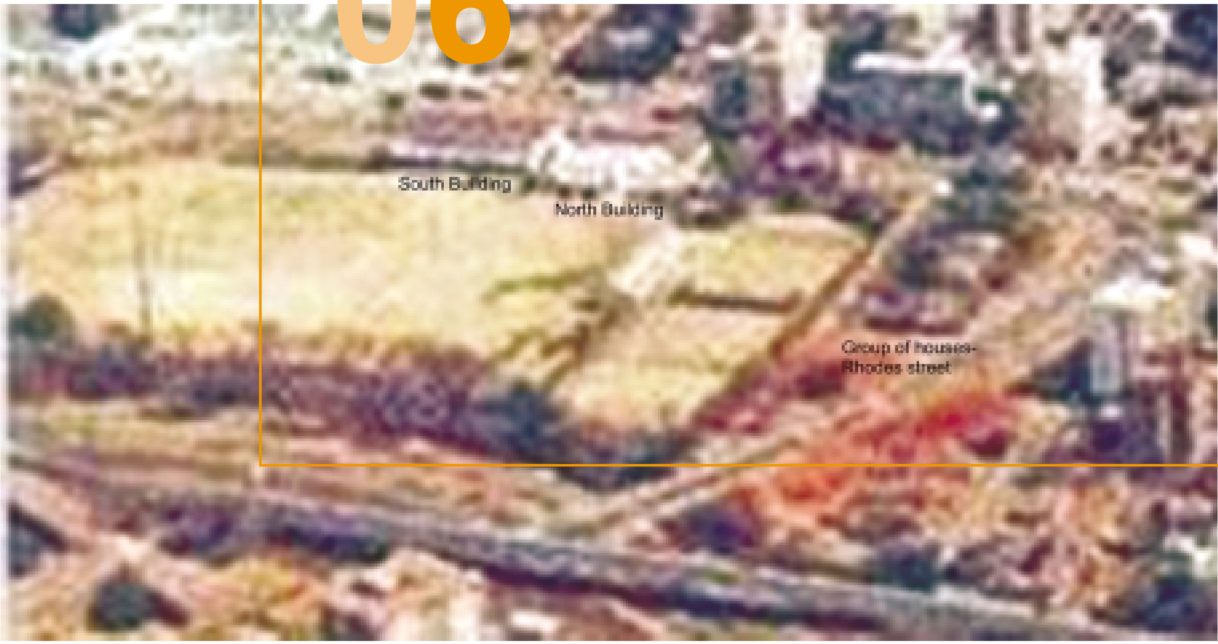
Figure 5.1:
Charts of EU funding





historical context 06

Figure 6.1:
Site showing historical context



A short synopsis of events that happened along the Apies River:

- 200 000 years ago – Stone age communities got water from the Apies River.
- AD 1200 – Iron age communities settled along the river.
- 1825 – 1826 – Bakwena tribe settled along the river and called it Enzwabuklunga (Painful) referring to the sharp stones at Fountains Valley. Later the Tshwane People settled along the river.
- 1830's & 1840's – Voortrekkers including the farmers Bronkhorst and van der Walt settled along the river.
- 1857 – The name Apies were given to the river because of vervets on the banks *(Cercopithecus aethiops)*
- 1912 – The first date palms planted along the river.
- 1980's – The first proposal for the city lake at Caledonians by Floris Smith & Meyer Pienaar Argitekte & Stadsbeplanners in 1983 and Gouws Uys & White Landskapargitekte in 1989. (Hlahla; 23 –06- 2001).

Site specific

The Houses on the north of Berea Park have some basic characteristics:

- Simple form
- Shield roof
- Verandah on columns and stoepwalls
- Face bricks/ painted plinth
- Plastered top walls (bo-mure)
- Timber windows and doors
- Set back from the street
- Fenced gardens
- It has social importance as group of houses

(Le Roux et al, 1990: 157) (See figure 6.4)

The Clubhouse in Berea was built and is owned by the S.A. Transport Services (Le Roux et al, 1990: 163).

In 1845 the Andries van der Walt house was built on the western bank of the Apies river but has been demolished before the 1890's.

Football was forbidden on Church Square, and the players asked the vice-president of the then municipality of Pretoria for other sports grounds.

The ground belonged to The Bourke Trust Company and in 1888, Loftus Versfeld started the Pretoria Rugby Club and they leased the ground from the Bourke Trust Company (Jansen, 2001: 3)

The Berea Club was developed in 1897. In 1902 the Old Caledonian hall was built but was for exclusive use of Spoornet workers. In 1903 the Bourke Trust Company sold Berea Park to the Pretoria Railway Institute for £ 12500. The Southern Clubhouse was built in 1907, designed by S.A.R. & H., for £ 8000 and upgrading of the sports grounds was done for £ 4000 **(Figure 6.2)**.

In 1913 the club had 1200 members. In 1926 the northern club hall was built as a loose-standing building **(Figure 6.1)**. In the same year the Pretoria Rugby Club moved to Loftus Stadium and the Berea Rugby club was started (Jansen; 2001; p.5). Some additions were done in 1938 and later in the 1940's. Apparently these were the last alterations made on the buildings. It was the only sports facility in the young Pretoria. The Railway Club provided a library, music room and bar to its members.

Thus, this landmark location has great cultural and historical value (Le Roux et al, 1990: 164).

The first South African motor car (a Benz) was exhibited at Berea Park in 1897(ARUDF, 1999: 16).

An assessment of the current state of the building includes:

The Southern Clubhouse 1907

The quartzite stone plinth needs to be cleaned and preserved **(Figure 6.9)**. The verandas on the street façade were previously filled in with bricks and steel windows were inserted.

Two gables were demolished, another storey added and then again rebuilt **(Figure 6.8)**.

The external walls are treated with a textured paint that needs to be maintained. The advertisement boards are insensitive to the building typology. The Art Nouveau with sand-blasted glass double entrance doors needs to be celebrated more **(Figure 6.7)**. The conclusion is that the building should be conserved and continous maintenance is of utmost importance. This building will be included in the design of the resource centre and will form part of the development.

The Northern Club Hall 1926

Although a different architectural typology, this building is sensitive to the existing southern building. The arches for the entrance doors to the hall was adapted and the red brick plinth was painted white. Again the texture paint on the outside needs maintenance. The entrance to the hall is in an alley between the two buildings which undermines the importance of the building **(Figure 6.14, 6.15)**. A floating "dance floor" of Oregon pine, tongue and groove jointed planks was replaced in the seventies with a Maculata strip timber floor. This floor consists of 150mm by 50mm lathes on 300mm by 75mm Oregon pine beams, 1500 mm in both directions (Jansen, 2001: 10). These beams are on steel springs mounted on masonry footings and are in a working order. The clubhouse and hall was connected by a walk bridge **(Figure 6.11)**.

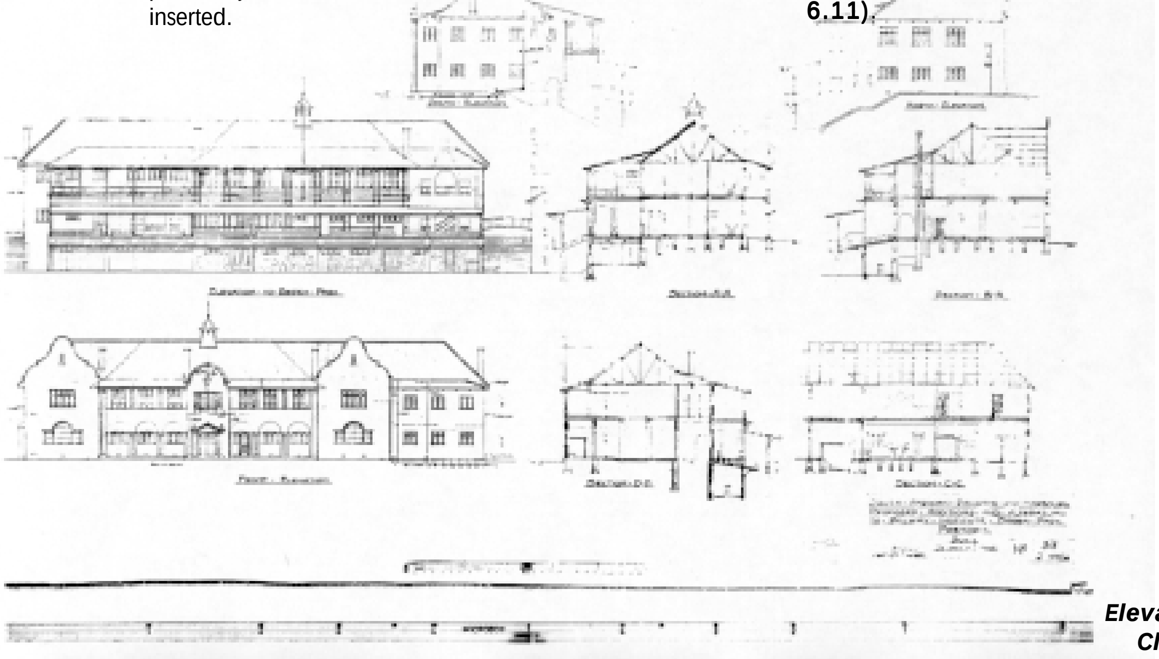


Figure 6.2, 6.3: Elevations of the Southern Clubhouse built in 1907

Figure 6.4:
View of Rhodes street with residential buildings to left

Figure 6.5:
South Clubhouse, eastern balcony

Figure 6.6:
South Cluhouse, stairs to sportsfield

Figure 6.7:
South Clubhouse, van der Walt entrance door, sandblasted glazing

Figure 6.8:
South Clubhouse, western gables

Figure 6.9:
South Clubhouse, stone plinth

Figure 6.10:
South Clubhouse, refurbishing of new classrooms

Figure 6.11:
Bridge between Northern building and Southern Clubhouse

Figure 6.12:
South-Eastern view of bridge

Figure 6.13:
Interior of bridge looking south

Figure 6.14:
Entrance to alley with bridge, from van der Walt street

Figure 6.15:
Northern Building, entrance foyer from alley

Soil

Central Pretoria is underlain by shales and andesite of the Pretoria Group with a vertical syenite dyke in the north- south direction (Purnell, 1984: .6) **(Figure 7.1)**. In the Pretoria area conditions changed rapidly, resulting in alternating bands of shale and quartzite and four volcanic suites of which the Hekpoort andesite is close to the base.

The shaly zone is the Timeball Hill formation composed of shale, siltstone and flagstone with a white, yellow or red colour on weathering (Purnell, 1984: 9). The Hekpoort Formation is grey to green andesite, amygdaloidal to non- amygdaloidal lava with base of agglomerate and tuff near the base. The vertical syenite dyke is 100 m in width.

The hekpoort andesite weathers down to clayey silts and silty clays with a maximum depth of 10m (Purnell, 1984: 23). In the southern and western parts andesite bedrock may be encountered within few hundred millimeters from the surface. No foundation problems should be encountered.

The syenite dyke weathers same as andesite and soft rock will be encountered at 14m and hard rock at 20 – 25m.

Reaction: After soil testing in andesite on a large site, ordinary footings or slightly deeper strip foundations can be used (Purnell, 1984: 35). Deep piling can be used in these problematic soils to reach inactive material with a suitable bearing capacity (Minimum 1,5 MPA). Stiffened raft foundation is recommended. This foundation compromises a grid of reinforced concrete beams cast integrally with the floor slab (Purnell, 1984: 36).

Subsurface pipes and drains, by means of flexible joints, needs to be installed to prevent subsurface drainage. Drainage should divert rainwater away from the foundations. Trees with excessive dessicating influence should be kept away from these structures.

In excavations vertical pre cast concrete piles can be used tied back with anchors and horizontal concrete plastering. Some sort of shoring technique should be used on all excavation faces (Purnell, 1984: 36) The syenite weathers in the same way as andesite.With deep excavation in these soils, strong inflows of water must be anticipated. Attention must be given to construction joints (Purnell, 1984: 37).

Hydrology

The depth of the water table is affected by climatic conditions, being deeper during periods of drought and shallower in times of high rainfall. The water table in the andesites are 6m deep (Purnell, 1984: 10).

Groundwater moves to approach the overall gradient, but as the water table declines to approach the base of the topography it moves in diverse directions corresponding to those of the surface drainage (Purnell, 1984:11).

Reaction: With the Pretoria Dyke of syenite, the groundwater is higher in west. In Central Pretoria basements of structures require regular pumping into the stormwater system. This is lowering the groundwater in the vicinity.

Topography

The site is situated between two ridges; Muckleneuk (South-east) and Salvokop (South-west). The slope of the site falls to the north. On the west is the Pretoria station area, to the east is Sunnytown, to the south-east is Unisa and to the north is Pretoria CBD **(Figure 7.2)**.

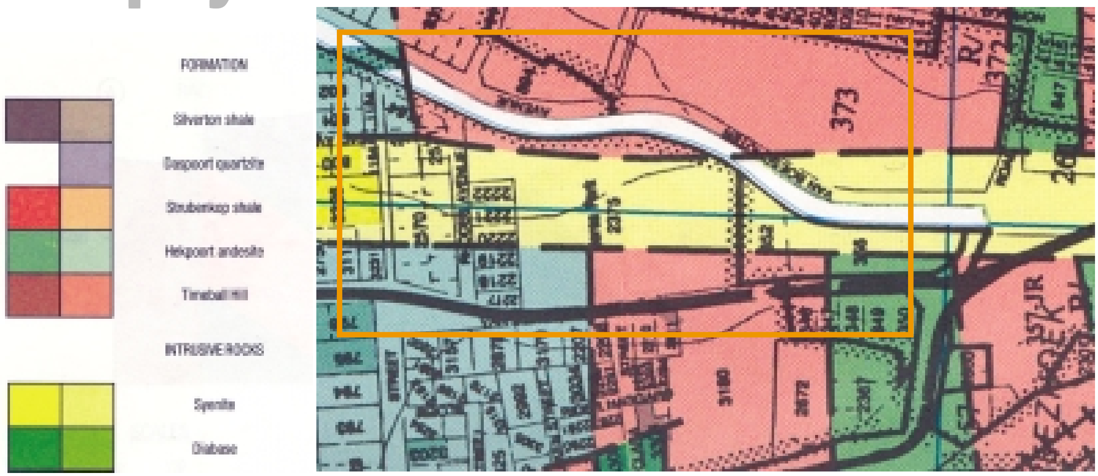


Figure 7.1: Soil map and key

Reaction: The natural topography has as a result a natural flow of water to the north for example the implementation of a wetland.

Vegetation

- Northern slopes: *Ochua Pulchra (*lekkerbeuk*), Burkea Africana* (wilde sering)*, Strychos Purgens* (Botterklapper)*, Bequertiodenron (*Stamvrug)*, Ficus pretoriae (*Wildevy)*, Rhus (*Karee)*, Acacia Caffra* (wag 'n bietjie)*.*

- Southern slopes: *Protea Caffra* (Suikerbos), *Acacia Caffra*

- **Riverbanks-** *Celtis Africana* (Witstinkhout), *Kiggelaria africana* (Wilde perske), *Halleria Lucida, Leucosidea sericea, Buddleja salvifolia, Cassinopsis ilicifolia.*

- Historical: *Phoenix canariensis* (Palm), Acorn trees and jacarandas (Gouws et al; 1989; p.21)

Reaction: The planting of indigenous trees will have as a result sustainable vegetation.

Climatological aspects:

(Gouws et al, 1989: 26)

Makro: Intermediary savannah biome – between dry savannah biome (150 – 1500mm rain/year) and humid savannah biome (>1000mm rain/year)

Half dry and very warm/ light frost. The location of the area is 25,8 - 30,7 degrees east and 22,0-25,9 degrees south (Holm, 1996:69).

Temperature:

Maximum - January 27 - 38 degrees celcius
July 17 - 27 degrees celcius

Minimum- January 13-1 degrees celcius
July 0 -10 degrees celcius

The average monthly diurnal variation is 13 Kelvin.

Frost period – 120 days between May & September. (Gouws et al, 1989: 29)

Climatogram (Figure 7.3)

Pretoria at 12:00 Latitude 25,77 degrees-
Solistice - 64, 23 degrees, Winter- 40,73 degrees (Holm, 1996: 72) **(Figure 7.5)**.

Precipitation: 679 mm rain yearly

Extremities: 372mm & 914mm rain

November – March most rain with February the maximum, 50 – 80 days rain a year

Average monthly humidity is 59 % (Holm, 1996: 69)

Winds: North East, SouthEast –summer
South West, North East - winter

Wind rose **(Figure 7.4)** (Gouws, 1989: 28)

Seasons: October, March, April – warm, dry
November, December, January, February –warm,humid
May, June, July, August, September – cold and dry

Reaction: The design of the building will accommodate a dry, warm climate with maximum ventilation and sun-shading.

Micro: (Gouws et al, 1989: 30)

In tree rich, wide streets there is extensive evaporation and transpiration. Next to rivers there is less variation in daily temperature. In treeless wide areas like parking it is open and dry. In the afternoon it is warm but cools down in the evening. Narrow streets and courtyards are 4-6 degrees Celcius less in the afternoon and late afternoon (not in the evening). Still

Figure 7.2: Topography showing the "poort" between the koppie

bright evenings can be experienced with cabatic flow: cold air in valleys, warm air out **(Figure 7.6)**.

Reaction: Pedestrians must be protected by trees, arcades or canopies. South facades should be tree lined because of radiation. The most pollution is gasses, solids and noise.

Apies River (ARUDF, 1999: 16)

Two springs in Fountains Valley, delivering up to 30 million litres of water per day, are sources for the Apies River. Bulk of this water is distributed into the water network of the city. Based on water quality guidelines for recreational use, the river is in general usable. Areas with a decrease in water quality are limited. The Apies River has ten tributaries also providing water (ARUDF, 1999: 7).

The conservation of the Apies river includes the natural- and landscaped area. The river is canalised without a natural riverbed. There are a lot of indigenous trees along the river. Littering is a problem and needs to be addressed.

The accessibility to individual sites are problematic from the side of the river, but is good in general. There is potential for rail transportation, cycles & pedestrian movement (ARUDF, 1999: 16).

The infrastructure & services is in good condition:

The stormwater management is in a good condition with a concrete lined channel and 50 yr flood line of 12m. It has surface drainage & street inlets to manage the flow of the water. This could be applied for more sustainable energy use, for example electricity generation. The water pipes are 450mm diameter & 525mm diameter on the right bank, and 900 mm diameter & 150mm diameter on the left bank. There is sufficient electricity supply and the sewerage is moved in 600mm diameter pipes on the right bank. The sewers are in the street reserves **(Figure 7.7)**.

The public amenities at the moment :

Social infrastructure includes the sports fields to east and the Museum Mall to the north.

Public infrastructure is created along pedestrian routes but needs to be improved.

Maintenance and care are insufficient and the concrete canal needs repair (ARUDF, 1999: 15)

Jan	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Maximum average monthly temperature (°c)	28.6	28	27	24,1	21,9	19,1	19,6	22,2	25,5	26,6	27,1	28	24,81
Minimum average monthly temperature (°c)	17,4	17,2	16	12,2	7,8	4,5	4,5	7,6	11,7	14,2	15,7	16,8	12,13
Average monthly amplitude (K)	11,2	10,8	11	11,9	14,1	14,6	15,1	14,6	13,8	12,4	11,4	11,2	12,68
Average monthly relative humidity (%)	58.0	59,5	60,0	59,5	55,0	53,0	50,0	46,0	45,0	49,5	54,0	56,5	53,83
Average monthly rainfall (mm)	136	75	82	51	13	7	3	6	22	71	98	110	56,17
Rham 72	74	76	78	76	75	71	64	61	64	68	70	75	70,75
Rhpm 44	45	44	41	34	31	29	28	29	35	40	43	44	36,92

Figure 7.3: Climatogram of Pretoria

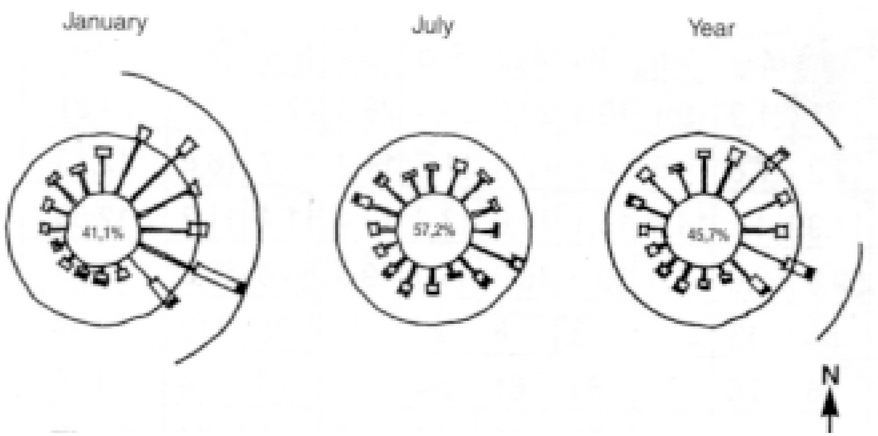
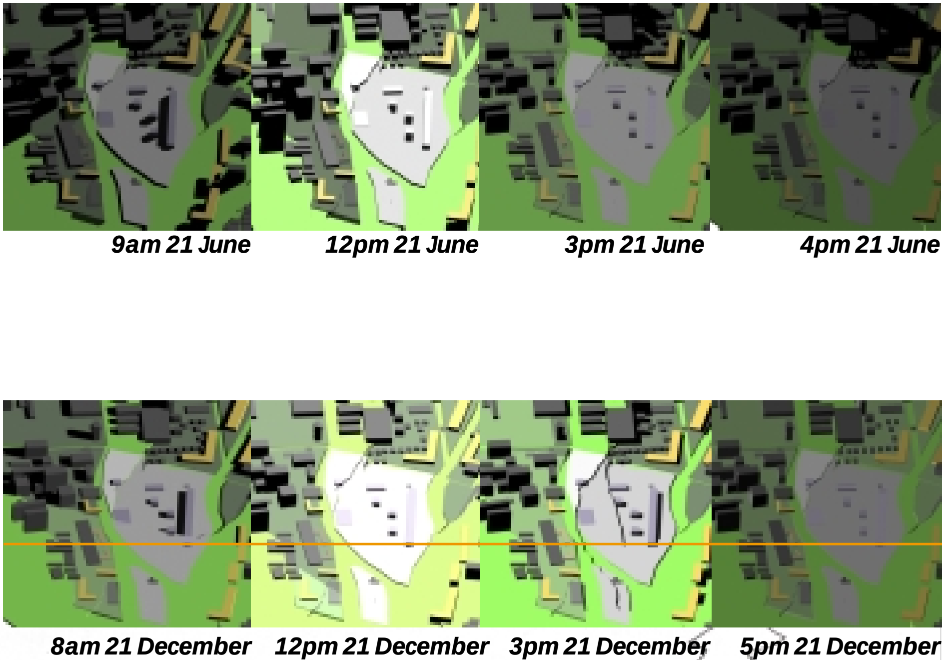


Figure 7.4: Windrose of Pretoria; intensity and direction is indicated, percentages indicate wind stillness

Suburban refers to an area where nature is organised and discernible as a green strip running through a low to medium density built-up area (ARUDF, 1999:6). Berea can be seen as suburban. The potential of the South Berea node as a gateway promoting human scale towards the city centre with tree lined, building set-back, designed street interfaces (ARUDF, 1989: 44).

Figure 7.5: Sun angles on the site



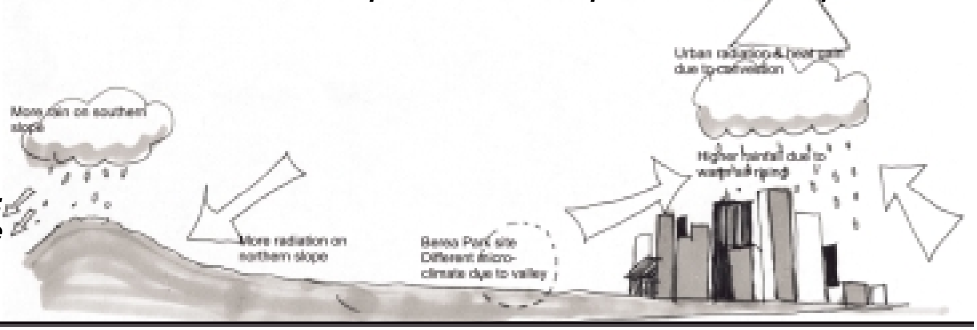


Figure 7.6: Microclimate

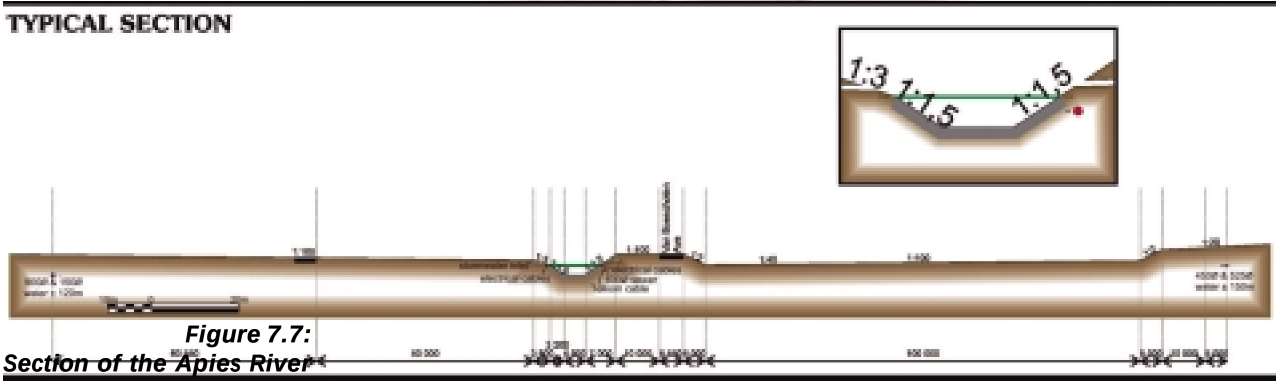


Figure 7.7: Section of the Apies River

08 social- and economic context

Figure 8.1:
Founders school, South Clubhouse

The social context consists of a high density residential component. There is a lack of social amenities in the area - study space and recreational space. Commuters using the metro rail move through the area to and from work and the surrounding educational institutions **(Figure 8.1)**.

The people living in the area are mainly lower middle class, because of migration of people into the city for job opportunities. The social amenities and economical state of the area can be improved dramatically.

The education of people is important. The bad debt on service fees in the residential blocks is in the excess of millions of rands because of peoples ignorance towards fees like levis, water and electricity. The community need to be educated about elementary things like paying bills.

After an interview with Mr. Jonas, the headmaster of Founders school, it became apparent that most of the people in Berea use the train as transport. People living in Berea mostly work in the CBD, including informal trading. Most commuters in Berea use Pretoria Station as a transportation node. Students of the different schools and colleges are a mix of local residents and commuters coming from the edge cities. The crime in the area is 75 % vehicle theft related and 15% petty theft and house breaking (Capitol Consortium, 2002: 67) **(Figure 8.2)**.

1: Rhodes street (north)

2: c/o Walker and Nelson Mandela streets

3: North wast corner, residential buildings

4: Nelson Mandela drive, Prinsloo bridge

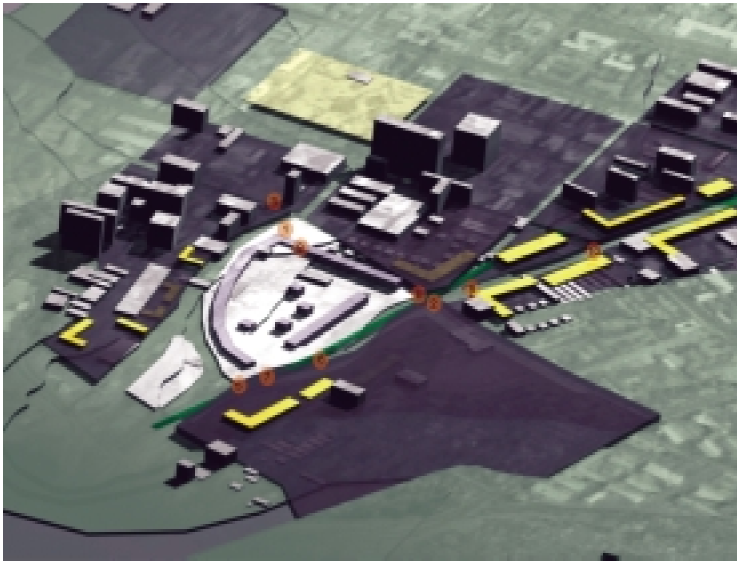
5: c/o Andries and Nelson Mandela streets

6: Eastern edge of Nelson Mandela drive

7: North western entrance to site

8: Nelson Mandela drive
with MOTH club to the right

Figure 8.2:
Map of physical- social- economic context



Site and surroundings, Stand no. 2375.The site of Berea Park is situated on the Southern entrance into Pretoria. It is a 48282 s.q.m site belonging to Transnet. It is currently used as a sport field and the historic buildings house the Pretoria Graduate Academy. The Berea High School is on the terrain, but only the northern part of the site is utilised. The site is overall in a derelict state.

The site is under-utilised, because it forms an integral part of the open space system along the Apies River. It could be used as a green space for education and recreation. The site faces onto Nelson Mandela drive and has great landmark- and gateway potential. It links up with Unisa, Pretoria Station, the proposed Gautrain station and various colleges including Vista University and the Pretoria Technikon. It also has Freedom Park to the south-west and the Museum Mall to the north. The tourism potential is also recognised.

Berea Park is surrounded by multi-storey, high-density residential blocks to the north and links up with Sunnyside to the east.There is a need for recreational- and educational amenities for the local community. To the west there is mainly two- to four storey buildings and to the east and south, mainly open space .
Three important vehicular routes surround the site:
Nelson Mandela drive: it is part of the Pretoria ringroad system and is a high-speed street serving the southern suburbs and is channelised along the Apiesriver.
Walker street/ Scheiding street: is on the northern part of the site and is a one-way street serving high-speed traffic during peak hour in a east-west direction. Scheiding street leads to the Pretoria Station.
Van der Walt street: it is a high- speed, one-way street serving traffic in a north-south direction during peak traffic.
The current state of Berea Park gives rise to various constraints and opportunities for the designer **(Figure 9.5)**.

09 physical context

Figure 9.1: North West view to CBD

Figure 9.2: West view to Unisa

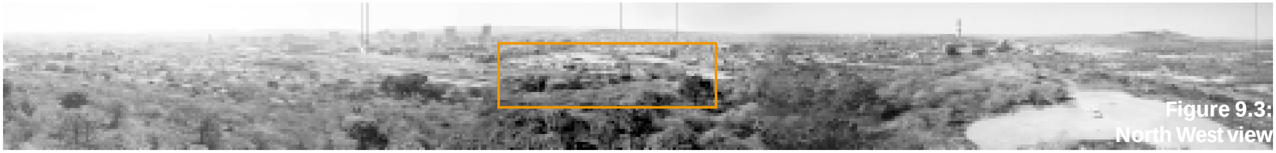


Figure 9.3: North West view

Figure 9.4: South West view

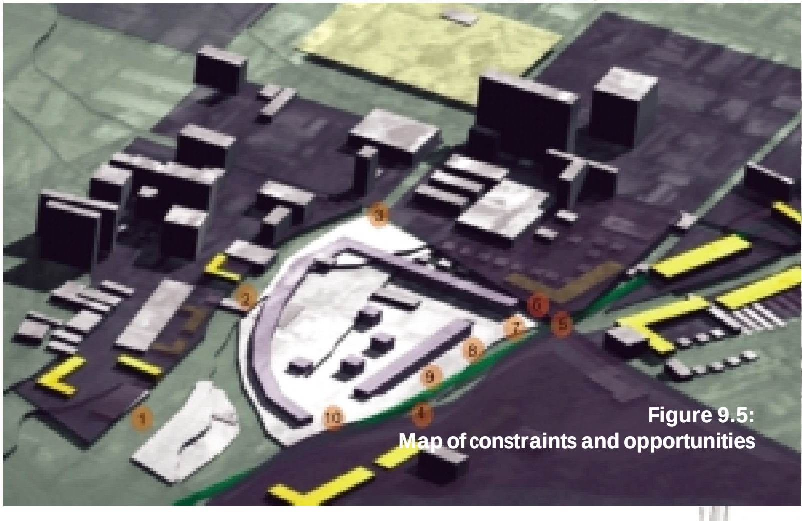


Figure 9.5:
Map of constraints and opportunities

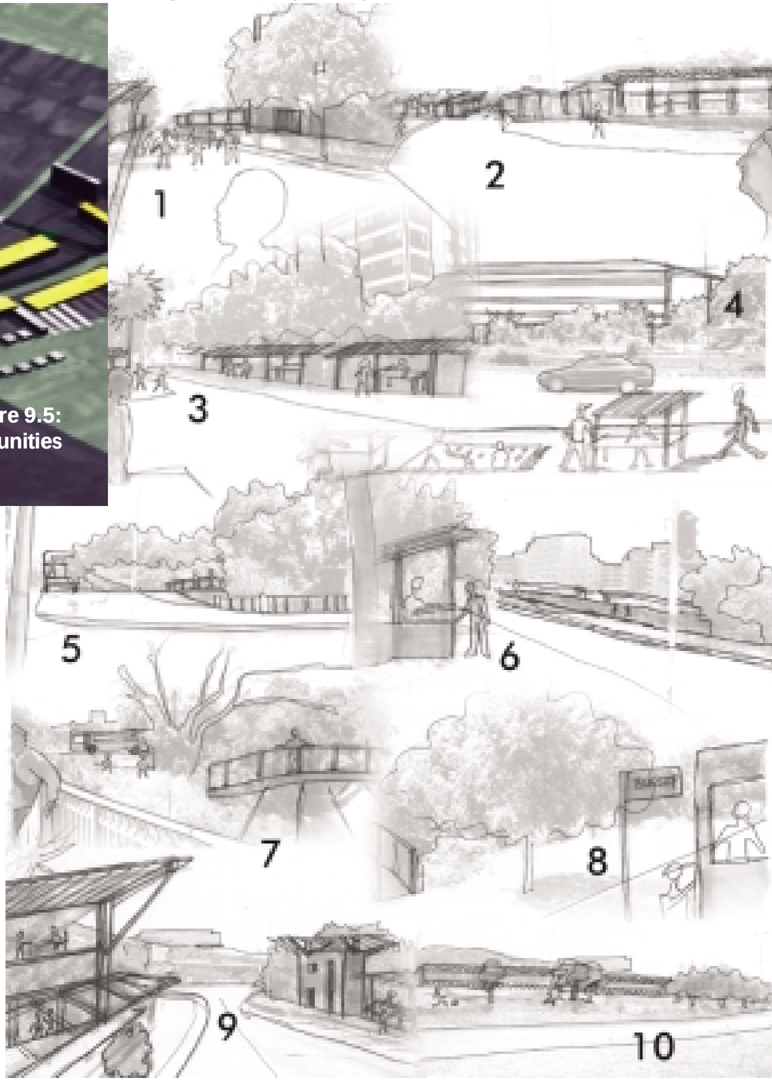


Figure 9.6:
North-west entrance to site

Figure 9.7:
View from South Clubhouse balcony

Figure 9.8:
View to Unisa form site

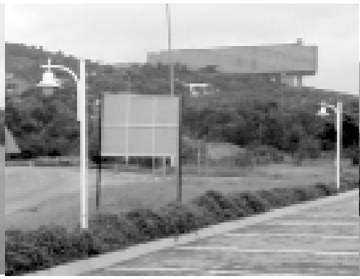


Figure 9.9:
View to Union Buildings from site

The study of the climatic context had as a result the passive climate design.

Solar passive design is climate sensitive and uses resources from the natural environment such as the heat of the sun, wind and temperature differences to heat or cool the building, or to generate energy (Holm, 1999: 1). This reduces the negative impact on the environemnt caused by energy consumption.

The temperature for thermal comfort is 21-22 degrees celcius with air movement of 1m/s (Holm, 1999: 5). The optimum humidity is 50%. The illuminance is the luminous flux uniformly distributed over a unit area. One lux equals one lumen per square metre.

Orientation is important for lighting, west and east orientation is undesirable because of unwanted heat gain. Preference should be given to rooms that need natural light close to the facade. Room depth should be kept to a maximum of 15 metres to ensure natural lighting.

Windows with a higher cill height let in more light, as well as larger, vertical windows. The minmum area of openings should be 10% of the floor area (Holm, 1999: 7). The most suitable plan forms for South Africa are oblong and courtyard forms. The longest sides should be orientated north (Holm, 1999: 10).

External spaces should have shade in summer and buffer zones should be placed (Holm, 1999: 70). Thermal mass is advisable and is provided by massive floors and walls. Lightweight insulated roofs are feasible.

External surfaces should be light coloured or reflective to minimise solar gain. Summer sun should be screened and winter sun allowed to penetrate. An equatorial window of 21,2% of the floor area is sufficient for the winter period. Natural ventilation is sufficient for summer period and management of openable windows is advisable. Direct evaporative cooling is not effective, but ventilation with the stack effect is advisable (Holm, 1999: 71).

Learner's Resource Centre

The design brief is compiled by the architect to accommodate a new identity for the city of Pretoria. The client explicitly wanted the landmark and gateway quality of the building to be celebrated and to establish a new aesthetic for Pretoria. The designed space needs to be transparent, accessible, flexible, open, safe, sustainable and economic. It has to have visual identity, serve the community and ensure regeneration in the social, economic and environmental context.

The building will function as a Learning Resource Centre. This will include a study centre for people living in the city. Smaller classrooms will be used for adult literacy classes as well as individual study rooms for students. A small rental fee will be payable for this use.

The digital library consists of computers with all the most recent (last 10 years) journals, magazines and excerpts from books. This will make research easier and more accessible to anyone. Internet will be provided to create a global library. Together with the digital library, an audio- visual library will house video machines, televisions, compact disc- and DVD players.

The exhibition space will display Modern Culture in South Africa as well as a temporary exhibition for schools in the city. This links up with an information centre for tourists.

Administrative offices will provide space for the state departments as well as the institutions involved.

An "Urban Park" will be used for recreational facilities, to link in with the green space along the Apies River. Commercial activities will link in with the Taxi terminal, providing amenities to the public transport user. A small residential component houses employees for a small rental fee as well as overnight facilities for visiting schools.

The building will have the following functions:
Tourism- information centre, dynamic exhibition
Educational- study centre, adult literacy classes, visual library (internet), digital library
Transport interchange- taxi stop, commercial enterprises
Recreational- Urban Park next to Apies river.

Design

Nelson Mandela Development Corridor and the Apies River will be analysed to create a people's place. Nelson Mandela Drive is a main road leading into the Capital City of South Africa with a high vehicular load. The ideal is to organise the city around non- programmatic spaces. Places where events can take place.

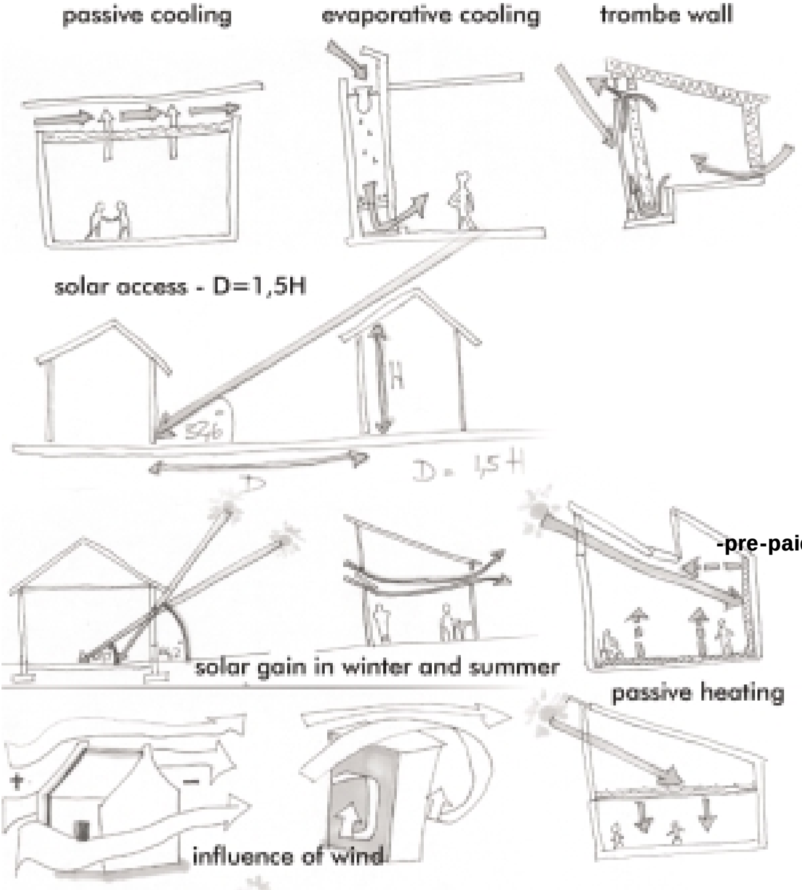
The site for the building serves as a landmark and a gateway. This fits into the study theme of architecture and visual culture. The semiology of architecture is explored to ensure the image of the city. The building will be a visual experience, asking the question what architecture is and what the different elements of architecture really means.

The regionalism of Pretoria will be researched to see where the current image of Pretoria is rooted and to influence the appropriate design decisions. An identity will be established to promote a more dynamic experience for the user (see introduction to document).

The building function will be a Learning Resource Centre because of its location. The multi- functionality of the building is to enhance the Berea area with an already high residential component. Social amenities will be provided, especially educational. The site is within walking distance from various colleges, UNISA and Vista University.

This building will be public, serving the community with a study centre, as well as an "urban park" for recreation. Through this the definite tourism component will be addressed.

The "information centre" will be multi- functional, celebrating the landmark- and gateway quality of the context as well as giving something to the community that is really needed. The site is near the Pretoria Station and next to the proposed Gautrain station, enhancing the public transport and pedestrian movement in Pretoria.



The proposed program of the building includes:

- large rectangular hall for local functions
- computer centre
- study carrels
- class rooms
- courtyards
- administration block
- market
- taxi & bus rank
- cable access, sufficient lighting
- periodicals
- street edge
- market related rental generating spaces
- inner edges- micro- enterprises
- pre-paid meters for electricity and water used by traders
- overnight storage, lockers, bulk storage
- small entrepreneurs
- public toilets
- internet
- children's books
- conference room
- audiovisual centre- cd players, DVD monitors
- café
- open square
- information desk
- bicycle parking
- book stacks
- reading rooms

The Third Vernacular

Regionalist architecture can be described as the designer directly responding in a place specific way to climate, materials, site, defence, economics, religion and the particular cultural expression of the community. Pretoria regionalism can be seen as the third vernacular, because it is an architectural expression that becomes endemic (Fisher et al, 1998: 123).

Greig suggests the second vernacular as a Gregorian architecture beginning in the early 19th century, and the first vernacular as the colonial invention of Cape Dutch (Fisher et al, 1998: 123).

Pretoria Regionalism has a particular response to nature and landscape through economic use of naturally available and industrially produced materials with a response to climate (Fisher et al, 1998: 123). The character of Pretoria Regionalism includes traditional plan forms, rustic brick either directly as clinker or as whitewashed stock, low- pitched iron roofs, deep shaded eaves and verandahs, sun- shy windows, sensitivity to landscape and land features, an architecture responsive to climatic constraints (Fisher et al, 1998: 125).

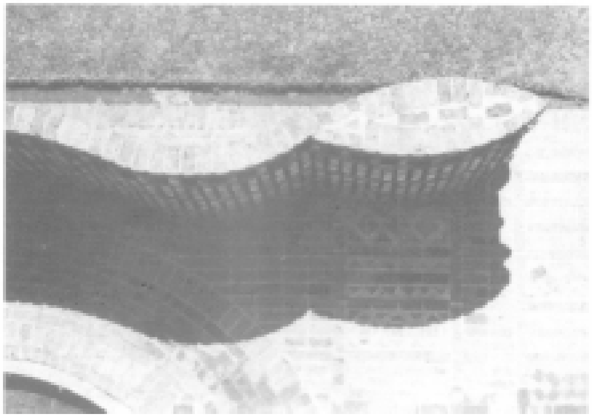
Through the Public Works Department a brick aesthetic was established in Pretoria. Brick architecture was well known to the Dutch Architects working on these projects (Fisher et al, 1998: 129). A good example of this influence can be seen in the Nederlandse Bank on Church Square designed by Norman Eaton in 1953.

Eaton moved towards an adaptation of the modern movement because of poor weathering of material used in the international style (Fisher et al, 1998: 123). Because of the availability of bricks it became popular as decorative and structural material. It's modularity and thermal advantages made it a regional material **(Figure 10.1, 10.2)**.

A move towards the Modern Movement promoted a move towards the use of steel, glass and concrete to fulfil the International Style (Fisher et al, 1998: 129). The Brazilian Purist movement had an influence on the use of bricks, glass and exposed concrete. An expressive architecture evolved with the use of exposed concrete, articulation and use of diverse materials, the decorative interpretation of brick as load bearing material and indirect light as natural source of light **(Figure 10.3)**. This can be seen in the NG Church in Burgerspark designed by Daan Kesting in 1969 (Wessels, 2001: 27)**(Figure 10.5)**.

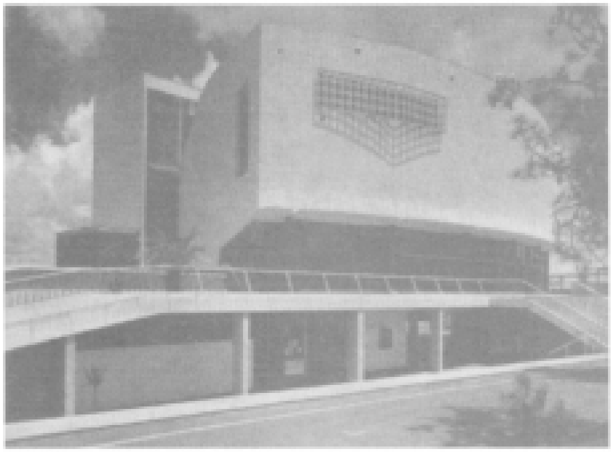
Figure 10.2:
Polley's Arcade, Pretoria - Norman Eaton. Stairwell detail. 1953.

Figure 10.3:
Little Theatre, Pretoria - Norman Eaton. Brick wall detail. 1940.



Although Pretoria Regionalism can be seen as an "apartheid" architecture, it can still be applied to the situation we have currently. A common bond for people living in the city is the sense of African Landscape and dwelling on African soil (Fisher et al, 1998: 140). The same generators of a global architecture is applicable again: the urbanisation of rural people with ties to a sense of material, climate, landscape and economic restrictions (Fisher et al, 1998: 140). City culture can be seen as a global culture.

The regional tectonics will influence the design of the building to establish an image and identity for Pretoria.



9.13

Figure 10.4:
Aula at University of Pretoria's main campus - Philip Nel & Partners. Decorative concrete screens.

Figure 10.5:
Little Theatre, Skinner street - Norman Eaton, 1940.

Figure 10.6:
Doxa Deo Church, Burgerspark. Daan Kesting, 1969.

11 precedents

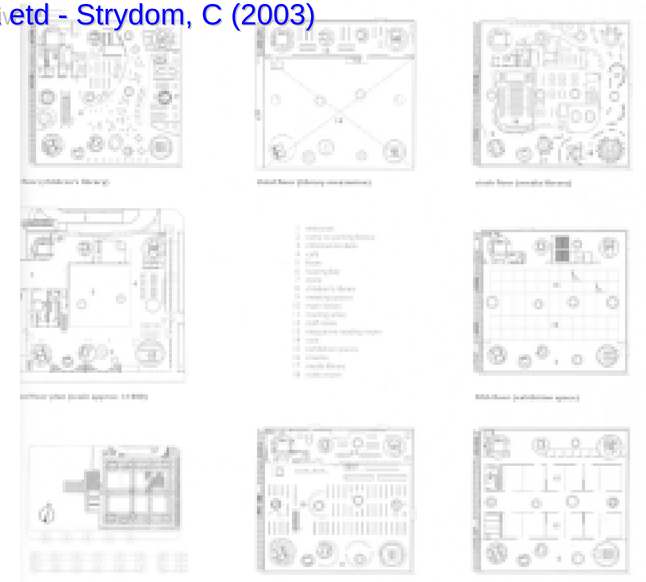


Figure 11.3:
Building plans

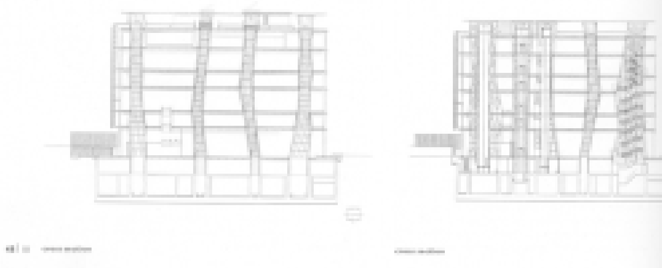


Figure 11.4:
Section through the building

Mediatheque , Sendai, Japan – Toyo Ito 1999

According to Ito, the typical form of library and museum is demolished with the rise of the Mediatheque. As he calls it a convenience store for media: paintings, books, films, compact discs and video tapes, without any hierarchy. This new type of building will be close to a railway station and open 24 hrs (Ito, 2001: 36). Marshall McLuhan said in the 1960’s “clothing and shelter are an extended form of our skin” (Ito, 2001: 36). Architecture can do just that, acting as a media suit.

Architecture in the guise of a media suit can be described as an externalised brain. The Mediatheque, being on one of the city’s main boulevard, is easily accessible and needed to be both culturally and architecturally challenging (Ito; 2001; p.37).

This building becomes an expression of civic pride; with each façade being different it shows a new attitude towards architecture: an ambiguous façade.

The structure of the building is even more so a new attitude: the floor is flat plates of steel embedded in concrete and the vertical structure is a structural tree of welded tubular steel baskets supporting voids **(Figure 11.1)** (Ito, 2001: 38). The floor plates vary in thickness due to the difference in forces on the tubes. The internal orthogonal ribbing is arranged radially around the tubes (Pollock, 2001: 199). The structural system had as a result an openness that promoted free action and for the user, as Ito describes it, to discover new spaces and uses for themselves.This gives the impression of lightness. The hollow section trees range in diameter from 7 to 30 feet and comprises of sections of 5 to 10 inches in diameter (Pollock, 2001: 192).

The corner columns are 240mm in diameter for seismic bracing and the other 9 columns are 160mm in diameter and are scattered in between, the straight ducts carry lifts, while the rest carry ducts (Webb, 2001: 49).The columns also double as conduits for vertically circulating air, water, electricity, people and light. Some of the voids have circulation systems like stairs and lifts in them, while the others just let in vast expanses of light.

The furniture was designed by Kazuo Sejima and Karim Rashid to bring colour into a monochrome structure. The furniture, lighting and materials create a unique identity for each floor. It becomes pretentious, forcing symbolism for example the green carpet on the top floor called the “garden of knowledge”.

The building is monumental and as Pollock describes it an “urban spectacle” (2001: 191)**(Figure 11.2)**. The ground floor can be seen as an urban plaza with a 5000 square foot open square. All the paths from the gound floor lead to the second floor with periodicals, internet, children’s books and offices, separated by curtains to keep visual barriers to a minimum **(Figure 11.4)**. The third floor has a double-height library with 160 000 books, quiet study areas and casual seating overlooking the street. The fourth floor mezzanine has the reference section. The fifth- and sixth floor have galleries that could be rented out to the general public or used for professional exhibitions and performances. The top of the

Figure 11.1:
Elements of structure

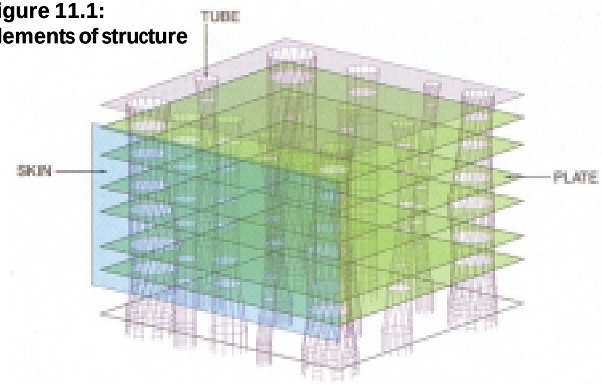


Figure 11.2:
The "urban spectacle".

building has an audio-visual centre and a theatre, conference room and administrative area all in the centre of the floor (Pollock; 2001: 192)**(Figure 11.3)**.

The city wanted the building to be forward-looking and that held up the design process. Ito decided to break down the design into three fundamental elements: plates, tubes and skin. A criticism to this design is that the partitions, doors, elevators and stairs were just plugged in to make it an actual building.

The diverse activities on each floor are exposed by transparent and semi-transparent glass and metal. The south façade is a double skin clear glass façade that insulates the building interior in winter and draws hot air up and out in summer (Pollock; 2001; p.201). The west façade has a metal louvered screen and the roof is also a louvered metal screen, hovering on the structural tubes jutting out from below.

The Mediatheque is an innovative and fun building. Ito wanted to bridge the gap between real and conceptual, a physical embodiment of the electronic labyrinth of today's society (Webb; 2001: 48). The building cost $100 million and is a popular local resource to the Sendai community. The idea was to create an innovative structural system of gathering and sharing information by electronic, digital, visual and printed means (Pollock; 2001: 191).

The building's structural openness is unfortunately sacrificed for a lot of crammed functions on each floor. The top two floors are used for exhibition space that could rather be used for other functions in the buildings. The movable curtains could rather have been used to improve flexibility than to just enhance visibility. Although the idea is to let the occupants decide on the use of the space, more clues needed to be given for use. The architecture of the building is successful and perhaps through use and time the real potential could be realised.

The program of the building includes:

- café
- shop
- open square
- info desk
- bicycle parking
- childrens library
- conference
- periodicals
- offices
- book stacks -160 000 books
- reading
- lounge
- computer studio
- audiovisual
- internet
- theatre

(Pollock; 2001; p.194)

University Library Delft,
The Netherlands 1998

This $30 million building designed by Mecanoo architects was on commission from the International Netherlands Group Real Estate. The university's library program included that the building be experienced as a square, piazza and public place (Betsky, 1998: 124). The library has a language of sustainability, functionality and legibility.

Being next to the Van Den Boek & Bakema building it tactfully responds to its iconic neighbour (a Brutalist lecture hall) by burrowing into the ground, becoming part of the landscape (van Cleef, 1999: 45)**(Figure 11.5)**. The roof thus becoming a relaxing space for students **(Figure 11.6)**. Although being sensitive to the existing buildings it has its own integrity and celebrates the innovativeness of a readable information hub. The isolated existing buildings creates a sense of no intimacy, and this is solved by the new library bringing a human scale to the surroundings **(Figure 11.7)**. This building organises patrons through visibility; they can see functions they might use. The glass tower signifies the traditional bell tower, giving it a landmark and beacon quality. The cone also brings light into the building and places emphasis on the information desk in the centre. This 160 000 s.q.m library could be seen as a centre of Enlightenment: a sleek glass façade versus the large institutional building (Betsky, 1998: 130) (Lootsma, 1999: 29).

Computers began to free up space in all kinds of buildings (Betsky, 1998: 124). The building has a sense of transparency with the majority of books in a central stockroom. The material stored in the basement can easily be retrieved and the process of information retrieval and perusal gives the impression of a train station or airport rather than a traditional library **(Figure 11.8)** (Betsky, 1998: 128).The glass façade is layered with galleries giving access to the users. The building could be seen as a large hall with long strips of office space around the hall perimeter (van Cleef, 1999: 46)

The library has 1000 study spaces with 300 of them computer (van Cleef, 1999: 46). The result is a variety of different types of working spaces: private, cellular study spaces with airy communal reading rooms with 500 seats lighted by the white cone (Betsky, 1998: 124). The cone houses the four levels of reading rooms, with the study spaces around the central light filled void (van Cleef, 1999: 45)**.** The double volume in the main hall ensures that enough light falling in through the cone. The library has 80 000 current books and periodicals that are kept in open book cases **(Figure 11.9)**. The building also includes distance reference and information

Figure 11.5:
Glass facade with Bakema building in background

Figure 11.6:
"Green roof" of building becomes relaxation space.

services for commercial and industrial companies, and is connected electronically to libraries around the world.

The glazed facades and turf roof has thermal and acoustic insulation properties. Rainwater evaporation ensures cooling in summer and all subsurface water is carried away in subterranean tubes (van Cleef, 1999: 47). Double glazing with horizontal slits in the glass, a 140mm air cavity that is ventilated, solar shading and a sliding inner leaf of toughened glass ensures thermal comfort in the building (Betsky, 1998: 124). The air in the cavity is sucked out at high level on each floor, and to minimise disruption of air flow, open-able windows are kept as small as possible.

In its context the library becomes an intersection between old and new, familiar and strange, public and private. The building goes against the typical static spatial configuration of most libraries to introduce a new dynamism **(Figure 11.10)**. The function of the cone as an expressive element could be questioned but it definitely has an orientating function together with the visibility of each structural element and the building function. The shapeless world of digital technology becomes visible (Betsky; 1998; p.130).

Figure 11.10:
Bridges connecting reading rooms to the rest of the building

Figure 11.7:
Site plan

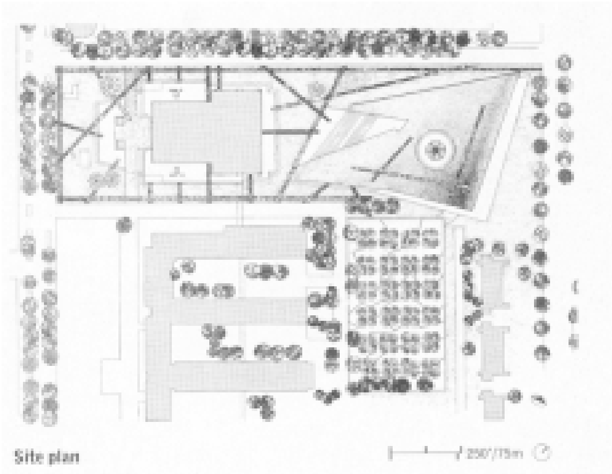


Figure 11.9:
Building plans

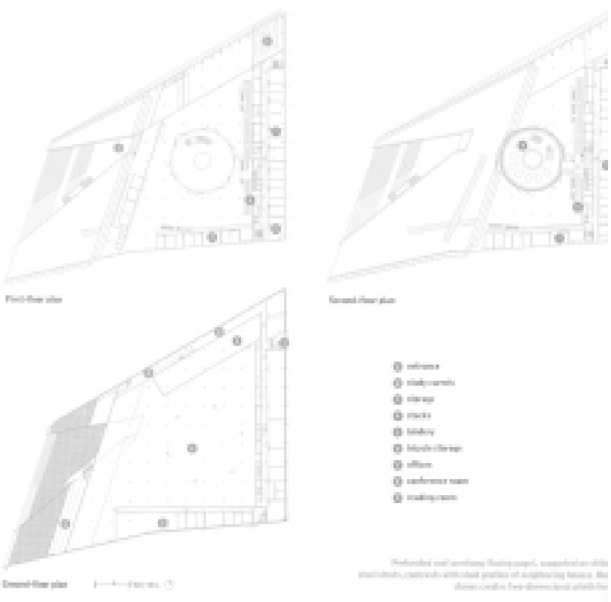
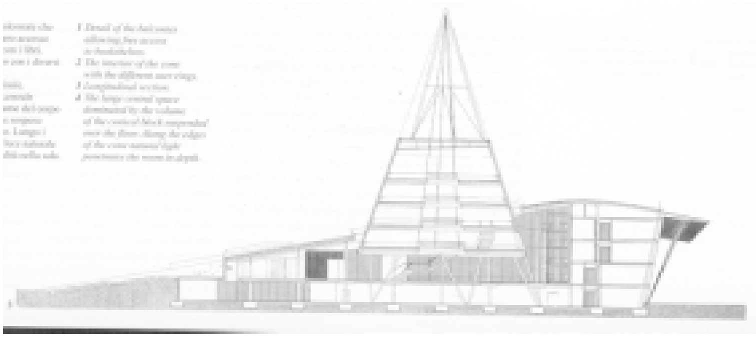


Figure 11.8:
Section



Duduza resource centre
Joe Noero Architects 1992

The main objective for this development was an educational and community function. The support for this project came from Industrialists in Nigel area. A building was established for a community of 45000 people with 24 hour access (Slessor, 1993: 24).

The program for the building includes a market, taxi and bus rank, classrooms, courtyard, community hall, offices and a flexible space with moveable walls. A board of trustees, consisting of the union and the industrialists initiated the project. In 1992 the building was built for R 1500 000: the aim was neither to be cheap nor expensive; but resourceful. Unskilled and semi – skilled labour were used. Skill transfer was the main objective for this resource centre. The principle during the construction of the building, was that the nature of construction must be made apparent (Noero, 1994: 28). The users of the building are engaged consciously with the building, not just in an abstract sense.

Christiaan Norberg Schultz comments that a place must be experienced as a gathering with concrete presence (Noero, 1994: 28). The creation of place is the purpose of architecture. As soon as language is added to man- made centres, it becomes civilization. As a result of clarity of definition one gets interaction.

Herman Hertzberger sees a variety of opportunities in such buildings. Buildingsare three dimensional, not two dimensional (Noero, 1004: 29). A building must be accessible and legible for example the entrance and circulation system. The functions must be recognisable and have comfortable human proportions, give a sense of scale to people and object and ensure flexibility (Noero, 1994: 29). Unfortunately the residential scale of the building results in the importance thereof being undermined. If it had some larger scale some civic pride could have been the result.

After visiting the building, it became apparent that all the ideals of the architect did not realise. A 24 hour community street was proposed where people will move similar to shopping streets. Unfortunately the building is only used untill eight o' clock on some evenings. The internal street does have open readable glass "shop fronts". These rooms were added independently along circulation spines. This promotes a vibrancy along these routes **(Figure 11.15)**.

The building has a central courtyard with all development around that **(Figure 11.14)**. Smaller courtyards were proposed, but unfortunately nothing of the proposed additions were built. Because of this, the building is only experienced in a linear manner, with the rest of the site left derelict. Every piece of landscaping was supposed to have a particular ecological system, from wet to dry land, for educational purposes. This was also never built. The entrance is clearly differentiated on the eastern side because of the market area. The community edge (active edge) to support activities within the centre, is unfortunately only apparent on the easterns side. The western side is unused and derelict.

Night-time study was proposed (Noero; 1994; p.30). Study spaces could be rented with workspace, a locker and electricity. This was to promote 24 hour activity. This facility is not used **(Figure 11.17)**.

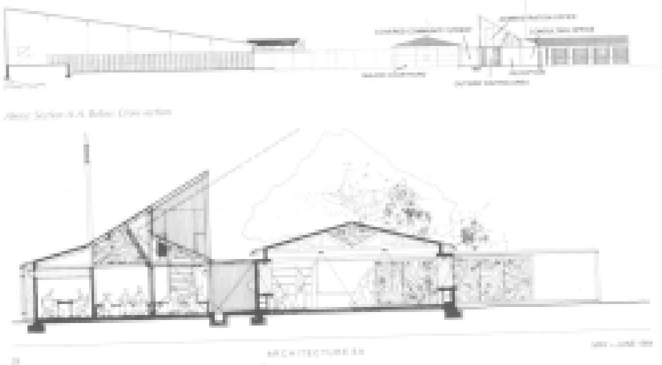


Figure 11.11: Section

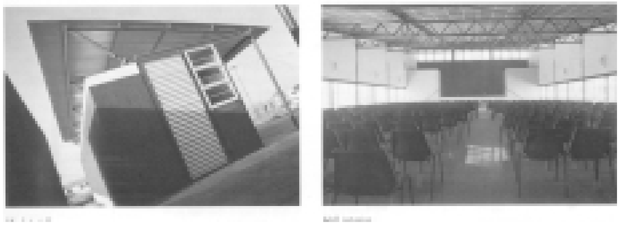


Figure 11.12: Market and hall in 1992

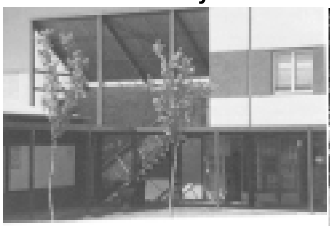


Figure 11.13: Courtyard in 1992

Figure 11.14: Courtyard 2003

The building is in a derelict state. It appears as if no maintenace was done since its construction. The steel structure is corroded, the plaster has cracked, the paint is faded, sixty percent of the glass windows is broken or not there, the timber panelling in the sliding doors and on the rest of the building is rotted and broken, the sliding doors are not working, the gutters are corroded with holes in it and door handles are broken off. This does not even list all the unmaintained elements.

It appears as if this is due to vandalism at night, and the lack of maintenance.

Functionally the building works well, and the spaces are flexible. The hall has pivot doors that opens up to the courtyard. Unfortunately the sliding doors in the classrooms are not working. At the moment the building functions consist of a nursery, offices, rehabilitation facilities, matric tuition which includes a science laboratory. It is a pity that the rest of the development was never built, the result is an monotonous landscape and un-utilised space. The passive climate control is successful through light infiltration and cross ventilation.

Figure 11.15: Internal street

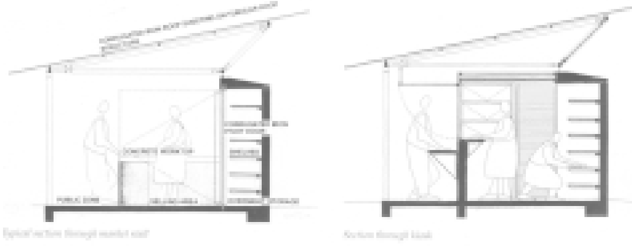


Figure 11.16: Sections of stalls

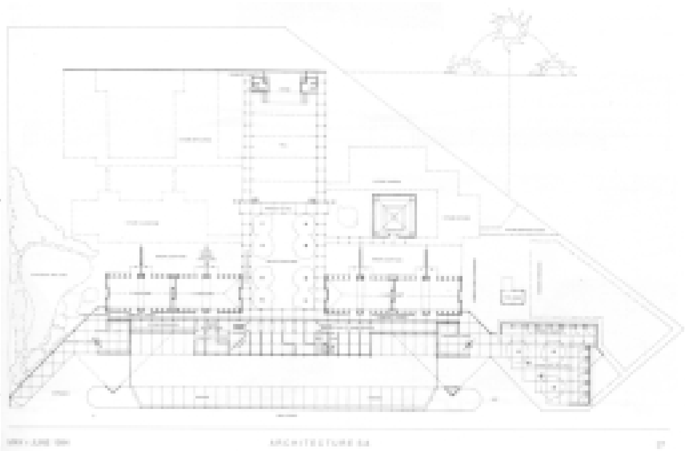


Figure 11.17: Site plan

Conclusion

After the study of the precedents, certain aspects of each building are seen as influential , regarding visual culture and the design of the building.

Mediatheque

Ito describes this building as a new type that will be close to a railway station and will be open 24 hours. The structural system of the building allows an openness and a discovering of new spaces and use for the user. The building can be seen as an "urban plaza" with open squares, thus promoting a definite link between the interior and exterior of the building. A innovative structural system of gathering and sharing digital information.

Delft library

Sustainability, legibility and functionality are the key words in this building design. It has a sensitivity to culturally relevant buildings on the site, while still keeping its independance and integrity. Through visibility, the building's function is clear. A new library is created versus the large institutional building. Information services are supplied to commercial and industrial organisations, creating electronic connections with other libraries around the world. The result is a visible digital world.

In both buildings the passive climate control is evident where natural ventilation is used for cooling and heating of the building.

Duduza resource centre

The concept of the Duduza Resource Centre is derived independently from any form of cultural association. It works functionally and is flexible. The maintenance is poor, and the question arises on the sustainability of the materials chosen, for example the timber panelling. The residential scale of the building is not appropriate. Definite steps need to be taken to rehabilitate the building.

Acoustics – 25 – 55 dB, SABS 0103 Act 73 of 1989
Norms and Standards – SABS 0400 – 1990
F- face C- concrete A- acoustic T= total c= children a= adult t=temperature
Consultants – architect, interior-, landscape-, land surveyor, geologist, town planner, Q.S, structural-, civil-, mech.-, electrical-, fire-, project m.
Ventilation
Varies from Xtra Low-0,08 W/m³C; Low-0,17 W/m³C; Medium- 0,33 W/m³C; High- 0,5 W/m³C; Xtra high-0, 67 W/m³C

Programme	Area/Person	Appliances	Furniture	Finishes	Illumination	Ventilation
Multi Functional Hall	1.1 m²/p 450 m²	Electricity	Moveable Chairs & Tables	F brick, Carpet tiles, A panels	300 lux	t=18C Low
Kitchen	0,45 m² aisle:1,4m	Electricity, H2O, gas	Fixed stoves- refrigerator	Fbrick, polished C screed	500 lux	t=20 C
Computer Centre	1,25 m²	Cable, electricity	Moveable chairs, tables	F brick, polished C screed	500 lux	t=18 C
Study Carrels	1,85 m²	electricity	moveable chairs, table	F brick, polished C screed	300 lux	t= 18 C X
Class rooms	2,3 m²	electricity, H2O	moveable chairs, tables A panels	F brick, polished C screed,	300 lux	t= 18 C X high
Administration offices	9,3 m² T= 250 m²	electricity, H2O, internet	moveable chairs, tables	F brick, painted epoxy enamel floor	500 lux	t= 20 C Med
Reading rooms Low T= 375 m²	1,1 m²	electricity	moveable chairs, tables	painted wall modules, painted epoxy enamel floor	500 lux	t=20 C
Book stacks Low T= 750 m² (a)	T= 100 m² (c)	electricity	moveable stacks	painted wall modules, painted epoxy enamel floor	150 lux	t= 18 C
Periodicals	T= 200 m²	electricity	moveable stacks	painted wall modules, Painted epoxy enamel floor	150 lux	t=18 C Low
Children's books	T= 350 m²	electricity	moveable stacks, play carpet	painted wall modules Painted epoxy enamel floor	150 lux	t=18 C Low
Book Stock	T= 180 m²	electricity	moveable stacks	painted wall modules Painted epoxy enamel floor	150 lux	t= 15C X low
Conference rooms	4,65 m²	electricity	moveable chairs, tables	painted wall modules Painted epoxy enamel floors	750 lux	t=18C Med
Audio Visual Centre	T= 450 m²	electricity, cd, dvd, Players, monitors, cable	moveable chairs, tables	painted wall modules painted epoxy enamel floors	300 lux	t= 20C low
Information desk	2,5 m²	electricity, cable, internet	moveable chairs, tables, info desk	painted wall modules painted epoxy enamel floors	500 lux	t= 20C Med
Exhibition Space	T= 85 m²	electricity	moveable stands	painted wall modules, polished C screed	500 lux	t=18C X Low
Public Toilets (Inside)		electricity, H2O, Services	fixed appliances	painted wall modules painted epoxy enamel floors, waterproofing	150 lux	t= 18 C High
Courtyards	1,05 m²	electricity,H2O	fixed outdoor furniture Drinking fountains	paving material, F-brick	30 lux	

Café	1,0 m^2	electricity	moveable chairs, tables	painted wall modules, polished C screed	200 lux	t= 18C Med
Kitchen	0,45 m^2 aisle: 1,4 m	electricity, H_2O, gas	fixed stoves, refrigerator,	painted wall modules, polished C screed	500 lux	t=20C Med
Market	0,46 m^2 3,5m aisle	pre-paid meters – H_2O -electricity, - gas	fixed counters, -basins, - hot plates	F-brick, polished C screed	100 lux	t=18C Med
Storage	1 m^2		lockers, bulk storage	painted wall modules Painted epoxy enamel floors	150 lux	t=15C Low
Taxi Rank		electricity, H_2O	fixed outdoor furniture Drinking fountains	paving material, face brick	30 lux	
Bus drop off		69m long, 16,2 Transition length	fixed outdoor furniture drinking fountains	paving material	30 lux	
Public Toilets (Outside)		electricity, H_2O, Services	fixed appliances	F-brick, polished C screed	150 lux	t=18C High
Overnight Facilities	T=16 m^2/ room	electricity, H_2O, internet	moveable table, chair, bed	F-brick, polished C screed	150 lux	t= !8C Low
Communal bathrooms	1,21 m^2	electricity, H_2O	fixed appliances	F-brick, polished C floors	100 lux	t=22C X high
Circulation Spaces	0,8 m^2 T= 126 m^2	lighting	Gradient- 8,5 %, Rise- 200mm max, treat- min. 250mm, 1:8 gradient: 1,2 wide (SABS 0400-1990; p.91 -94)	textured pigmented concrete screed	100 – 150 lux	t=16 C High
External Circulation		lighting	150mm kerb	paving material	30 lux	
	(SABS 0400 – 1990; p. 56)				10% of floorarea (SABS; p.102)	5% of floorarea (SABS; p.108)

Sources: (Tutt et al; 1979; p. 293; p. 381; p.412; p.433; p.481) (Van Zyl; p.2-5) (Tutt et al; 1979; p.385-386.)

Recycability/Sustainability
Material- low embodied energy, durable materials, flexible space.
Recyclable materials, Re usable, low energy use.
Passive climate design, Labour intensive/ Skill, transfer, economic.

Fire regulations
2 escape routes if > 45m to nearest escape route. Room >50 persons.
120 minute lag time floor ceiling, walls. Door 800mm wide
Route width- 120 people. 1,1m- 190 people, 1,8m well ventilated
Fire hydrant for energy 500 m^2. Extinguisher 1/200 m^2 - 9 litre type
Source: SABS 0400-1990; p. 181- 198.

Sanitary Appliances
Classrooms/ Lecture = Male- 4 WC, 7 Ur, 6 HWB, Female- 10 WC, 6 HWB
Exhibition = Male- 1WC, 1 HWB, Female- 1 WC, 1 HWB
Market/ Taxi = Male- 4 WC, 7 Ur, 6 HWB, Female- 10 WC, 6 HWB
Offices/ Library = Male- 4 WC, 7 Ur, 6 HWB, Female- 10 WC, 6 HWB
Residential = Male – 4 WC, 8 Ur, 6 HWB, 6 bath, Female- 12 WC, 6 HWB, 6 Bath
Source: SABS 0400-1990; p.124-126.

Handicapped
Gradient max 1:12 Handrail, Balustrade- 600mm rise
1 WC for 100 bedrooms
2 WC for > 20 WC
2 wheelchairs in aisle
Source: SABS 0400-1990; p.152 -155.

Legislation
Agenda 21 ISO 14001 Environ. Cons. Act 73 of 1989 Nat. Monum. Act 28 of 1969 Nat. Heritage Act 25 of 1999 Urban Develop. Framework
Develop. Facilit. Act 67 of '96 Sectional title Act 95 0f '86
National Roads Act 64 of '71 Nat. Build. Reg. Act 103 of '77
Arch. Proff. Act 36 of 2000
Lands. Arch. Act 36 of 2000 Reg. of Deeds act 47 of '37
Land Affairs Act 101 of '87 Atm. Poll. Prev. Act 45 of '65
Land Survey Act 9 of '27
Phys. Planning Act 126 of '91 Community Develop. Act.
Internal Security Act 74 of '82 Land Measures Act 27 of '91
Urban Transport Act 78 0f '77
Nat. Env. Man. Act 107 0f '98 Employment Act of 1997
EIA of ECA sect 21,22,26 of '98 Ground Dev. Fac. Act 67 of '95
Water Services Act 108 of '97
Constr. Indust. Develop. Act.

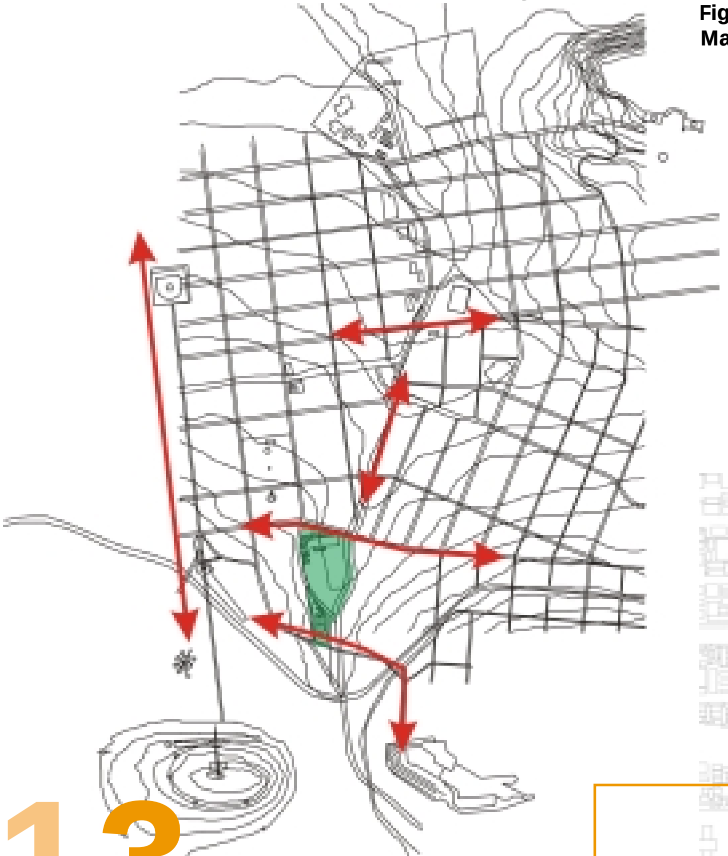
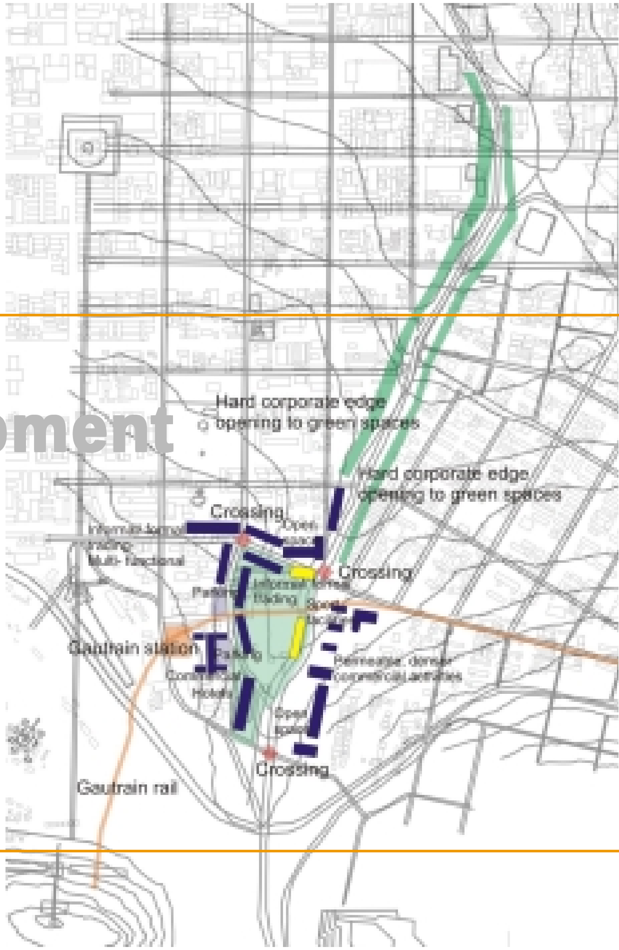


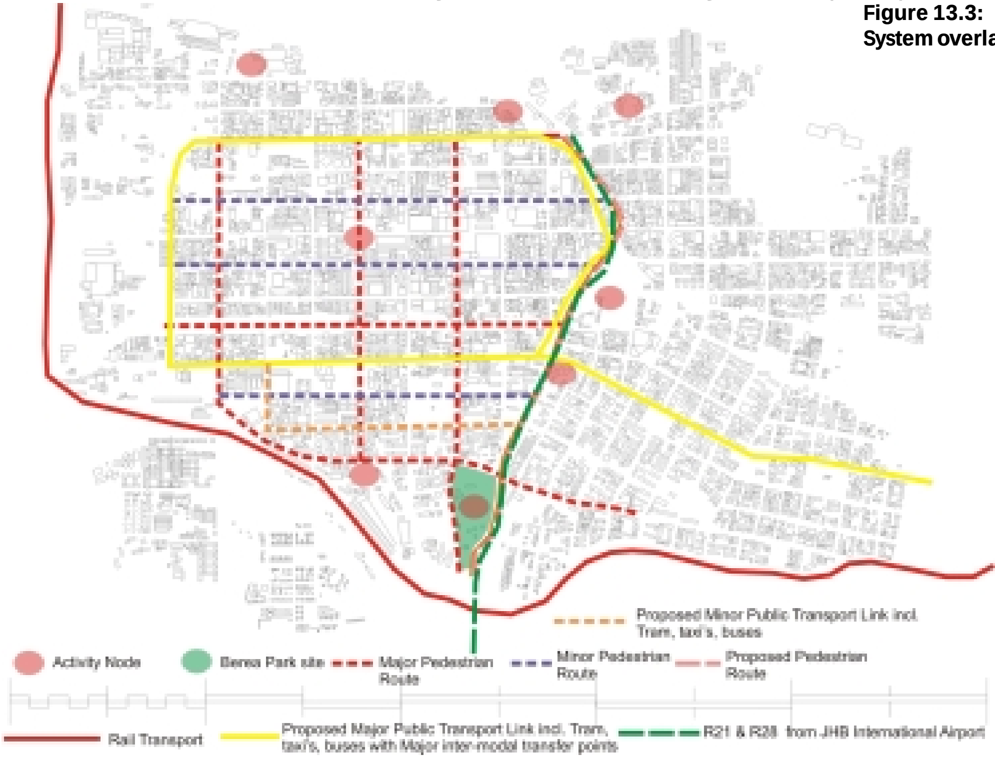
Figure 13.1:
Makro site showing links

Figure 13.2:
Spatial planning



13 concept development

Figure 13.3:
System overlay: conclusion



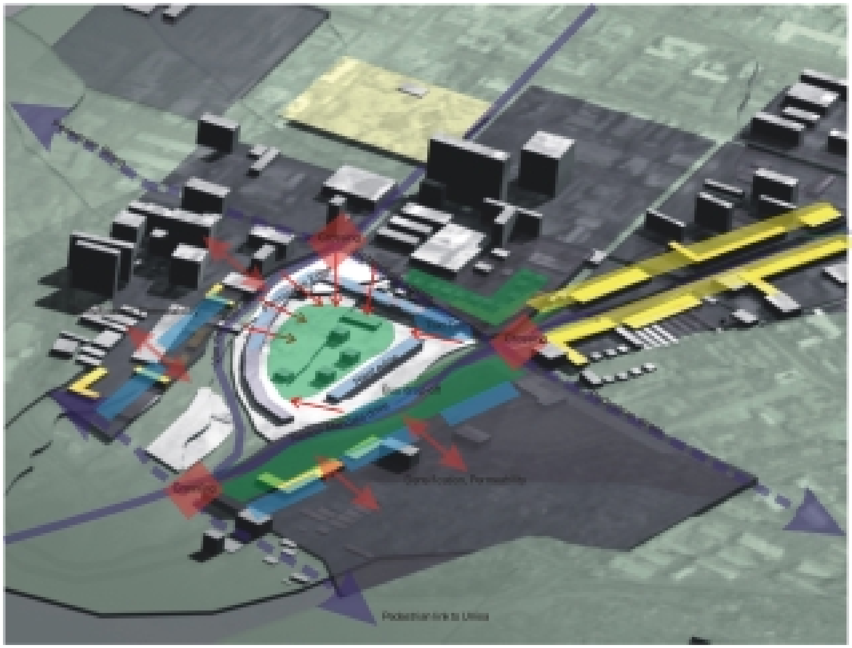
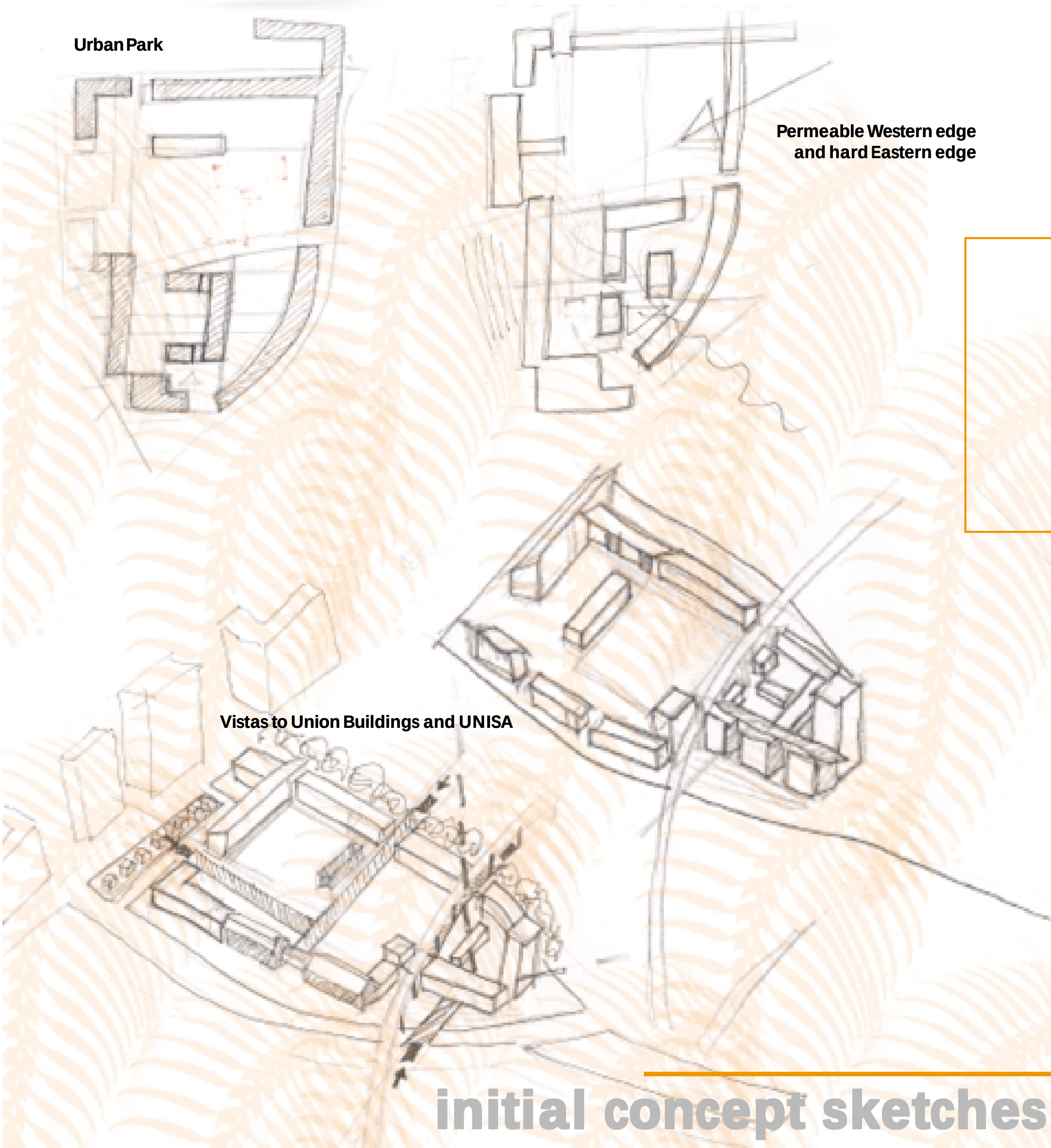
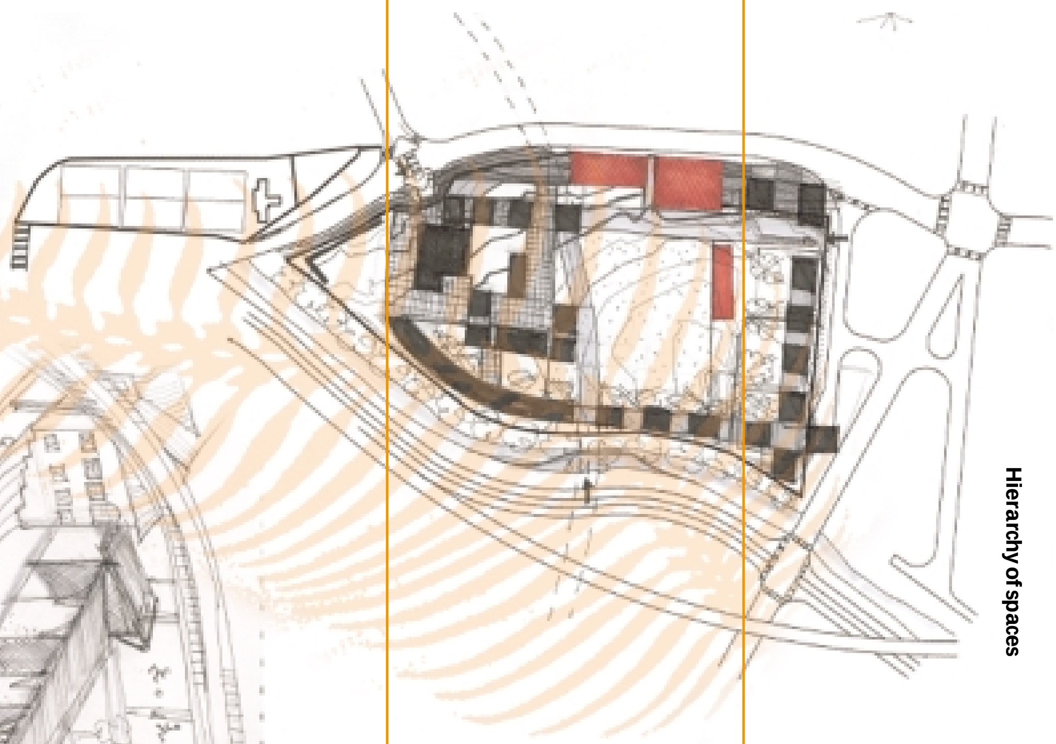


Figure 13.4:
Makro site

MODULAYERMODULAYERMODULAYER



initial concept sketches



Hierarchy of spaces

Brick, concrete, corrugated iron ...

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The Sustainable Building Assessment Tool (SBAT) has been designed to assess the sustainability of buildings. This is done by assessing the performance of a building in relation to a number of economic, social and environmental criteria. The tool has been designed to be appropriate for use in developing countries and therefore includes aspects such as the impact of the building on the local economy, not normally included in other assessment systems.

The tool can be used in design stages of a new building, or for the refurbishment of an existing building. It is designed to encourage the development of more sustainable buildings by enabling different options to be evaluated rapidly and compared. The tool also enables a building to be rated in terms of its sustainability. This enables buildings to be compared to each other and to benchmarks. The tool has been developed by the Sustainable Buildings Group of the Division of Building and Construction Technology, CSIR, Pretoria, South Africa.

The tool is designed to be very easy to use and generates graphical reports which enable performance to be easily read. The tool is also not building type-specific and can be used on a variety of buildings such as offices, factories, schools, clinics and housing (Gibberd; 2002; CSIR).

sustainability building assessment tool

01

Social

1. Occupant comfort priority: 5

- **Lighting –** the emphasis of the design is to let in as much natural day lighting as possible (see *Fenestration and Signs*).

- Ventilation – the emphasis of the design is to enhance natural ventilation and to promote cross – ventilation. This will all be managed manually by the occupants through openable windows. The stack effect will be used to enhance air movement through the building by passive cooling in summer and heat gain in winter. This will also be managed manually (see *Environmental Qualities*).

- Noise – this appears not to be a problem. Acoustic engineering will be addressed in the auditorium e.g. acoustic panels (see *Materials)*.

- Views – Occupants should be 6 m or less away from a window with views outside. Where this is not possible, indirect natural lighting and framed views are desirable (see *Access and Legibility*).

- Green Outside- Easy access to outside spaces ensured by visually- and physically permeable facades as well as planting inside the building (see *Landscaping)*.

2. Inclusive environments priority: 5

- **Public transport** – the development is at the furthest point 300 m away from a taxi terminal, 500m away from the Pretoria Station and 150 m away from a bus stop (see *Urban Design*).

- **Routes**- all the routes in and around the building have smooth and even surfaces and are handicap- friendly (see *Access and Legibility*).

- **Entrance**- the entrance to the building is open and legible. This enhances the gateway and landmark qualities of the building (see *Identity*).

- **Circulation** – all the spaces and staircases are connected and linked by ramps. This becomes a functional as well as a visual element (see *Foundations, Structure and Circulation*).

- **Furniture and fittings**- (see *Spatial Planning).*

- **Toilets and kitchens** – all of these spaces are disabled- friendly and easily accessible (see *Spatial Planning*).

3. Access to facilities priority: 3

- **Childcare**- available on site (see *Robustness and Flexibility*).
- **Banking** – close by ± 1-2 km.
- **Retail** – available on site. Forms part of greater inner city central business district (see *Urban Design)*.
- **Communication**- extensive internet and digital library. Electronic communication is promoted.
- **Residential** – available on site. Overnight facilities, apartments and high density residential area on the northern part of the site (see *Urban Design)*.

4. Participation & control priority: 5

- **Environmental control** – windows openable to outside as well as to the chimney stack, to ensure cross ventilation and air movement, all manually operated (see *Environmental Qualities*).
- **User adaptation** – the interior and exterior spaces create an opportunity for personalisation and re-arrangement because of its openness and flexibility e.g. moveable walls and stairs. Thermal comfort can also be controlled by occupants (see *Robustness and Flexibility*).
- **Social spaces** – personnel rooms are available for occupants. Seating is created along all the main pedestrian routes. All communal spaces are large enough for social gatherings, and the multi- purpose hall could be opened up to include the adjacent outside spaces (see *Robustness and Flexibility*).
- **Amenities** – there is easy access to all amenities including the cafeteria/ hall, kitchen spaces, class rooms and ablution facilities placed along circulation routes.
- **Community involvement** – this building has a social function and serves the greater community. The functions include study rooms, information classes, a digital library etc. all to uplift and educate the community.

5. Education, health and safety priority: 4

- **Education** – this is the single most important function of the building. The library, evening classes and the study carrels all contribute to that.
- **Safety & Security** – all the routes are well lit and passive surveillance is promoted through a mixed use development e.g. the evening classes and the overnight facilities. The Building Management Systems will include security systems.
- **Health** – recreation spaces are created in and around the building including a sports field on the northern part of the site. The indoor air quality is controlled by passive means.

Economic

6. Local economy priority: 3

- **Local contractors** – within 10 km
- **Local material supply** – within 50 km
- **Local components** – within 50 km
- **SMME's** – the security, cafeteria, maintenance etc. will be outsourced to different companies. The retail component on the northern side of the site will be practised by the local community. The management of the resource centre will be done by University of Pretoria, Unisa, Pretoria Technickon and smaller colleges.
- **Repairs and maintenance** – within 60 km.

7. Efficiency of use priority: 5

- **Usable space**- not more than 30% un-usable e.g. services and circulation. (see *Spatial Planning*)
- **Occupancy**- for 18 to 24 hrs a day.
- **Management of space**- hot desking in the office space, management by different universities, technikon and colleges.
- **Use of technology**- digital library and internet communication.
- **Disruption and Downtime**- all the passive systems will have as back up the conventional mechanical and electrical systems.

8. Adaptability and flexibility priority: 5

- **Vertical dimension** – 4m in the resource centre because of its civic function and flexibility, 3m in the rest of the development for maximum adaptability (see *Robustness and Flexibility*).
- **Internal partitions**- any division of spaces by moveable, adaptable walls or heavy stage curtains.
- **Services** – all services in a central, concrete service spine incl. mechanical-, electrical services and passive systems. Ventilation in the building will be supplied by cross ventilation and the stack effect. Solar panels will generate electricity which will be put back into the conventional grid system (see *Environmental Qualities).*

- **Structure**- mainly a steel structure. A lightweight steel structure will be used for moveable elements and roofs as well as for visual diversity (see *Foundations, Structure and Circulation).*

- **Circulation and service spaces** – These spaces will be provided in the service spine to promote flexibility and robustness (see *Robustness and Flexibility).*

9. Ongoing costs priority: 4

- **Maintenance**- easy, manageable low maintenance materials like stock brick, concrete and steel. Maintenance of the building will be outsourced to a SMME.

- **Cleaning** – floors will be solid with hard finish – no thick carpets (except in the Auditorium)

- All windows are reachable and cleanable.

- This function will be outsourced to a SMME.

- **Security** – passive surveillance is enhanced by mixed use and 18 hour activity. This function will be outsourced to a SMME.

- **Cost monitoring and shared costs** – this will all be managed by the different educational institutions and bureaus of the DEAT and DE.

10. Capital costs priority: 3

- **Consultant fees**

- **Build ability**- the building will be built economically, with a simple form, replication of elements and conventional materials.

- **Construction**- the shell will be built first and the finishes later. Phasing for the whole development could be proposed.

- **Shared costs** – size- and the quantity as well as costs will be reduced.

- **Use existing** – the historical clubhouse, hall and existing Berea Park High School and all its current functions will be kept (see *Briefing document & Context Study- Historical Context*).

- **Plate efficiency** – (see *Spatial Planning).*

- **Capital:** ongoing cost: building size (*will be addressed later in financial report*).

Environment

11. Water priority: 5

- **Grey water** will be re used . All the stored water will be pumped by energy from solar panels. A network of pipes will be installed though the building to create a circular grey water system. The sewerage will form part of the municipal system (see *Environmental qualities).*

- **Rainwater** – will be harvested, stored and used for grey water circulation and irrigation (see *Environmental Qualities*).

- **Water use** – all water efficient devices and the use thereof minimised by harvesting.

- **Grey water** – for washing, flushing toilet and irrigation and used in a closed system. This water after use will be sent through a gravel bed to filter and clean.

- **Run off**- most surfaces on the site will be pervious and absorbent surfaces. Gardens will be used on the roof and in the building. Hard surfaces will be used to define spaces.

- **Planting**- all planting will be indigenous and serve an educational purpose demonstrating ecosystems. Rainwater will be used for irrigation (see *Landscaping).*

12. Energy priority: 3

- **Location** – 50m from closest transport node.

- **Ventilation system** – will be based on a passive cross ventilation- and stack effect system (see *Environmental Qualities*).

- **Heating & cooling system**- heat gain through direct northern sunlight and a closable chimney stack (see *Environmental Qualities)*.

- **Appliances & fittings** – low energy appliances and fluorescent artificial lighting.

- **Renewable energy**- solar energy for electricity generation as part of the electrical grid system. Energy usage will be lowered by placing generated electricity back in grid by means of a meter system (see *Environmental Qualities*).

13. Recycling and Reuse priority: 3

- **Toxic waste**- if it is produced there will be safe disposal and placed at an allocated area.

- **Inorganic waste**- place for sorting, storage, pick up and recyclable waste (see *Environmental Qualities*).

- **Organic waste** – a suggestion is that all this waste will be sorted and picked up by a pig farmer in exchange for compost.

- **Sewerage**- will connect with the municipal connection and could then be recycled on a larger scale.

- **Construction waste**- no wastage of material and demolishing of existing structures. Modular and conventional material is used.

14. Site priority: 4

- **Brownfield site**- The site is a sports field, disturbed with traces of previous buildings.
- **Neighbouring buildings** – all buildings have access to sunlight. All the historical buildings are kept with the placement of the new buildings respectful to the existing (see *Urban Design*).
- **Vegetation**- roof gardens will be placed on the roof of the southern wing of the Resource Centre building, with planting all through the building (see *Landscaping).*
- **Habitat**- All the planting along the river is preserved. Ecosystems will be explained and has an educational function. Natural, local flora is vegetated.
- **Landscape** inputs are not artificial and disruption due to construction kept to a minimum.

15. Materials and components priority :4

- **Embodied energy** – Low embodied energy material like timber, concrete, brick and steel is used. Steel has a long life cycle and is structurally strong (see *Materials).*
- **Material/ Component sources-** All material could be recycled. Modular structural systems designed and – material used.
- **Manufacturing processes**- no pollution during manufacturing.
- **Recycled/ reused materials and components** – as far as possible recycled structural steel from demolished buildings will be used.
- **Construction processes-** no excavation, or damage to vegetation.
- **Components & modular coordination** – a structural grid will be used and modular bricks and windows will be used.

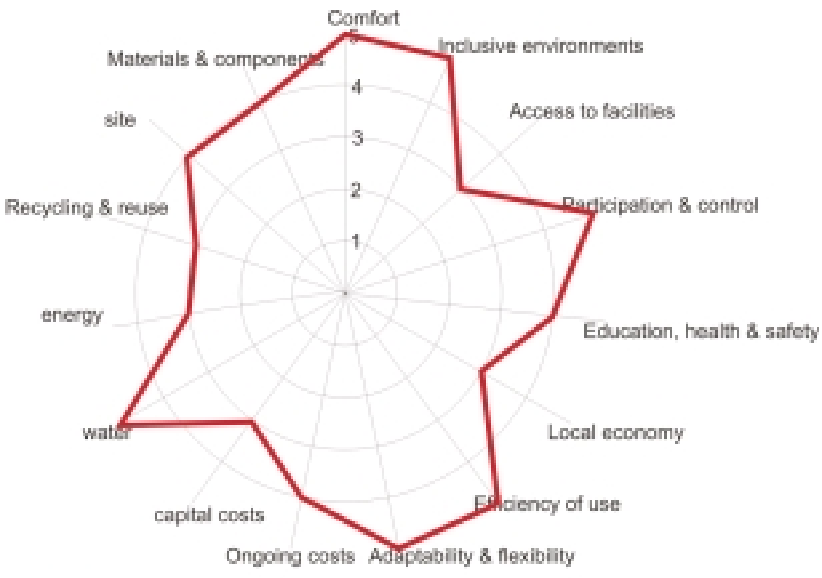


Figure 1.1: **SBAT** targetsetting

0 2 objectives & guidelines

To read the achievement of these objectives see the *Design essay* and *Technical report*

- To establish a visual identity for the building: enhancing its landmark- and gateway qualities and making it recognisable and identifiable through circulation systems and routes **(Figure 2.1)**

- To integrate public and private spaces through a multi functional development **(Figure 2.2)**

– To fragment the building to achieve desirable outdoor spaces and diversity in use and passive surveillance.

- To emphasise the buildings social uplifting role.

- To address the buildings political role through for example questioning the physical fabric of a wall and the way it is managed.

- To adopt the concept of the virtual office where information processing takes place by telephone, fax and data processing systems.

- To design a sustainable building with less energy use.

- To use natural systems to regulate climate, to use solar energy in generating electricity and to harvest rainwater for grey water and irrigation use **(Figure 2.3)**.
- To design an economic building regarding energy, function and space.
- The adopt the design guidelines as in *Responsive Environments*:

Permeability:
-To give choices and alternative ways through an environment and to lead people in a certain direction e.g. ramps and circulation through the building.

Variety:
- To give the user a choice of experiences and to maximise variety. The building volumes and scale are very important e.g. the different functions have a different volume and scale **(Figure 2.4)**.

Legibility:
- To ease the understanding of the layout of the building. Differing qualities and spatial enclosures are used for different routes, junctions and different volumes. For example the transparency of the facades and horizontal- and vertical textures will make the function of the building more legible **(Figure 2.5)**.

Robustness:
- To design a multi-purpose building. This could be achieved with careful consideration of lighting, volume, scale etc. It is achieved in the building through moveable walls and curtains. The possibility of adding mezzanine floors in the double volumes of the resource centre is addressed.

(up to this point – Bentley et al; 1998; p.10)

Visual appropriateness:
- To address the detail appearance and interpretation of the building. The building is interpreted as having meanings and makes people aware of the choices offered (see *Identity).*

Richness:
- To increase the choice of sense experiences with the choice of materials and construction techniques.

Personalisation:
- To accommodate for public participation in the design of the building and to leave room for individual input by the occupant. This should not erode the public role of the building.

(Up to this point – Bentley et al; 1998; p.11).

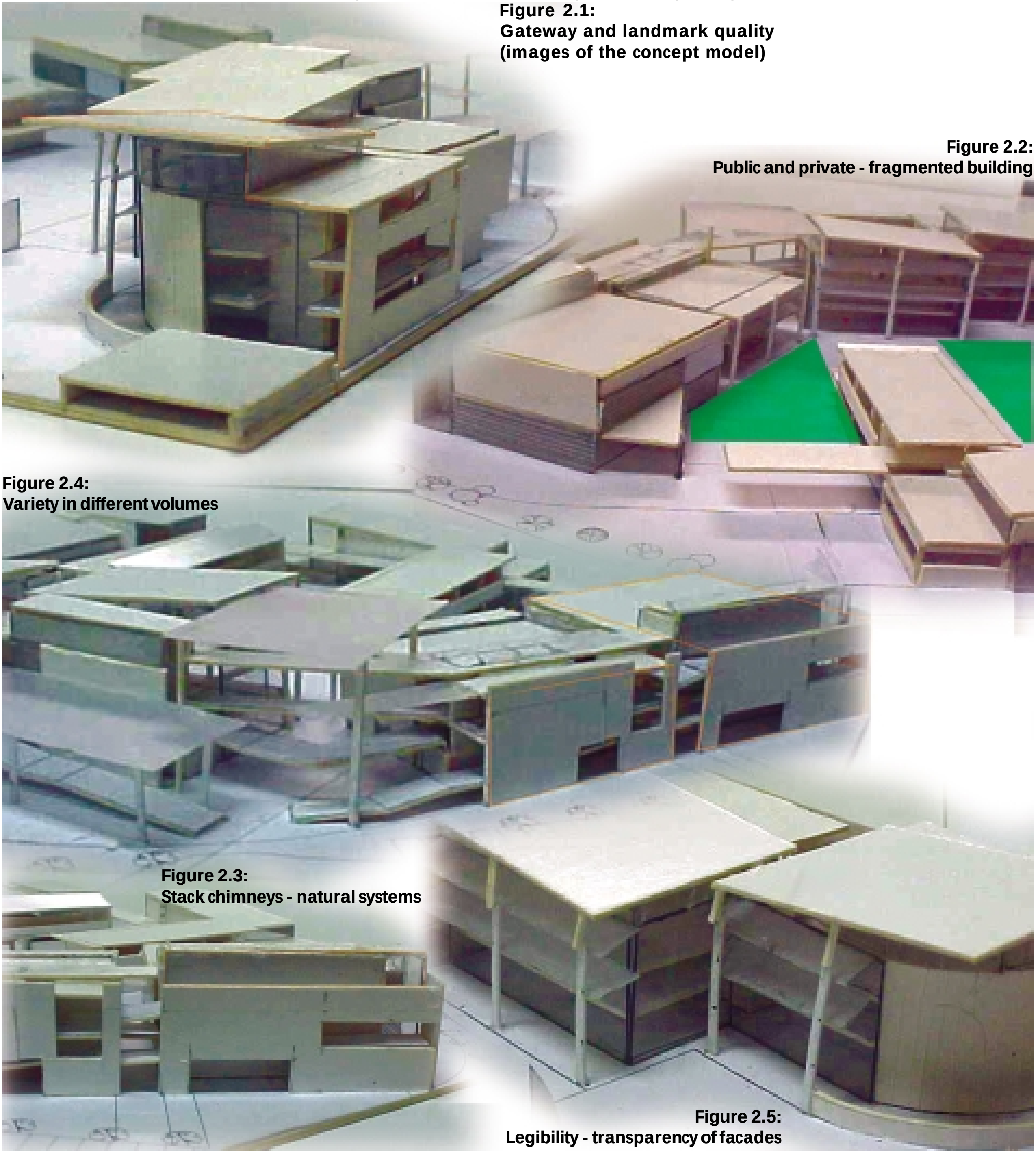


Figure 2.1:
Gateway and landmark quality (images of the concept model)

Figure 2.2:
Public and private - fragmented building

Figure 2.4:
Variety in different volumes

Figure 2.3:
Stack chimneys - natural systems

Figure 2.5:
Legibility - transparency of facades

spatial planning 03

Figure 3.1:
Spatial site planning
(not to scale)

All the following targets were met in the design. Elementary mathematics were used to keep communication easy. Some calculations could be taken further by an engineer.

FSR = -commercial – 7698 m²
- offices -3168 m²
- residential – 2104 m²
- overnight facilities- 2400 m²
- resource centre- 8829 m²
- hall & classrooms – 2251 m²
- 26450 m²
- site- 48282 m²

= 26450 m²
48282 m²
= 0,55

Coverage = 15931 m²
48282 m²
= 32 %

Parking = 1,5 bays/ 100 m² building
= 400 bays maximum - * the reason is that the site is surrounded by a major public transport node

Height = 3 storeys maximum
* The reason for this is that the site is in a residential area, and part of the green open space system.

Building lines = 12m on river side because of the flood line.

SLOAP (space left over after planning) = 0

Plate ratio = Floorarea (excluding roofed courtyard) : elevation
= 9177 m²: 2667,3 m²
= 30% or 0,3 (not more than 0,4) for appropriate ventilation and lighting.

Volume : Envelope
=36705,6 m³ : 4986,6
= 0,13

Daylighting : Floorarea (Excluding roofed courtyard)
= 9177 m²: 2819,3 m²
= 30% - minimum 10% is needed according to the NBR.

Ventilation : Floorarea (excluding roofed courtyard)
Average of 60% opening sections of windows
= 2255 m²: 9177 m²
= 25% - minimum 5% is needed according to the NBR.

% of site that is landscaping (ideally 90%)
= 11 563,3 m² / 25132,5 m²
= 46 % planted.

BULK – 26450 m²

PARKING – 400 BAYS FOR WHOLE DEVELOPMENT - 5000 m²

RETAIL – 7698 m² 29%

RESIDENTIAL – 4504 m² 17%

COMMERCIAL/OFFICE – 3168 m² 12%

RESOURCE CENTRE- 11080 m² 42% (OFFICE + RESOURCE CENTRE = 42% + 12% = 54%)
(Fig. 4.1)

Economy:

Total area (Including roofed courtyards) : Area services, structure, circulation
= 9177 m² : 2749,4 m²
= 70% lettable

For passive climate regulation certain guidelines can be implemented:
-A mono-pitch roof to stimulate natural air flow through the building.
-A ventilated roof structure to let warm air escape.
-Large overhangs on the northern and eastern side, with shading devices on the east.
-A solid western façade
-The sun should be kept out in summer and let in during winter on the northern facade.
-The integration of nature, public and private spaces is desirable on the eastern and southern side
-The different courtyards should have identity and comfortable microclimate.
-Deciduous trees could be planted on the northern façade to let sunlight in during winter.
-Evergreen trees could be planted on the western façade to keep the sun out throughout the year.
-A designed passive climate system is desirable to minimise the use of non-renewable energy.
(Figure 4.1)

Addressing the climate of Pretoria, the building will be built out of masses, with minimal light through small windows and light coloured surface that reflect the sun (Daniels; 1998; p.50).

For heat gain and to use that as an energy source, surfaces can be painted black to absorb sunlight (Daniels; 1998; p.58).The solar radiation in the Pretoria area is > 2200 kWhr/ m², which is excellent for solar production (Daniels; 1998; p.59).

Figure 4.1:
Environmental control

4.1 Electricity generating

The use of grid electricity is reduced. The electricity generated through photovoltaic solar panels will be placed back in the grid to minimise units used **(Figure 4.2)**.

The annual net energy use for buildings:
General electricity use:
Space heating 73 MJ/m²/yr
Water heating 6 MJ/m²/yr
Cooling 48 MJ/m²/yr
Ventilation 16 MJ/m²/yr
Int. Lighting energy 40 MJ/m²/yr
Ext. Lighting energy 4 MJ/m²/yr
Pumps & Fans 6 MJ/m²/yr
Elev/ Esc. 1 MJ/m²/yr
Receptacles/ event equipment 12 MJ/m²/yr
Other 1 MJ/m²/yr

Electricity used in Resource centre according to benchmarks:
200 kwhr/ m²/ yr (benchmark for building with low energy benchmarks)
= <u>720 MJ/ m²/ yr</u> (building should have enough: heat gain, low energy lighting, no A/C etc.)

Best practice is 97 MJ/m²/yr
Normal practice- office over 3000 m² = 397 kwh/m²/year
1 kilo watt hour = 3,6 MJ

Energy consumed in Resource Centre:
= 200 kwhr/ m²/ yr x (9177 + 4586 m²)
= <u>275 2600</u> kwhr/ yr

<u>Only 10% of solar energy generated is usable</u>

Winter:

Solar energy = Surface area of panels x 5 kwhr/ m²/ day
= 1140 m² x 5 kwhr/ m²
= 5700 kwhr
= 570 kwhr is usable (10%)
= 570 kwhr/ day x 365 days
= 208050 kwhr/ year

Summer:

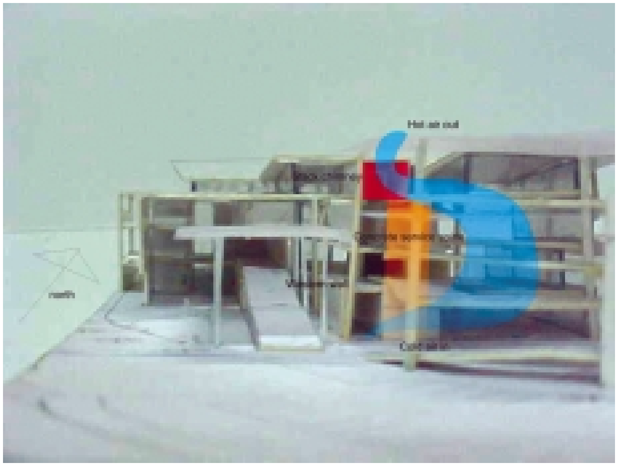
Solar energy = Surface area of panels x 7 kwhr/ m²
= 1140 m² x 7 kwhr/ m²/day
= 7980 kwhr
= 798 kwhr/ day x 365 days
= 291270 kwhr/ year

Percentage generated:

208050 kwhr/ yr / 275 2600 kwhr/ yr   291270kwhr/ yr / 275 2600 kwhr/ yr

= 7,5% (winter) to 10,5% (summer) of annual electricity replaced in grid annually

Figure 4.3:
Ventilation system



Economy:

The price of the solar panels is R 3000/ m²
= 4500 m² x R3000
= R 3420000

30c / kwhr for energy use
= 0,30 x 275 2600 kwhr/ year
= R 825780
= 11% of R 825780
= R82578 less will be paid yearly for electricity

(www.greenbuilding.ca)

Figure 4.2:
Renewable solar energy

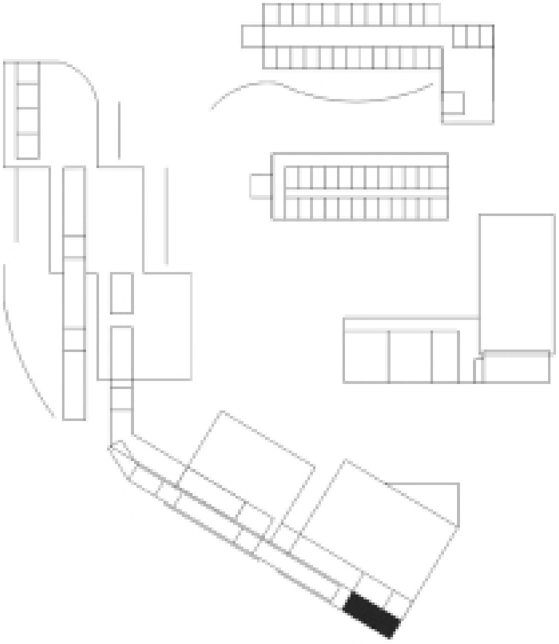


Figure 4.4:
First floor plan showing rock store area

4.2 Ventilation

The aim is to ensure that the need for mechanical ventilation is minimised and the passive climate of the building is appropriate and managed manually by the occupants **(Figure 4.3)**.

Any openings must at the minimum be 5% of the floor area. Awning windows on the first and second floor ensure that opposite pressure zones are created.

To achieve appropriate ventilation in the summer, the sun should rather be kept out. Another important aspect is the colour of surfaces, appropriate isolation, the distribution of openings along the façade, and the ability to close the chimney stack during winter time.

Resource Centre:

13,5m x 24m x 4
= 1296 m² per stepped plan

= 260 persons x 7,8l/s
= 2028 l/s
= 2,03 m³/s
= 7308 m³/h (2,03 x 3600)
= 7308 / 1296
= 5,64 air changes/ hour
- ideal 3-4 air changes/hour

Offices:

15m x 25m x 3m
= 1125 m²

1125/ 4,7 x 6 l/s
= 1436 l/s
= 1,44 m³/s
= 4,6 air changes/ hour
- 6l/s per occupant or per 4,7 m² and ideally 4-6 air changes/ hour

Auditorium:

20m x 30m x 4m
= 2400 m²

2400 persons x 1,7 l/s
= 4,08 m³/s
= 6,12 air changes / hour
- 6 -10 air changes/ hour

5% of the building floor area should be open-able windows to ensure desirable ventilation
(Adler et al; 1998; p.384 & 387)

Economy:

Air conditioning use is approximately 48 MJ/m²/ year (Benchmark: www. greenbuilding.ca)
1 kWhr = 3,6 MJ
= 13,3 kWhr/ m²/ year x (9177 + 4586 m²)
= 183 506,67 kWhr/ yr used on AC
= R 55052 saved annually on AC

4.3 Air

The ventilation in the building will be managed passively by the stack effect with more than one stack strategically and locally placed. These stacks will be a metal surface with a south facing window. The spine will cool-off during the night and hot air during the day will pass through the spine and cool-off. The air will enter the spine at a lower point and will move through the occupied spaces. The hot, used, stale air will be released higher up through the outlet in the spine, through the stack chimney.

Windows will be placed on the spine on the northern side, high up to let air escape there.

The advantages of a system like this are cost effectiveness by combining the dual roles of weather proof skin and energy collector into one building integrated component. The reduction of the effective U-value of the building envelope by adding the cover layer and recycling the fabric heat losses that otherwise would have been lost to the external environment (Ho et al; 1997; p.293). This air heating solar collector comprise of a 2m long section of profiled cladding with a depth of 0,03m, finished with a black coating resistant to 120 ºC. A backing of 0,1m thick fibre glass insulation is used (Ho et al; 1997; p.296).

In the auditorium a rock bed will be placed to cool off the theatre space. A two meter space is needed for the air to move before reaching the wet rock storage bed. This will be placed on the southern side of the auditorium as part of the service spine **(Figure 4.4)**.

1 m³/ 10 m² of floor area rock is needed to cool of the space.

Important principles for the winter time are that the Northern façade will have some dark areas, with 20% of the floor area in direct sunlight. The southern façade must have porous isolation on the outside of the building e.g. mix of concrete slurry and polystyrene pieces. The eastern façade must ideally be open to outside spaces and to the river. The sun shading devices will be of canvas and mainly placed on the eastern façade, and will be manually adjustable.

Ventilation is based on the fact that the sun should rather be kept out than let in. The painted colours are important to absorb or reflect sunlight. There should be enough isolation for the winter time and all openings in the facades should be evenly distributed and spaced along the façade. Openings should be low on the one façade and high on the opposite façade to encourage cross ventilation. The occupants should be able to close the stack off completely during the winter time to keep warm air in the building.

The orientation of the building will determine the façade treatment. The southern façade will have optimal light penetration, northern façade will have smaller glass and external shading, the western façade will have passive solar heat gain and the eastern façade will have moveable shading devices (Daniels; 1998; p.115).

4.4 Rainwater

Water cooling is a good system to use and will bring down the microclimate in an urban area down with 2-3K. It could be achieved by a water surface in front of a window e.g. a temperature of 32º C, a relative humidity of 40 %, a wind speed of 3 m/s, the water source 5m away and 10m in length will cool the building by 2K (Daniels; 1998; p.64). The Apies River will cool down the development by 3K.

The rainwater harvested by the roofs will be channelled to a collection tank on the ground floor and filtered there. The water will then be pumped through the building by electricity generated by a solar panel. This pumped water will be used for grey water e.g. hand wash, bath, etc. After it is used it will be sent through a gravel bed to filter it clean. It is then placed in the system again. The pumps and tanks will be placed in the service spine **(Figure 4.5)**.

4.5 Water harvesting

To put grey water back in circulation it could be sent through a reed bed on the roof garden for re use. On the ground level there will be tanks and the water will be pumped by the energy of a solar panel.

Example: (water harvested)

$2088m^2 \times 0.7m/year$

$= 1461{,}6\ m^3/year$ $* 1000\ L = 1m^3$

$= 1461\ 600\ l/year\ /\ 365\ days$

$= 4004\ l/day$

= 4004/ water use in building

= x % of daily water consumption harvested

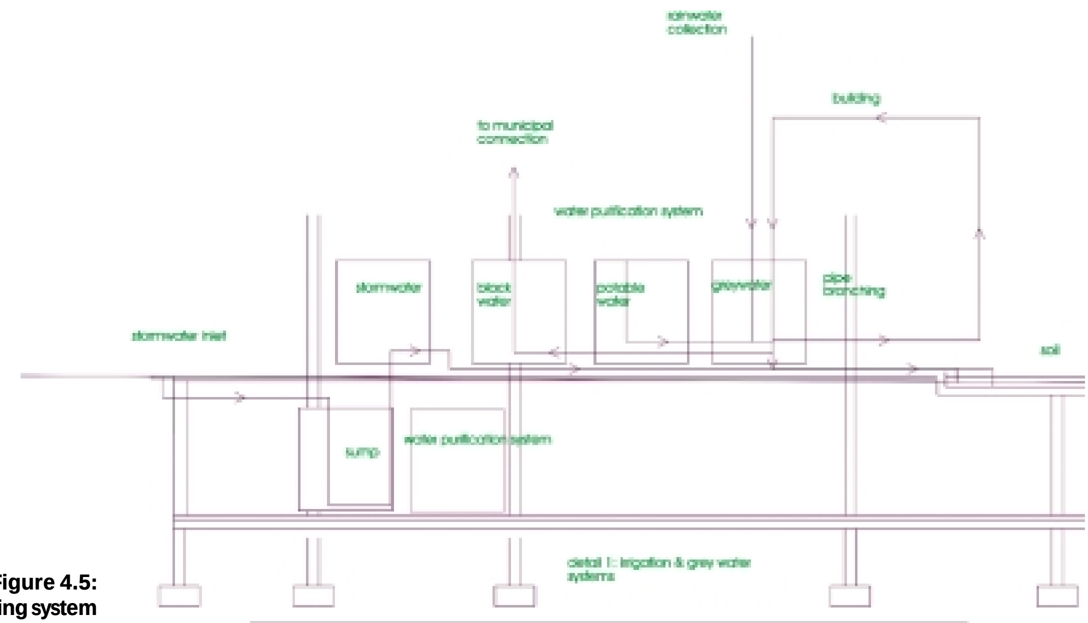


Figure 4.5:
Rainwater harvesting system

General water consumption:
Office = 23 l/person/day
Retail = 11 l/person/day
Residential = 130 l/person/ day

Water consumed Resource Centre: Overnight Facilities:
= 23 l x 900 people = 130 l x 100
= 20700 l/day = 13000 l/day

Landscaping = (2 x s x a x v x 25)/ 1000 m^3
S = species
= 1,0- cool season grass, 0,5- ground cover, 0,7- warm season grass, 0,2- shrubs & trees
A = area in m^2
V = evapo- transpiration
= 19,5 or 13,0 or 14,3

= (2 x 0,5 x (9230.8/2) x 19,5 x 25)/ 1000 m^3
= 2250 m^3 per year water consumed
= 6,2 m^3 per day
= 6164 l/day consumed

Water harvested:
= 4483, 175 m^2 x 0,7m/year
= 3138,2 m^3/ year
= 8597,9 l/day / 39864 l/day
= 21,6 % of daily consumption replaced by rainwater harvesting

Economy:
Water costs approximately R0, 003 / L.
3138233,5 L harvested yearly
Yearly approximately R 10 000 will be saved by rainwater harvesting.
(www.greenbuilding.ca)

4.6 Water holding structures

The rainwater harvested is an estimated 8597, 9 L/day and it will be stored in standard reinforced fibreglass water tanks. The total daily consumption of water is 39 864 L/day for the whole development. If a benchmark of 60% (23 918, 4 L/day) is used for grey water and irrigation usage, the water harvested is 35% of daily use. The calculations are theoretical.

The amount of water tanks used for rainwater harvesting is 4 x 4500 L tanks on the roof and on the ground floor there will be an allocated area for the distribution tanks. These 4 ground floor tanks will provide for storm water, black water, potable water and grey water. Water to be pumped by energy from solar panel.

4.7 Systems

The systems in the building include the following:
- Ventilation & passive climate through cross ventilation, the stack effect and cooling by the Apies River.
- Lighting is by means of natural lighting
- Security access through passive surveillance and personnel at every exit/ entrance
- Circulation – ramps used by handicapped will also double as fire escapes

Fire escape staircases at each end of the building
- Wet services- rain water irrigation/ Grey water/ Drinking
- cooling on eastern façade
- grey water circulation system
- sun panel as energy generator for water pump

See *Traffic & Fire*

4.8 Waste management

This includes the allocation of an area for waste management where all wastes are sorted and recycled **(Figure 4.6)**. Organic waste for example food could be exchanged for compost with a farmer, but due to the size of the site compost could be produced on site.
The size of the waste management centre:
0, 4 m^2 of 100 m^2 (Gibberd; 2002; Short Course)
= 9177 m^2 / 100 m^2
= 91, 77 x 0,4
= 37 m^2 needed

4.9 Services

The building has a service spine with clip-on facilities. All the dry and wet services, as well as the passive climate system, will be accommodated in this concrete spine. This will ensure flexibility and functionality. The passive climate systems will also be accommodated in this spine.

Electricity, water, heating and cooling all indicated on the plans and sketches **(Figure 4.7)**.

Figure 4.7:
Steel service spine

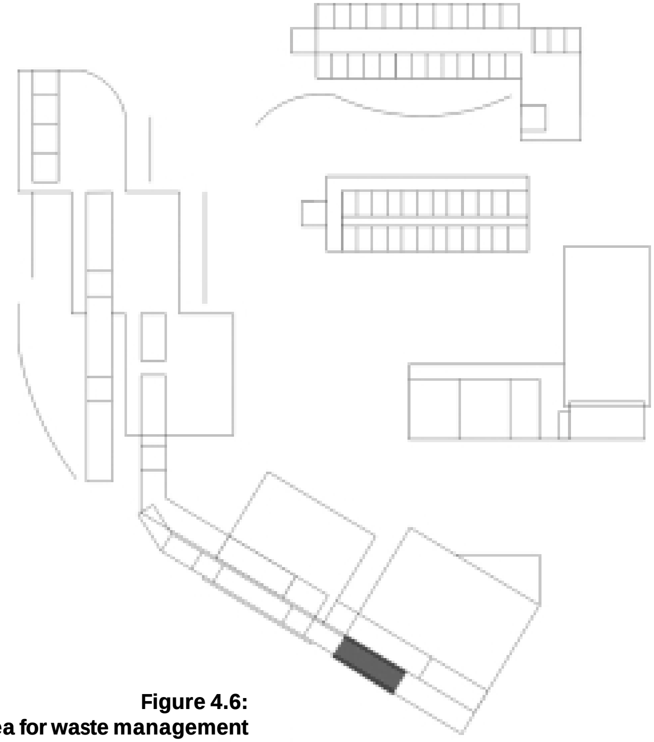


Figure 4.6:
Ground floor with allocated area for waste management

5.1 Foundations

Reaction: After soil testing in andesite on a large site, ordinary footings or slightly deeper strip foundations can be used (Purnell, 1984: 35). Deep piling can be used in these problematic soils to reach inactive material with a suitable bearing capacity (Minimum 1,5 MPA). Stiffened raft foundation is recommended.

This foundation compromises a grid of reinforced concrete beams cast integrally with the floor slab (Purnell, 1984: 36).

Subsurface pipes and drains, by means of flexible joints, need to be installed to prevent subsurface drainage. Drainage should divert rainwater away from the foundations. Trees with excessive dessicating influence should be kept away from these structures.

In excavations vertical pre cast concrete piles can be used tied back with anchors and horizontal concrete plastering. Some sort of shoring technique should be used on all excavation faces (Purnell, 1984: 36)

The syenite weathers in the same way as andesite. With deep excavation in these soils, strong inflows of water must be anticipated. Attention must be given to construction joints (Purnell, 1984: 37).

5.2 Structure

The structure of the building will be steel column and beam with a concrete slab. Steel will be used for beams and to carry some of the lightweight roof structures. Steel will be used because it appears lighter, creates visual variety and has higher structural strength.

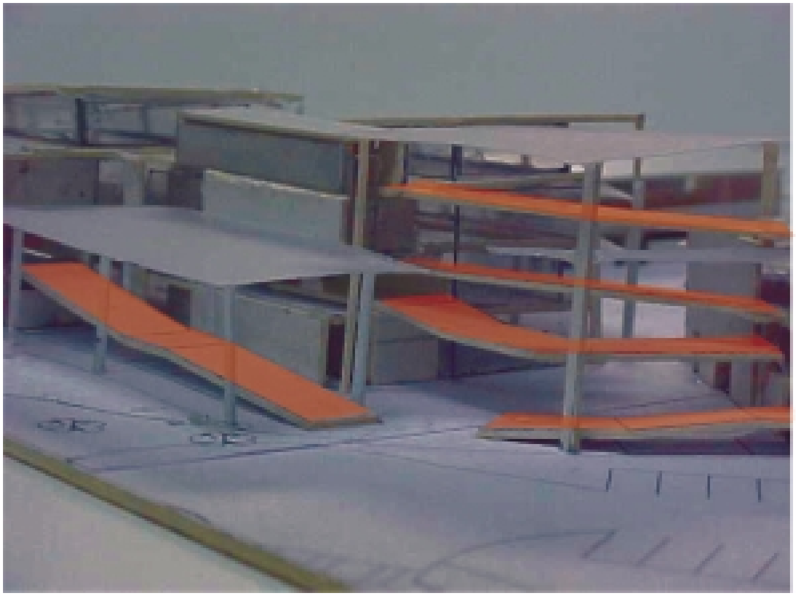
Steel will be used in all the different types of buildings for the staircases and wherever a lightweight structure is needed.

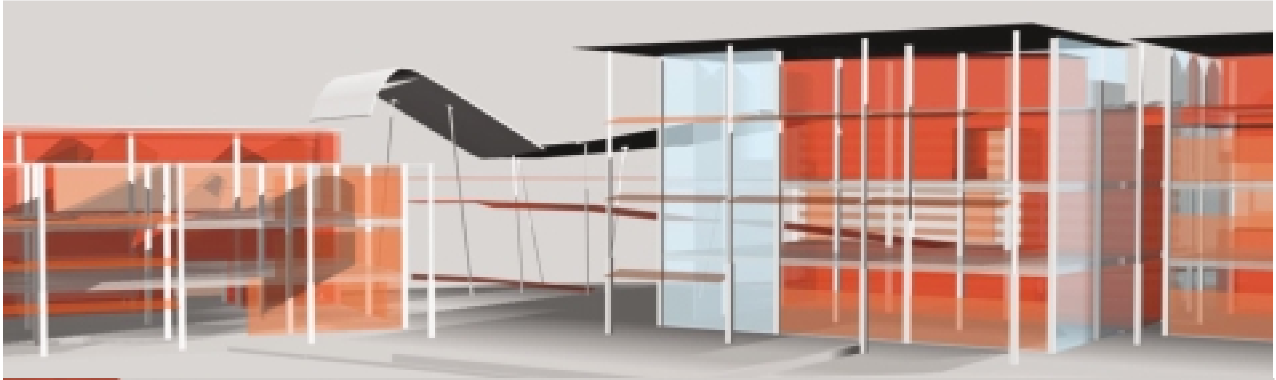
Concrete as a structural system has low embodied energy because it is produced on site. This method is labour intensive and attribute to skills transfer and job creation. This structural system will be used in all the buildings because the wet works will be already in place on the site, and therefore more economic.

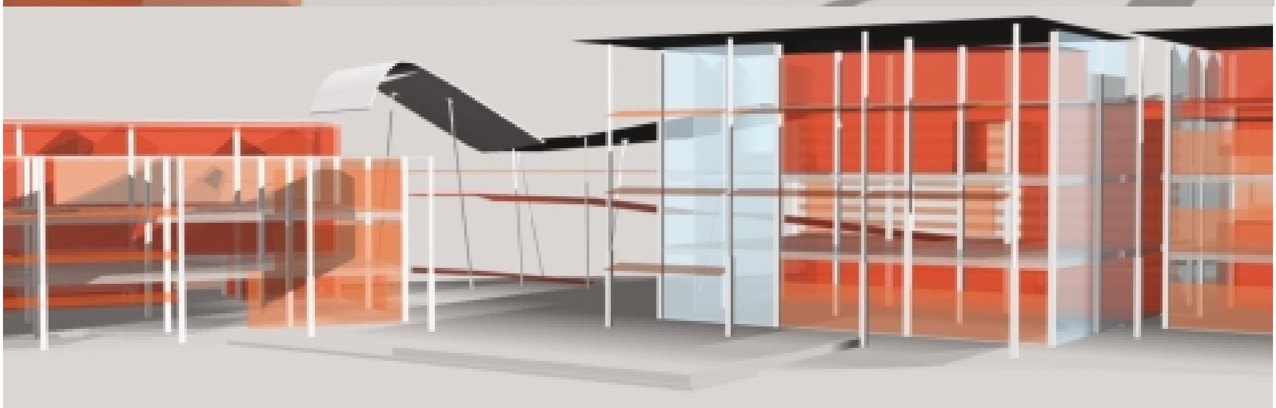
5.3 Circulation

The main circulation will be with concrete and steel ramps connecting all the different spaces in the building. At each end of the concrete service spine there will be a concrete and steel staircase that will be used mainly as fire escapes. The circulation "corridors" are limited to the western side of the Resource centre building adjacent to the service spine. This makes circulation easier because it is legible and accessible to any user. The ramps will also be used as fire escapes. The classrooms/hall and overnight facilities circulation will be through corridors in the buildings and fire escapes will be provided according to the National Building Regulations. All external circulation will be on paved walkways **(Figure 5.1)**.

Figure 5.1: Circulation ramps







Embodied energy of construction materials:

- Sheet steel – 34 GJ/Tonne
- Softwood – 3,4 GJ/Tonne
- Brick – 2,5 GJ/Tonne   0,4 kwhr/ kg
- Concrete – 1,7 GJ/Tonne 0,2 kwhr/ kg
- Plasterboard – 4,4 GJ/Tonne
- Concrete tiles – 12 GJ/Tonne
- Vinyl – 70 GJ/Tonne
- Plastic – 150 GJ/Tonne

Water consumed in the manufacturing processes of materials:

- 1 ton bricks – 2200 l
- 1 ton steel – 165 000 l
- 1 ton plastic – 1,32 million l

The materials used in the design will be stock brick, concrete with reclaimed aggregate, steel, glass, timber and canvas. The majority of the materials have a low embodied energy and can be made on site. The only material with a high embodied energy is steel, but it has a long life span, low maintenance and good structural quality. All the material can be recycled.

Certain materials used for specific elements:

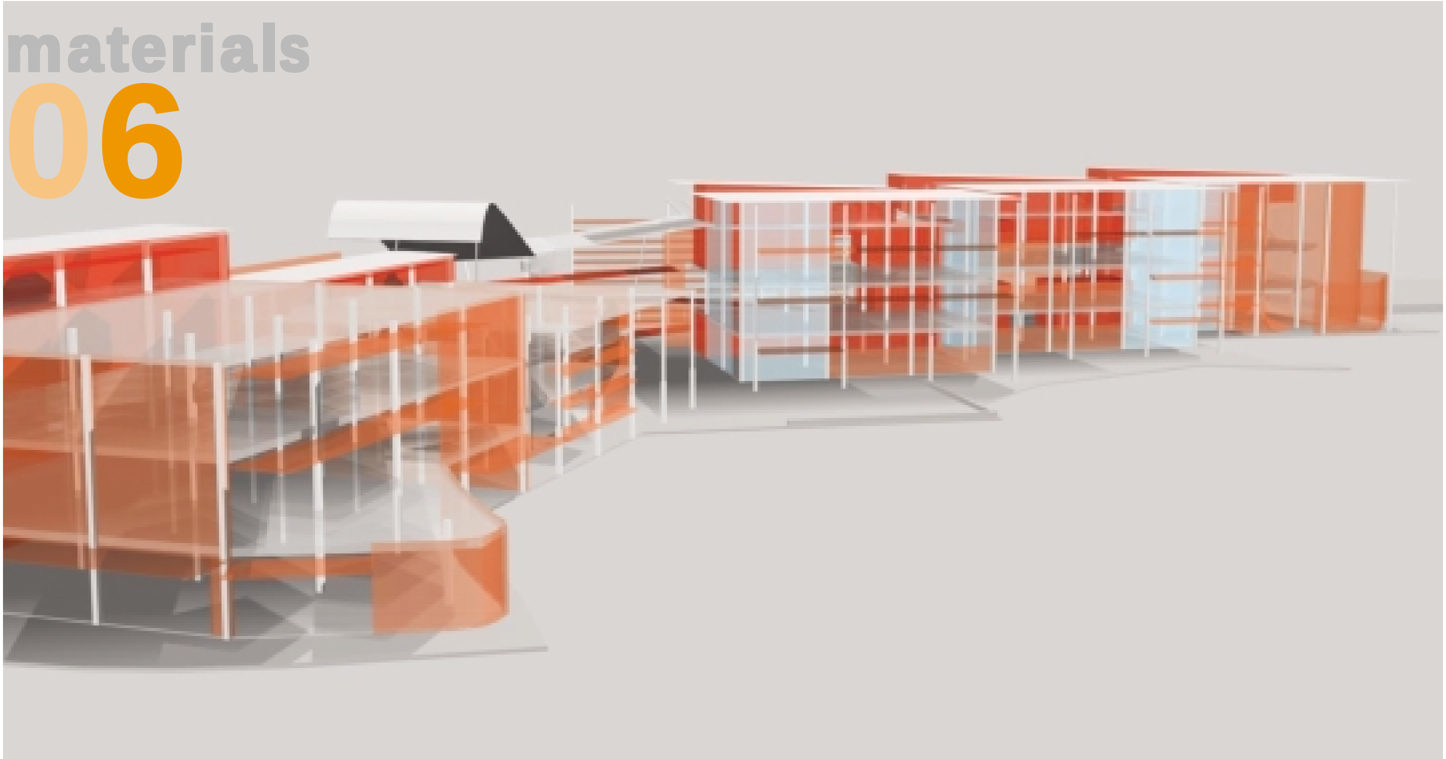
Foundations: concrete with reclaimed aggregate. This will limit the need for new gravel required (Anink et al; 1996; p.40)

Floor construction: Concrete on permanent formwork.

Walls: Brick will be used for external non loadbearing walls because its production requires little energy and the process is pollution free. Concrete walls should preferably be cellular concrete blocks because of less material use, but concrete with reclaimed aggregate is also an option (Anink et al; 1996; p.44). Moveable walls will be of frames and panels, because it is light weight and use less material. The cavity will be insulated for sound with mineral wool (Anink et al; 1996; p.45).

Roofs: The roofs on the Resource Centre will be a steel construction with corrugated sheeting. The steel can be recycled if treated against corrosion. On the classrooms and overnight facilities a pine timber roof structure will be used. The insulation will be mineral wool and sisalation.

Economy:



The Resource Centre will cost approximately R 4500/ m² = R 41 296 500

The classrooms/hall and overnight facilities will cost approximately R 3500/ m²= R 16 051 000

A sophisticated building with durable finishes and sustainable passive climate systems will be designed.

6.1 Interior design: materials & finishes

The interior finishes will include:
Floors- Linoleum floor finish kept to a minimum, noise absorbing floor finish e.g. carpets, painted- and polished concrete floors.

Walls- In situ concrete walls- off-shutter concrete, stock brick – plastered and un-plastered, painted colours strategically placed.

Ceiling- Soffit of concrete slab painted white for light reflection or permanent formwork (Anink et al; 1996; p.24).

Frames- Steel/ Timber frames strategically placed.

Colour – The use of colour achieve a balanced relationship between stimulation and reassurance, order and variety, relatedness and contrast. Colour integrates order and explains (Daniels; 1998; p.104).

6.2. Acoustics

In the auditorium there will be a need for acoustic material used in the interior.
Isolation in the interior will be achieved by cavity walls plastered with bints. A cavity wall with glass wool isolation will be better.
Double glazing will be used, with an absorbent material on the inside for example timber shutters.

Finishes include:
Floor: 6mm carpet on a 10mm under felt – factor = 0,73
Seating: upholstered – factor= 0,5
Curtain: factor= 0,6
Shutters: 6mm plywood – factor= 0,4 for an 60m open air space and low 125 Hz. Good isolation, not good absorber.
(Van Zyl; 2001; p.7-11 – 7-14)

07
fenestration & signs

The emphasis is on a transparent, legible window. The fenestration of the building is so placed as to maximise interior occupant comfort regarding passive climate and lighting. The eastern façade has the most glazing with canvas sun shading, opening up to the river, the northern façade's glazing ensures winter heat gain, the southern façade glazing will provide lighting especially for working, studying. Indirect lighting will be achieved by the strategic placement of the windows **(Figure 7.1)**.

Signs will be discussed in the theory part of this thesis, *Visual Culture & Architecture*. In the design, place for signage should be provided and will be something dynamic and mobile e.g. projected imagery on the roofs and walls.

This kind of signage will be educational and the openness of the building compliments the legibility and the visual appropriateness of the building.

7.1 Day lighting

Natural lighting and illiuminance is desirable in the building to minimise the use of electricity and artificial lighting.

General information for calculations:

- The day light illuminance outside for design purposes is 15 000 lux.
- The depth of the room must be < 2 x the height of the building e.g. 4-6m deep
- The general reflectance of a white ceiling is 70%, a pastel wall is 50% and a dark floor is 15%
- The general illuminance in a building:
  - Lecture rooms – 70 – 150 lux
  - Offices/ Library – 200 lux
  - Bedrooms- 50 lux
  - Kitchen – 100 lux

The two main formulas for calculation of the internal illuminance:
(van Rensburg; 2001)

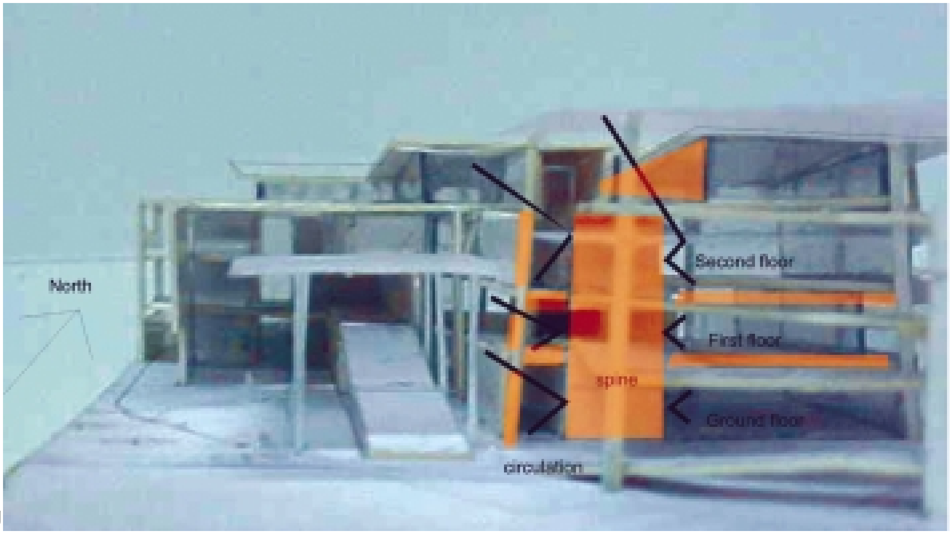


Figure 7.1: Indirect natural lighting

$$RDF = \frac{DDF \times EOBF}{GF \times DTF}$$

all values found in tables in notes

$$I\,int = \frac{RDF \times I\,eks}{100}$$

Resource centre:

$$RDF = \frac{1{,}75 \times 0{,}9}{1{,}1 \times 1{,}7} = 0{,}84$$

$$I\,int = \frac{0{,}84 \times 15\,000\ lux}{100} = \underline{126\ lux}$$ ideal 70 – 150 lux

On internal side of room- light in by saw tooth roof with no angle:

$$RDF = \frac{4{,}5 \times 0{,}5}{1{,}1 \times 1{,}7} = 1{,}2$$

$$I\,int = \frac{1{,}2 \times 15000\ lux}{100} = 180\ lux$$ – extreme

thus Resource centre at 126 – 180 lux

Classrooms:

$$RDF = \frac{1{,}9 \text{ X } 0{,}9}{1{,}1 \text{ X } 1{,}7} = 0.9$$

$$I\,int = \frac{0{,}9 \times 15000\ lux}{100} = \underline{137\ lux}$$

Outside offices:

$$RDF = \frac{2{,}75 \times 0{,}9}{1{,}1 \times 1{,}7} = 1{,}32$$

$$I\,int = \frac{1{,}32 \times 15000\ lux}{100} = \underline{198\ lux}$$

Overnight facilities:

$$RDF = \frac{1{,}3 \times 0{,}9}{1{,}1 \times 1{,}7} = 0{,}62$$

$$I\,int = \frac{0{,}6 \times 15000\ lux}{100} = \underline{94\ lux}$$

10 % of floor area should be windows according to the NBR – this will ensure appropriate lighting.

Economy:

Energy used for artificial lighting according to the GB tool (www.greenbuilding.ca) is 44 MJ/m²/yr.
= 12,2 kWhr/ m²/yr x (9177 + 4586 m²)
= 167906, 6 kWhr/ yr used for interior and exterior lighting
= 44% of daily lighting is natural
= 73 879, 784 kWhr/yr saved
= R 22164 saved (R 0,30/ kWhr)

8.1 Vegetation

The Ecological dimension is defined as:

The human fascination with natural growth is the change independently of human design and therefore the impossibility of total manipulation.

The ideal is a planted roof structure. If 50- to 100m width is planted, the temperature of the structure would be 3,5 K lower because of a free flow of cold streams through the structure (Daniels; 1998; p.69). On planted roofs and facades, the variation in temperature is minimised from 100 K to only 30K.

08 landscaping

Northern slopes

Ochua Pulchra (lekkerbeuk),
**Burkea Africana* (wilde sering) – wilde sering (Breitenbach et al; 2001; p.72)
Strychos Purgens (Botterklapper),
Bequertiodenron (Stamvrug),
#*Ficus pretoriae* (Wildevy) (Venter et al; 1996; p.71)
-or *Ficus thonningii* (Gewone wurgvy)
-**evergreen**, max 15m, nat. no. 48
- suitable in a large garden/park
- **has an aggressive root system (not near buildings)**
-help to control erosion
-humus rich, deep loamy soil
-whole year flowering, fruiting with October the peak **(Figure 8.1)**.
#*Rhus* (Karee) (Venter et al; 1996; p.102)
-**evergreen**, max 9m, nat. no. 386
-flowering- June to September
-fruiting- September to January
- **non-aggressive root system**, in any soil **(Figure 8.2)**.
#*Acacia Caffra* (wag 'n bietjie) (Venter et al; 1996; p.67)
- **deciduous**, max 17m, no. 162
- flowering- September to November, fruiting- January to May
- grass grows beneath
- **aggressive root system**
- growth rate 700 – 900 m/year (Fast)

Figure 8.1: Ficus pretoriae

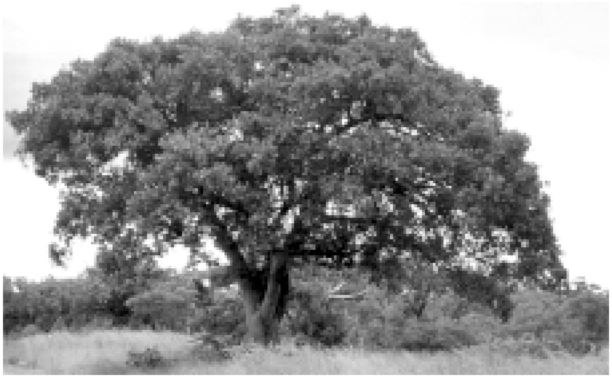


Figure 82: Rhus

Figure 8.5:
Cassinopsis ilicifolia

Figure 8.4:
Halleria Lucida

Figure 8.3:
Celtis Africana

Southern slopes

**Protea Caffra* (Suikerbos) (Breitenbach et al; 2001; p.41)
#*Acacia Caffra*

Riverbanks

#*Celtis Africana* (Witstinkhout) (Venter et al; 1996; p.257)
- **deciduous**, max 40m, no.39
- flowering- August to October, Fruiting- October to February
- good shade in summer, sun in winter
- ideal container plant – **non-aggressive roots (Figure 8.3)**.

#*Kiggelaria africana* (Wilde perske) (Venter et al; 1996; p.270)
- **evergreen to semi-deciduous**, max 20m
- **non aggressive roots**
- ideal in bird garden

#*Halleria Lucida* (Notsung) (Venter et al; 1996; p.237)
- **evergreen tree**, max 10 – 30m, no.670
- flowering- April to December, fruiting- June to February
- bird garden, shrubbery
- **non aggressive root system (Figure 8.4)**.

* *Leucosidea sericea* – oudehout (Breitenbach et al; 2001; p. 59)

#*Buddleja salvifolia* (Saliehout) (Venter et al; 1996; p.197)
- **evergreen to semi deciduous**, max 8m, no. 637
- flowering – August to October, fruiting – October to December
- birds, insects
- stabilizing embankments, hedges, container plant
- **aggressive root system**

#*Cassinopsis ilicifolia* (Lemoentjiedoring) (Venter et al; 1996; p.131)
- **evergreen**, max 5m, no. 420
- flowering- September to November, fruiting- February to May
- singly planted, could be cut into tree
- birds
- **non- aggressive root system**
- container plant **(Figure 8.5)**.

amenities 09

The building has a community function; placing a learner's centre in the Pretoria CBD. There is a lack of public amenities in the inner city and to make it accessible to everyone it needs to have an 18 hour activity to enhance security and to make the development viable.

These amenities include:
- Concrete roofs to accommodate views to Union Buildings and Unisa and to create green spaces.
-Public spaces that is open, visual and used for interaction.
-Semi-private spaces that could be used for educational functions and community gatherings.
-Informal/ formal trading on the northern part of the site to accommodate the pedestrian and commuter.
-A sport field for soccer games and the sport activities of the schools and college on the site. This will have a community function to give green spaces in the inner city.
-An urban park with a mix of activity and function.
-Education facility to teach and inform people living and working in the inner city. This also involves the mentioned educational institutions in the community and to inform possible future students.
-These functions fit in with the policy of the European Union who provides the funding for this project.

The deliveries will happen at the BMS allocated area and distributed through the building. The entrances will be enhanced visually by means of architectural elements and needs to be easily accessible **(Figure 10.1)**.

The idea with the transportation in- and around the site is to minimise the use of the individual car, and to increase the use of public transport (Daniels; 1998; p.111).

10 entrances & deliveries

10.1 Traffic

The existing entrance to the site on van der Walt Street is used for access. All the pedestrian crossings at the traffic lights are emphasised and van der Walt Street has added pedestrian crossings to link the visitor parking across the road. The on site parking on the southern side of the site is kept to a minimum to limit the use of the individual car. The northern part of the site has no structured parking but the play ground could be used as parking certain times of the day.

The parking for the development is limited to 400 because of the public transport node close- and on the site including the train station, taxi terminal and bus stops.

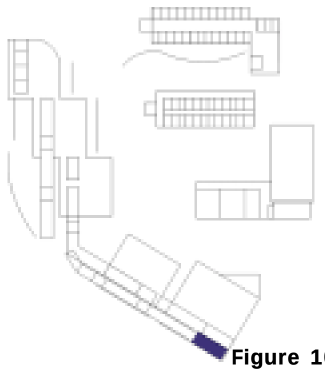


Figure 10.1: Allocated area for Building Management Systems

11 fire design & building management systems

Fire:

2 Escape routes if >45m to nearest escape route
Room >50 persons
120 minute lagtime- floor, ceiling, walls
Door 800mm wide
Route width- 120 people 1,1m
- 190 people 1,8m
Well ventilated
Fire hydrant for every 500 sqm.
Extinguisher 1/ 200sqm - 9 litre type
Adequate balustrades should be provided.
(SABS; 1990; p. 181- 198)

BMS:

This area will include the waste management, security systems, water circulation systems, rock store and climate control systems. In the spine all water tanks and pipes will be allocated. The air pipes will be located in the spine and under the circulation ramps. Security personnel as well as deliveries will be located there.

To read how the following objectives were achieved see the *Design essay* .
The important objectives:
-accessible routes with a variety of choice and use
-permeability
-hierarchy of public/ private spaces: the size thereof determines importance of building
-sensory and functional diversity
-legibility: identifiable according to principles
-articulation of ground surface: spatiality & visual zones
-Landmark, gateway building: beacon of reference, generator **(Figure 12.1)**
-Wall, floor, roof: hierarchy, symmetry, rhythm and layering
-Materials and symbolism.

Legibility

The modern city has confusing important activity systems with bureaucracy being more important (Bentley et al;p.42). There is a lack of orientating elements that give the user something to remember.

Nodes, edges, paths, districts and landmarks on a smaller scale are implemented in the design of the buildings **(Figure 12.2)**.

Paths – This will follow the most important features in a building e.g. a specific wall

Nodes- This will be certain junctions and important open spaces in and around the building **(Figure 12.3)**.

Landmark- There will be beacons visible from the southern entrance into the city as well as from strategic points on the site e.g. the chimney stacks for ventilation becoming visual elements.

Edges – This for example the Apies river and any route that is not used as a path. This will be perceived as an edge, permeable or impermeable.

Districts- the building should have some identity in the context and environment. Some clues of the context should be evident.

12 access & legibility

Paths and nodes should be reinforced to make the building legible. Views should be enhanced e.g. the south western view to the classrooms and hall through the entrance to the Resource centre. Splayed corners, setbacks and higher ratios of enclosing walls will lead the viewer to the next path.

13 robustness & flexibility

The idea is that **all** spaces, inside and outside, could be used for any desired activity. That is why the ceiling heights vary from 3 – 4m, a structural grid of 8-10m is used, any occupant is 7,5m maximum away from natural lighting and natural ventilation and the passive climate can be manually controlled by the occupants **(Figure 13.1)**.

Moveable walls and -curtains will ensure flexibility in larger spaces. In the classrooms/ hall, walls will slide out to create a bigger interior space and more intimate outdoor spaces at the same time **(Figure 13.2)**.

Where double volumes are created, it could easily be filled in with a lightweight floor if another level is required. Certain staircases will be moveable, e.g. at the book stacks, to ensure flexibility and mobility. The “in-between” spaces could be seen as “non-programmatic”: this is any communal space that could be used for any function. This gives the occupier a choice to utilise the space to fulfil their needs and wants **(Figure 13.3)**.

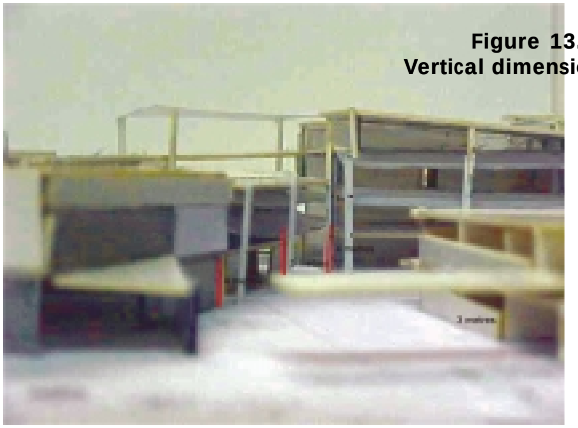


Figure 13.1: Vertical dimension

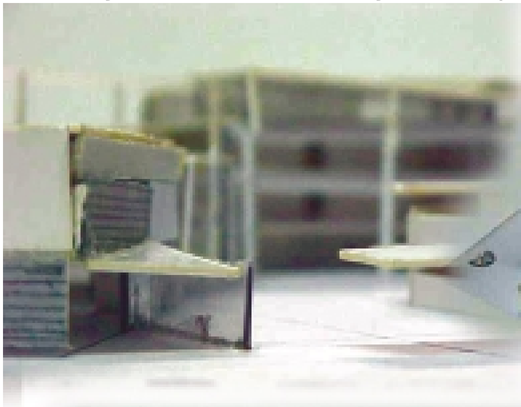


Figure 12.1:
Views

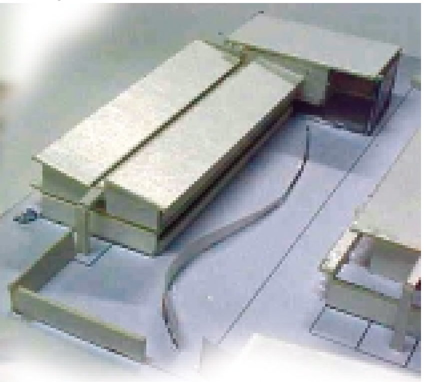


Figure 12.3:
Nodes

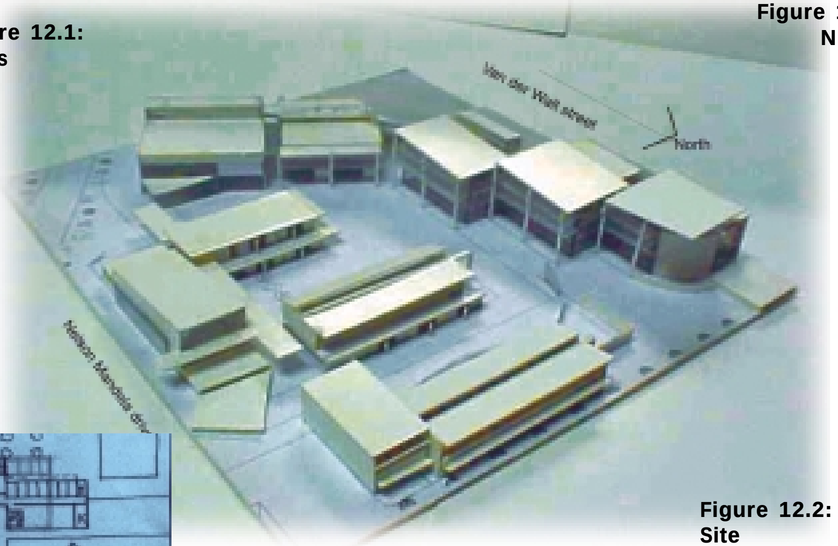


Figure 12.2:
Site

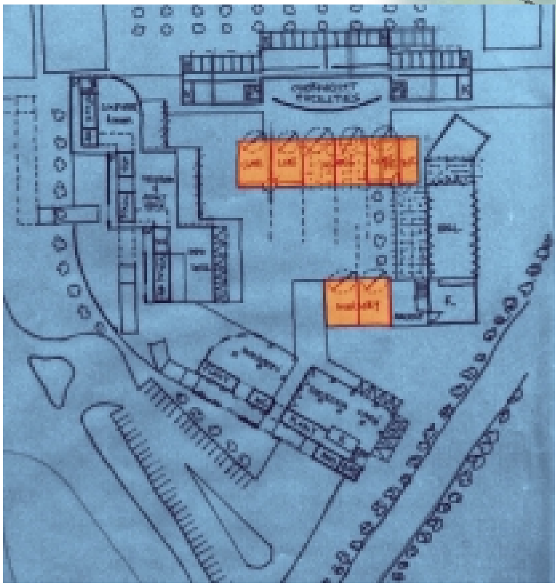


Figure 13.2:
Adaptability

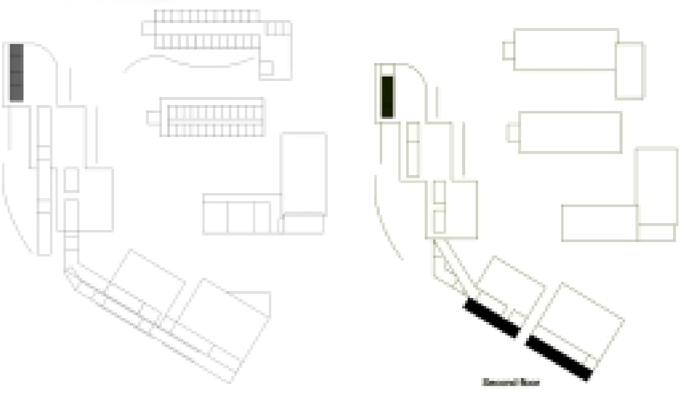


Figure 13.3:
Social spaces

To react to the regionalism of the third vernacular:

- -brick
- -corrugated sheeting
- -bag-wash wall finish
- -pre-cast concrete/
- -decorative use of brick
- -sun panels

are used in the design of the building (See *Briefing Document and Context Study*).

This vernacular takes into account:

- -function
- -climate
- -historical context
- -availability of materials

To establish an identity the *visual appropriateness* should be addressed.

Visual appropriateness supports robustness and a wide variety of different backgrounds of the viewer are used to determine appropriateness. The outside defines the public realm and the area it is located in will determine the form. The use of legibility is to read the pattern of uses and to establish a democratic environment. A variety is achieved if an image of every area is appropriate as a setting. To achieve large scale robustness the building should look like several things at once and small scale robustness needs to accommodate all the different backgrounds of the users (Bentley et al; ;p.76).

People have learned meanings determined by the group. Different experiences and objectives differ and variety and robustness are cues for the experience. The landmark quality of the building is something contextual with noticeable vertical- and horizontal rhythms, skylines, wall detail (material colouring, patterning), windows, doors and ground level detail. The elements and relationships determine this visual quality (Bentley et al; p.89) **(Figure 14.1)**.

14 identity

14.1 Walls, floors and roofs

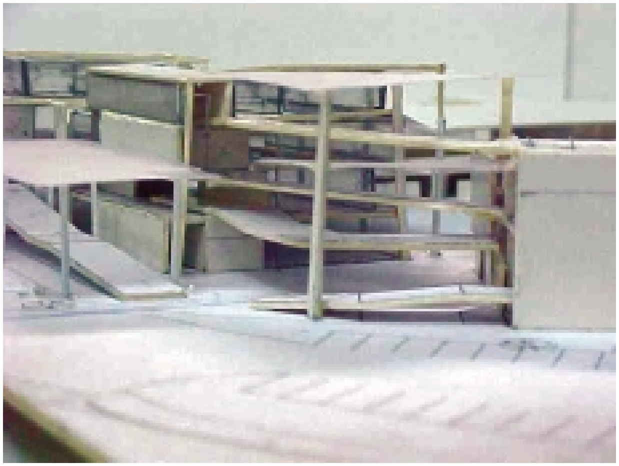
The architecture of the building is successful in its simplicity. The loose pavilion buildings are placed on the site to create a hierarchy of outdoor spaces and to be respectful to the historical buildings. There are emphasised relationships and articulation between the different pavilions.

The western façade to van der Walt Street and the parking forms a hard edge with punctured openings to create vistas and views through the building. The eastern façade forms a colonnade and opens up to the green open spaces and the river. This glass façade will have canvas sun shading.

The circulation ramps cut through the floors and walls of the building creating an awareness of the different elements of architecture. The viewer is then challenged to question the materiality and politics of architecture. The roofs are placed as expressive elements that let in light and enhance natural ventilation. The entrance roofs are lightweight concrete and function as space defining elements.

Hierarchy and function of spaces are legible to the user and serve an orientating functions.

Figure 14.1: Entrances



14.2 Electric Ladyland, Bellevue road, Kloof, Durban -OMM Design Workshop

Electric Ladyland is used as a precedent to establish an identity for the Resource Centre.

In this building the aesthetic is in its simplicity, the resolution of tectonics and the assembly of elements. There are striking juxtapositions of materials, like concrete, glass and steel, and a restriction in the use thereof, the imaginative details and spatial formal purity (Unknown; 2002; p.35). The site is set as a stage and the result is an innovative, robust and versatile building. The only form giving and articulation is at the linkage between the different pavilions. There is a dynamic relationship between the buildings with a definite presence to the historical Cape Dutch house as a landmark and pivot point. The influence of this building is evident in the design of the Learner's Resource Centre at Berea Park. In this design, emphasis is placed on the loose pavilion buildings, with articulation strategically placed on façade and plan, with respect to the existing Clubhouse and Hall.

The double storey rectangular blocks are at acute angles to the Cape Dutch house and each other. High volumes ensure adaptability and response to changing working teams **(Figure 14.2)**. The fully opening doors and windows ensure functional flexibility in access, with mobile stairs, adjustable levels in the interior (Unknown; 2001; p.32).

The triangular courtyard and intimate semi enclosed spaces at loosely linked junctions create mediating zones between outside, public areas and office areas. The courtyard edge has an external circulation route with circular columns, next to glass curtain walls, shaded by a projecting roof slab and hanging sails **(Figure 14.3)**. The fine tuned composition, gripping vistas and characteristics differentiate between the structures (Unknown; 2001; p.10).

The building has proportioned detailed facades with a hard edge of punctured openings to the traffic and parking **(Figure 14.4)**. These edges are off shutter concrete. A spatial dynamic is created by flat surfaces, porches and recesses (Lipman; 2003; p.42).

This building is a noteworthy example of simple, functional yet aesthetic South African Architecture.

Figure 14.2: High volumes

Figure 14.3: Circulation route

Figure 14.4: Punctured openings

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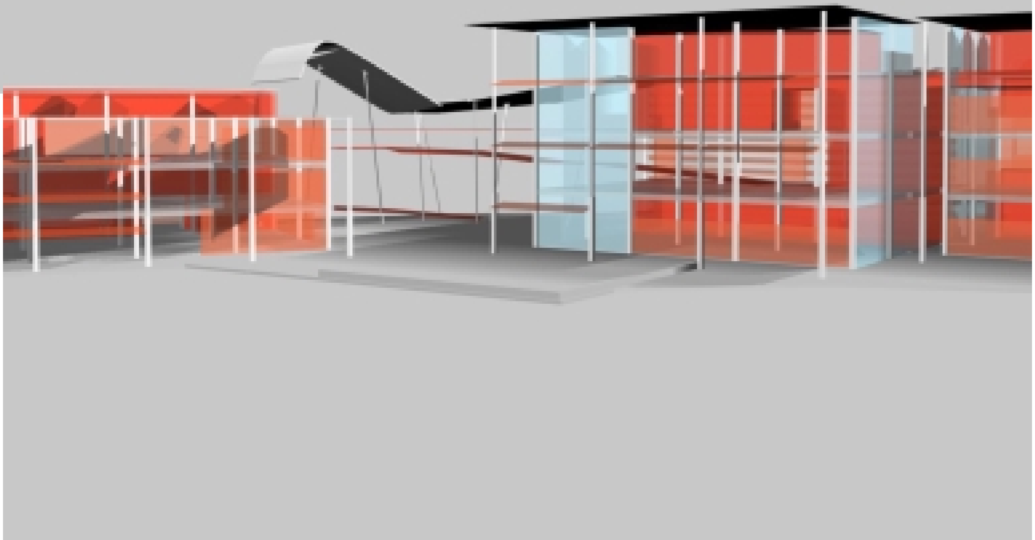
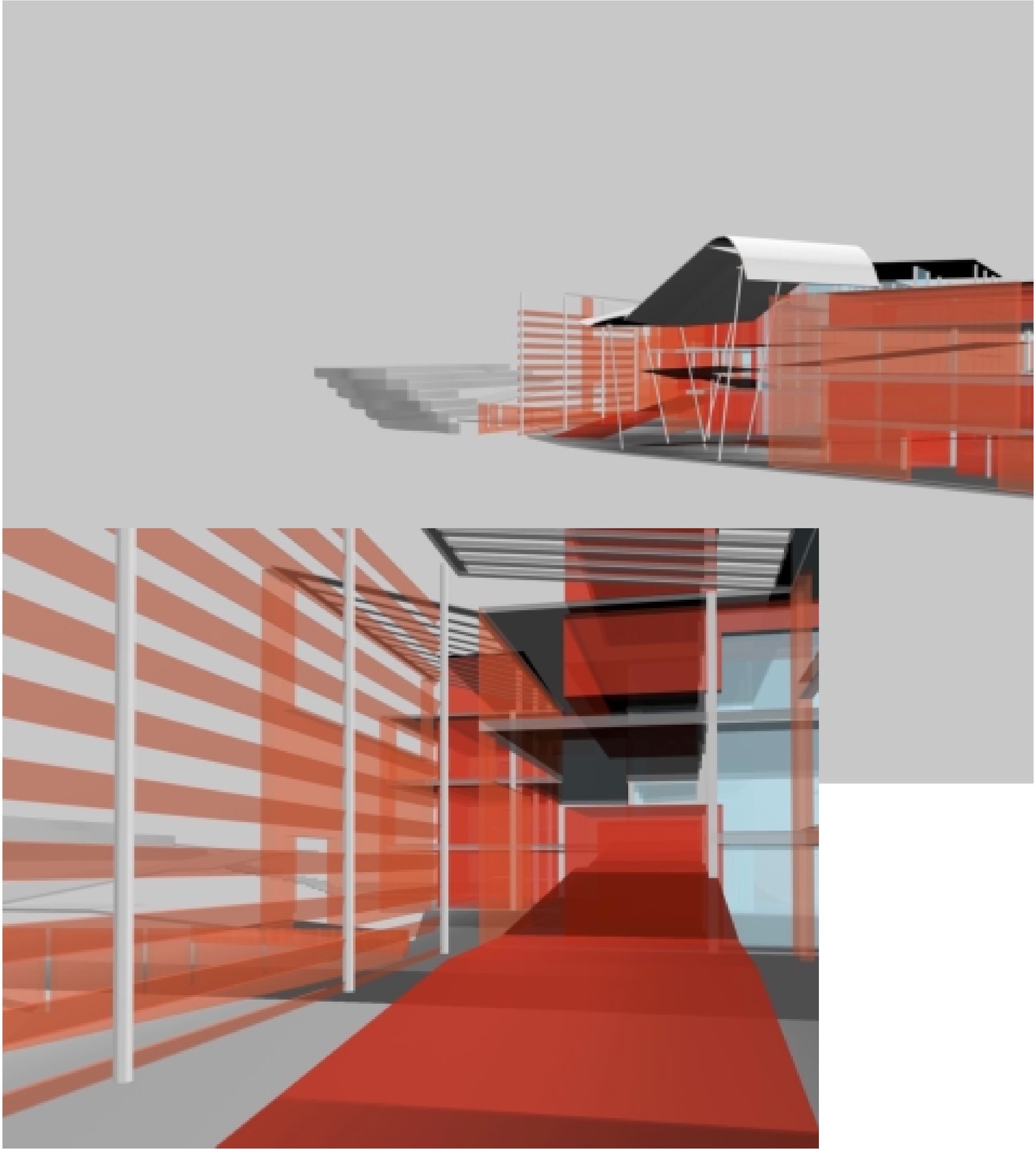




technical report

The building is a proposed Learner's Resource Centre situated in Berea Park. The development will be funded by the European Union and managed by a section 21 company of tertiary institutions and government departments. It creates a community facility that is needed in the Pretoria inner city, addressing lack of study space. The main building includes a digital library, offices, auditorium, conferencing facilities and a restaurant. This building is the focus of the technical investigation, while the rest of the campus development is part of the Urban Design scheme discussed earlier in the discourse.

The building is 5m lower than the van der Walt street level on the western edge of the site. The relationship of the building to the site is multi-dimensional: The western- and south eastern street facades are harder and layered towards the busier street. The eastern façade opens up towards the Apies river channel and the rest of the campus development. The exposed northern façade is limited because of the east west orientation and therefore the building steps to the east in modules, for maximum northern light.

Design approach

The development, being part of the proposed Nelson Mandela Development Corridor and the Apies River Urban Design Framework, emphasises interaction in the east west direction, this is addressed three- dimensionally. The set of building presentation drawings range from the site locality plan to floor plans, sections and three- dimensional drawings to specific plans and three dimensional details. The first drawing explains location (drawing 2), the floor plans show different functions of the building (drawings 3-6) with the sections explaining the verticality and modularity of the building (drawings 7-8).

The detailing of the drawings focus on certain portions considered more important to resolve, like the building module. This is the essence of the design. The three dimensional drawings are the most important communication tool, because this is the only way the building can be experienced as a whole. It also contributes to the emphasis placed on the three dimensional quality, layering and modularity of the building. Through these drawings a level of detail on which the building could be resolved is established (drawing 1). A constant reconciliation between the two- and three dimensional had, as a result, some irregularities which show the development of the technical resolution.

One of the most important aspects of the building is its adaptability. The reason for this is it being a community building. It can be changed to cater for personalisation and changing functions. The building at its core has a service spine which is modular and completely dismantable. This enhances the ease of "servicing" the building and inserting a light structure which serves as the backbone of the building. The spine clips onto the structural skeleton of the building.

A junction is created at the main entrance to the building and the rest of the campus. The architecture of the entrance celebrates its function and has a poetic quality. It corresponds to the north- and south east corners of the building which are articulated with curved masonry walls in plan. This articulation is investigated three dimensionally in the entrance (drawing 9,10).

This general description of the building illustrates the concept: a light concrete- and steel skeleton, a lightweight adaptable steel service spine, a heavy western façade and a pivoting elbow celebrating the entrance.

The building's layers are read from the northern- and south eastern ends to the junction and from the west to the east as solid/ closed to transparent/open. This is in response to

introduction

modular

context: the Apies river and campus development to the east of the site and the harder street edge to the west. This layering creates an experience of the different architectural elements and an awareness of the different layers of architecture. These different space-defining elements explain the meaning of different architectural elements.

The ramps in the building circulate from the main entrance foyer of the building and connect with the building through the service spine. This restricts the circulation through the building to the service backbone, with the fire escape staircases at the north- and south east ends of the spine. Together with the curved roof and angled columns of the main entrance, these sloped ramps enhance the dynamic tension of the foyer, giving it a readability and legibility (drawing 9).

The building consists of modules made up of similar elements (drawing 5,6). These modules are discussed and resolved in more detail. The module is repeated through the building and consists of the western concrete wall, a concrete corridor/ walkway linking the different modules, the steel service spine and the eastern open functional space including the digital library, offices, exhibition space, conferencing, restaurant and auditorium.

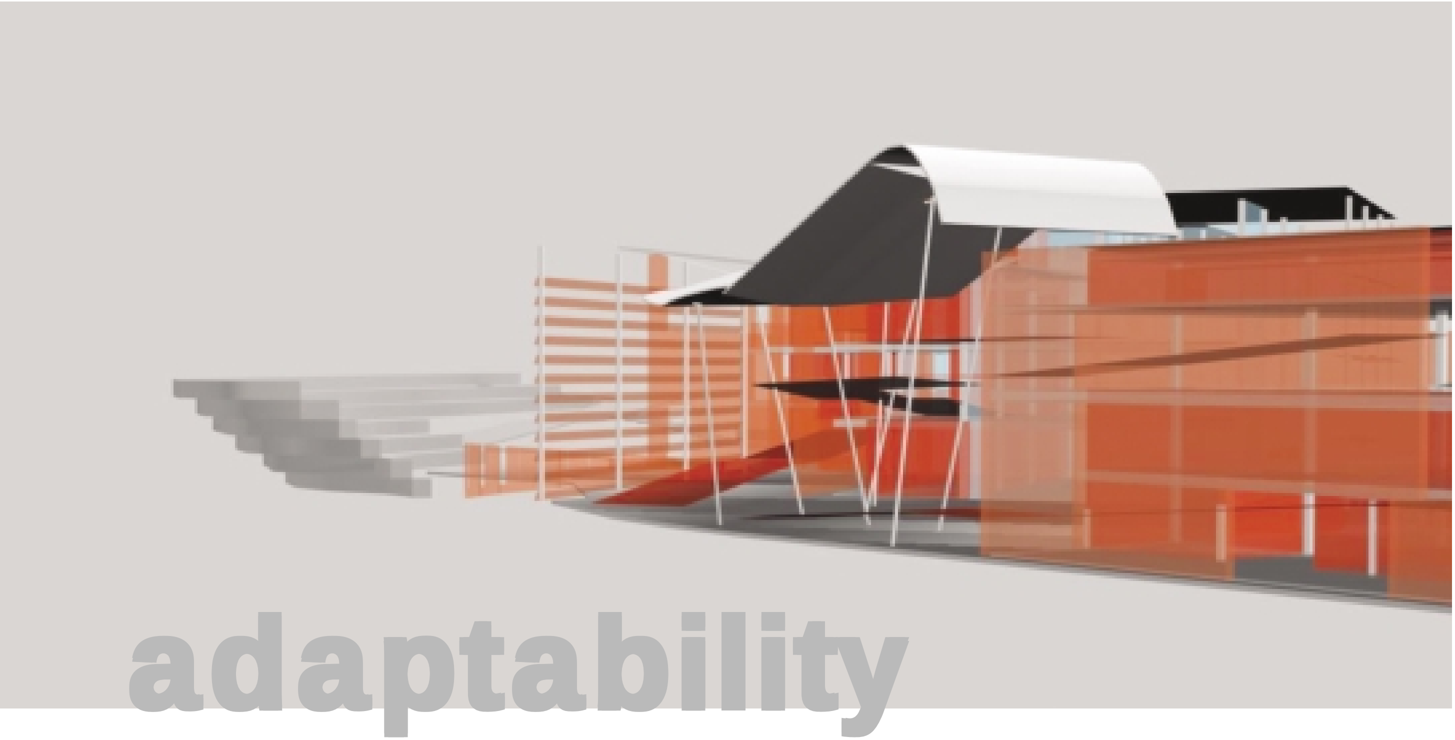
The three dimensional resolution of a module addresses the context, interaction and functionality all simultaneously. This brings the building together as a coherent whole consisting of layers and modules.

The module

This report should be read together with the technical drawings.

The spine

The service spine forms the backbone of the building and it



a light concrete- and steel skeleton, a lightweight adaptable steel service spine, a heavy western façade and a pivoting elbow celebrating the entrance.

bridges the gap between the western walkway layer and the eastern functional layer. All the services in the building including electricity, ventilation, wet services, maintenance, ablution, fire escapes and staff are located in this spine. All services run vertically in this spine, spilling out horizontally to adjacent western- and eastern layers. The reason for the spine is to have a serviced- service space, ensuring that the building is modular, adaptable and flexible. The building will mainly be passively regulated with mechanical ventilation as a back up. These systems will be specified, approved and certified by an environmental/ mechanical engineer.

The structure

The structure consists of steel columns with a concrete deck on permanent formwork. Through investigation the structure changed from concrete to steel due to recycability, better structural properties and because steel is perceived as being a "lighter" material.

The structures on the western- and south western facades of the building are off shutter concrete walls that carry the structural beams. The mass of the wall helps with thermal comfort in the building: shading against the western sun and thermal mass properties allowing the stack effect ventilating hot air out of the interior.

These concrete walls create the illusion of free standing walls punctured with holes. This achieves certain views, vistas and entrances through the building.

The western façade consists of a 420mm off shutter in situ reinforced concrete wall on a 450 mm deep by 1100mm wide reinforced concrete strip foundation. This structural wall carries the 305 x 165 x 41 and 406 x 178 x 54 structural steel I-beams of the skeleton. Structural conditions are according to the engineer specifications.

The eastern façade, 270 x 270 x 6mm hollow square steel columns are placed on a 7100 x 6800mm grid. These columns are filled with concrete for extra protection for structural failure in case of fire. To withstand fire the structural elements will be designed bigger or painted with a 12mm coat of special epoxy/ ceramic material for 2 hour fire resistance.

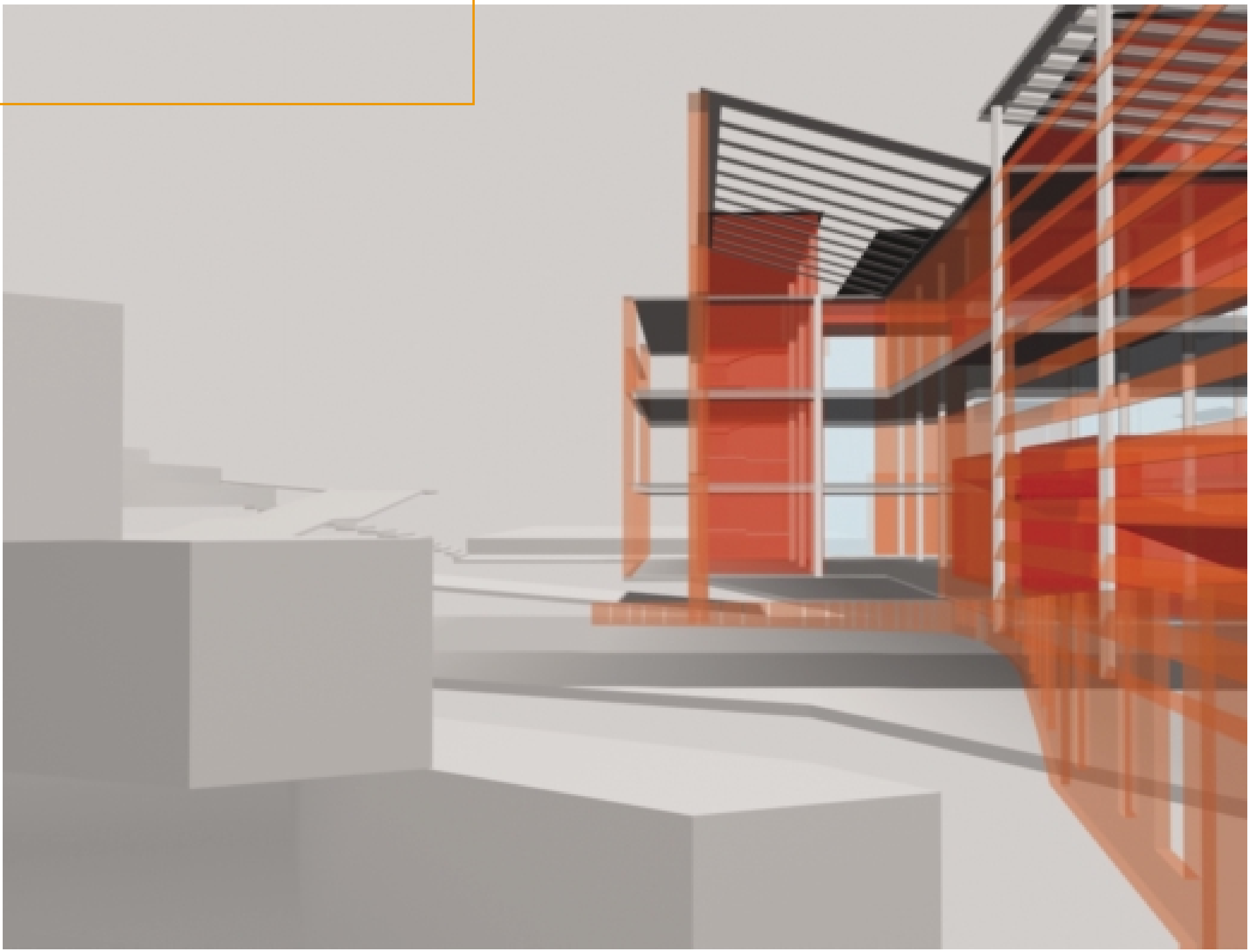
A 4000mm floor to ceiling height will ensure adaptability and maximise free usable space. This is achieved with all the services and equipment restricted to the spine, specifically the stack chimney space and the cavity interior wall.

The main structure of the service spine will be 152 x 165 mm T-section columns welded to a 200 x 200 mm mild steel footplate, bolted to the concrete floor. In between these columns a 100 x 100 mild steel angle track will be bolted to the concrete floor (drawing 11).

1200 x 1200 mm wall module will consist of 75 x 50 x 20 x 2mm mild steel lip channels screwed together to form a frame. 12, 5 mm wall board will be screwed to the steel frame. A galvanised mild steel plate/ polycarbonate sheeting/ Cor-Ten plate will be custom profiled to be water proof and to form a tray that will be screwed, as a cover, over the wall board, to the module. The module will be screwed to the steel track. The modules will be stacked on each other and fastened by screws through the interlocking lip of the profiled tray. The interior wall of the spine will be a cavity wall of these modules, to accommodate services. Maintenance will be easy by just removing one of the modules. Where a window is needed, one or more of these modules can be removed, and a steel frame, sliding window inserted. All the doors in the spine will be sliding and comprises of 30 x 5mm mild steel flat bars welded together to form a frame. Wall modules will be screwed to this frame. The door will slide along a 75 x 50 x 20 x3 mild steel track (see detail).

The walkway layer includes the ramps and corridors linking the different modules of the building. The ramps and floors consist of Bond- Deck permanent formwork for a composite steel and concrete flooring system.

A steel decking manufactured from 1,2mm thick ASTM 446 Grade C steel galvanised to Z275 is used in the **functional layer** (library, auditorium etc.). A custom made Cor-Ten (High –strength, Low- alloy steel) decking according to specifications will be used in the **walkway - and spine layer**. Each sheet will have a cover width of 900mm, with a rib



height of 75mm and interlocking male and female up stands. Accessories include steel end closers, self tapping screws, pop rivets, hammer drive screws and flashings. The decking will be fastened to the 305 x 165 x 41 and 406 x 178 x 54 I-beams by the self tapping screws. A light mesh for shrinkage control and reinforcing for large spans will be inserted. All specifications will be done by the manufacturer and structural conditions must be certified and approved by the structural engineer. The reason for the Cor-Ten use is to give the soffit/ ceiling in the circulation areas and spine texture, and the galvanised steel in the functional spaces will be a more uniform finish. This will create a separation between the different layers.

The thickness of the concrete will be 200mm for the ramps and 250mm for the floors. A textured, pigmented concrete screed to be laid in situ, single bay and saw cut will be used for the ramps. The floors in the functional spaces will be primed and coated with two coats of Epoxy enamel according to the manufacturer's specifications. A secondary 152 x 89 x 16 mild steel I-beam will be placed at 2500mm centres, between the primary beams to accommodate the larger spans of 5 – 7 m.

Because of the simple and fast erection, the permanent formwork above a conventional concrete slab saves costs and provides a finished ceiling. Dry and wet services can run in the ribs of the decking. Double volume openings are placed strategically in the decking to accommodate air movement and natural lighting in the interior spaces. The primary structural columns are 270 x 270 x 6 mild steel hollow sections welded to a 350 x 350 x 5 galvanised steel footplate bolted by M20 anchor bolts to a 450 x 1100 x 1100 reinforced concrete footing. All beams and columns are welded to a 5mm galvanised steel footplate and bolted together by hexagon bolts, M22, 50mm length, 5MPA strength spread, finished with corrosion resistant coating.

Glass & Shading

The eastern façade is a combination of a glass curtain wall and a custom made modular wall panel with a steel/ polycarbonate panel cover. The curtain wall consists of 1200 x 1200 x 6mm safety glass complying with SABS 1263 in a 50 x 50 x 3 mild steel frame screwed to a concrete screed.

The glass panels are fitted together by a 100 x 100 x 2 stainless steel patch fitting bolted together and sealed with a silicone sealant (drawing 12). The curtain wall is supported by a 200 x 6mm safety glass fin bolted to the concrete floor by means of a mild steel fin support box.

The shading device consists of an adjustable light weight system shaped like an aerofoil and clad with semi translucent light polyolefin weaved netting; Teflon coated according to manufacturers specifications. The mesh/netting must be sag-resistant with a **memory** to return to its firm state.

Each frame is 1500 x 3400mm and consists of 42 x 4mm mild circular hollow sections welded together. An aerofoil shaped steel plate will be welded to this frame. 8mm diameter cables will span between the aerofoil plates to give form to the netting. A simple crank system enables **individuals to regulate** the climate from within the building. This consists of gears which enables two louvers to be moved by a handle on a worm screw. Specifications to system will be according to the mechanical engineer (drawing 12).

The shading device at the south east auditorium and restaurant space is a timber louvered shutter operated manually. This shutter functions as a pergola for the restaurant and auditorium spaces when opened up. It consists of a timber frame of 30 x 30 timber slats screwed and nailed together. The frame has grooves for 25 x 5 mm timber louvers glued into it. A 50mm diameter mild steel circular hollow profile strut is fastened by a pivot joint to 100 x 8mm mild steel flat bar backing, screwed to the timber frame. The strut is clamped in a 75 mm diameter circular hollow profile welded to a 100 x 5 mm mild steel footplate. This is bolted to 12 mm diameter reinforcing starter bars cast in a 400 x 400 x 50 pre-cast concrete footing (drawing 13).

The roofs

The entrance roof is a post-stressed concrete slab cast in situ. This curved roof will have a 900 mm thick centre towards the middle of the entrance, consisting of a cavity cast into the concrete. This will taper out to a 85mm thick edge of the roof. This will be according to engineer's specifications. It will be supported by slanting hollow circular columns. 245 x 6 mm circular hollow section columns, painted with a epoxy finish for fire resistance, will be used. A 600 x 5 circular mild steel foot plate will be welded to the base of the column and bolted with M32 anchor bolts to a 600 x 1100 x 1100 reinforced concrete footing (drawing 11).

The **connection** between the columns and the roof is celebrated. The column and roof connection will be a 600 x 10 mm mild steel head plate welded to the top of the column. The top of the column will be cast into the concrete roof with a circular hole around the head (see detail). This 600mm circular hole will articulate a shadow line around the head of the column. The angle of the columns is determined to carry the roof as well as the ramps connecting the loose standing


spine
walkway
shading device
natural lighting
timber louvered shutter

modules of the building. The ramps act as bracing for the columns. Through this the amount of columns are kept to a minimum. These angled columns together with the curved roof also create a visual dynamic that celebrates the entrance as a pivoting **elbow** and orientating element.

The steel roof of the module in the east west orientation is a monopitch steel column and beam structure. The 270 x 270 x 6 square hollow section columns extend to the roof. The main roof structure will be carried by a custom made mild steel beam made up of 10mm steel plate welded together. The beams taper to the ends, with the deepest central point 406mm deep to accommodate the large span of 10m. A 305 x 102 x 25 mm mild steel I-beam, forms the top flange of this composite beam. This beam supports the purlins, roof cladding, solar – and roof panels. A 102 x 203 mild steel structural T- profile frame will be welded in between the consecutive I- beams to form a tray for the panels. The solar panels will have a frame of welded mild steel flat bars according to manufacturers specifications, bolted to the T-section tray. The roof panels will be *Zincalume* (Zinc and Aluminium galvanising with a matt finish) galvanised mild steel panel or an opaque polycarbonate panel, custom profiled with a gutter to facilitate water run-off. The panels will be screwed to the T-section tray. This is to prevent glare to higher neighbouring buildings, to have smaller areas of water run off and to minimise maintenance. 75 x 50 x 20 x3 mild steel lipped channel purlins will be welded in between consecutive I-beams. The roof cladding will be a clip decking with specially designed roll form ribs for greater locking strength. The steel trays have 700mm coverage, a 42mm high rib and forms a 233mm trough between ribs. The decking will be fastened to the purlins by specified clips fastened by self locating tabs. The steel will be coated by polyvinyl fluoride to minimise corrosion and the insulation fastened in between purlins, will be a reflective foil laminates complying with SABS 1381, part 4, class A (drawing 12).

The flat roofs of the south east modules as well as the walkway layer are concrete on permanent formwork. A screed with a 3:100 fall to a 100mm diameter rainwater outlet running down the columns, is cast on the roof structure. Over the walkway layer, on two modules with an east west orientation, the two concrete roofs are used expressively to differentiate between different functions in this **layer**. Holes are cut in these slanted roofs, so extra reinforcing will be used and the concrete will be deeper. This accommodates sun patterns on the vertical and horizontal surfaces in these spaces and creates an awareness of the climatic elements. The user will intentionally not be protected against wind and rain in this space. This creates another **layer** in the building.


layering layering

Ventilation, Lighting & Water

Natural lighting of interior spaces is achieved by a glass curtain wall on the eastern façade and indirect lighting from the clerestory window under the monopitch steel roof. Light will be reflected by light surfaces into the spine and through 1000 mm openings in the floor decking.

Ventilation of the building is based on the fact that warm air moves up and is replaced by cooler air. A stack chimney is created by extending the spine above the concrete roof level with a steel mesh floor panelling. Larger services will run in this space. This part of the spine will consist of dark painted corrugated sheeting fastened by hook-bolts to 35 x 35 x 3 steel angles welded to secondary mild steel I-beams columns. These columns are bolted to the primary beams of the roof slab. A glass wool insulation backing is screwed to the secondary I-beams. A heat build up is created in this space and warm air will be pulled up through the spine and functional spaces by means of cross ventilation and released by a southern open-able window in the stack chimney.

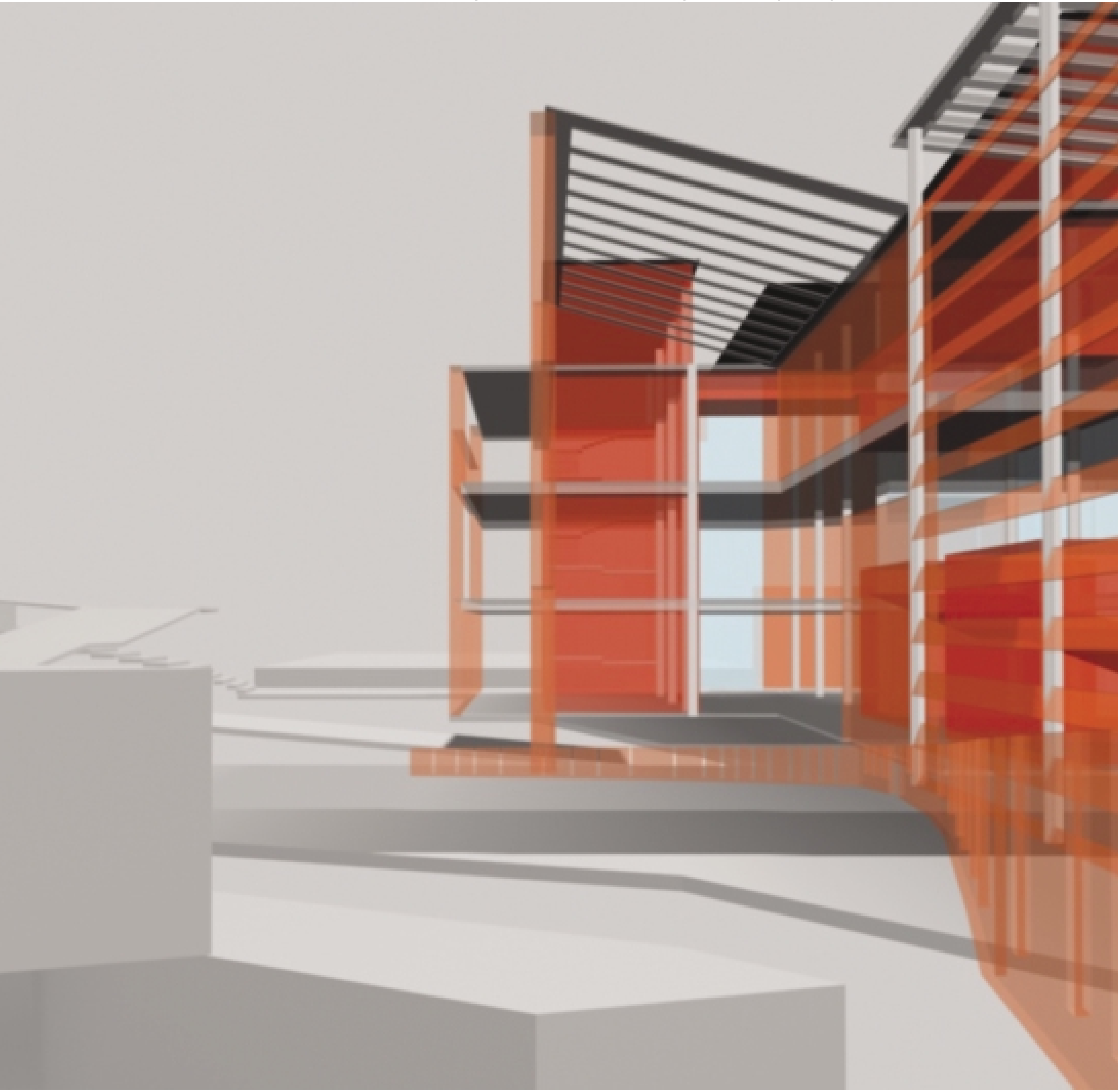
The steel roof also has louvered clerestory windows that will let air out. In winter time these windows can be closed up manually. Another ventilation system is the vertical 1000mm openings next to the western wall where a temperature difference between inside and outside will cause air to move up these openings and escape higher up. The suction ventilates the walkway- and spine layer.

Rainwater harvesting by catching rainwater from the roof and draining it through down pipes to tanks on the ground floor. The water will be filtered during this process and pumped up by a solar panel to the roof again where it will be reticulated through the building by gravity and used for grey water. Once through the cycle the water will be used for irrigation. These systems will ensure responsible energy consumption and resource use. This will be designed in conjunction with an environmental engineer (drawing 14).

Circulation

Circulation through the building is mainly by ramps, with two fire escape staircases at the ends of the building. These staircases become visual architectural elements. Being behind a glass façade it enhances the articulation of the ends of the building.

The staircase has a structural balustrade of 10mm structural steel cut and welded together, according to specification. A 60 x 2mm handrail will be welded to the



structural steel. The balustrade is bolted to a 200 x 200 x 10 steel angle welded to a 200 x 300 steel footplate, bolted to a 2400 x 1000 x 750 concrete footing. A 1200 x 300 x 50 fibre concrete light weight tread is bolted to the steel balustrade. A 25 x 25 x 3 mild steel angle nosing is screwed to the tread (drawing 13).

The ramps as discussed before, are of concrete on permanent formwork. The structure of the ramp is, as far as possible, part of the entrance structure. The main structure of the ramps will be 305 x 133 castellated I-beams spanning between 100 circular hollow section columns at 7 meters centres.

This integrates the ramps with the spine and the rest of the building. The secondary ramp structure will be smaller rectangular hollow sections with I-beams.

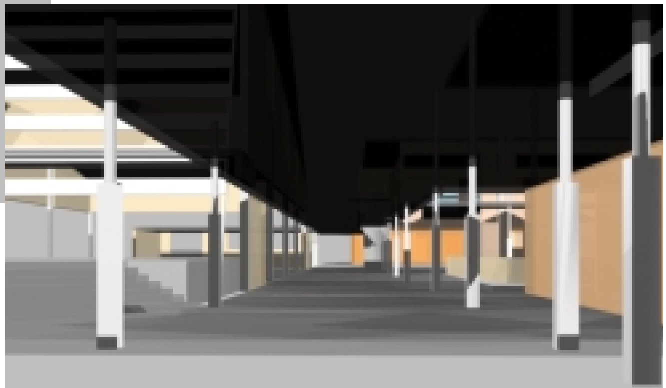
The auditorium

The auditorium is placed in the south east module, in the functional **layer**. It consists of a dismantable I-beam structure. On this primary structure a secondary 200 x 75 galvanised mild steel angle welded to a 70 x 10 steel plate, bolted to the beam structure, serves as support for the treads. The tread module consists of a steel tray of 100 x 3mm flat bars welded together, bolted to the angle. A 1500 x 300 x 50 precast fibre concrete lightweight tread with a slip resistant profiled surface, will be bolted to the steel tray.

This ensures the dismantability of the auditorium structure. The building, being a community centre, needs to be adaptable and this extends the life of the building. Timber acoustic panels will be fastened to the structural columns according to acoustic engineers specifications (see detail) (drawing 13).

The exterior spaces will be landscaped by a specialist. The outdoor spaces are so designed to strengthen the campus atmosphere (see site plan). The level changes in the landscaped spaces are to drain water away from the building to storm water drains.

All other services in the building are discussed in depth in the Baseline document.



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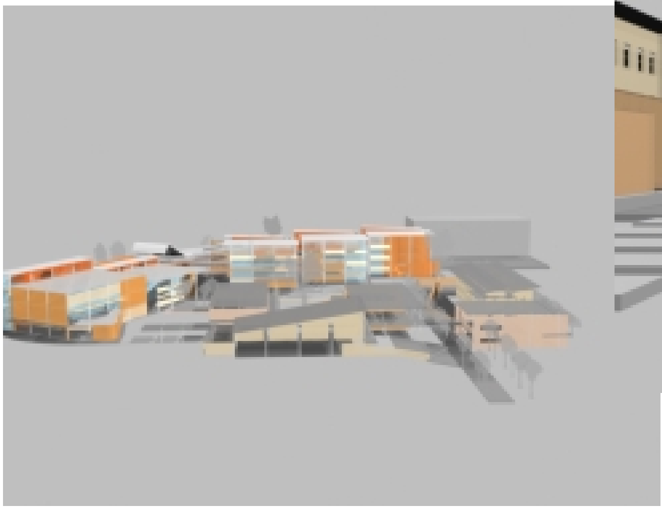

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introduction

This essay should be read together with the ***Technical Report****. It is an elaboration of the* ***Introduction*** *at the beginning of the book.*

Semiotics, the study of signs, presupposes the assumption that meaning forms the basis of culture. In architecture, meaning relates buildings to all other things to which people attach **[sign]ificance** and value including purposes, ideas and beliefs. According to Morris (Broadbent; 1980; p. x) semiotics has three components: anthropology, psychology and sociology.

Built artefacts, by which humans regulate their transaction with nature, are the fabric of social interaction. They connect, at the highest levels of complexity, elements of human behaviour to create signification (Broadbent; 1980; p. xi). Rules governing this behaviour are outside the epistemological framework, and the behaviour itself constitutes social empirical science.

Any building is a referent, a tangible object to be experienced physically. It is a signifier according to where, when and how it was built. The building is signified by architectural concepts like words, drawings and photographs (Broadbent; 1980; p.2).

Visual culture is the interaction between the viewer and the viewed; the visual event. The viewer engages with technology and media to experience a visual event. The event is the interaction of the visual sign, the technology enabling and sustaining the sign, and the viewer (Mirzoeff; 1999; p.11). The visual image is not stable but changes its relationship to exterior reality at particular moments (Mirzoeff; 1999; p.7)

According to post-modern theorists, the dominance of the image is in its distinctive features (Mirzoeff; 1999; p.9). The outcome of this visual event is that a cultural framework is needed to explain its history and its visual impact (Mirzoeff; 1999; p.22).

Through this essay, the meaning and psychology of architecture as theory is investigated. Architecture is communicated through language. This has relevance to the Berea Park Learners Resource Centre. It is a building conceived through the superimposition of an abstract system on a distinct context. The building is thus communicated to the user through the abstract system so that a relevant, personal meaning can be concluded. An eventful experience of the building, intended by the architect, is then achieved.

meaning in architecture

Meaning and Psychology of Architecture

The most general views in architectural psychology according to Ittelson et al (Broadbent; 1980; p.322) are that of Freudian psychoanalysis, Watsonian behaviourism and Kohlerian Gestalt. These views reinforce certain theories: Operant learning, social modelling, satisfaction sites and behaviour settings. These views and theories assist researchers in conducting experiments of social behaviour.

According to **architectural psychology** (Broadbent; 1980; p.324) organisms survive only if it interact appropriately with the environment. An organisms survival relies mainly on what it can learn of its environment. A person will personally learn the value of the different objects that form the environment and the various spatial locations within an environment. Information is received through sensory receptors. It is not heaped up in order of arrival. A continuous sorting process, where fresh information is allocated to existing material of the same kind, is used. Inner representations are examined and manipulated in the absence of real external objects. The viewer reviews his/her own experiences and decides what should have happened. There is a constant coding of "whatness" and "whereness" of objects. These objects should have a spatial tag. Environmental psychology is based on factors determined by the human capacity to navigate and to move.

The communication between architects and non-architects is at the core of what is experienced as meaningful, good architecture (Hershberger; 1980; p.41).
Research done in Englewood, Colorado, concluded that humans have a mental map of their physical surroundings and their local environment, containing much detail. Lynch's terms paths, edges, nodes, districts and landmarks coincide with this interpretation (Harrison et al; 1980; p.163).

The perception of a city is an extremely complex series of relationships intimately involving the individual as resident-dweller. It is mostly based on function and to serve the particular needs of inhabitants.

Architectural space and semantic space

In semantics there are connotative signs that are described by adjectives e.g. the house is warm, soft, small and cosy. Denotative signs use a noun e.g. that is a house. If these signs become more ambiguous semantic chaos will result e.g. non- artists judging abstract art.

Smell, sound, touch, temperature and adaptation over time are needed to experience architecture. Models and two dimensional communications are not sufficient. Through a holistic view, physiological, psychological intentions and other factors which buildings will

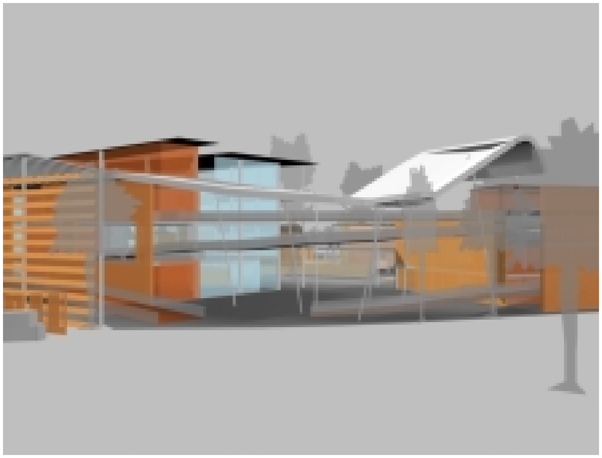


Fig. 1 The three dimensional quality of the design emphasis the exploratory mode of the routes.
The entrance "elbow" and circulation ramps.

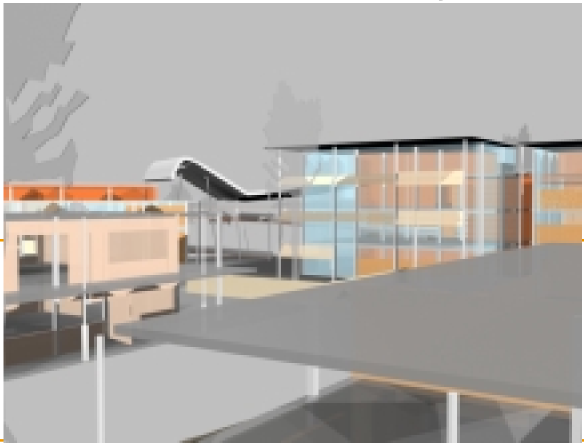


Fig. 2 The module as an icon (meaning).
North east view from the recreation building next to the river.

influence are realised. Techniques of determining these factors are behaviour questions, real world simulations and unobtrusive/participating observations. This is achieved by the interlinking of two chains: integration chain of human activities and a space chain of physical spaces (Broadbent; 1980; p.313). This is the man-environment paradigm.

When seeing the building for the first time a viewer will notice aspects that will go unheeded because of an exploratory mode of behaviour. If a building is used more regularly a habitual mode of behaviour is experienced and this will determine the true success of a building (Bechtel; 1980; p.215).

LRC-The Learners Resource Centre (LRC) being 5m lower than the Western street edge, is resolved multi dimensionally because of this reason. Emphasis was placed on this quality during the design process, enhancing the three dimensional experience of the user as he/she walks along routes through the building and the site. Thus the exploratory mode of the building and site is extended (figure 1).

Hillier and Leaman (Broadbent; 1980; p.326) are opposed to the man-environment paradigm, stating that it overlooks the importance of symbolic and semiological systems in the human universe. Language, society and symbolic systems exist in logical space with high symbolic content. This theory is based on structuralism. Structuralism (whether language, society or environment) recaptures logical structures which makes meaning possible. The richness and diversity of man-made artefacts are made intelligible. In reaction to this theory Esser (Broadbent; 1980; p.327) says environment is experienced physically, socially and conceptually, and not split from humans.

According to Hillier (Broadbent; 1980; p.336) a building does five things: it encloses space where an arrangement of rooms, corridors, staircases and their size, shape and adjacencies facilitate activities. It acts as an environmental filter protecting people from the external climate making it comfortable and pleasurable internally. It *will* act as a cultural symbol, has economic implications and environmental impact (climatic, symbolic etc.). People will naturally assign meaning to buildings.

According to Juan Bonta (1980; p.275) another tendency is that of the indicator and signal. An indicator is a directly perceptible fact and an interpreter realises that the indicator refers to a meaning. A signal communicates and an indicator indicates. In design the signal and interpreter are present simultaneously (Bonta; 1980; p.279).

Architecture expresses certain values or meanings to a passive viewer. This viewer is placed in the role of an active interpreter of an essentially passive architecture. Expression is the interpretation of the entire social and cultural group. Architecture expresses values by itself without human interaction e.g. materials, climate etc. Interpretation needs a human agent (Bonta, 1993; p.520). Interpretations are in verbal form. The questions asked; is the meaning intentionally embodied, and is the intention recognised? (Bonta; 1993; p.521). A changing of meaning happens by convention and re – semantisation (Bonta; 1993; p.523).

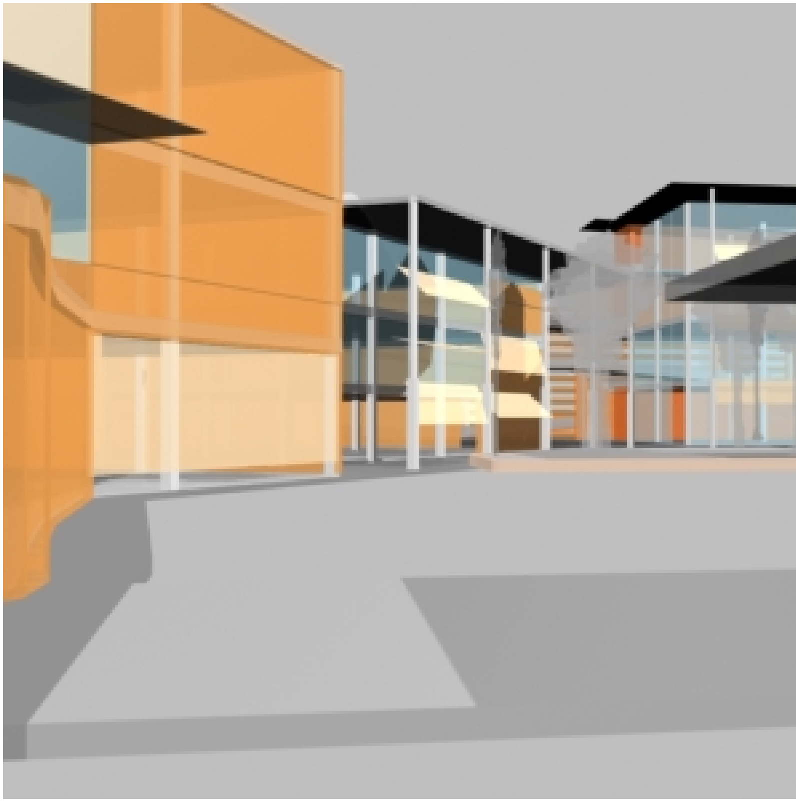
In post-modern architecture the analogy is complicated and one needs a thorough knowledge of classical architecture to understand what rules are broken (Broadbent; 1980; p.147). A contextual design is a building that houses human activities and acts as a cultural symbol. The building must have cultural reference where the uses of the building are readable. This is the only way meaning can be built into architecture (Broadbent; 1980; p.163). Michael Graves in the eighties used analogies which stressed the relationship between objects in terms of oppositions. He creates symbols giving those further meanings instead of encouraging new meanings (Broadbent; 1980; p.208). Functionalists tried to only have function: it is impossible, architecture will inevitably carry meaning. According to psychology one has to categorise, otherwise everything will have to be thought out afresh every time. Metaphors will be drawn and people will read what they want whether the architecture intended it or not.

The Language and communication of Architecture

Theory and modes of communication

Architectural signs are a compound of indexes, icons and symbols.
Questions are asked: what does it communicate, what behaviour does it encourage and inhibit and how successful is it? This is answered by **semiotics and structuralism.**
Everything is stretched over the same intellectual framework with common thinking and similar results.
A sign is something that reminds us or stands for something else, like an analogy in architecture. No sign is completely pure and all have a conventional coded element.

The most important aspect of semiology (the science of signs) according to Charles Sanders Peirce (Broadbent; 1980; p.340) is that of icons, indices and symbols.
An **icon** is a sign referring to an object that it denotes by virtue of certain qualities of its own and which it posses e.g. architects drawings. A building is an icon because of its similarity to plan. An icon can be topological e.g. Frank Lloyd Wright's central planning or analogical if it has the same symbolism as the referred object. According to Jencks (Broadbent; 1980;



p.347) it is the richness of possibilities by which anyone can read their own meanings into it. There is a different relationship between signifier and signified and is relatively motivated. Walter Gropius and Le Corbusier tried to establish a universal language based on iconic signs. The international style based on these signs became too restricted and more clues were needed to understand them. An example of this is a bridge as a conventional representation of forces, not the forces themselves.

LRC - The building is mainly a topological icon with reference to form and space. The meaning of the building is left to the interpretation of the user. The different sizes of the different functions are readable in the module. The module creates an ease of interpretation and a sense of orientation (figure 2).

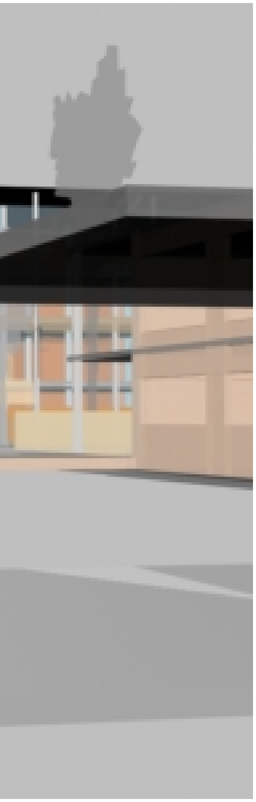


Fig. 3 The module as a symbol (function). View from the east under the extended hall slab.

A **symbol** is a sign referring to an object that it denotes by virtue of a general law, usually any associations of general ideas, which operates to cause that symbol to be interpreted as referring to that object. This is the quality of relationship with the entity it resembles. There is sensory motor (physical function) - and semiotic (meaning) symbolism. This is the analysis of semantic differential and personal construct theories (Broadbent; 1980; p.348). Categorisation takes place where someone who has learned the appropriate symbols, recognises them and knows the meanings (Broadbent; 1980; p.349). There is an arbitrary relation between signifier and signified. An example of this is in the present day usage of building materials where glass and steel signify an office building. Motivation is involved and orders are connected to functions by usage and constant feedback (Jencks; 1980; p.105).

LRC - This includes a programmatic - and meaningful function. Categorisation takes place and a communal meaning is created, that refers to the building, as soon as it is "claimed" by the users. Repeated use will ensure that the module becomes a symbol for what function it houses. Similarity is key for the building in terms of its role as an icon and symbol (figure 3).

An **index** is a sign, or representation, which refers to its object not so much because of similarity or analogy. The general characters are in a dynamic connection with individual objects and senses the memory of the person to whom it acts as a sign e.g. notices showing people where to go. This is the easiest way to experience a building. A particular building's form encourages and forces people to move along and around certain routes. There is an existential relation between signifier and signified. The indexical sign is functional and, if reused, becomes a symbolic sign e.g. the walkways and ramps in the building becoming signs of route and destination (Jencks; 1980; p.102).

LRC- The dynamic connection and combination of individual objects feeds on the memory of the user. The form and assembly of the building encourages moving along routes and walkways and habitual use generates its symbolic significance. The walkways and staircases become the sign - facilitating a "reading" of the building (figure 4).

Architecture is not just signs but has grammar and intention. It has syntax with the different parts fitted together, and this composition is meaningful through the combination of its parts (Scruton; 1979; p.160). Saussure formulated semiology (the science of signs) thus creating an analogy between language and other activities. Language has meaning because of a deciphered code, this means structure, which means rules. Meaning in language is based on truth which is based on syntax. This is not the same in architecture where there is non-linguistic meaning (Scruton; 1979; p.165). Different elements together create a disobedience to rule. This syntax of architecture enhances and conveys expressive intentions and rules are only found to depart from them (Scruton; 1979; p.172). There is a dependence of meaning between part and whole and vice versa. Details themselves impose a possibility of organization. The success depends on composition and "structural" grammar over, for example, the façade (Scruton; 1979; p.173). In language an incomplete sentence has no meaning. An incomplete building could have stylistic unity. Style emerges from synthesis of the whole (Scruton; 1979; p.176).

The difference between architecture and language is context and medium. The building is designed to protect, shelter, exclude,include and to articulate complexity.
The medium of communication is floors, walls, roofs etc. The elements of architecture have physical and expressive properties. Signs and symbols communicate through expression. A building becomes symbolic of a person in terms of sex and social role.

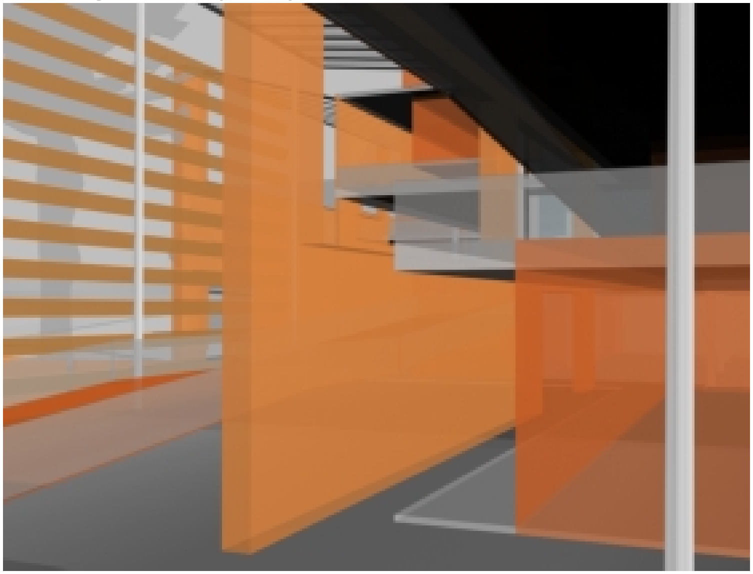
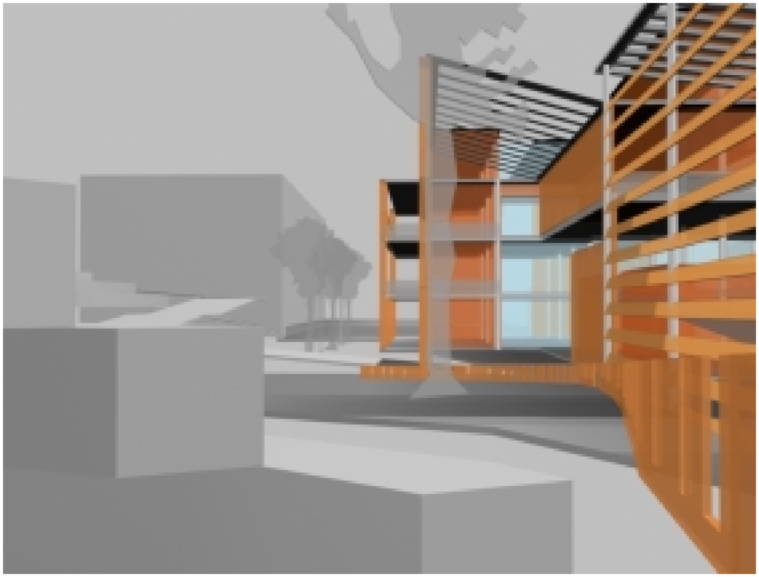


Fig. 4 The walkways and staircases becoming indexes
Northern view from the entrance showing the spine and ramps.

Fig. 5 The assembly of the spine, skeleton, skin and elbow
View from the south showing historical building to left.



The human body has always had a correlation to architecture in many cultures. A response to buildings is cognate with the response to people (Onions, 1993; p.512). The international movement had a pre-eminence to universal human functional needs. In post modernism the individual emerges, liberated, and personal aspirations are tolerated. These became complex instruments for articulating human interaction.

Fig. 6 Plocek House, New Jersey, 1977 by Michael Graves. The colouring becoming an abstract ion of the ground and sky, and the stylised column marking the entrance and hearth and becoming a stair-column

In the 1980's a new language of architecture was used as a critique of the modern movement. Anthropomorphism is the symbols and meanings related to the human body. A building has silhouettes, faces, tops etc. Modernists symbolise efficiency and utility and process. Symbolism itself was the machine. Balconies became decks, plans "work", the elevation articulated and stairs become nodes. Modernism according to Hellman (1993; p.518) was bureaucratic jargon while Post modernism is pseudo-vernacular, clothed in 18th century garb. Post-Modernity makes the vulgar acceptable. Language in architecture is not static and symbols are constantly replaced (Hellman; 1993; p.519). Space, time, form, atmosphere, texture and colour are added to signs and symbols. This creates poetry and evokes a spiritual response.

LRC- The assembly of floors, walls (transparent or solid) and roofs ensure a unique language. The expression of the elements depends on the combination thereof and the experience of the user moving through, over and under them.

The relation of the building to the human body is related to words describing a certain group of elements: the service "spine", the structural "skeleton", the pivoting "elbow" entrance and a western, punctured "skin". This is related to sensory motor symbolism (function related), more than an analogical look-a-like. The way the building is experienced by the user determines the grammar (figure 5).

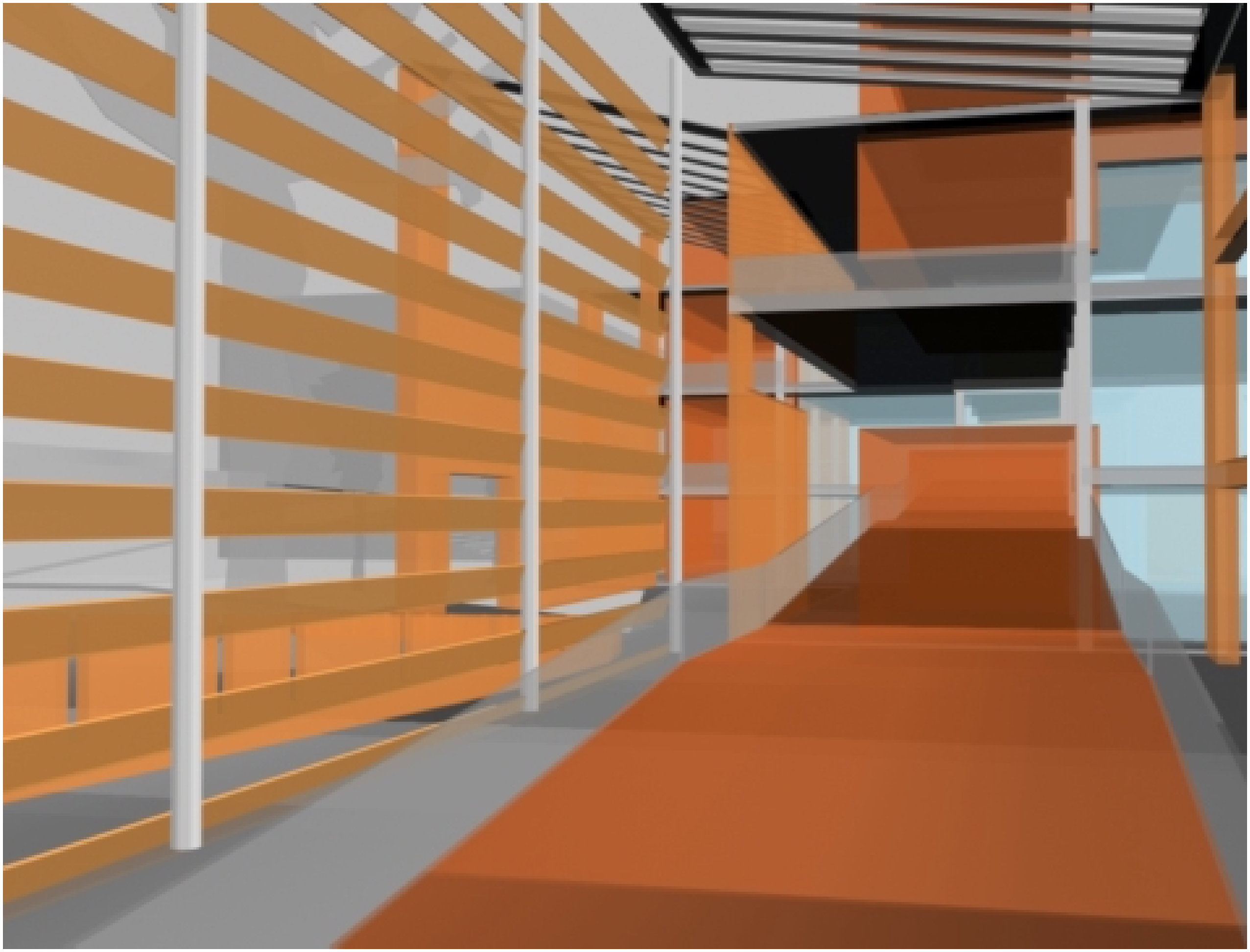


Fig. 7 The skin, spine, skeleton and elbow becoming the semantic field creating a coherent meaning. Northern view from the ramp in the entrance space.

There are no rules in architectural grammar. Although terms are used in describing architecture (Jencks; 1987; p.39):

The metaphor is the matching of one experience to another (Jencks; 1987; p.40). Conflict arises in different subcultures where you need to be trained to understand metaphors and everyone's experience must be taken into consideration. This is dependant on local code (Jencks; 1987; p.42, 43). It determines the way in which the building is experienced.
In the Sydney Opera House actual functions were obscured and the expressive functionalism criticised (Jencks; 1987; p.45). Venturi means the *decorated shed* uses conventional ornament instead some analogy for example a duck (apparently popular in the 1950's). "Duck" buildings can be seen as iconic were decorated sheds are symbolic. An increase in metaphors has an increase in drama as result.
In Ronchamp by Le Corbusier, metaphors are called up without naming them; the result is imaginative brilliance and coherent meaning (Jencks; 1987; p.48). Architecture in everyday life is experienced inattentively with prejudice of mood and will. The result is a building with over coded architecture (Jencks; 1987; p.50) and non-literal metaphors are more successful and creative.

Architectural **"words"** are more elastic and polymorphous than spoken or written words. They explain the idea of the architecture and make it identifiable by the user. Thus it is based on their physical context and the code of the viewer (Jencks; 1987; p.52). In a modern building indexical (e.g. arrows), iconic (e.g. structurally) and symbolic (learned conventions) signs are used (Jencks; 1987; p.54). The repeated use of these codes ends up in a symbolic sign. A new language full of gamut of architectural expression can be created. This as a result will have metaphorical reading, signs and sometimes intentional vulgarity (Jencks; 1987; p. 62). An experience is expressed verbally.

The **syntax** includes a combination of various words like doors, windows, walls etc. There is an enjoyment for the designer in breaking the syntactical rules for example Michael Graves foregrounding elements of architecture out of visual functional context (figure 6)(Jencks; 1987; p.63). Semantic meanings are joined with other associations creating a new meaning and experience (Jencks; 1987; p.64).

In this differentiated society, the environment becomes more legible (Jencks; 1987; p.69). The relationship between elements is more important than their inherent meanings (Jencks; 1987; p. 72). In the architecture of the eighties, the technical aspects and aesthetics were more important, not **semantics**. For example steel and glass being seen as cold, impersonal and precisely ordered and thus ideal for the symbol of an office building. Yet, the relationship between brick, concrete, steel creates a semantic field. The semantic questions are left to intuition. The mixed styles of eclecticism, although confusing, could become an aid in communication (Jencks; 1987; p.78).

LRC- Imaginative use of the "metaphors" like skin, spine, skeleton and elbow are used to create a coherent meaning. The metaphors are not named but are determined by experience. The combination of the words (skin, spine, skeleton, and elbow) creates the semantic field of interpretation. This is related to elements of architecture making the user aware of the materiality of the specific element (figure 7).

Practice of communication

Architecture is a form of mass culture as it communicates to large groups of people, thus confirming certain widely subscribed to attitudes and ways of life (Eco; 1980; p.41).Architecture is psychologically persuasive prompted to follow the instructions implicit in the architectural message.

Functions are signified, promoted and induced. This discourse is experienced inattentively in the same way one experience films and advertising. Not like one would experience works of art or other demanding images that call for concentration and absorption (Eco; 1980; p.42) Architecture as mass communication does not use highly conventional messages. It is inventive and its premise is that society could become something new, different and more informative (Eco; 1980; p.43). It compares with prior and subsequent means and ideologies of inhabitation. A styling happens where new rhetorical forms are born, a reaffirmation of something, with new connotations and re-codification. All this is an increase in information content.

Architectural messages are interpreted in an aberrant way without the addressee being aware of perversion e.g. hanging laundry over a railing. It fluctuates between being coercive and being indifferent where it is seen as being fit. Architecture belongs to the realm of everyday life like pop music, not like high fashion. It is like a business where economic conditions govern mass culture.

Architecture addresses expectations in society and is related to linguistic forms. According to Eco (1980; p. 45) there are three approaches to what society wants: integrating the work into the reigning social system, that to which it is accustomed. Avant-garde subversiveness discards all conventional architecture with an alien underlying code. Then there is architecture that is new but still intends to answer to the basic code. Available data is used to determine what new system of functions can be related to the whole of society. Interdisciplinary work relates sign vehicles to that which lies outside architecture, for example advertising and the virtual universe.

Cultural forms and all determined languages are absorbed in **advertising**: it has no depth, it is instantaneous and instantaneously forgotten (Steele; 2002; p.3). The form of advertising is that of a simplified operational mode that is vaguely seductive and vaguely consensual. Today oscillating forces converge into the parallel force of 20th century architecture and advertising.

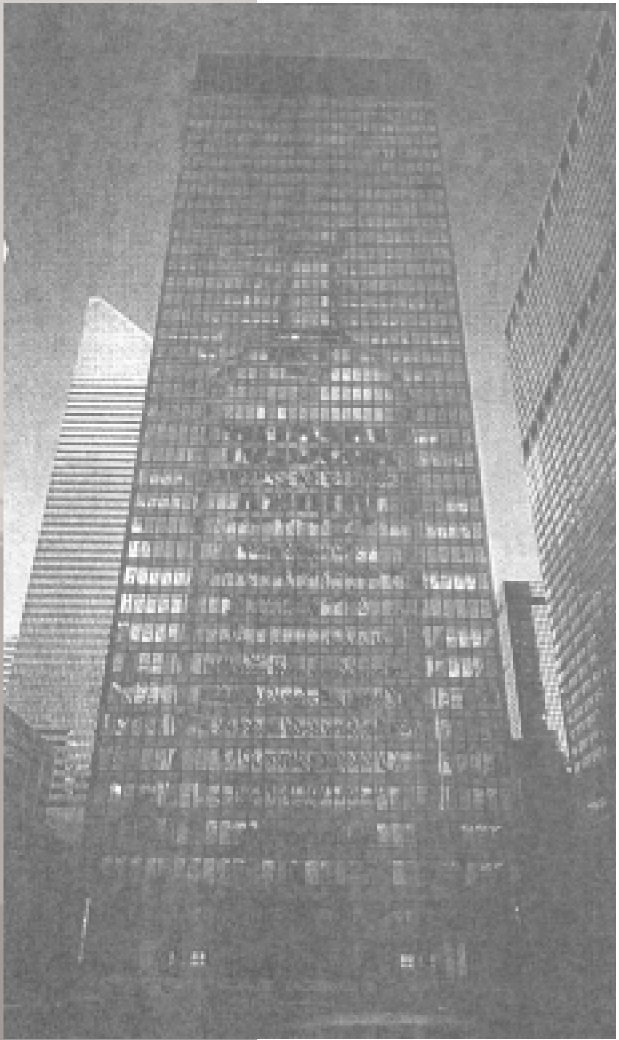


Fig. 8 The Seagram building by Mies, with a reflection of an Absolut vodka advertisement (Steele; 2002; p. 3).

The viewer is unable to determine where the architecture stops and the advertisements begin, for example, the reflection of the *Absolut* vodka sign in the façade of the Seagram building (figure 8). Architectural space has become the ultimate consumer ready made with it becoming a vehicle for extending advertising's single greatest invention; brand space recognition (Steele; 2002; p.4).
Real space (architecture) triggers imagined (pictorial) space (Steele; 2002; p.17). In architectural spaces a moving viewer has, as a result, a phenomenological reading: the physical presence of the viewer as subject register.

For human beings in an industrial society everything is rooted in symbols: a **virtual universe** of images (Daniels; 1998; p.26). Media – irrationalism creates everything as artificial, unreal, irrational and meaningless. The brain acts as virtual reality, where there are no more spatial distances. The time dimension is overthrown. Language skills are impoverished and the result is a decrease in creativity and innovation. Language is changed to abbreviated images of symbols. The need of architecture is the preservation of the environment, conservation of resources, necessity for recycling and accommodation for the information age (Daniels; 1998; p.28).
Through e-mail, an electronic identity is constructed and geographical boundaries broken. A community is experienced as a daily network of people. Barrier of "skin" is broken and boundaries between surroundings and architecture will gradually dissolve as well (Daniels; 1998; p.30, 32). A building has a space and time continuum that creates scenes with new dimensions and distance.

LRC- The building is seen as advertising a meaning. It is rich with information content and due to the existence of the virtual, universe a decrease in space needed. Walls become a backdrop for imagery and scenes and the user registers spaces and meaning (as in advertising) as he/she moves through the building. The building becomes a vehicle for a

collective interpretation. The "skin" is broken to make worldwide communication and a contextual architecture without barriers possible. The tension between the inside and outside of the architecture is dissolved. Dynamism in function is possible with a combination of digital and hard copy in the library to ensure context, reciprocity and experience for the user. Re-interpretation of function and the un-static nature of architecture are experimented to create a library space with computers, books and study carrels. A recognisable image (the module) is created (figure 9).

Computer networks and central servers result in a decline in walled-in space. The negative result could be a reduction in significance of real experience, the undermining of education, creativity and the counteracting of schools and libraries (Daniels; 1998; p.37). Creative problem solving still requires context, reciprocity and experience.
Yet, any building should provide shelter, warmth and security. It should illuminate surrounding surfaces, create rooms and should have soft, rough and smooth materials in harmony (Daniels; 1998; p.33). The contemporary, contextual responsibility of a building is realised in the Learners Resource Centre. The meaning and communication of the desired building was kept in mind through the design process and development. An abstract layer superimposed on a context is the resultant design.

Design (de)constructed

Introduction –The context and the superimposition

The context- In the world today entertainment, information, clothes and food is becoming more and more alike. Similar fads are rolled into a massed fashion (Lipman; 2003; p.6). This is all good for business, distribution and mass consumption. Architects relish richness of variety and wealth of differences. The ideal is the realisation that there is unity

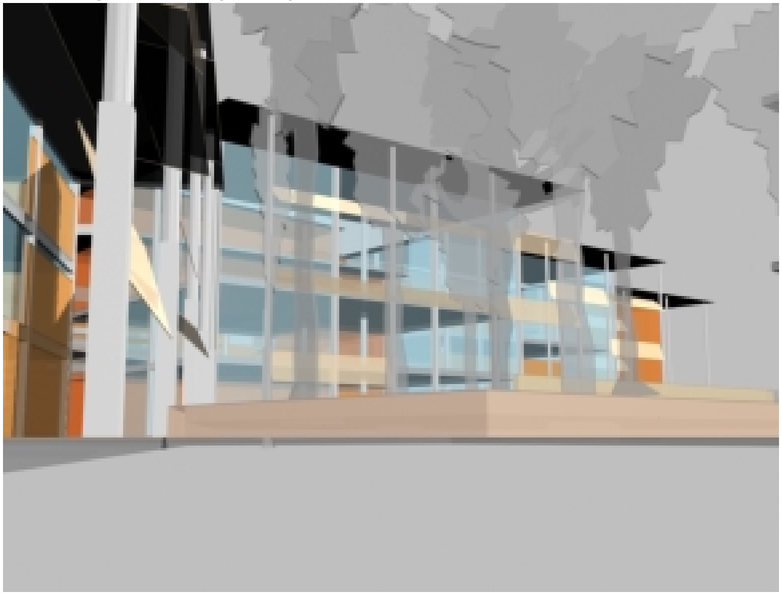


Fig. 9 The module, the walls as a backdrop with the "skin" punctured and the tension between inside and outside.
View from the exhibition space to the library modules

Fig. 10 The entrances, paths and routes on the site.
Eastern view from the river crossing

in cultural diversity. There is a distinction about the buildings that have shaped physical and cultural settings. Traditional architecture is fragile because of shabby cover ups. It is the same architectural boxes with signs and symbols stuck on. Post modernism resulted in cities cut out of time, out of place and culturally polluted.

A **critical regionalism** is important to make people feel at home in built things. It has a self-consciousness (Frampton; p.17). It reflects who we are through physical qualities and experiences of people (Lipman; 2003; p.7). New and old, local and universal is counter posed. Architecture is a resistance to global meaning. To understand the past, the future can be shaped. A vernacular was established in Pretoria by Norman Eaton that includes among others small windows, projecting sun shades and roof eaves. That is an answer to making relevant architecture in South Africa. A vibrant modern architecture can be the result; a township jazz of architecture. (Refer to - the Third Vernacular in the *Brief & Context)*.

The superimposition - Tschumi used in the Le Parc de La Villette scheme, a regular point grid selection consisting of a system of points, lines and surfaces superimposed. Superimposition creates a new layer reinforcing a specific aspect of the design.

A calculated **discontinuity** brings forward certain chains. In film, discontinuity has as a result a multiplicity of combinations, the cinegram. Words associated with the cinegram are repetition, inversion, substitution and insertion. The invention resides in contrast (Tschumi; 1987; p. vi). A complex architectural organisation, not resorting to traditional rules of composition, is the result in La Villette.

There is a **dis-integration** versus the totalising synthesis of objective constraints, versus cause and effect. The new contiguity and superimposition result in something opposite to totality (Tschumi; 1987; p.vii). La Villette is non-contextual with a specific vision of post-modernity. The idea of meaning imminent in architectural structures and forms which directs signifying capacity is used. Post modernity rejects well-defined signified that guarantees the authenticity of the work of art. La Villette de-regulates meaning, rejecting "symbolic" repertory. Architecture is always changing meaning, it promotes programmatic instability. It means nothing, just a multiplicity of impressions (Tschumi; 1987; p.vii). Meaning is a function of interpretation: a dispersed and differentiated reality that marks an end to the utopia of unity.

The **superimposition** of three systems generates a system of calculated tensions reinforcing the dynamism of the place. Each system has a logic and independence (Tschumi; 1987; p.3). Programmatic requirements are distributed over the total site with arrangements at points of intensity. This emphasises discoveries and present visitors with a variety of programs and events. The folly is a neutral object with function, the structure is bare and the programme complex (Tschumi; 1987; p.4). It is an autonomous sign with maximum programmatic flexibility. It becomes an etymology, an artificial abstraction (Tschumi; 1987; p.5). The superimposed systems consist of points as programs in fragments, lines as axis, meandering and lanes of trees, and the surfaces as textures (Tschumi; 1987; p.6). The follies (points) become necessary to fulfil the programmatic and to develop a clear symbol. This enhances easy maintenance and orientation (Tschumi; 1987; p.7). The lines coordinate the most frequent activities. The curvilinear line intersects the straight lines at important points. The surfaces are textured according to program and the left over surfaces are compacted earth and gravel (Tschumi; 1987; p.8).

The cinematic promenade allows for associations along the routes with a plurality of interpretation rather than a singular fact. The frames along these routes are experienced in sequence or independently. Like a cinema this creates flashbacks, jumps etc. (Tschumi; 1987; p12). In the park there is a distancing agent, like the actor and his/her character. This agent is the folly where the program is reinterpreted, re-written and deconstructed by the architect. A globalisation in architecture is impossible if a design is responsive to its context and the relevant abstraction.

Berea Park Learners Resource Centre

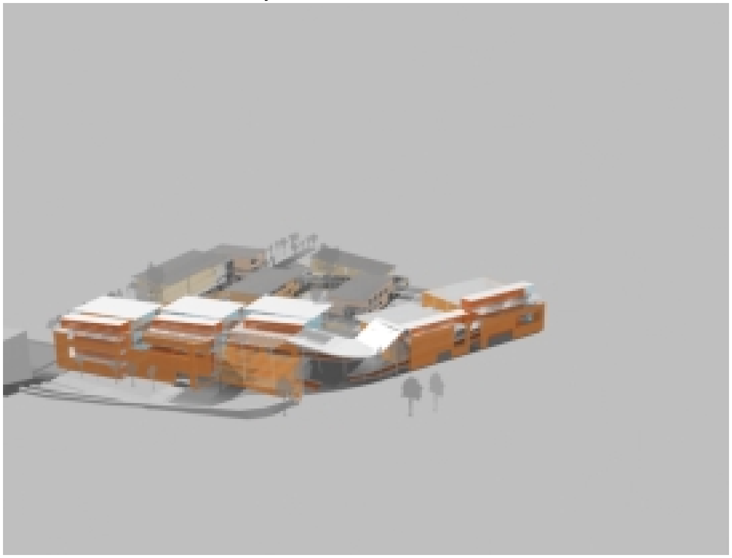
The context of the design was its single most important generator. Extensive time was spent designing the site and fitting it into the context. To use Lynch's terms; the gateway and landmark quality is celebrated with the placement of the entrances to the development and building. This permeability places the user on certain paths and routes with intersections to create nodes of activity (see drawing 1 and 3D model) (figure 10). The site is a nature room, part of the green open space system. This is respected by creating new urban spaces and a fusion of indoors and outdoors. The site making actions are the movement patterns on and around the site. The activity systems on the site include a multi functional development on the northern side of the site. This is a harder urban form to fit in with the grid of the inner city. The southern part of the site is the campus development with pavilion buildings to fit in with the green open space system of Fountains valley (figure 11). Between the buildings a hierarchy of spaces is created with emphasis placed on gathering of users. Trees are concentrated on spots, curved walls are strategically placed for orientation, high trees are placed to communicate places of meeting, rows of trees define axis and benches, walls and berms become nodes (figure 12). Important views are created celebrating the importance of the resource centre. The legibility creates a democratic environment where visual appropriateness ensures robustness. Large scale robustness on the site is because of many functions creating diversity (see drawing 2). Small scale robustness caters for the different backgrounds of the users; making it understandable.
The visual quality of the landmark is created by the context. This is vertically enhanced by the entrance and horizontally by detail like openings in the walls.

Vernacular architecture takes into account climate, materials, site, economics and cultural expression. The resulting vernacular is an abstract language of what the elements of architecture are. Sensitivity to landscape and climate, simple plan forms, low pitched roofs, large overhangs are some of the clues used gathered from Pretoria Regionalism. Material use is important with the use of articulated face brick (brick aesthetic), exposed

Fig. 11 The pavilion buildings fitting into the green open space system and creating a hierarchy of spaces.
Eastern view from the river.

Fig. 12 Rows of trees, curved walls and high sculptural trees.
North view to building.

Fig. 13 The auditorium and office vs. the library modules.
Western birdeye view



concrete (international style), glass and steel. The architectural elements described from west to east:

Abstract ***overlay***- The superimposition of layers and modules on the site makes the functions and program of the building readable. The layers consist of the walkway, services and functional spaces. They, in turn, are made up of a punctured western façade “skin”, a walkway and service “spine”, a steel structural “skeleton” and an entrance “elbow”. This enhances the experience of the building where the scale of elements determines the interpretation of the user. The modules consist of these layers. A combination of books, computers and study carrels fill the functional spaces. The different modules are readable as to what function it houses. The library modules are the same combination of elements, the office module is lower and smaller and the auditorium bigger (figure 13). The auditorium and office module is a “heavier” architecture than the library modules because of its commune function. The building is read from east to west to the river, and from north to south to the entrance junction, as close to open. *The entrance* is articulated by slanted columns and a curved concrete roof. The dynamic tension of the entrance is created by the ramps connecting the different modules and tying all the elements together. This is the “elbow” where the building is junction-ed. The north and south-east corner’s articulation fits with the entrance, celebrating the circulation and landmark quality of the building (figure 14).

Western ***skin***- This is in response to the harder, busier van der Walt street façade and because of evident climatic restrictions. The off- shutter concrete walls frame the different modules and different heights and strategically placed punctures allow for an interesting composition and harmony over the entire façade. The functions of the wall include allowing natural ventilation and indirect lighting as well as entrances and views along the paths through the building. The wall consisting of wall modules enhances the entrance ramp and creates an openness fitting in with the entrance and punctured concrete roofs.

The secondary non load bearing walls will be face brick tying in with the brick aesthetic of the vernacular. These curved walls articulate the corners of the building, stressing the importance of them as places of arrival (figure 15). As mentioned before the loose standing curvilinear walls define routes and orientation on the site. The curved concrete wall on the western façade celebrates the entrance and defines the western amphi space created by the contours of the site.

Circulation ***spine***- The ramps and staircases are indexical signs. The ramps create tension at the entrance and become iconic and symbolic, celebrating place of arrival and orientation. By its width it creates places of gathering, meeting and socialising. The staircases at the north and southeast corners, together with the curved walls, enhance the articulation and therefore become visual elements. A three dimensional labyrinth is created with the user intentionally forced to use specific ramps to get to a specific destination. This enhances the experience of the building (figure 16).

Serviced-service ***spine***- These spaces include all services; the buildings' and the users. Ablution, offices, storage and environmental control is serviced here. The services are kept apart from the rest of the building. The design is based on adaptability and flexibility. The whole "spine" is made up of dismantable modules, and it can in totality be removed from the building, without the integrity of the building structure being compromised. This creates dynamism in the architecture (Figure 17).

Structure ***skeleton***- The steel columns are perceived as being lighter and contribute to the openness of the eastern façade of the building. It has a high slenderness ratio, and through this the scale of the volumes is enhanced. The colonnade becomes a threshold between inside and outside; it is read as being more than just a covered walkway (figure 18).

Glass wall, shading and wall ***modules***- Besides these elements having a functional role which is fulfilled, it also has a visual one. The combination of these elements on the eastern facades creates a pattern

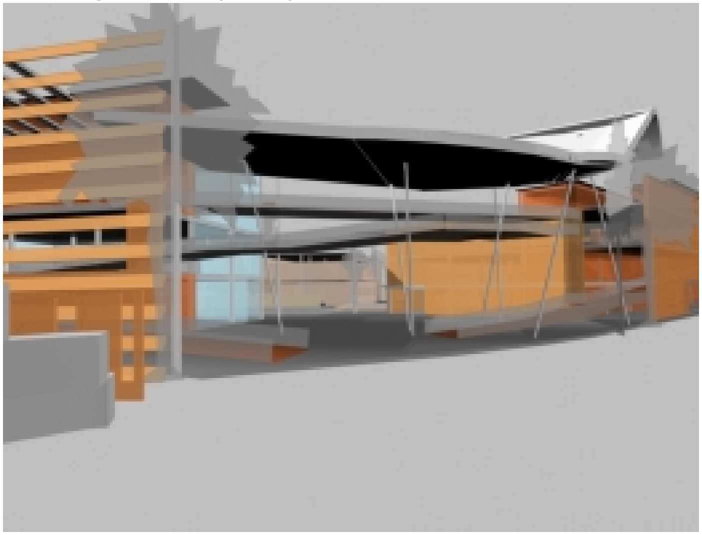
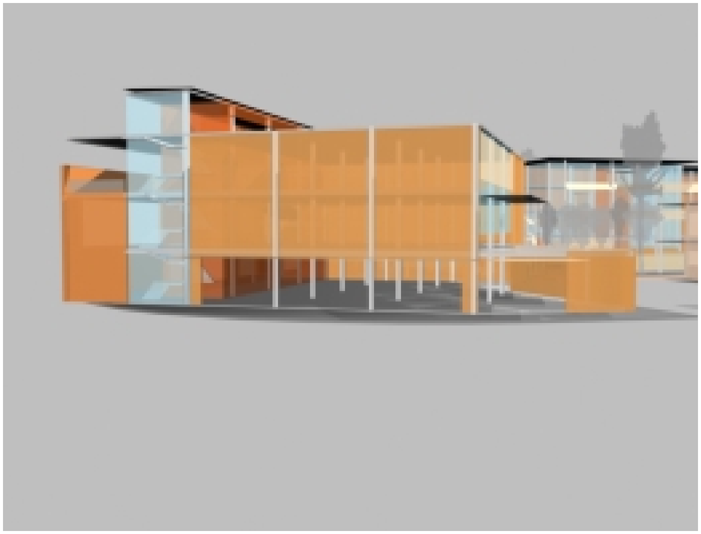


Fig. 14 The entrance "elbow"
The entrance showing the curved roof.

Fig. 15 Concrete walls and the corner walls articulated.
South east corner of the building (auditorium)



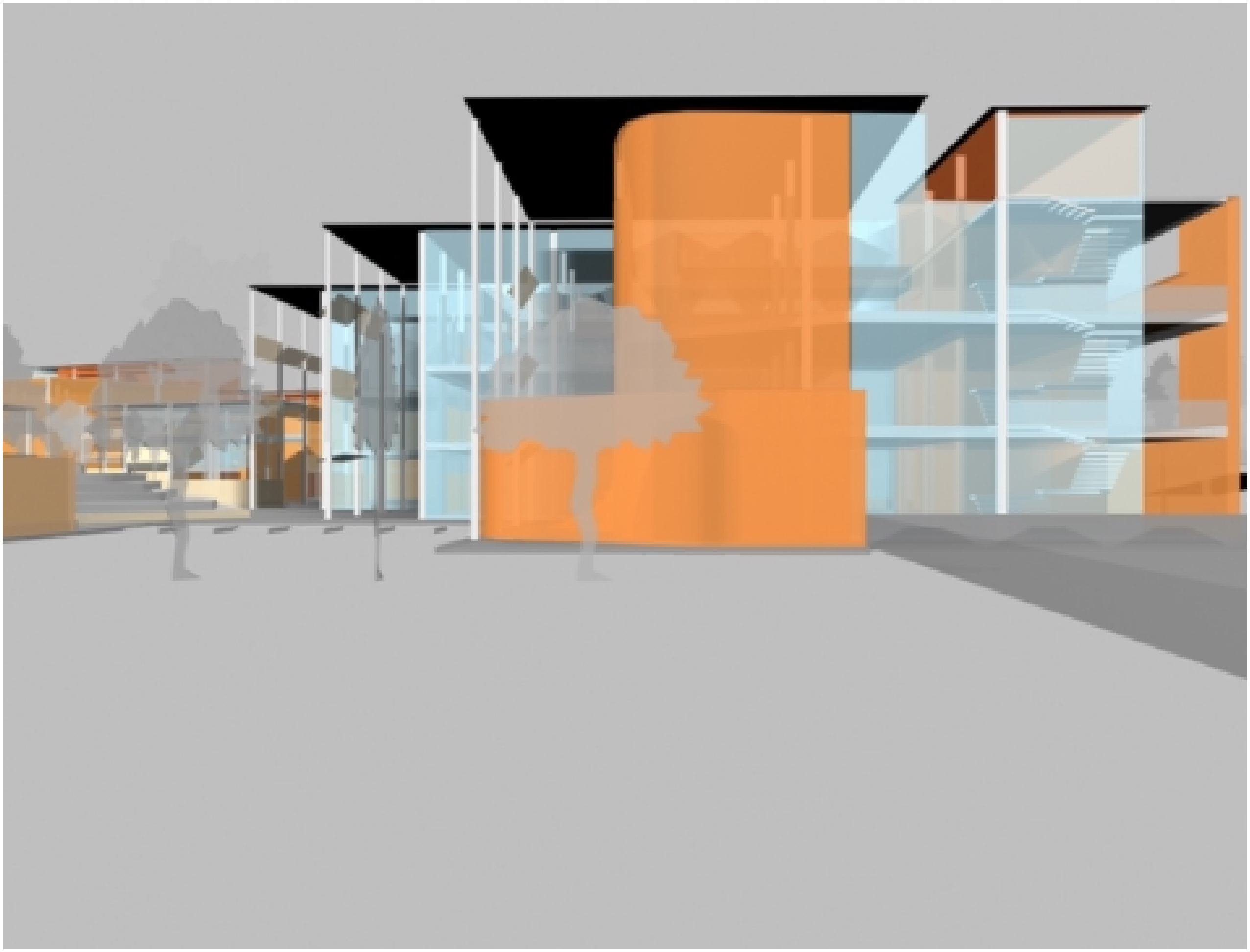


Fig. 16 Walkway ramps and staircases
North view of corner showing the staircase

according to the air- and sunlight need on the inside. An articulation is the result where the interior workings are readable. Views are created and the non-static aspect of architecture is enhanced by it constantly changing. The timber louvres on the auditorium and restaurant, together with the curved walls, clearly contribute to the functional difference of this module; it being an important place of gathering (figure 19).

Roof ***modules***- The roofs are metal and concrete. The pitched metal roof, together with the eastern steel structure, is perceived as lighter. This allows for natural lighting and –ventilation by clerestory windows. The service spine is also a metal roof, differentiated from the other roofs. The concrete roofs tie in with the harder western façade and it is accessible for maintenance. Together with the poetic concrete entrance roof, dynamism between light and heavy is created. This is successful with the result being an articulation that defines all the different spaces underneath. The punctured concrete roofs allow for a play of light that washes the surfaces and allows for time and movement to be evident on a two dimensional plane. The different roof heights allow for a difference in size of module. This makes the different functions readable (figure 20).

In the design of the building certain attributes are regarded as essential and some as incidential. To understand meaning we connect a word with an object in the real world (figure 21). It refers to an object and this is termed referential theory of meaning. In the design of the resource centre a reference is made to the human body. These essential concepts create hierarchy in the building; The musco- skeleton (centre) of the building includes the furniture and fittings: it is determined by the programme of the building. The structural skeleton is the support of the building: it carries the function. The elbow (joints), e.g. the entrance, becomes a point of orientation: the entrance as place of arrival determines which routes the user will take; thus determining movement. The spine is the backbone of the building, where servicing

Fig. 17 Service “spine”
View from south along western facade

Fig. 17 Service “spine”
View from south along western facade

takes place: the nervous sytem (operation) of the building. The skin becomes the environmental filter as it controls climate and becomes the barrier/ threshold to the building (figure 22). The meaning of the building to the user will be a matter of social definition and habitual use.

<u>Conclusion</u>

There is a constant spatial coding of objects which generates meaning in architecture. This building has a spatial tag and the experience and perception of its environment is based on factors determined by the human's capacity to navigate and to move. An extremely complex series of relationships makes up the architecture of a building. If the whole is looked at, that is the physiological (senses) and psychological (meaning) factors, the building influences are thus realised. The user *will* connect meaning to the architecture and it *will* act as a cultural symbol. Context and medium are crucial ingredients in architecture to relate the abstract to reality.

The language of architecture consists of signs that are a compound of indexes, icons, symbols and terms like metaphor, word, syntax and semantics are used to describe architecture. This grammar and syntax of architecture enhances and conveys expressive intentions. Architecture as a from of mass culture communicates to large groups of people and confirms certain widely subscribed to attitudes, ways of life and meaning. Physical boundaries are broken in the virtual universe and architecture responds accordingly.

In La Villette, Tschumi wanted to create architecture without context. According to him that is the only way the meaning of the architectural structures and forms can be signified and the authenticity of the artwork be assured. Opposed to this, Lipman emphasises the concept of critical regionalism and the recognition of a unity in cultural diversity. Through this, a person feels at home in a building if it is designed for a specific context. Both are against a globalisation of architectural meaning. The mass consumption of architecture is not

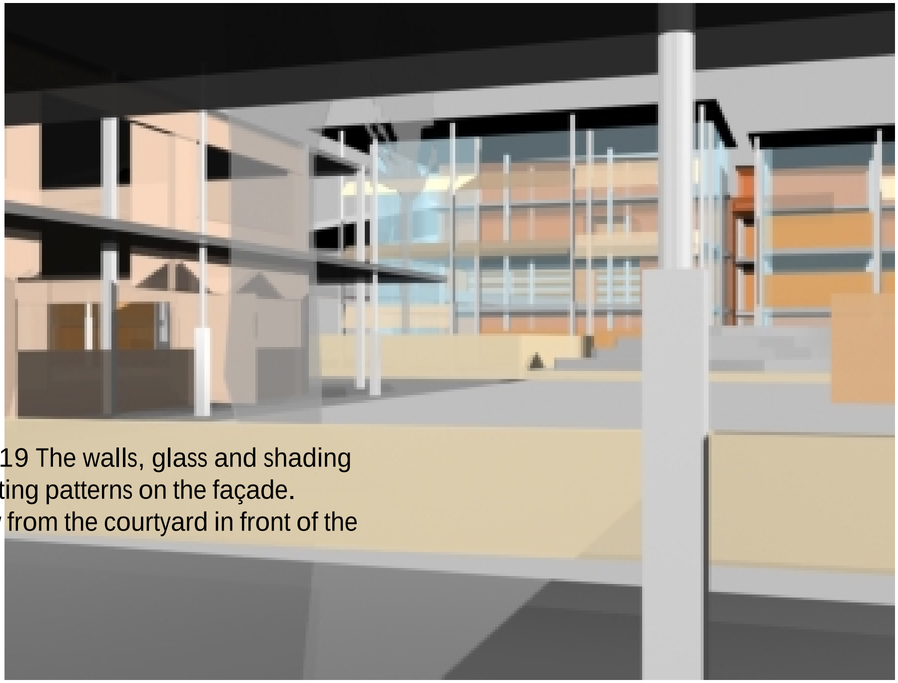
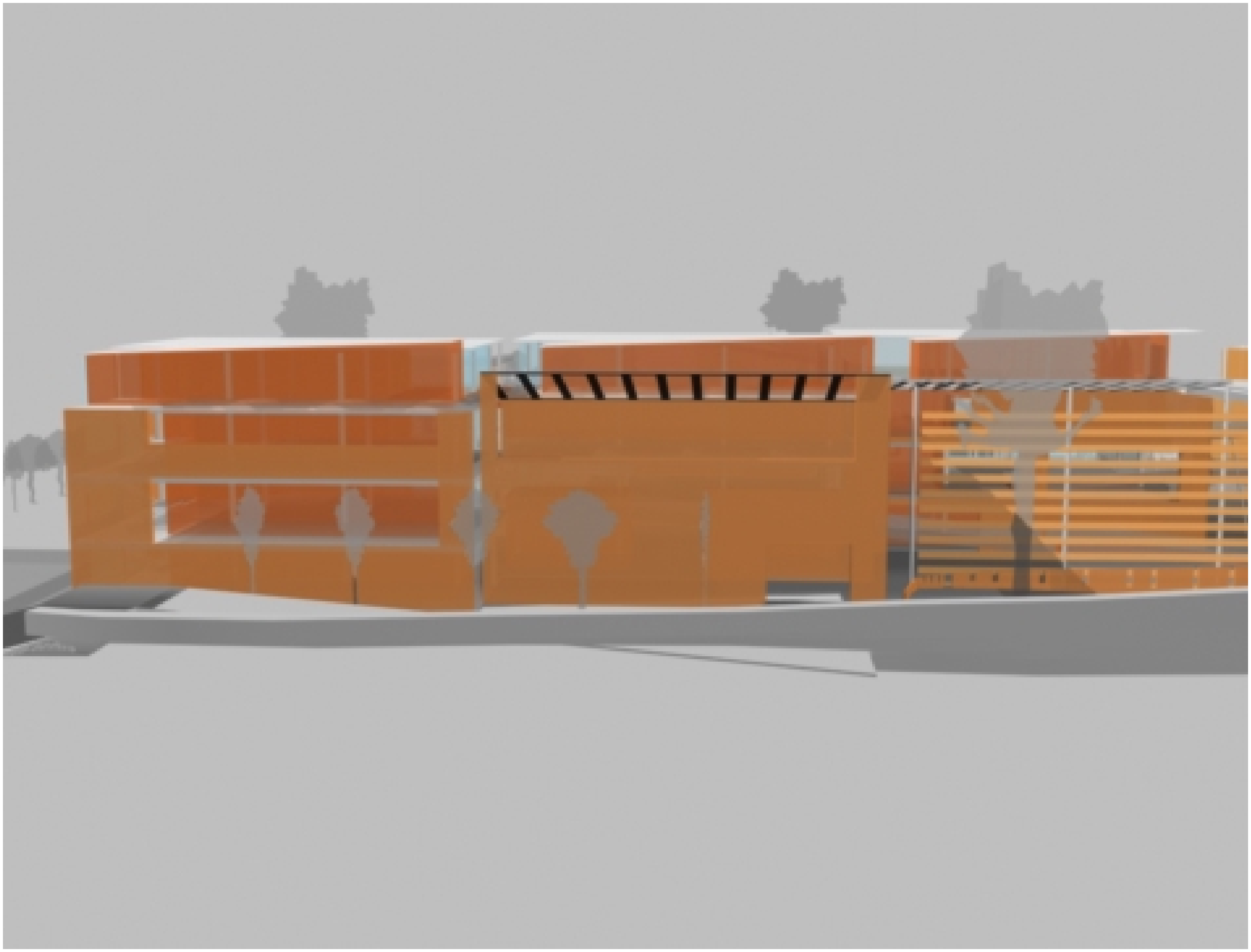


Fig. 19 The walls, glass and shading creating patterns on the façade.
View from the courtyard in front of the hall

just about economical gains, but creating a vehicle for sustainable development instead of becoming the advert and consumable object itself.

The language of architecture needs context and medium. With this vernacular (contextual) architecture, not becoming something usual and expected, the architect can overlay an “abstract” (like in La Villette) to make something exciting, dynamic, exploratory and new. Putting that over a context creates an authentic work of art that is understandable. The composition of the architectural elements (medium) creates a simpler architecture that can be interpreted, categorised and used as seen fit without it losing integrity and becoming static.

Fig. 20 The steel-, punctured concrete- and mass concrete roofs.
Western view from van der Walt street.



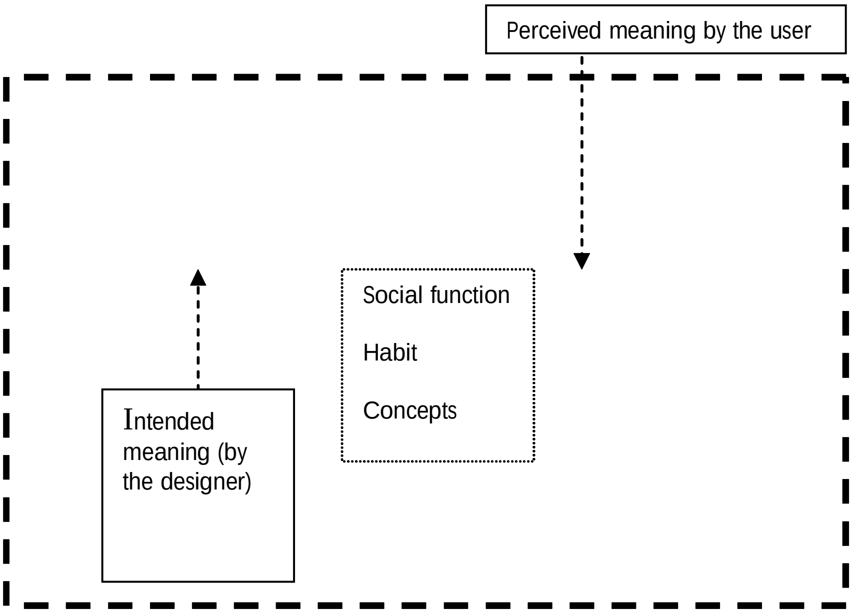
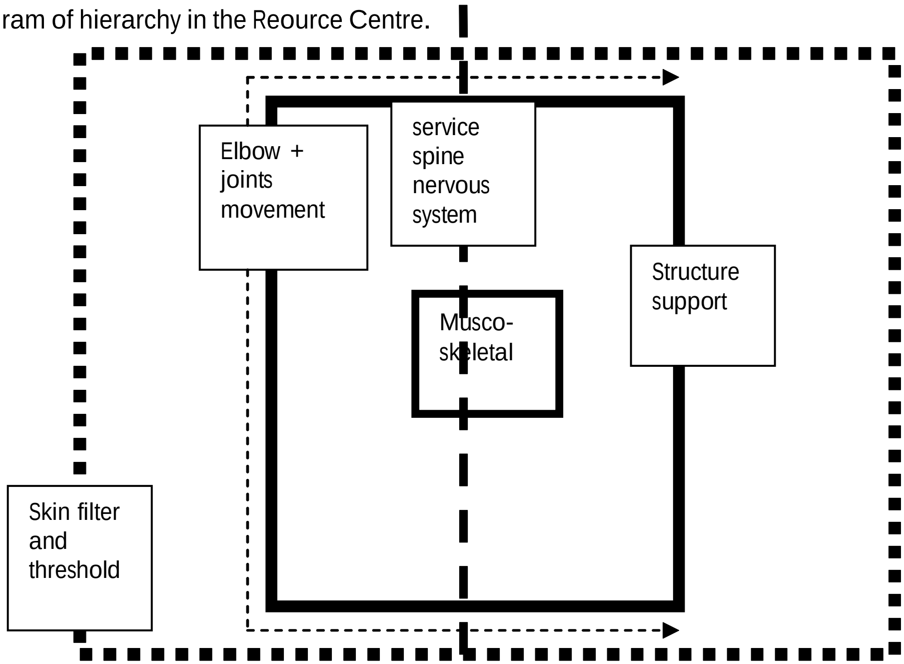


Fig. 21 The "horizon of understanding"

Fig. 22 Diagram of hierarchy in the Reource Centre.



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list of references

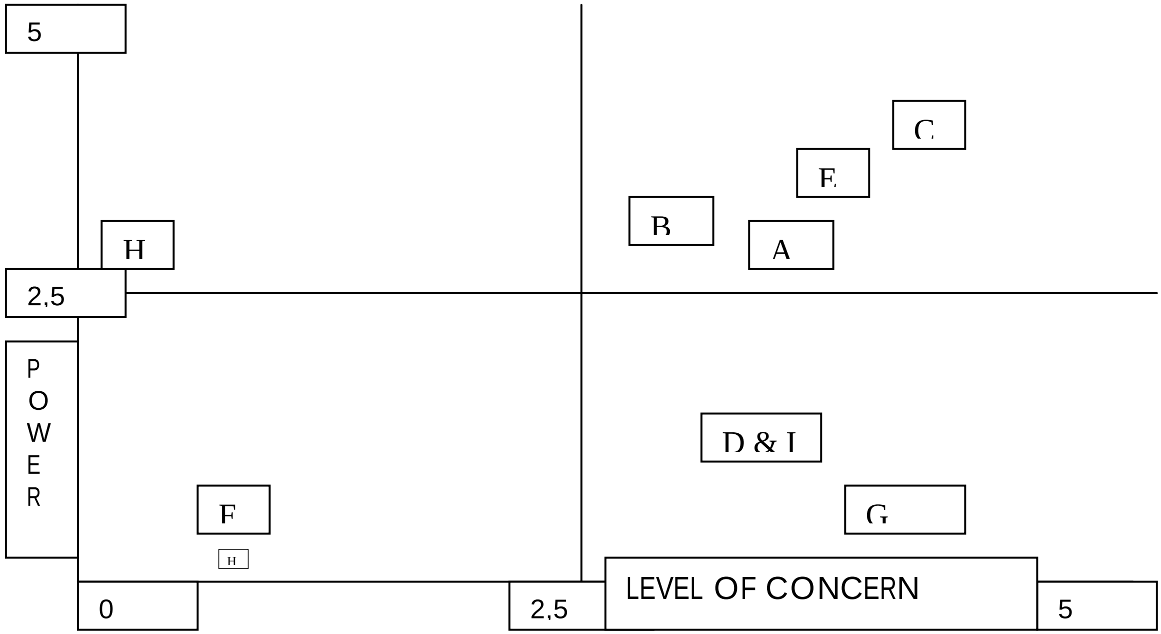
cost analysis

In doing a cost analysis and feasibility study for a building the important stakeholders are determined. A feasibility study is done to determine the cost of the building and criteria is set up to determine the management of the project. A triple bottom line balancing scorecard addressing financial status, the environment and social aspects, forms the basis of reporting to investors. Apart from the finances, the social feasibility of the project determines advantages gained for the community.

In the Berea Park Learners Resource Centre that is the most important aspect; it being a community centre. This project is funded by the European Union as part of its support to the betterment of education in South Africa. The building itself will be managed and used by a Section 21 company consisting of bureaus of the Department of Education and Department of Environmental Affairs and Tourism and tertiary institutions like the University of Pretoria, Unisa and the Technikon Pretoria. This building will become an information centre for the public. A digital library will be run by the tertiary institutions as a first contact base for future students. The resource centre will also become a study centre for students and life-skills training centre for the inner city community.

	POWER			LEVEL OF CONCERN			
STAKEHOLDER	INFLUENCE ON OTHERS	DIRECT CONTROL RESOURCES	**X-AXIS**	TECHNICAL	SOCIAL	ENVIRONMENT	**Y-AXIS**
	0,3	0,7		0,2	0,5	0,3	
A government	4	2	**2,6**	2	3	5	**3,4**
B Tertiary institution	4	2	**2,6**	3	3	2	**2,7**
C European union	5	4	**4,3**	0	5	5	**4**
D community	4	0	**1,2**	0	5	2	**3,1**
E professionals	4	5	**4,7**	3	3	5	**3,6**
F labour	1	0	**0,3**	5	1	0	**1,5**
G environment	4	0	**1,2**	3	3	5	**3,6**
H unions	0	5	**3,5**	0	1	0	**0,5**
I students	4	0	**1,2**	0	5	2	**3,1**

1 = low priority 5 = high priority



Management plan of Stakeholders

C- **European Union**- The funding off the project will be the main concern for the Union. Their interest will be managed by keeping them posted with a triple bottom line report after each phase.

E- **Professionals**- A good relationship needs to be established between the different professionals. Everyone on the professional team need to be aware of what is expected of them and do their work accordingly. A management strategy needs to be put in place to streamline communication channels.

A- **Government** – A 20% funding will be expected from them and therefore a triple bottom line reporting system will be put in place. As being part of the Section 21 company the involvement in the design will stop at the detail design stage.

B- **Tertiary Institutions**- The different tertiary institutions are part of the Section 21 Company and they will manage the building. They are sub-clients and will pay rent for the spaces they use. They will assist in compiling the accommodation schedule and they will be involved up to the detail design stage.

The other important stakeholders that need special attention, but does not fall into the upper right quadrant of the graph, are the community, students and the environment.

Schedule

The budget will be spent on specific elements. If funds need to shift around a special form need to be filled in for permission. Every month certain work will be signed off and the final account delivered. A triple bottom line report will be prepared for the European Union after every phase. The procedure for the execution of the project will be evident in the regulations and the budget.

RISK CATEGORY	PROBABILITY	IMPACT	FACTOR = P x I	RISK
Time & schedule	3	2	6	low
Special work	2	4	8	medium
By laws & legislation	3	4	12	medium
Control & management	4	5	20	high
Lifespan	4	4	16	high
Sustainable income	4	4	16	high
Security	4	4	16	high
Environmental damage	1	5	5	low
Cost	3	4	12	medium
Cash flow	2	5	10	medium
Loss of potential	1	5	5	low
Contractual	4	4	16	high
Design	1	5	5	low

1 = low probability/ impact5 = high probability/ impact

Management plans for high risks

Control and management - Every month certain work will be signed off and the final account delivered. Because funding is provided by an independent stakeholder and executed and managed by another, this is the best way to achieve the best result. A triple bottom line report will be prepared after each phase to monitor funding, the environment and the social impact. The management after construction will be by the Section 21 Company.

Lifespan- Because this is a public building in the inner city of Pretoria, a high priority is placed on the sustainability of the project. The adaptability and flexibility of the design is addressed from concept phase to reassure its use can be recyclable. The community function can easily be changed to a commercial one with the modules of the building rented out for retail or offices.

Sustainable income – The scheduling of the project can determine that certain phases of the building be finished and rented out during the construction phase. The rentable space should be adequate - in the case of the Resource centre it is 70 %. A mix of uses and more than one client and user ensures a variety of functions. This makes the development sustainable because a mix of small and big enterprises runs the project.

Security- During the construction process the security is the responsibility of the contractor. The design of the building allows for functional modules of the building to be totally closed off at will. Passive surveillance and check points will be established by the users and staff.

Contractual – The responsibility of all the different professionals and labour must be made clear in the contracts. Penalties will be paid if contracts are not adhered to.

Preliminary estimate

Ground floor

Exhibition space	454 m²	@R 1057.00	R 479878.00
Library space	909 m²	@R 1375.00	R 1249875.00
Restaurant	601 m²	@R 1057.00	R 635257.00
Foyer	723 m²	@R 500.00	R 361 500.00
Circulation, stairs, toilets	670 m²	@R 1205.00	R 807 350.00
Maintenance	104 m²	@R 950.00	R 98 800.00
Offices	310 m²	@R 1375.00	R 426250.00
Total	3771 m²		R 4058910.00

First floor

Library space	909 m²	@R 1375.00	R 1249875.00
Offices	764 m²	@R 1375.00	R 1050500.00
Auditorium	601 m²	@R 1057.00	R 635257.00
Circulation, stairs, toilets	670 m²	@R 1205.00	R 807 350.00
Maintenance	104 m²	@R 950.00	R 98 800.00
Total	3048 m²		R 3841782.00

Second floor

Library space	606 m²	@R 1375.00	R 833250.00
Conferencing	454 m²	@R 1057.00	R 479878.00
Circulation, stairs, toilets	670 m²	@R 1205.00	R 807 350.00
Maintenance	104 m²	@R 950.00	R 98 800.00
Office	310 m²	@R 1375.00	R 426250.00
Total	2144 m²		R 2645528.00

General site works

Demolishing, boundary walls etc.	R 148 000.00
Ground works	R 240 000.00
Parking paving, driveway etc.	R 620 000.00
Retaining walls etc.	R 275 000.00
Piling	R 386 000.00
Landscaping, trees etc.	R 20 000.00
Total	R 1689 000.00

Conclusion

Ground floor	3771 m²	R 4058910.00
First floor	3048 m²	R 3841782.00
Second floor	2144 m²	R 2645528.00
	8963 m²	R 10546220.00
General site work		R 1689 000.00
		R 12235220.00
Plus: Unforeseen expenditures (2,5 %)		R 305 880.5
Estimated building cost		R 12 541100.5

This estimate does not include:
Air conditioning, Equipment, Escalation and Professional fees.

Feasibility study

Total Capital: R 12541100.5

Estimated building cost

Estimate escalation:

- Before contract (2 months)	R 250 822.00	
- After contract (10 months)	R 877877.00	R 1128699.00
		R 13 669 799.5

- Disowning costs	R 2500 000.00
- Transfer fees	R 5350.00
- Diverse legal costs	R 10 000.00
- Municipality	R 21 000.00
- Plans and photocopies	R 12 000.00
- Interim property tax	R 13 680.00
- Loss due to interest on total capital investment and/or interim interest calculated at 12 % over 12 month time	R 550 000.00
- Agent commission	R 91 000.00

Total estimated capital outlay R 16872829.5

Running costs

- Cleaners
- Cleaning material
- Property tax
- Water use
- Sanitary fees
- Electricity use
- Refuse removal — part of rent
- Building maintenance — R 4700.00
- Insurance — R 3660.00
- Auditors fees — R 1520.00
- Management fees — R 3800.00
- Diverse — R 800.00

Running costs per month for first year — R 14180.00

Income

Retail, store, restaurant etc.	2110 m²	@R 50.00/ m²	R 105 500.00
Office, Admin, Auditorium, Library	3808 m²	@R 27.50/ m²	R 104 720.00
Total rentable area	5918 m²		
Gross income per month for the first year			R 210 220.00

Gross income per year for the first year — R 2522640.00
Minus: Running costs per year for the first year — R 170 160.00

Effective nett income for the first year — R 2352480.00

Estimated nett income on total capital investment

- Total capital outlay — R 16872829.5
- Total nett income for first year — R 2352480.00

$$\frac{R\ 2\ 352\ 480.00}{R\ 16\ 872\ 829.5} \times 100 = 13{,}9\ \%$$

This cost analysis and feasibility study is based on a feasibility study done in 1996 by Andre Venter associates quantity surveyors for a shopping centre in Pretoria. The building cost will be more, but this shows the finance broken down into comprehensible parts. A more realistic figure would be R 3500/ m^2. This amount comprises of the steel structure @ R 400/ m^2, concrete walls @ R 300/ m^2, the concrete slab on permanent formwork @ R 400/ m^2, brick walls @ R 150/ m^2, the glass curtain walls @ R 800/ m^2, the dry walling system (modules) @ R 300/ m^2 and the painted /pigmented cement screeds @ R 30/ m^2.
An estimate according to these figures is R 3500 x 8963 m^2 = R 31 370 500. Which is double that of the estimate based on figures from 1996.
Reference: van der Kolf, H. 2002. The Project Management Processes & Cost Analysis MProf & PRS 320 notes. Photocopied notes: University of Pretoria.