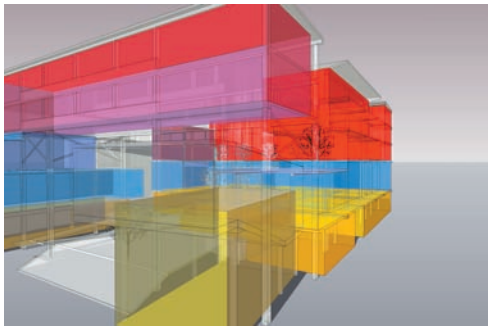

city building

Submitted by: Rousseau Pienaar
Student Number: 9908509(8)
Mentor: Professor Schalk Le Roux

Submitted as part of the requirements for the degree of Magister in Architecture (Professional) in the Faculty of Engineering, Built Environment and Information Technology.
University of Pretoria - Department of Architecture - November 2004

Summary

The design of a multi-functional building entails the synthesis of multiple systems and networks. The needs of multiple clients must be effectively overlaid to create a build able, contextually suitable and aesthetically pleasing architectural solution.

The proposed building is a public, urban building. City buildings consist of spaces that are essentially part of the city, simultaneously dependant on the whole and separated by building lines and security systems. The gradation of space from public to private exists everywhere. The focus of the design is on the creation of place in the Pretoria CBD. The scheme is integrated into its surroundings, and functions as a system in itself.

The proposed multi-use building will be set on a currently built up site in the Pretoria CBD, on the c/o Paul Kruger and Schoeman Streets, one city block from Church Square. Building functions include retail, residential, a satellite gallery for the Tshwane Art Museum, and new offices and facilities for Talking Beads, a producer Arts and Crafts.

Contents

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Problem Statement

The decentralization of cities has been a worldwide phenomenon since the 1960's. Ever-increasing expansion and the creation of new nodes of development result in 'urban sprawl'. *(Schoonraad et al, 2000)* The problems associated with urban sprawl are numerous, including the associated waste of resources due to transport of persons and products over large distances, to name only one.

The same condition of decentralization exists in Tshwane. South Africa furthermore has a history of segregation and separate development. The result is a city splintered into various "edge cities." These new centres of business and opportunity compete for potential development and customers *(Capitol Consortium, 1999)*. Consequently the inner city of Pretoria has lost its standing as the preferred destination for business, shopping and entertainment.

Yet the inner city of Pretoria is brimming with potential. It is a vibrant, diverse and historically rich environment with opportunities for entrepreneurs and the potential of becoming both a preferred place of business and an important tourist destination. But the large businesses and big money is missing. Organizations opt to invest elsewhere, and the trend will continue unless it is consciously reversed. A return to the historic core is a necessity for Pretoria.

List of Figures

Point of Departure

Movement and activity makes a city work. It gives a city character and makes it memorable. A bustling sidewalk; crowded public transport; flashing cameras around historic buildings; doves swept up in gusts of wind. It all makes the city come alive. This holds true for New York and Berlin as for Lagos and Cape Town.

The overwhelming sensory experience of the sights and sounds of the Pretoria CBD also bears testament to this. Fruit and imported shoes change hands on the pavement, while taxis boom kwaito music and determined lawyers in black suits dodge those handing out flyers advertising the services of traditional healers. You can get yourself some dreads, buy a 'mielie' for lunch, bum a cigarette, wonder at the Modernist canyon of Pretorius Street, or compare the ones clad in air-conditioned Mercedes to those sweating all the way home on the bus.

Fig 1-1

The Pretoria Inner City is a bustling place that has undeniable potential. Future decisions made by developers, town planners, government officials and architects will determine whether the potential is realized. So how to make a *good* city? Kevin Lynch formulated a good city as a *"continuous, well connected, open place (that is) conducive to development." (Lynch, K. 1984: 235)*

The city is unpredictable and diverse in nature. Anything could be around the next corner, and is: a skyscraper or second hand car dealer, a phone booth or mugging. Chances are always that something surprising might be seen, or that a beautiful or interesting place might be discovered. Any paying visitor would demand his money back if it were any other way.

"…diversity is the natural order of things. To accept this dynamic state rather than looking to replace it with something fixed, stable, whole, is to utilize the tremendous energy of the city." *(Mayne, 1992: 51)*

If it is accepted that diversity, activity and the ability to explore are important for the nature of a city, would encouragement and stimulation of these conceivably make a 'better' city?

Marcus Fields agrees in a 2003 essay: "We should give preference to diversity and freedom over the production of controlled spaces as the ultimate commodity."
But can a certain arrangement of building materials influence the way a person utilizes the city?

Amid granite, tar and concrete, the theatre of the street is played out. Bernard Rudofsky sees "the street (as) the supreme stage." In the book Streets for People, a book dedicated to "the unknown pedestrian," he writes passionately about the role that architecture plays in the making of good streets: "The street is the matrix: urban chamber, fertile soil and breeding ground. Its viability depends as much on the right kind of architecture as the right kind of humanity." *(Rudofsky, 1969)* Elsewhere he writes, "One might say that the street is a street by courtesy of the buildings that line it. Skyscrapers and empty lots do not a city make. "*(Rudofsky, 1969)*

In a 1937 essay entitled "What is the city" Lewis Mumford wrote:" The city fosters art and is art; the city creates the theatre and is the theatre." *(Fields, 2003: 25)* In regards to this statement, Marcus Fields wrote the following:

"The physical organization of the city may deflate this drama or frustrate it; or it may, through the deliberate efforts of art, politics and education, make the drama more richly significant, as a stage-set, well-designed, intensifies and underlines the gestures of the actors and the action of the play." (Fields, 2003: 25)

From the same essay: "Rather than being an end in itself, architecture needs to interact with what surrounds it… a building, like a film or a piece of music, can help to amplify your own responses and emotions." *(Fields, 2003: 27)*

The delivery of goods and the selling of flowers are all part of the city drama. Someone locked out of their flat; someone reading a newspaper on a park bench; a car guard wildly gesturing a car into a parallel parking bay; a sudden opening to the sky in a closed arcade. When the casual passerby happens upon these things he or she experiences the city.

"The modern, dystopian city will overlay differences rather than segment them." *(Mayne. 1992:51)*

The activities and movement of citizens may easily be regarded simply as a necessity for business. Pedestrians are the life-blood of the city, but are they only in public places to be shuffled into buildings where they can spend their money on fashion accessories or settle their speeding fines?

Fig 1-2

Public spaces must become places; sidewalks enjoyable places of interaction. If people have access to pleasant environments, and the city is associated with recreation and living as opposed to traffic and noise, the benefits would be felt in all levels of society. People-friendly places must be created. Places that delight and surprise.
The daily activities of the city must be celebrated. Citizens must feel safe and welcome in the city while they discover and explore it. Any new development in the city must attempt to realize this goal.

This design thesis is a conscious attempt to understand and unlock the inherent potential of the city. The design is a product of its surroundings. It attempts to establish links, to create a finer grain of movement for pedestrians, to become a place, to define some edges and blur others, and ultimately to set the stage for a celebration of city living.

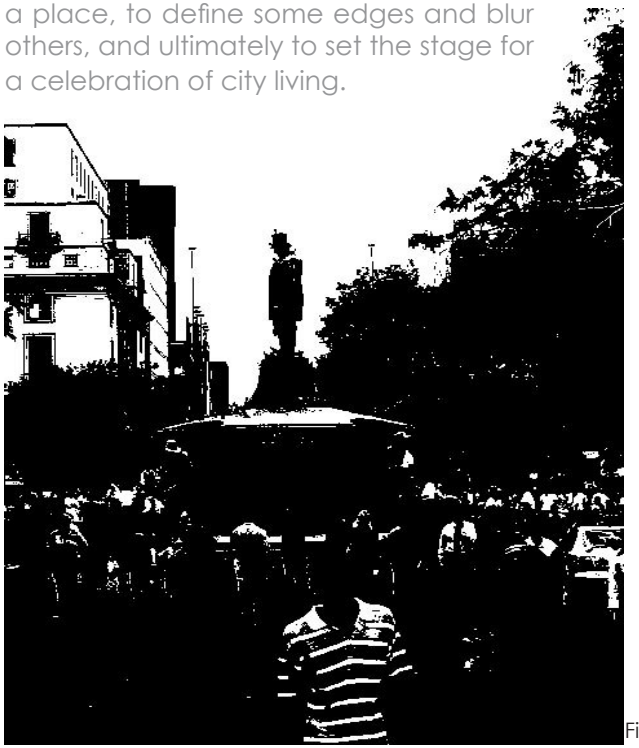


Fig 1-3

"Hybrid building programs, with their mix of living, working, culture and recreation, break down the social barriers of rationalist zoning" *(HOLL, 1992: 35)*

Identified potential

A site was identified in the Pretoria CBD, located between Schoeman and Pretorius Streets on the Eastern edge of Paul Kruger Street.

It is the last city block one passes on the Paul Kruger Street ceremonial route from Pretoria Station before reaching Church Square. The site is clearly not developed to a CBD intensity and architectural quality. This is despite its location in the heart of the CBD, its close proximity to Church Square and the importance of Paul Kruger Street as a tourist and pedestrian route. The site contains a number of single storey buildings that have no apparent historic or architectural value and are in desperate need of repairs. The few buildings of historic or economic importance that can be found on the site are under-utilized and in dire need of maintenance.

Figure 1-4 Location in the Pretoria CBD

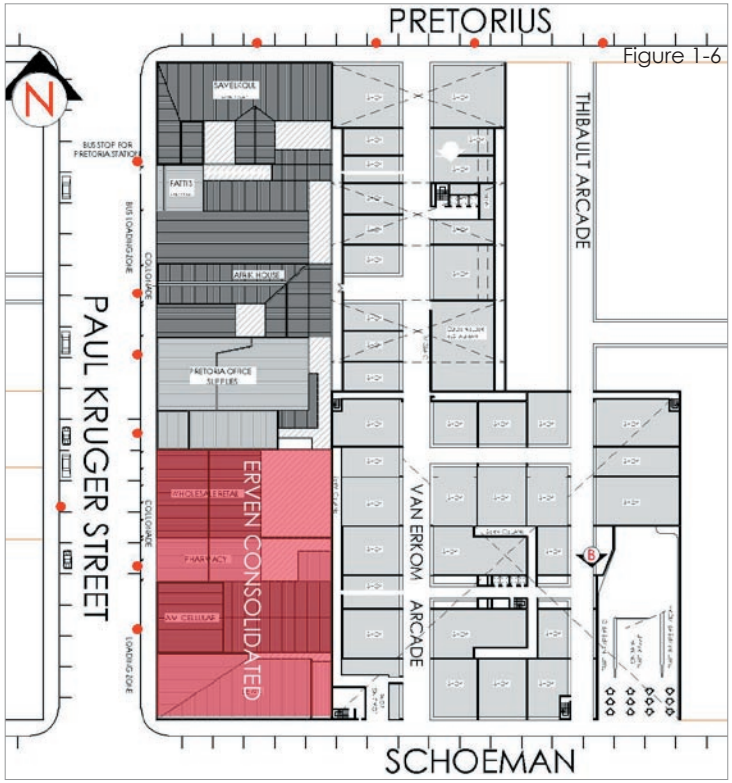
Figure 1-5 View to the site down Pretorius street - Looking East

A study of the city block and its context was undertaken to identify inherent potential. In this way, a suitable building function and possible clients were identified, and a building programme was developed. Architecture grew out of the existing city fabric.

A new 2002 sqm (36m x 55,6m) erf on the corner of Schoeman and Paul Kruger Streets, is proposed. The erf is created through the consolidation of four erven, the existing buildings demolished. This is the site for which a design proposal will be made. For the remainder of the identified site, suggestions of possible building functions and guidelines for future development will be proposed.

The Context study and Baseline Study that follows focus on the entire identified city block.

Figure 1-6



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Die klas van 2004 vir 'n great studio ervaring

Schalk vir die regte raad op die regte tyd

Pretoria Historical Context

1854 saw Marthinus Wessel Pretorius purchase two farms in the central Transvaal from J.G.S Bronkhorst. Located in the area now called the Fountains Valley, the property was declared a *kerkplaatz* for the central Transvaal. A *kerkplaatz* is a place where a travelling *dominee* called to celebrate *nagmaal* and officiate weddings and baptisms. *(Allen, 1979)* A year later a town was proclaimed on the site. On 4 April 1860 this town, until then referred to by its residents as *Pretoria Philadelphia,* was declared the official capital of the Transvaal Republic. *(Engelbrecht S.P 1955)*

Pretoria, named after General Andries Pretorius, the father of M.W. Pretorius, was surveyed in its formal grid pattern by its first *landdrost*, Andries du Toit in 1857. Church Square, originally called Market Square, was the heart of Pretoria, the "focal point from which it all grew". *(Allen, 1979)* The first church was built in the centre of the clearing. The square was also the commercial and social core. Here the residents mingled, did business and worshipped. (*Allen, 1979*) Church Street and Market Street formed the *cardo* and *decumanus* of the new town.

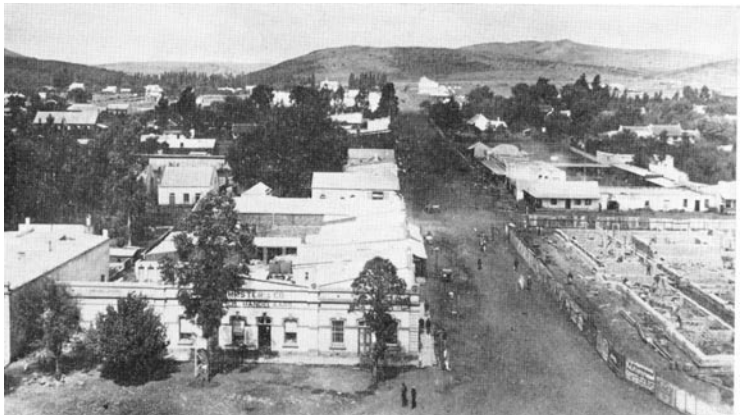


Figure 2-1 Markstraat in 1899 looking to the South – The Raadsaal under construction on the right *(Engelbrecht, 1955:260)*

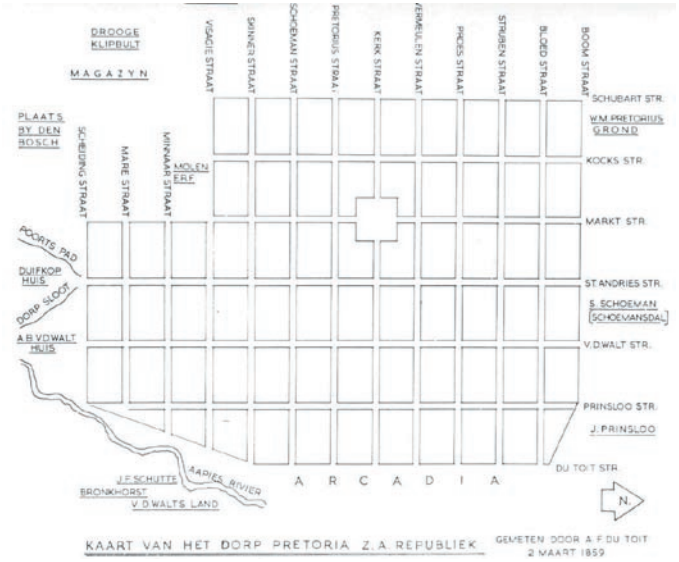


Figure 2-2 The original town as drawn out by A du Toit *(Allen, 1979)*

Paul Kruger was elected president of the Transvaal Republic in 1883. He was the charismatic leader of the Boer Republic and an important character of Pretoria's social life, until 1901 saw the British occupation of Pretoria during the Anglo South African War. Kruger's influence can still clearly be seen in the historic centre of the city. He laid the cornerstone of the Old Raadsaal in 1899. His statue, sculpted by Anton Van Wouw, peers over Church Square. His house and church are tourist attractions and the City Council changed Market Street's name to Paul Kruger Street during Pretoria's Voortrekker celebrations in 1938 *(Allen, 1979)*.

Pretoria's street layout stands in relation to the surrounding topography. The east-to-west orientated city blocks line up with the surrounding *koppies,* and the longitudinal shapes determines Pretoria's street character. *(Van der Waal, 1990)*

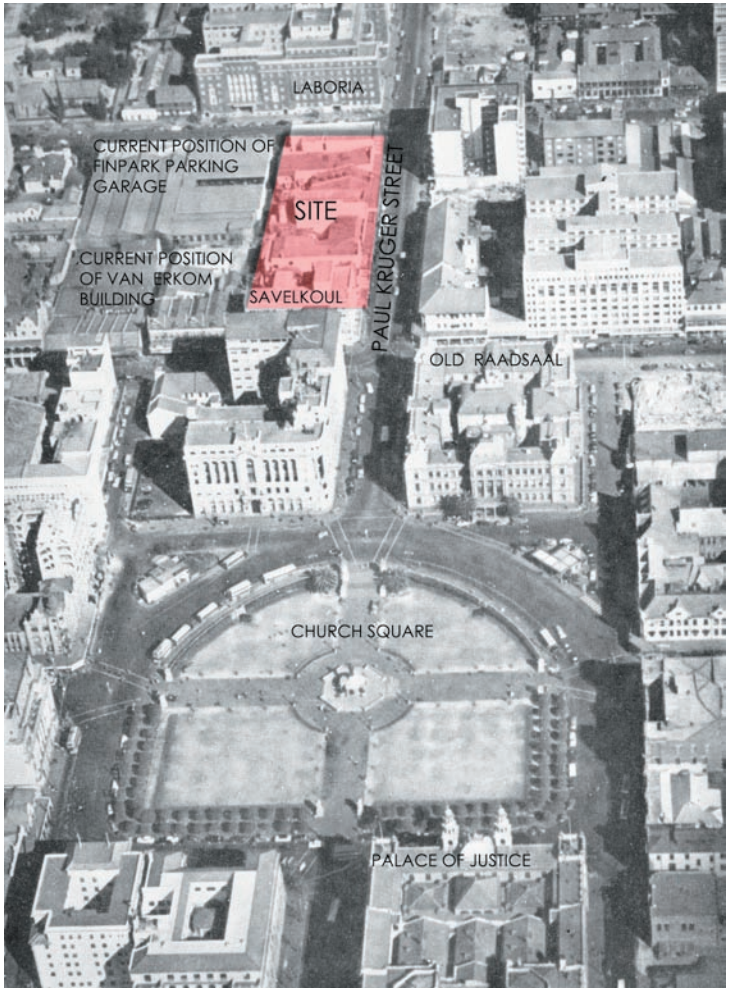


Figure 2-3 Bird's eye view of Church Square and surrounds in 1955 looking South (*Engelbrecht, 1955:260)*

The street edge played an important role in the buildings of the Pretoria historic core. The first buildings on Church Square stood on the building line, with verandas negotiating the street edge. Until the 1940's the street was a place of interaction and activity. International Modernism arrived in Pretoria in the 1930's, and although the streets edges were clearly defined through the geometry of Modernism, the result was lessended street activity. *(Jordaan, 1990)*

At an early stage in Pretoria's development the long city blocks resulted in small alleys to create a finer grain and allow easier pedestrian movement. *(Jordaan, 1990)* With time these were formalised and resulted in an arcade system. These internalised streets provided shelter from the elements and the rushing traffic of the CBD. Although the arcade system is a unique and important aspect of Pretoria's character, it resulted in less personal and lively streets. This was clear by the 1930's *(Van der Waal, 1990)* when the streets became transport infrastructure designed for effective vehicular movement instead of exciting places for human interaction.

The methods of street interface changed as different architectural styles dominated the CBD. Initially colonnades created a well-defined pedestrian space. In the 1930's floating canopies were the vogue. The result was vaguely defined walkways, or even worse, architects entirely rejecting their responsibility of creating shelter for the city dweller. *(Jordaan, 1990)*

Different periods' building form can be distinguished through the architectural expression. Modernism's rational grid makes it impossible to distinguish a government building from a block of flats. A number of Modern institutional buildings withdrew entirely from life on the street *(Van der Waal, 1990)*.

In the 1970's and 1980's architects attempted to create a more human scale through the breaking up of the building blocks into irregular shapes. Interior malls and atriums created new pedestrian movement networks *(Van der Waal, 1990)*

Despite the good intentions the result was a loss of coherence in the city fabric and a lack of unity. The interior mall system created dead street edges. "The integration of the interior pedestrian movement networks created in the 1970's and 1980's into the larger whole of the city will be a major challenge." *(Translated by the author from Van der Waal, 1990)* After the 1980's very little new development happened in the CBD. Big business fled to the eastern suburbs, and when the workday ended, the city shut down. Activity in the city struck an all time low in the early 1990's. The general perception is that this is still the case.

But a lot has changed since 1994's wind of political change blew through the city. New needs and opportunities have emerged, and ever more new ones are emerging. A process of city regeneration has been set in motion. Historic buildings have been renovated and the city is marketed as a tourist destination. Tertiary education takes place above micro loans stores and bakeries. Traditional healers can be found next to financial institutions and hawkers trade on the sidewalks. Office blocks are converted into flats.

The city is taking on a new life and is becoming as diverse and culturally rich as cities are meant to be. This thesis project works within the context of these exciting events in an attempt to make a positive contribution towards the inner city rejuvenation of Pretoria.

Figure 2-4 informal trade on the CBD's busy sidewalks *(Author, 2004)*

The Pretoria Inner City Integrated Spatial Development Framework (ISDF)

Cities compete for business, consumers and tourists. Capitol Consortium developed the ISDF for the City Council of Pretoria, setting up guidelines through which Tshwane could develop as a competitive international business and tourist destination. The ISDF puts forth a future vision of a truly world-class capital city. Development guidelines at a regional, city, and local precinct level were put forth.
Citywide development goals put forth in the ISDF include

- *The enhancement of the city as a people friendly place with a unique image and identity.*
- *Encouragement of new development that enhances Pretoria's image as a world-class and capital city*
- *Development of an appropriate, attractive and well-defined urban structure*
- *Creating specific identities for individual precincts*
- The encouragement of a diversity of land uses

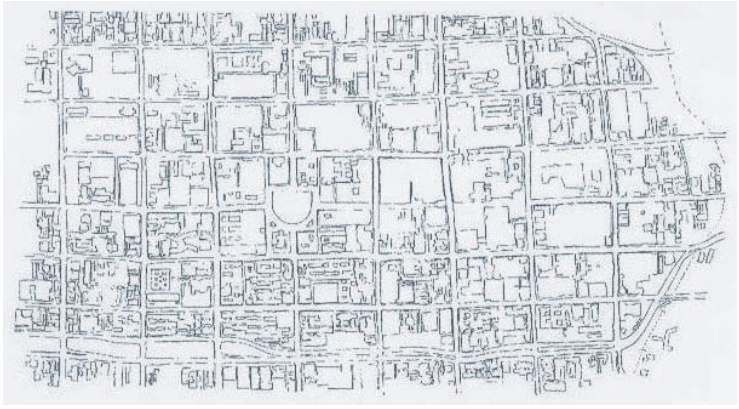


Figure 2-5 Footprint of the Precinct *(CAPITAL CONSORTIUM, 1999:20)*

ISDF Guidelines for CBD Central

The proposed site falls under the CBD Central Precinct as defined by the ISDF. The precinct specific guidelines will be discussed, as well as its relevance and potential for implementation into the project.

"Enhance Paul Kruger and Church Street Ceremonial Ways by clarifying the spatial relationship along the axis. This includes the reinforcement of spatial definition and containment as well as the creation of focal points."

RELEVANCE: Development of the site fits perfectly into the guideline of clarifying street edge definition. Effective street edge definition will be a baseline requirement for the building. The potential of the site creating a focal point or becoming a point of interest along Paul Kruger Street is important. The latter can also be considered a baseline requirement.

"Establishing Struben and Skinner Streets as the respective Northern and Southern edges of the city."

RELEVANCE: The guideline does not have a direct impact on the site but its intention of clear definition of the precinct as a place with a unique image and identity in the city is relevant. Development of the site to have a relevant scale, function and architectural character to the CBD is a goal of the thesis project and a baseline requirement.

"Establishing and strengthening mid-block links between significant civic spaces, squares, arcades and building

atriums between Struben and Skinner streets."

"Develop and protect the existing retail and arcade structure. Link, strengthen and extend existing pedestrian networks and nodes."

RELEVANCE: The site is located next to the Van Erkom, Thibault and Polley's Arcade system. (See Arcade analysis later) Linking to these arcades and creating an entrance from Paul Kruger Street into the system is an ideal opportunity to stimulate the arcade growth while simultaneously creating a finer grain and improving pedestrian movement.

ISDF Guidelines for Paul Kruger Street

The development of Paul Kruger Street as a ceremonial way is discussed in the ISDF and includes suggestions on how the street is to be developed with this goal in mind. The suggestions are sparse and general:

- *"Improve linkage between Station Square and Pretorius Square through environmental upgrading."*
- *"Restructure pedestrian crossing at Skinner Street to improve north-south pedestrian movement in the city."*
- *"Terminate Paul Kruger ceremonial spine at Northern edge of city."*
- *"Develop central road space as new landmark space."*

The ISDF does not say much in regard to Paul Kruger Street's future development. The need for a more detailed framework is was answered through the Paul Kruger Street Spine document developed by the University of Pretoria., which is discussed next.

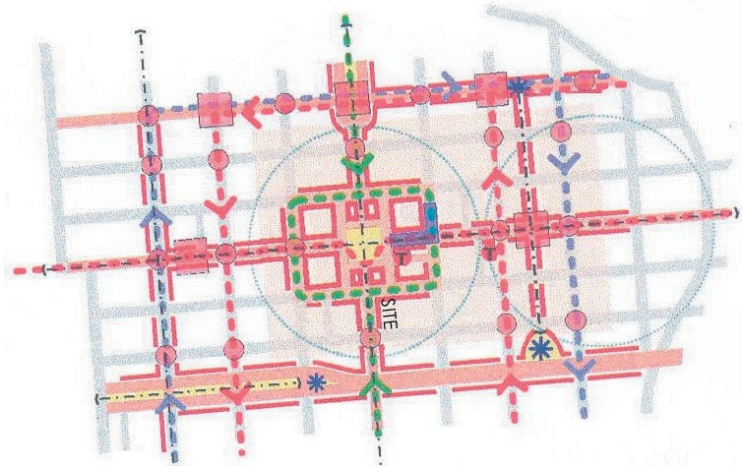


Figure 2-6 ISDF diagram showing public Spaces, Buildings, Pedestrian Networks and Public Transport *(CAPITAL CONSORTIUM, 1999:20)*

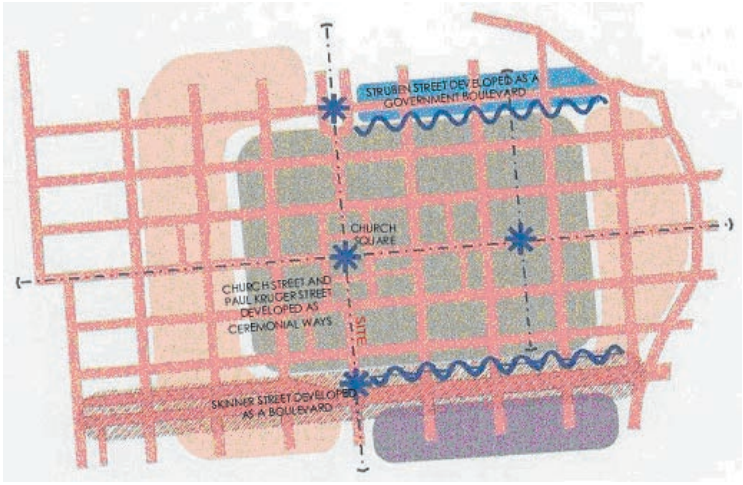


Figure 2-7 ISDF Development Concept - Text added by author *(CAPITAL CONSORTIUM, 1999:20)*

The Paul Kruger Street Spine Development Framework

This urban design framework was developed after Paul Kruger Street was identified as an area, the enhancement of which would "produce the greatest positive impact on the image of the inner city." Street-wide guidelines were developed. The street was divided into a series of zones for which more detailed guidelines were then given. The main focus fell on two areas namely to the North of Proes Street and South of Skinner Street. The guidelines for the zone between Visagie and Skinner Streets where the site is located do not go into a great level of detail.

New buildings on Paul Kruger Street

The Framework gives valuable guidelines for new buildings in Paul Kruger Street. Its recommendations will be critiqued and its relevance to the project discussed. This in turn will form baseline requirements for the buildings' street interaction. The following urban design principles are given for new buildings on Paul Kruger Street:

"Buildings must define the street and have an articulated and permeable street edge that contributes to the activity in the street. Opportunities for edge activities must be provided wherever possible, in the form of cafes, trees and seating areas"

RELEVANCE: The design of the buildings' street interface will definitely be more permeable than currently through its link(s) to the arcade system. A redesign of the pavement will be undertaken.

"Existing building configurations in terms of alignment to the street must be respected. If a setback is created, the setback must create a public place that forms part of the street."

RELEVANCE: The importance of lettable space on ground level and the high building density in the CBD would make setbacks unlikely on the site.

"Buildings must fit in with the massing of existing buildings and must form a street wall that defines the public space. A minimum and maximum height must be specified based on existing buildings, orientation and the creation of human scale"

RELEVANCE: There is relatively uniform height of 5 to 8 storeys in the Paul Kruger city blocks between Church Square and Skinner Street where the site is found. This will provide the guideline to be adhered to.

"The use of colonnades should be encouraged in areas where there are existing colonnades"

RELEVANCE: The identified site's existing colonnade is a very special feature of the existing buildings. This aspect will be reintroduced in a new building or alternatively the existing colonnade could be conserved.

"Compatible mixed land use should be encouraged in all instances… stimulation of a residential component and small businesses."

RELEVANCE: The proposed scheme attempts to work towards mixed land use, as well as the encouragement of small business.

"Parking must be provided in the centre of the block and not on the street edge."

RELEVANCE: The attempt to focus on pedestrian movement and the importance of lettable space on ground level would make parking at ground level unpractical. Parking could be provided at basement

level. The site has the potential of linking with the neighbouring 7 storeys Finpark parking lot at basement level.

Widening of sidewalks

The framework proposes the widening of sidewalks at intersections, so to decrease pedestrian risk through shortening distances at pedestrian crossings. This would only mean the loss of 2 to 4 parking bays per city block. Other proposals include:

"Extension of pavement material across the street to create a pedestrian environment."
"Use of railing and bollards to direct pedestrians"
"Ramping the sidewalk down to the road for easier movement of disabled persons."

RELEVANCE: All of these suggestions would make for a better street environment and will be considered in the design of the street edge. However the needs of vehicular movement and the lack of sufficient parking space in the CBD is a reality in Paul Kruger Street.

Precinct specific guidelines

The area is called the commercial precinct and described as "a typical urban street." Problems include the lack of street trees and the Skinner Street intersection, which is a dangerous crossing for pedestrians. It forms a major physical barrier between the Southern and Northern sections of Paul Kruger Street. Coherence of the built fabric is entirely lost due to this vehicular spine.

The drawing on the right was used in the Paul Kruger Street Spine Frame-work to indicate buildings of importance in the commercial precinct. The site is indicated in red. Save for the Savelkoul Building and the Afrik House no historically important structures are indicated on the block. The site will be investigated to assess that no other important structures were overlooked.

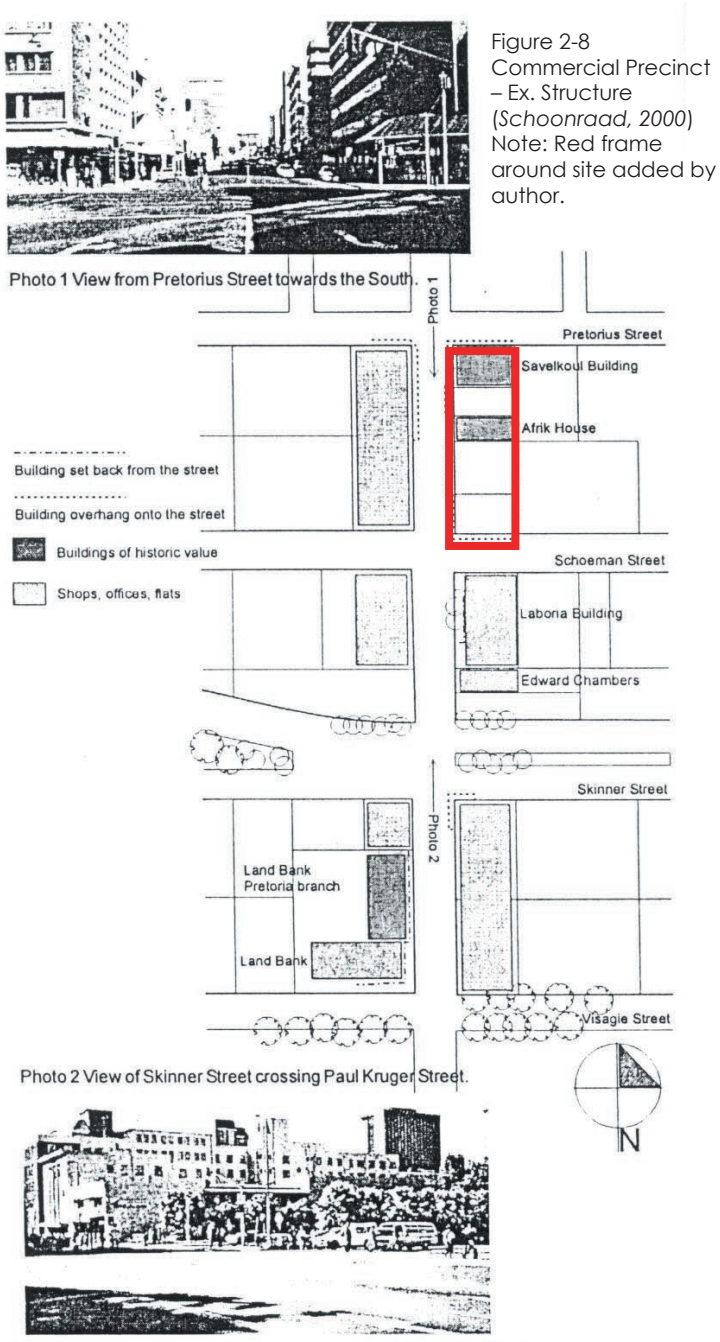


Figure 2-8 Commercial Precinct – Ex. Structure (*Schoonraad, 2000*) Note: Red frame around site added by author.

The City of Tshwane

The City of Tshwane states its vision of itself as "*An internationally acclaimed African Capital City that empowers the community to prosper in a safe and healthy environment*." Tshwane means "we are the same" or "we are one because we live together". Pretoria falls under the Tshwane Municipality. Any public building has all the residents of a city as its clients and should share in the vision of an Ubuntu life approach.

Tshwane markets itself as an international city. "*Tshwane, the administrative capital and the birthplace of the new South African democracy, is home to a large diplomatic community. Well over a hundred embassies and foreign missions are located here, making Tshwane the ideal base for international trade and for liaison with political decision-makers from all over the world*." *(www.tshwane.gov.za)* The importance of tourism is discussed under the physical context section.

Figure 2-9

Tourism in Tshwane

According to Statistics South Africa a total of 185861 overseas travellers arrived in South Africa in the month of February 2004. 92,6% of these visitors stated that they were in South Africa for their holidays. A total of 339 343 visitors arrived from mainland Africa, of which 89,9% stated tourism as the purpose for their visit. Both mark an increase from February 2003. *(Statistics SA, 2004)* Figure 2-10 shows the arrival of international travellers in South Afica in thousands from 2000 onwards. A marked increase can be seen.

Tourism is an important aspect of the South African economy, and the country has an expanding tourism sector. 2003 saw a global slowdown of tourism as foreign visitors avoided regions hit by security concerns and the SARS virus. South Africa showed a rise of 4,2 percent during the same period. *(wwwnews24.co.za)*

The Number of tourists that visit Pretoria specifically is unknown, but the stimulation of the tourist industry is a priority to the Tshwane municipality. In the State of the City Address on 17 February 2004 the Executive Mayor of Tshwane, Father Smangaliso Mkhatshwa stated that "the promotion of tourism is a key focus area of our Marketing Department for the forthcoming financial year."
New projects geaerd towards increasing Tshwane's appeal to tourists include:

Freedom Park is the Flagship National Heritage project and will become an important tourist attraction and public place. Located on Salvokop at the Southern end of Paul Kruger Street, the completion of Freedom Park (expected to be in 2005) will be the initiation of Paul Kruger Street as a Ceremonial and Tourist Route.

The Gautrain is part of the Blue IQ initiatives and will run through Freedom Park with a stop near Pretoria Station.

This public transport system will make the CBD much more accessible.

South Africa will host the **2010 Soccer World Cup**. The tournament will be sure to boost the South African economy. An estimated three million fans will visit South Africa during the tournament, far more than the number of supporters who came for the Cricket World Cup in 2003 or the Rugby World Cup in 1995. *(www.iol.co.za)* The improvement of South Africa's international image and the exposure associated with this event will be the beneficial to all levels of South African society, especially tourism. An estimated 159 000 jobs will be created. Tshwane will also receive a piece of the pie in the form of the brand new Rainbow Junction Sports Stadium in the North of Pretoria. *(www.news24.co.za)*

All of the above clearly portray the importance of tourism to the South African community. The upgrade of Paul Kruger Street and the creation of more stops and attractions along the future Tourist Route is a realistic and important consideration. The CBD should be made more attractive to tourists.

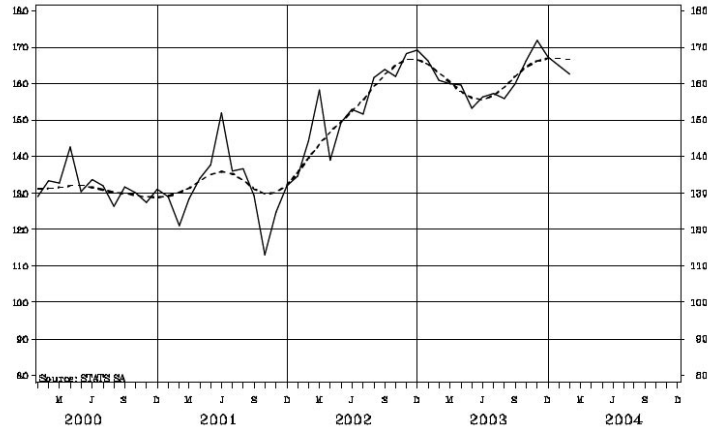


Figure 2-10 International Travellers Arriving In Thousands From 2000

Figure 2-11 Church Square looking down Church Street *(Hone,2000)*

CBD Character, Function & Needs

To understand the city it must be experienced and seen at ground level. Businesses and institutions, public places and streets within the CBD were studied. Needs and opportunities within the Inner City were identified. The findings are discussed below:

Diversity of use

City living is exciting because it is unpredictable. Around the next corner you might find anything and everything. This diversity is important for the functioning of a city: It is what attracts the people. Pretoria has an immensely diverse inner city. People from various walks of life negotiate the streets.

The proposed development will have to accommodate and stimulate diversity. It can be assumed that the project must have a multi-functional nature.

Education as an inner city function

Pretoria has a proud history of tertiary education. Institutions such as the University of South Africa (UNISA), University of Pretoria (UP) and the Tshwane University of Technology (Formerly The Pretoria Technikon), as well as institutions such as the CSIR contribute to Tshwane's character as a place for the attainment of knowledge.

The CBD has also developed into a place that offers tertiary education. Computer and Business schools can be found everywhere. A dance studio and art school can be seen, and Internet Cafes offer basic computer skills training. This may be attributed to the ease of access to the CBD.

The need for skills training and tertiary education facilities in the inner city is clear. This will be incorporated into the proposed project.

Space for small businesses needed

In most arcades it is usually the smaller shops that have been rented while those with larger floor area remain empty. City Properties confirmed the need for smaller shops areas: The highest numbers of enquiries concern shops of 100 square meters or less.

The proposed project's commercial levels will tender for smaller business in an attempt to encourage entrepreneurial development and small businesses.

Residential need in the inner city

There is a need for housing in the inner city. City Properties has converted a number of unused office blocks into apartment blocks and there are more in the pipeline. As the city develops it will continue to attract people who require adequate residences.

The project will offer flats to let. A seven-storey apartment block across the street from the site is 100% let out with eleven people on their waiting list. *(Coetzer, 2004)* This is a very viable building function in the CBD.

Informal trade on the sidewalk

The sidewalk is where the city lives. In the zone between vehicles and buildings the movement and interaction takes place. Pretoria's sidewalks are brimming with hawkers that offer everything from fruit to toys, sunglasses to cigarettes. Pedestrians often spill into the street and in front of hooting vehicles where the sidewalk has been turned into an informal market.

The project will take the reality of informal trade as a given and attempt to structure rather than prevent it.

Tourism as a means of income

Tourism in South Africa is a growing business, and the CBD already offers many of Pretoria's important tourist attractions, incl. Church Square, the Church Street Mall and soon Freedom Park. Paul Kruger Street should be envisioned as a tourist orientated street.

Tourism will be a major informer of design decisions.

Climatic data

Tshwane is located between 25,8˚ to 30,7˚ East and 22,0˚ to 25,9˚ South. It falls under the Northern Steppe climatic zone of South Africa, suggesting the existence of distinct rainy and dry seasons. Tshwane has hot summers, moderately cold winters, and moderate humidity levels. (*Holm, 1996*) All climatic information that follows is from the same source.

Sun

At 12h00 solar time the vertical sun angle in Pretoria is as follows:
Summer: 88 degrees
Solstice: 64.23 degrees
Winter: 40.73 degrees

Wind

Reigning winds
Summer: East-North-Easterly to East-South-Easterly with 41% of days breezy
Winter: South-Westerly with some North-Easterly and 60% breezy days

Rain

Pretoria receives summer rainfall. It receives an average annual rainfall of 763mm, of which 88% falls in the summer months, often appearing in the form of late-afternoon thunderstorms associated with lightning and occasional hail. Large amounts of water fall in short periods of time. This may cause flooding and associated problems if not taken into account in the design process.

Figure 3-1 Geographic location

Temperature

Average maximum temperature : 32°C Jan and 22°C in July
Extreme: 42°C Summer months°
Average minimum temperature : 18°C January 4°C July
Extreme: -7°C

Figure 3-2 Elecrical Storm over the CBD

Site Accessibility

The site is very accessible both through private and public vehicular transport. See Figure 3-4 next page

Vehicular Routes

The main vehicular access routes into the CBD are:

- Struben Street, which is the N4 from the west
- Pretorius, which is the N14 from the south
- Nelson Mandela, which is the R21 from the south
- Pretorius Street, which connects the N1 with the CBD and passes very closely by the site.
- Paul Kruger is a two-way street, which makes vehicular access easy to and from the site.

Public Transport

The site is located within 100m of Church Square. From here most buses depart to the rest of the city. The site itself is bordered by 8 bus stops, and a large number is found in Pretorius Street. The Pretoria and Bosman Street Stations are within 1 km walking distance from the site and a bus runs between the Pretoria station and Church Square every 15 minutes. The bus service only operates during office hours, which makes the diurnal use of the city difficult.

Minibus taxi's are visible everywhere in the city, and may be a preferred and more dependable source of public transport to and from the CBD (for most.) Further the *Gautrain* Public Transport System will be completed in 2005, which will make transport between Pretoria and Johannesburg much quicker for those able to afford it. A Gautrain station is planned close to the Pretoria Station, and will improve access to the Pretoria CBD from important residential and business hubs such as Hatfield, Menlyn, and Sandton.

Pedestrian movement

Paul Kruger Street is an important north-south pedestrian link connecting the Pretoria station to Pretorius Square, Church Square and the Church Street Pedestrian Mall. Van der Walt Street is another major north–south Axis, while large East-West movement happens along Church Street. However, all streets within the CBD represent a large number of pedestrians. The grain is further refined by the arcade system, which is an important movement system in Pretoria's long city blocks . A study of the arcade system was done and compiled to establish pedestrian movement. (See fig 3-7) The study follows.

Figure 3-3 Traffic on Paul Kruger Street - Looking north towards Church Square. The Savelkoul Building corner can be seen on the right.

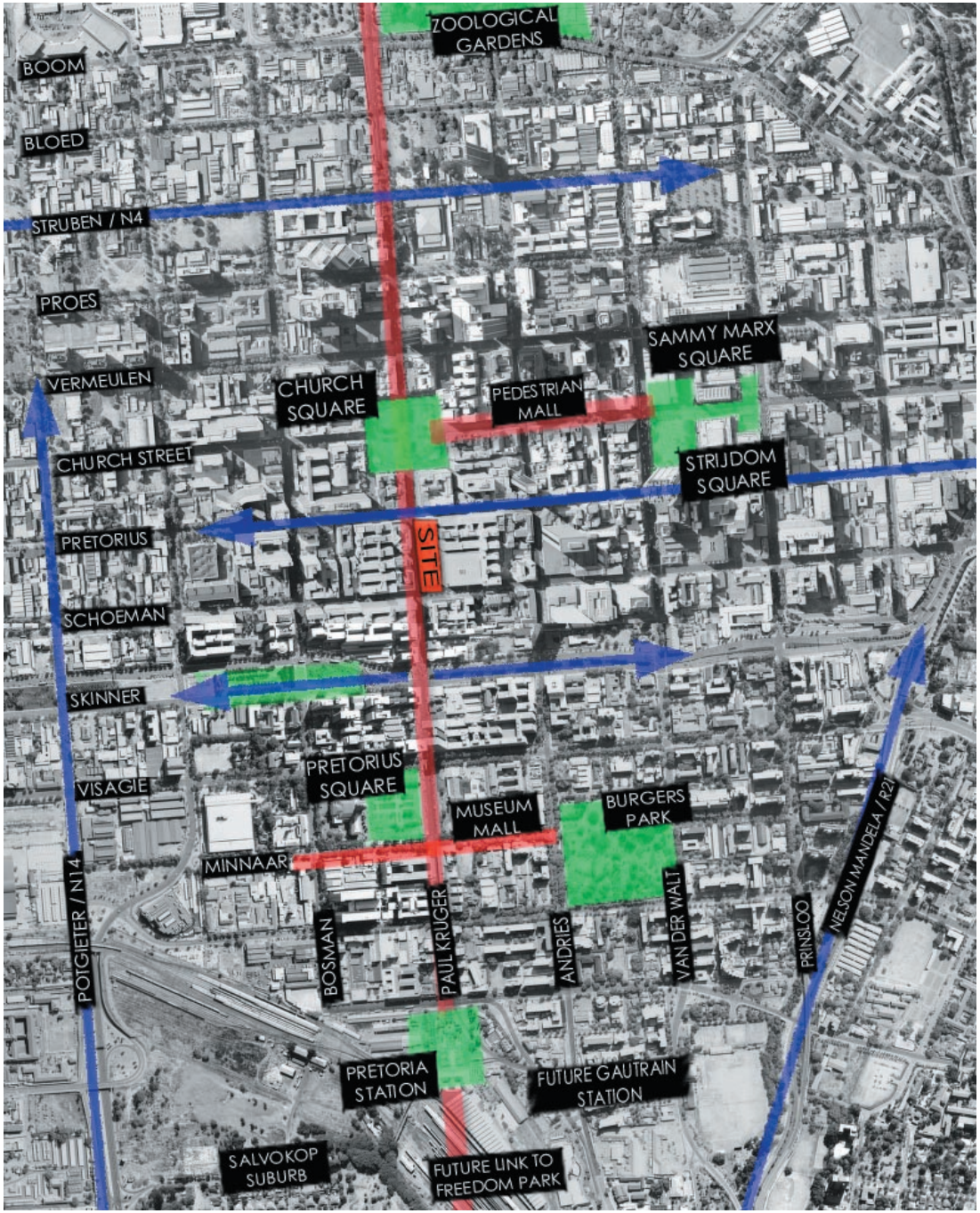


Figure 3-4
Main vehicular routes and public open space system (Author, 2004)

Figure 3-5 Birds' Eye View of Pretoria *(Hone, 2000: Ref. No. Pan 054)*

Figure 3-6 Birds' Eye View as above - edited by author

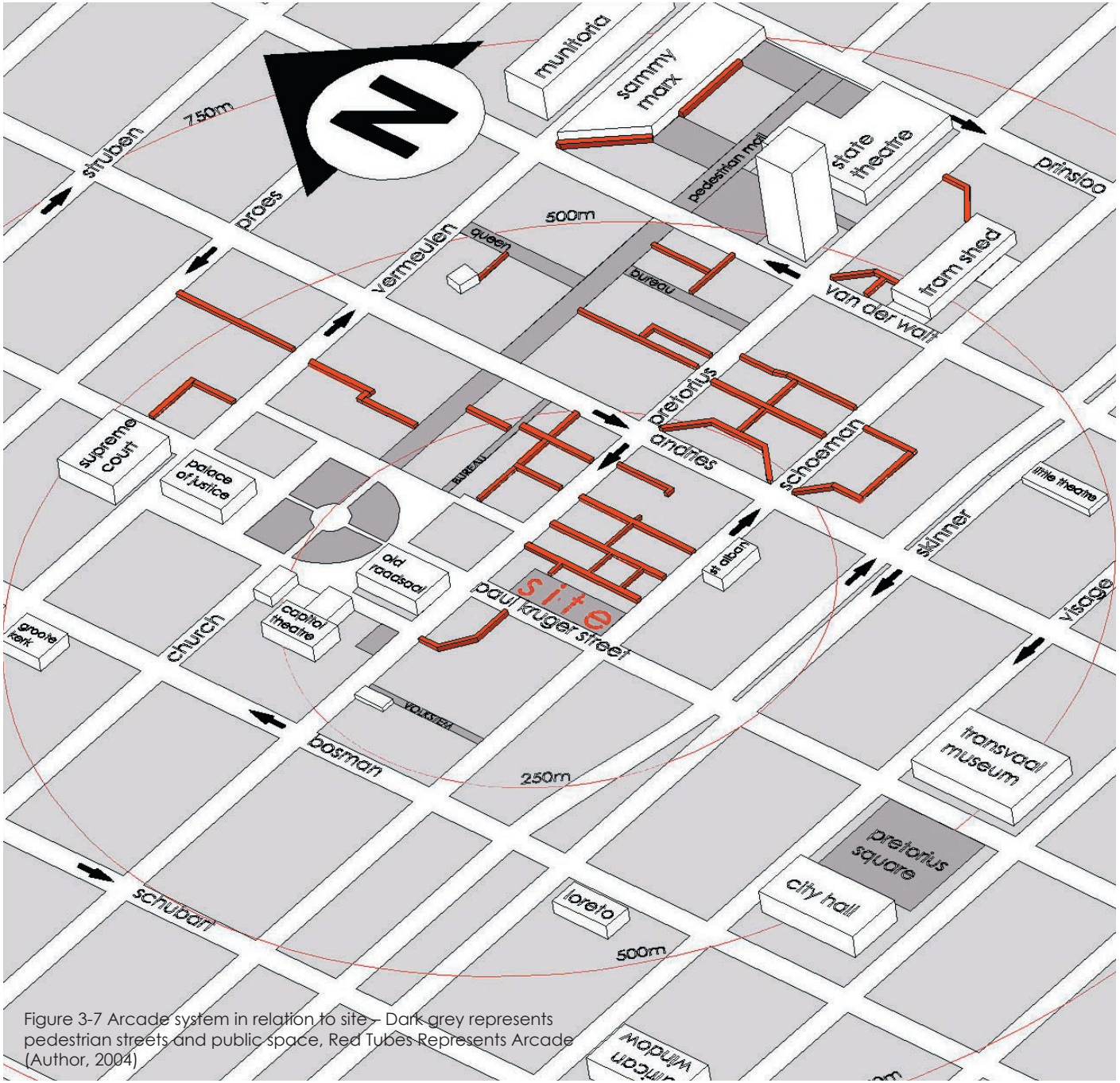


Figure 3-7 Arcade system in relation to site – Dark grey represents pedestrian streets and public space, Red Tubes Represents Arcade (Author, 2004)

Arcade Analysis

On visiting Pretoria's CBD today it is clear that the 1930's trend of an internalised city has been reversed. Many arcades, which were once bustling places, have deteriorated and serve only as functional pedestrian tunnels that link more important places. One experiences the need to move quickly through these often dimly lit corridors that do not encourage the user to stop and explore. The shops are there, and do business, but don't have the potential of attracting the cities' wealthier patrons. Arcade activity is often dependent on the institutions or government functions located inside to supply the lifeblood. By the end of the workday the arcades lie deserted: Bolted and secured from public access.

The Church Street Pedestrian Mall is where the commercial activity of the CBD peaks. This is one of the few places where the surrounding arcades are active places worth visiting, and on Saturdays it remains a shopping destination.

The arcades can be divided into two broad categories:

- Internalized Street type, which are the older arcades. These are found closest to the historic core.
- Shopping center or Atrium arcades which act more as malls that connect streets through a city block.

The focus will be on the internalized street type. The arcades in close vicinity to the site are all of this type and any possible links that the project can make will be to this system.

Van Erkom Arcade

A lack of natural lighting creates a feeling of claustrophobia on first tentative entrance. Yet the arcade is 90% rented out and businesses operate well. Jacaranda Stereo plays over hidden speakers. But the arcade would not attract tourists and does not offer anything special to the casual observer.

The arcade passes under two buildings, namely the Van Erkom Building (Northern half of arcade) and the Finpark Parking Garage (Southern half of arcade). A large diversity of shop and smaller businesses can be found in Van Erkom Arcade serving the local community and the employees of surrounding government buildings. Businesses include take-away restaurants, a furniture store, a micro loans business, a hair salon, and the offices of Prof. Dungu, a Herbalist healer.

Of special interest is the Oude Kelder Pub and Restaurant, or more specifically, the public artwork on its outer wall, facing the Van Erkom section of the arcade. The mosaic artwork (see Fig 3-10) is, according to the owner of Oude Kelder, the longest mosaic artwork in the Southern Hemisphere. Whether this is still the case is doubtful but a public artwork of this scale is of some importance.

The Upper floors of The Van Erkom Building can be accessed through the arcade. Office space is approximately 60 % rented out, mostly by the South African Police Service.

The arcade cannot be closed and remains a permanent pedestrian walkway. A potential link to Paul Kruger was clearly considered: A passage is in place, but terminates where the Van Erkom Building ends. The potential exists to create skylights in the Van Erkom section (Northern Half) of the arcade, which would greatly enhance the experience of the arcade, and make it much more

pleasant. Approaching Church Square along the Paul Kruger Street ceremonial way, Van Erkom could become the arcade through which one gains access to the entire system if a new link is established.

Thibault Arcade

The situation in Thibault is very similar to that of Van Erkom Arcade. The Southern section of the Arcade falls under the Finpark 7 storey parking lot. This section is also rather dimly lit with electronic light. Here the floor space is only about 60% rented out and a large number of display windows are empty.

The northern section of the arcade is more interesting. The South African Police Service main branch entrance is found in the arcade. The businesses are minimal but the SAPS office ensures a steady stream of visitors during office hours. Here the arcade jumps to a double volume. It falls under the same building as Polley's arcade next door, and so the floor finishes are much more interesting and exciting. The arcade is in need of upkeep.

Activity in Polley's is close to nothing after hours, and although the arcade cannot be locked and remains a walkway, nothing attracts visitors to potentially encourage diurnal use. The main importance of Thibault seems to be that of linking the more important Polley's and Van Erkom arcades.

Polley's Arcade

The Norman Eaton-designed Polley's Arcade is possibly the most impressive of the arcades and undoubtedly has the potential of becoming a tourist attraction in its own right. Unfortunately businesses and shops are all but non-existent in the arcade.

Figure 3-8 Van Erkom Arcade loacation

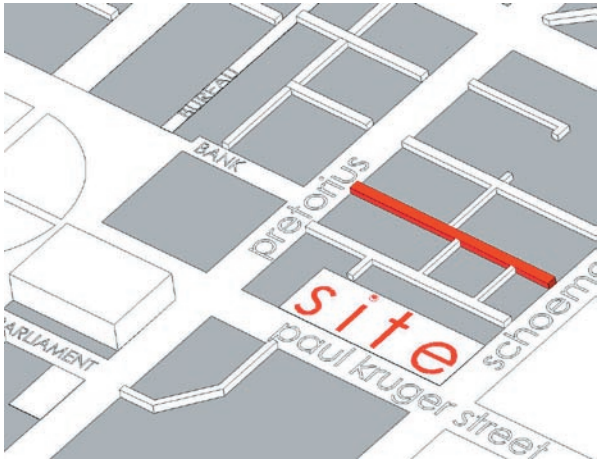


Figure 3-9 Thibault Arcade loacation

Figure 3-10 Public Mosaic artwork in Van Erkom Arcade

The South African Police Service uses the building as offices space. No public entrance to police facilities can be found in the arcade, save for the Jackie Selebi Wellness center, a gym for members of the SAPS that is not open to the public. The SAPS seems to use the arcade as its backyard. Deliveries are made by bakkie in the arcade. The arcade is a double volume space from beginning to end, and even a triple volume at the center where a grand staircase descends. Under the staircase is the only function other than SAPS facilities, namely the Pebbles Restaurant.
The city should make the upgrade, upkeep and development of Polley's Arcade a priority.

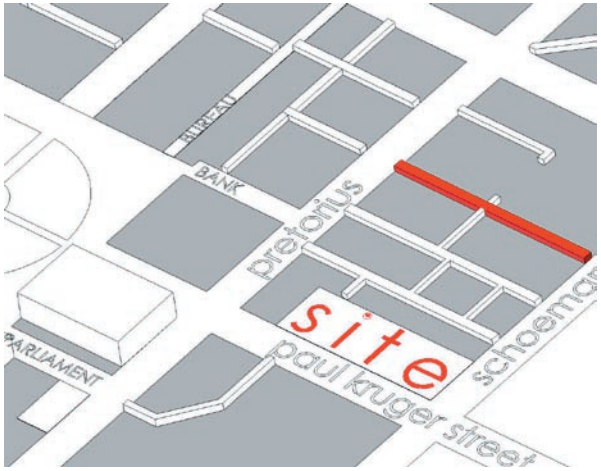


Figure 3-11 Polley's Arcade in relation to the site

Opera Plaza Arcade

Opera Plaza creates a link between Bank Street on Church Square and Pretorius Street, and allows access to the Koedoe Arcade, all leading to Andries Street.

Approximately 50% of the arcade is rented.
The arcade is unimpressive, save for the entrance off Pretorius Street. The old Opera Plaza façade was preserved when a new building was constructed behind it. A courtyard was created that is shared by a Wimpy restaurant and an Internet café. This is a very pleasant space that is flooded with sunlight. A vine covering the dead facade of a neighboring building and trees planted in the courtyard give the arcade a unique character. Glimpses of the courtyard from the sidewalk invite passersby to enter. This is an important principle in arcade design.

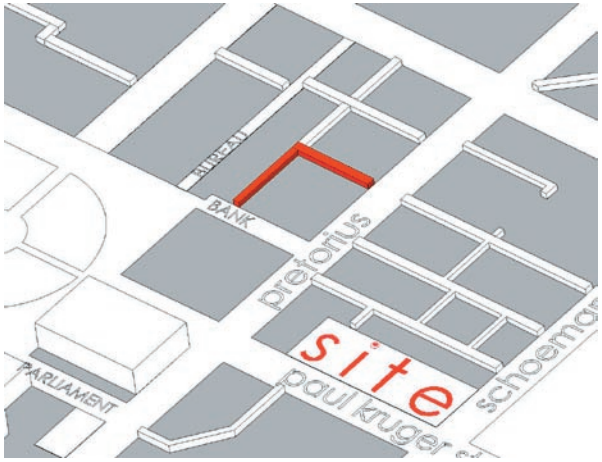


Figure 3-12 Opera Plazza location

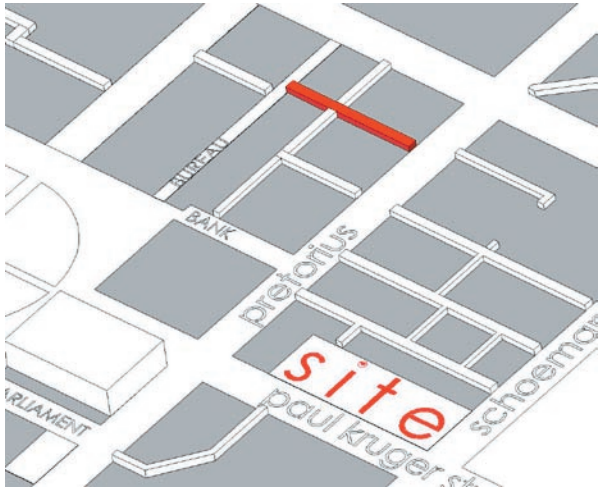


Figure 3-13 Koedoe arcade location

Figure 3-14 Opera Plazza Arcade

Figure 3-15 Burlington Arcade

Figure 3-16 Koedoe Arcade

Burlington Arcade

The Burlington Arcade is the most charming and pleasant of the studied arcades . It is part of the Art Deco Burlington House, designed by Gordon Ellis. It was built in 1934. (Le Roux, 1990)
The arcade is narrow and short, acting as a link between the Church Street Pedestrian Mall and the pedestrian street Bureau Lane. It is filled with activities and a diverse range of small businesses, including a leather shop, watchmaker, biltong kiosk and a small coffee shop.

The arcade is open to the sky and apartments have balconies opening onto the arcade. Flower boxes are visible. The success of Burlington arcade may be attributed to its location off the pedestrian mall, but its design proves how pleasant the arcade system can be. It is a well-designed public space with a unique character that adds to the city experience. It also confirms the importance of natural light to ensure a positive spatial experience.

Koedoe Arcade

Koedoe Arcade seems more like a mall, or an atrium of a larger building, than an internalized street. Skylights provide natural light to ensure a pleasant space. The arcade is in a good condition. Offices above have balconies looking out onto the arcade, and from the arcade activities can be seen on the upper floors.

Diverse tenants rent out 80% of the arcade. Clothing stores, micro loans businesses and a jeweller can be found. Koedoe Arcade is important as a pedestrian link between Pretorius and Andries Streets and ultimately the Church Street Pedestrian Mall.

Figure 3-17 Burlington Arcade in relation to site

Immediate Site Context

The site is situated 200m from the centre of Church Square, which is important as a tourist attraction and public place. The square is always a witness to activity. A large number of Governmental Departments are situated close by, ensuring an active CBD during office hours. Office space with lettable shops on ground floor makes up most other surrounding buildings around the site. Buses from the CBD depart to the rest of the city from bus stops located in Pretorius Street to the north of the site, as well as from the section of Paul Kruger from the site to Church Square. Tickets and information can be obtained from the Ticket office on Church Square. (See Site Analysis Drawings p3-14)

The Van Erkom Arcade runs next to the site (See Arcade Analysis p3-6 to 3-9). It passes under the Van Erkom Office building and the FinPark parking Garage. Finpark is a 7 storey-parking garage, with shops on ground floor and a basement parking level with controlled access.

Figure 3-18 View over site from Van Erkom building roof -Pretoria Office Supplies Roof in Front - Red roof at the back is the Lewis Building. Laboria (Depratment of Labour) is located in the Redbrick building behind the Lewis Building

Figure 3-19 South-western corner of the site, c/o Paul Kruger and Pretorius Street. The 7-storey FinPark Parking Garage is visible to the right of the Lewis furniture store building. The disparity of scale of the existing buildings on the site to the rest of the CBD is clear.

Figure 3-20 Immediate Site Context

3d Mass Analysis

The disparity of scale of the existing buildings on the site (indicated in blue) and the surrounding buildings can again be seen. Paul Kruger Street Façade is broken and rhythmic, with variations of building sizes and heights. The East-West streets of Schoeman and Pretorius have well-defined and solid street edges, appearing as canyons. This is due to the long street blocks orientated to the North, as described in the Pretoria History section A height of between 5 and 7 stories is the norm for buildings along the CBD section of Paul Kruger Street.

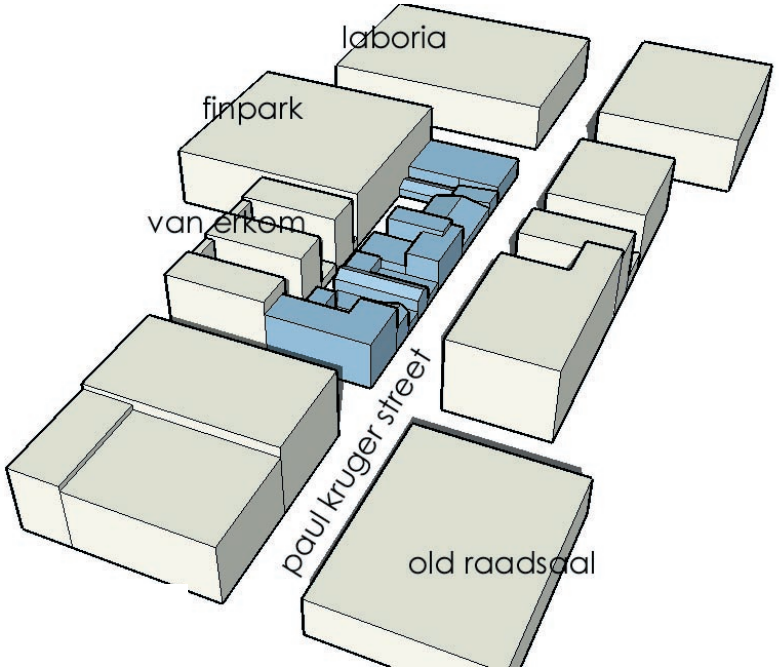


Figure 3-21 Birds' eye view of the site from the north-west, to the South

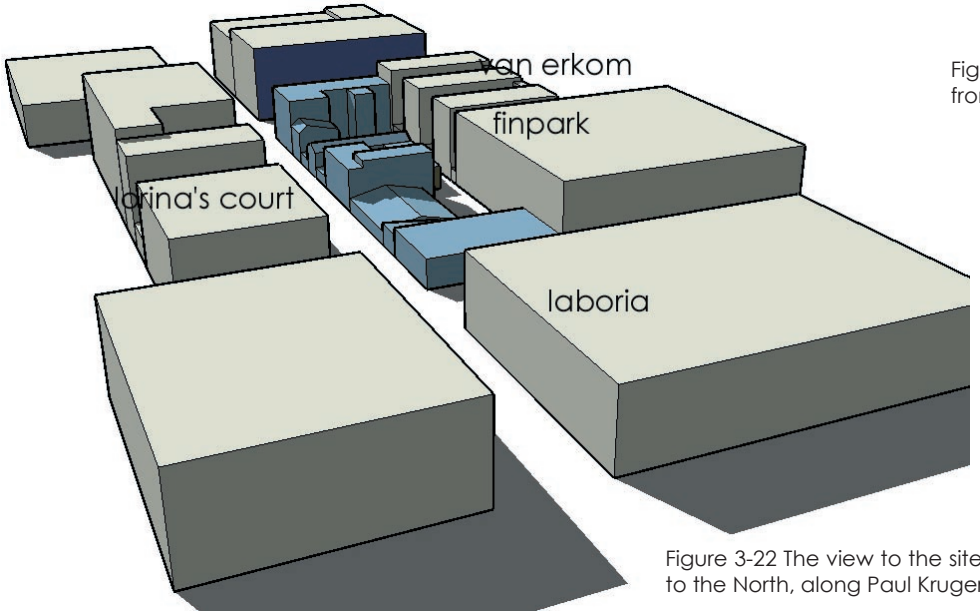


Figure 3-22 The view to the site from the South, to the North, along Paul Kruger Street.

Existing Building Analysis

Figure 3-23 Site Street Facade from Paul Kruger Street
See Site Analysis Drawings inserted on next page

Only the final proposal made for the individual buildings are given below. For the complete building analysis see Appendix A

Savelkoul Proposal
Conservation of building. No change in function.
Possible link to pedestrian movement

Fatti's Proposal
Conservation and maintenance. No change in Function, but potential of linking Sports Fly Bar at the back of the site to the proposed pedestrian walkway.

Afrik House Proposal
Conserve and Maintain / Restore exterior and the adaptive re-use of interior. The building ideally positioned to make a link to the arcade system.
Demolition of smaller structures.

Pretoria Office Supplies Proposal
Adaptive re-use of buildings with possible integration into project. The building is of economic value in the CBD.

Wholesale Retail Proposal
Conservation of colonnade and integration of the colonnade into new building. Demolition of building

Pharmacy Proposal
Conservation of colonnade and integration into new project. Conservation of Interior of Pharmacy, or of Pharmacy location for memory connected with the site.

Am Cellular Proposal
Demolition of building structure

Lewis Proposal
Possible Integration into the scheme. Adaptive re-use. To fit the scale of the CBD a structure will have to be constructed over it. The cost of this intricate process vs. an entirely new building must be considered however.

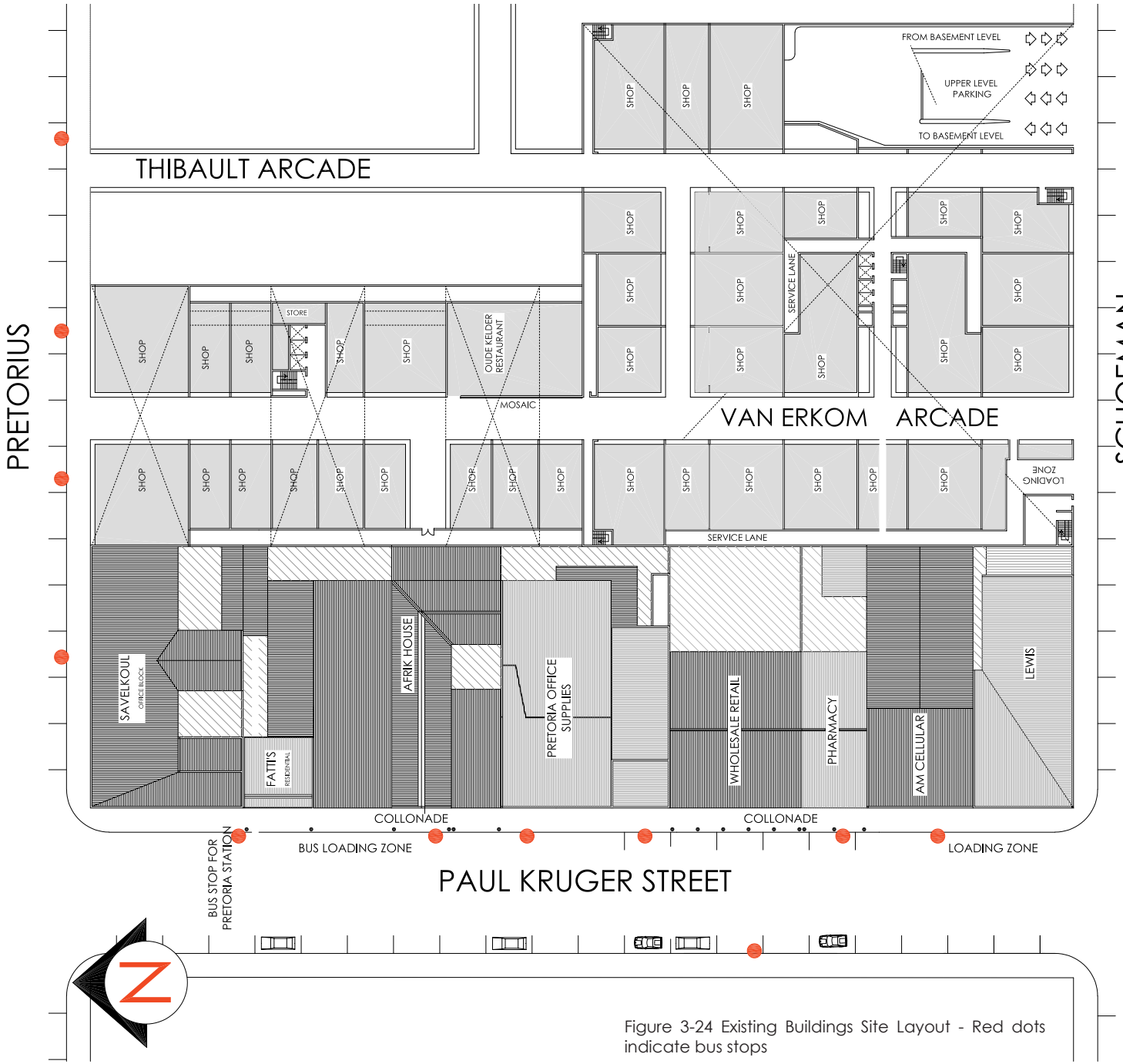


Figure 3-24 Existing Buildings Site Layout - Red dots indicate bus stops

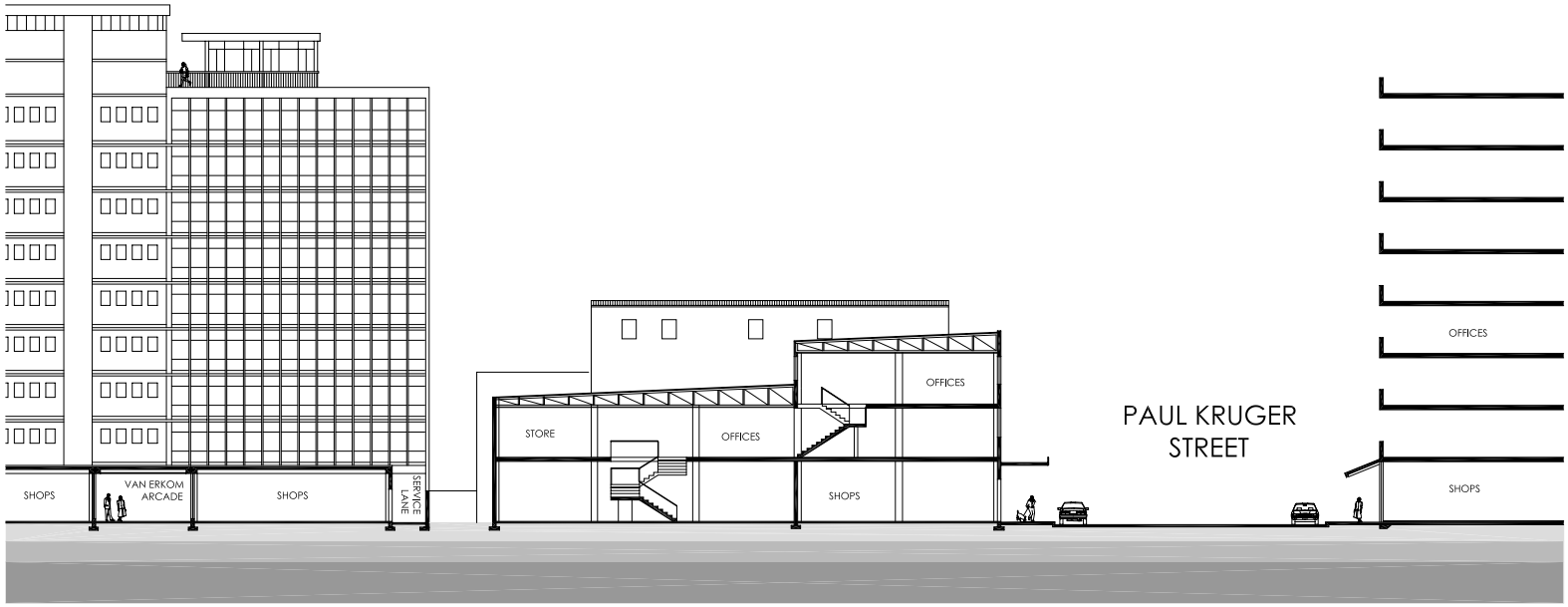


Figure 3-25 SECTION THROUGH PRETORIA OFFICE SUPPLIES BUILDING - VAN ERKOM BUILDING ON THE LEFT

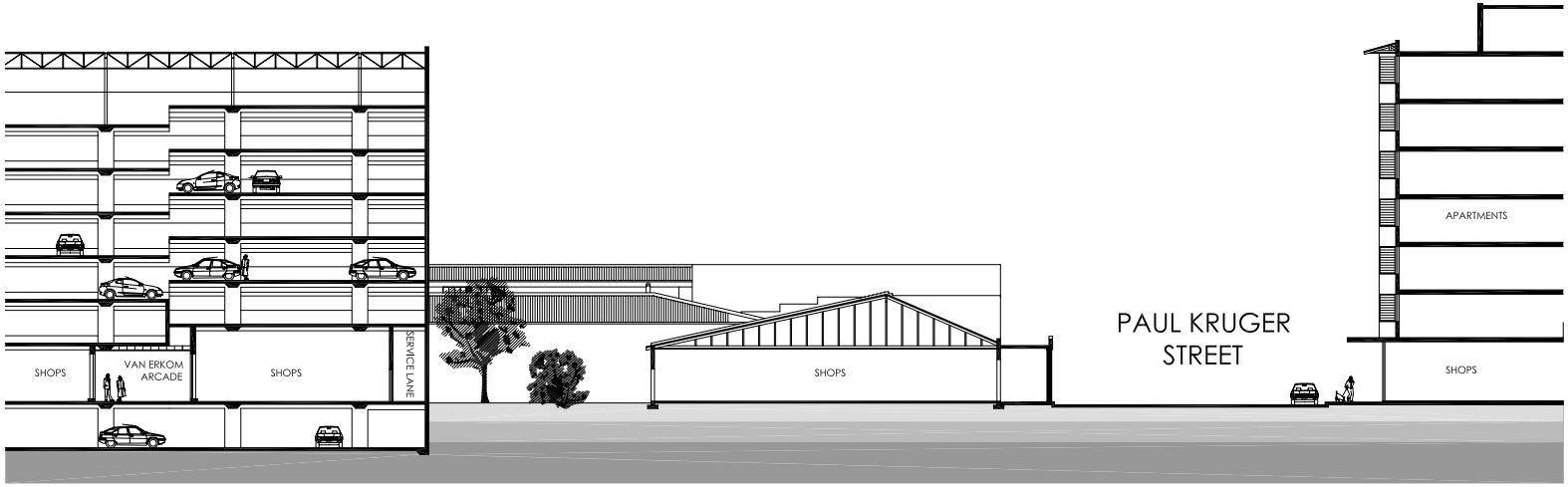


Figure 3-26 SECTION THROUGH PHARMACY AND FINPARK BUILDING EDGE

Site Shadow Patterns

The Van Erkom and FinPark Buildings to the east of the site cast long shadows and block early morning sun . The lowest Western sun rays are blocked by the existing buildings to west. This will influence solar design.

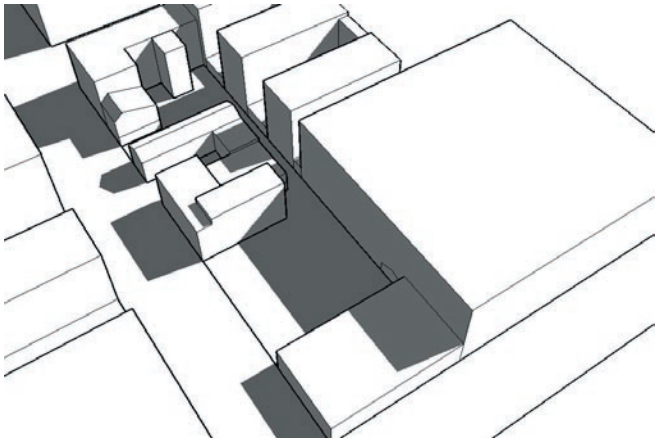


Figure 3-27 1st January 8h30 am

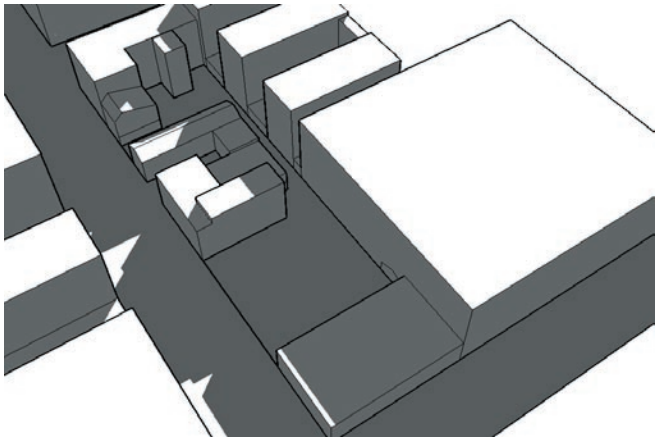


Figure 3-30 21 June 8h30 am

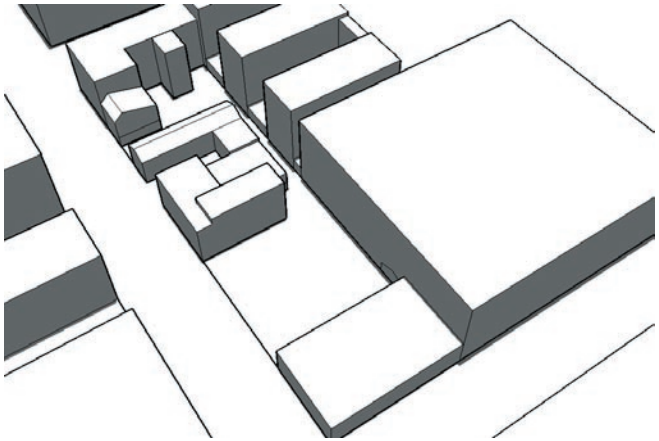


Figure 3-28 1st January 12 noon

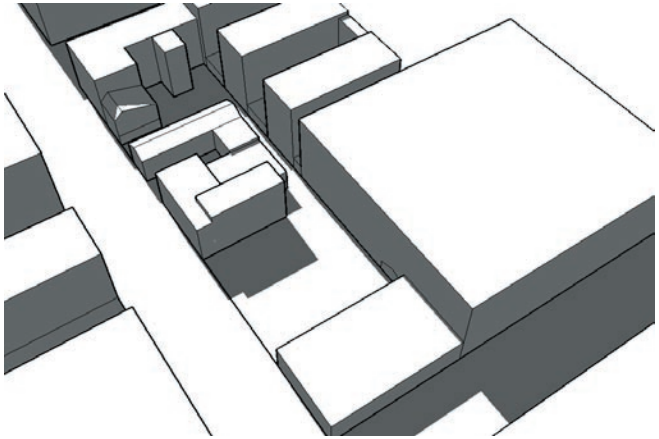


Figure 3-31 21 June 12 noon

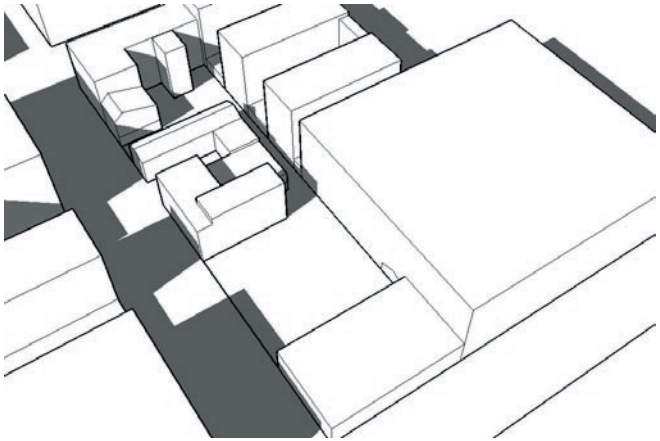


Figure 3-29 1st January 4 pm

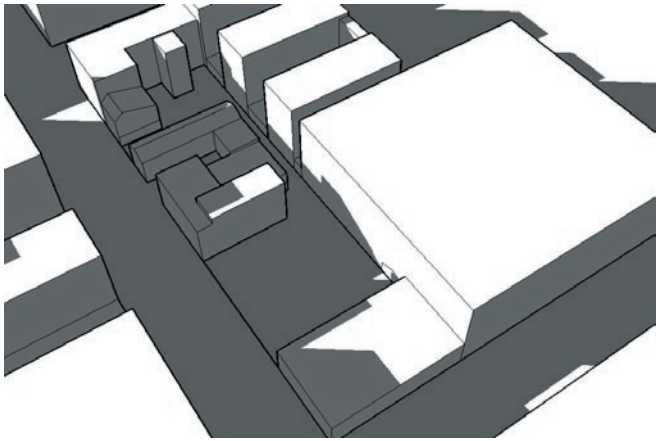


Figure 3-32 21 June 4 pm

Legal Context

Any new construction work must comply with the **SABS 0400** Building Regulations in all aspects thereof.

The Title Deeds (See Appendix E) give no specific requirements for the properties. A 2,5 m servitude is specified along the Eastern boundary of all properties, connecting Schoeman and Pretorius Streets. However, the Savelkoul (Erf 1/461), Wholesale Retail (Erf 1/509), AM Cellular (Erf 6/509) and Lewis (Erf 3/509) Buildings have disregarded this servitude entirely and it has subsequently been built over.

The Town Planning Scheme specifies a height restriction of 28 m for all the properties on the site. The site is zoned 'General Business', and a Coverage of 80% is specified for all properties that make up the site.

Some properties will have to be consolidated to accommodate the new building. This should be kept to a minimum if possible when the costs and time implications of consolidation is considered (9-month period for consolidation).

The Town Planning Scheme states that no part of a new building, or addition to or extension of an existing building, may be built over the building line, or extend across it. This excludes, however, balconies of a residential building, which may extend 0,7m over the building line, with the understanding that they may not be closed balconies.

'Inspired by Change'

Client profile: Pretoria Art Museum

Fig 4-1

Paul Kruger Street has the potential to be a tourist orientated street. Any site along the route may well attract visitors, if the idealised vision of ceremonial route is realised. The need for institutions and diversity in the CBD makes a gallery ideal for the site, and even more so if it highlights the work of South African artists.

The Tshwane Art Museum, the only fine arts museum in Pretoria is an ideal institution to manage the workings of the gallery. The precedent of a satellite gallery for the Art museum has already been set by the Centurion Museum, which a commercial venture. *(Oegema, 2004)*

"The Educational Role of Museums is at the core of their service to the community."
(From the Pretoria Art Museum Goals Statement)

The Museum is involved in community education and aims to expand these activities. A gallery in the CBD will bring the fine arts to a large sector of the population that would not usually see it. To visit the Pretoria Art Museum in Arcadia, one has to make a trip with the explicit intention of visiting an art museum. The proposed site is infinitely more accessible. It would be easy to make a quick visit to the gallery during a lunch break, and exhibitions could change regularly to continue attracting visitors. If it can be effectively intertwined into the urban fabric, casual passers-by could be engaged and drawn into the exhibit. The Arts and Crafts Training Center located on the same site can bring richness to the gallery/museum experience. Facilities could be shared, and this will encourage interaction between different disciplines within the art world.

Pretoria Art Museum Vision

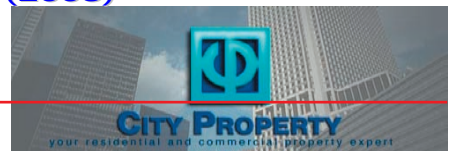
"An Art museum of world renown, specializing in South African Art".

Pretoria Art Museum Mission

"Collecting, documenting and conserving examples of mainly South African Art; researching and compiling exhibitions from the permanent collection; hosting major national and international traveling exhibitions, supplemented by educational activities."

Ciry Property

Fig 4-2



Client profile

"*City Property is a property management company that has been operating in Pretoria for the last 35 years. Its major clients include two listed property investment companies, Premium Properties and Octodec Investments Limited, as well as a large number of private clients." (Quoted from City Properties website)*

City Property will manage the proposed retail and residential aspects of the project. The company will be responsible for the funding of these aspects of the project. *One of the properties is already owned by City Properties.*

"*City Property has allocated substantial resources to managing, understanding and developing property within the CBD. In the last two years, R100 000 000 has been invested in the CBD by City Property and plans are far advanced for further investment*." (*Quoted from City Properties website)*

Talking Beads

Client profile

"*Talking Beads is an economic venture which empowers rural women from all over South Africa. Initiated and managed in Gauteng, the project has grown from strength to strength. We started as 2 women. Now we have a membership of 3000 women and 5 men*" (Information Leaflet of Talking Beads)

Talking Beads originated through the dynamic energy of Tembeka Nkamba-Van Wyk. Their current facility is located in Proes Street no 5, in an old clinic building. The building is used as a shop and centre of the operations. A large percentage of the Crafts are made on site.

Talking Beads does not only supply arts and crafts to tourists. The products, made by rural women all over the country, are exported overseas where the demand exceeds the supply. Talking Beads' products are internationally sought after. Large local contracts are also on the cards. This includes an order of 40000 hand-painted coffee mugs for Standard Bank, which employed a total of 500 people.

Skills training is another aspect of Talking Beads. Beadwork, weaving, and painting are all skills taught at Talking Beads, an attempt to empower people. In this way traditional skills, that may otherwise easily be lost, are preserved.
Talking Beads plans to expand the skills training aspect of the venture, but new people and more space are needed for the operation.

It is proposed that Talking Beads is relocated to the Paul Kruger Street multifunctional building. New funding and facilities would allow Talking Beads to expand their operations, while overseeing growth and activities of a new Arts,

Crafts and Skills training Centre, providing guidance and experience to the project. The new location in the CBD would allow better access to Talking Beads, both for tourists and potential trainees. Talking Beads can teach Embroidery, Beadwork, Painting, and Wirework. Operations can be expanded to include Pottery, and expand on aspects of painting.

Arts and Crafts as a source of income

The traditional craft-making skill of African peoples is a curiosity to tourists. It is also an income-generating activity that may sustain a way of life. In a discussion with Gwen Miller, an Arts lecturer at UNISA who has been extensively involved in skills training projects, successful management is of key importance. Arts and Crafts are often functional objects. A knowledge of market trends will be required, to offer the buyer what is wanted. Talking Beads has this expertise. The beauty of on-site production is that orders for specific requirements can be placed, and produced for the specific client.

Figure 4-3 to 4-4 Talking Beads existing building

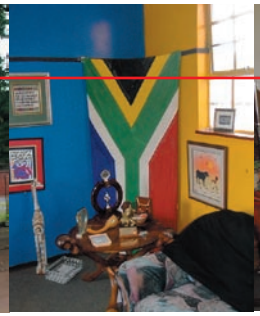


Figure 4-5 Full-size flag made entirely of beadwork

Figure 4-6 Talking Beads products

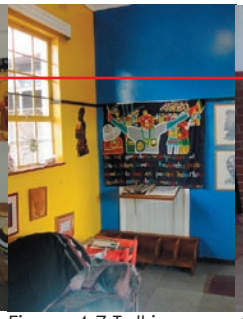


Figure 4-7 Talking Beads Interior

Figure 4-8 Men painting muggs

National Skills Fund Project Finance

The National Skills Fund was established in section 27 of the Skills Development Act of 1998. The Art, Crafts and Skills Training aspect of the project, as well as the Educational aspect of the Gallery will allow the project access to these funds.

Nedbank Arts and Culture's Trust (ACT) Project Finance

Fig 4-9

The ACT was established by Nedbank to support arts and culture activities that lead to job creation, improve creative and administrative skills, and create tourism opportunities. ACT is an independent institution under the guidance of the trustees. The proposed Arts, Crafts and Skills Training Centre fits exactly into the profile as laid out by Nedbank, and has these qualities as set goal.

Baseline Requirements

Baseline Requirements for the project were developed through a study of

- The guidelines contained in the Sustainable Building Assessment Tool
- Building typologies associated with the specific functions
- Clients Requirements
- Existing frameworks relevant to the site
- The context study

These requirements are characteristics and qualities that the design must include, and to which the project success will be measured. The requirements are qualitative, rather than quantitative.

Requirements For Entire Development

From the Frameworks and Context Study

The development must

- Improve street edge definition for Paul Kruger Street
- Improve interface with street to develop the street as a "city room".
- Have a scale and architectural character suitable to the CBD
- Create a finer grain for pedestrian movement within the CBD
- Conserve and incorporate valuable existing structures
- Encourage the development of entrepreneurial skills and the promotion small businesses.
- Increase the diversity of land use in the CBD
- Address the need for housing in the inner city

From the SBAT Tool

The development must

(SOCIAL ASPECTS)

- Create a pleasant environment for living, working, shopping and learning,
- Give users access to amenities and views to activities or greenery.
- Encourage interaction of its users.
- Give its users access to facilities necessary for daily living.
- Allow users options to change and adapt the building to their needs, rather than dictating every activity.
- Create spaces that are safe and secure to protect its users.
- Create the privacy required by its users.
- Artists and unskilled labourers to be engaged and involved in the process through Talking Beads.

(ECONOMIC ASPECTS)

- Employ local contractors, craftsmen and materials for the construction phase as well as for the maintenance of the building. The Contractor must train unskilled labourers during the construction process. Contractors that tender for the project must be made explicitly aware of this requirement.
- Be designed and managed in such a way that it allows for and encourages diurnal use of facilities
- Be robust enough to allow users to adapt spaces to their needs and to minimize maintenance.
- Be flexible and robust enough to allow for creative use of space and possible changes in its future use.
- Give easy access to elements that require regular cleaning and maintenance.
- Be designed to be a defensible space and not create security risks.

(ENVIRONMENTAL ASPECTS)

- Be constructed and managed in a manner that minimizes the unnecessary waste of energy, resources and materials. Contractors must be explicitly made aware of this requirement during the tendering process.
- Educate users and contractors on the importance of conserving energy and water.
- Harvest rainwater for gardening or industrial needs.
- Have natural ventilation for rooms as far as possible
- Have openable windows and adjustable sun control devices for user comfort.
- Use passive energy design for thermal comfort to lessen energy waste associated with air-conditioning and heaters.
- Supply a recycle point for inorganic and organic waste
- Share infrastructure with neighbouring buildings where possible

For detailed SBAT analysis and conclusions see Appendix B

Requirements For Retail And Residential

Client requirement: (City Properties)

- Sufficient and safe parking on the site
- Maximize lettable area. (This suggests not wasting space)
- Effective security measures and control (e.g. flats have swipe card at entrance that do not allow entry if rent not paid)
- Retail with shops of approximately 100 square meters area.

Requirements derived from SBAT Tool

- Views and access to amenities for all users
- Communal social space for flats and circulation that encourages interaction
- All flats with windows that the occupants can control to allow natural ventilation
- Maximize Northern Orientation for flats
- Robustness of design
- Allow for personalization by the user
- Privacy of individual flats

Requirements For Arts And Crafts Centre

Client requirement: (Talking Beads)

- Sufficient, safe parking
- Access and visibility for potential visitors
- Adaptability to allow for the ability to handle larger projects
- Security and safety of products and materials

Requirements derived from SBAT

- Design must allow for the diurnal use of facilities, e.g. adult education in the evenings.
- Focus on re-use of waste materials for artworks and crafts
- Artists from Talking Beads must be involved in the design process to encourage freedom of expression and a feeling of ownership.
- Social spaces are needed that encourage interaction and allow more opportunities for education.
- Access to facilities such as daycare, a kitchen etc.

Requirements For Gallery

Client requirement: (Pretoria Art Museum)

- Adaptability: Should allow for different mediums of artworks to be displayed
- Sufficient and effective lighting, preferably daylight
- Administration spaces naturally day lit.
- Fireproofing and safety of artworks a priority, and sufficient and correct storage methods needed.
- Easy access for delivery of artworks.
- Easy access to and visibility of the gallery for potential visitors, including enough parking
- A commercial aspect, e.g. allowing artists to sell at the gallery.
- From the previous, a possible auction house.
- Controlled access, e.g. minimum security staff required

Requirements derived from SBAT

- Artists involved in the design process to allow freedom of expression.
- A strong focus on community education, and arts appreciation for schools in the area.
- Galleries are calmer places. The challenge of Paul Kruger Street's noise levels must be negotiated.
- Robustness and Flexibility of design.
- Daylight where possible to light artworks, but glare avoided

Requirements and Concerns derived from Museum Building Typology: *(Matthews, 1991)*

- Importance of changeability. Ability to house several exhibitions at once and change exhibits without interrupting existing displays.
- Analysis of the pattern of use during the design process
- Potential users must be identified
- The image and character of the gallery which is inherently contained in its location and its context must be identified
- Natural lighting of artworks without glare

Design Challenges Identified

- Separate, independent functioning of different layers of activity.
- Effective Circulation for different functions.
- Allowing for potential expansion of the Gallery and Talking Beads.
- Robustness and adaptability of spaces.
- Creating potential work for unskilled labourers.
- Allowing artistic freedom for artists during design and construction phase.
- Designing defensible space that can be monitored by users and residents. This requirment must not compromise the privacy of individual flats.
- Incorporating existing structures into the design, and respecting the existing historic fabric.
- Design modularly while still ensuring a sense of place that allows users to change and adapt the space to their preferences and needs.
- Western Façade to Paul Kruger Street – Creation of an active and attractive façade, while still preventing unwanted heat gain.
- Encouraging diversity and interaction of users

Schedule of Accommodation

Museum Gallery

Delivery and Collection of Artworks					
Elevator	Linked to Service lane, Basement Storage and Gallery floor storage				
	1700x1850 inside car				
Gallery Delivery Lane				16	sqm
Storage					
Primary storage	Ventilation, Fire Protection, Security;	1		144	sqm
(Permanent Artwork Storage)	Accessibility (Located in Basement)				
Secondary storage	Ventilation, Fire Protection, Security;	1		18	sqm
(Cleaning equipment, Temporary Store)	Accessibility				
Concourse / Visitor services					
Lobby	Doubles as exhibition space	1		80	sqm
Information Desk	Inquiries- Sales- Entrance Fee	1		6	sqm
Gallery Toilets	Shared use with Auditorium				
Handicapped Persons			2,9 sqm		
Women			17 sqm		
Men			13 sqm	32.9	sqm
Mechanical room (Air-conditioning)	Ventilation			20.7	sqm
Exhibition Spaces	Circulation to allow separate/ adaptable displays				
	Lighting, Security, Fire Sfaety, Ventilation, Acoustics				
Gallery North		1	71 sqm		
Gallery South		1	145 sqm		
Gallery West		1	112 sqm	328	sqm

Auditorium

Auditorium	Managed by Gallery				
(120 seater)	Acoustics, Ventilation and Air-Conditionin	1		88	sqm
Foyer/ Exhibition Space					
(Potential extended exhibition space for gallery)				73	sqm
Toilets	Linked to Gallery Toilets				
Gallery Link	Link over Arcade - Exhibition space			20	sqm
Control Room		1		8	sqm
Mechanical room (Air-conditioning)	Ventilation, acoustics	1		8	sqm

Retail Component

Trading Stalls	(Managed by Talking Beads)				
	Privilege given to Talking Beads products				
Lettable structures	Lockable for security of goods			97	sqm
	Goods protected from elememets				
Rentable Shops	Shops of varied size / layout				
Street front		6 shops	98-120 sqm	645	sqm
Arcade front		3 shops	85 sqm	255	sqm
Café	(Managed by Talking Beads)				
Exterior dining area	On square - approximately size		50 sqm		
Interior Dining Area		1	57 sqm		
Snack Bar		1	17 sqm		
Kitchen	Back entrance available for deliveries	1	25 sqm		
Storage	Kitchen store	1	12 sqm	171	sqm
Gallery Coffee Shop					
Exterior sitting area	On square - Approximate size		35 sqm		
Interior sitting Area		1	29 sqm		
Snack Bar		1	5 sqm		
Kitchen	Back entrance available for deliveries	1	15 sqm		
Circulation			5 sqm	89	sqm

Residential Component

Communal Spaces					
Reception	Visitors announced = Security Booth	1		15	sqm
	Residentse access = swipe card system				
Elevator	2000x1400 inside car				
Communal Spaces	Casual observation from flats			460	sqm
(including Corridors)	Circulation utilized as usable spaces				
Parking	1 basement parking space per flat	37			
Refuse	Ventilated; Not visually intrusive	3	5 sqm	15	sqm
	Easily accessible, located on residential level				
Recycling point	Ventilated; Not visually intrusive	1		20	sqm
	Shared by retail level, located in basement				
Storage Lockers	Basement storage space provided				
	Available to residents				
Fire Stairs	2 Emergency exists provided				
Building Manager Flat		1 flat	70 sqm	70	sqm
Bedrooms	Naturaly ventilated	2			
Lounge		1			
Bathroom		2			
Study		1			
Kitchen		1			
Rentable Bachelor Flats	Naturaly ventilated	5 flats	32 sqm	160	sqm
	Northern / Eastern orientation				
Open plan bedroom / living room		1			
Bathroom		1			
Kitchen		1			
Rentable Two Bedroom Apartment	Naturaly ventilated				
Type A	Northern orientation	18 flats	52 sqm	936	sqm
Bedrooms		2			
Lounge		1			
Bathroom		1			
Kitchen		1			
Balcony		1			
Rentable Two Bedroom Apartment	Naturaly ventilated				
Type B	Northern/Southern/Eastern orientation	13 flats	62 sqm	806	sqm
	Includes dining area/ Larger second bedroom				
Bedrooms		2			
Lounge		1			
Bathroom		1			
Kitchen		1			
Balcony		1			
Dining Area		1			

Talking Beads

Delivery of materials / goods					
Elevator	Linked to Arcade, Basement Storage, Talking Beads Reception				
	1700x1850 inside car				
Storage					
Raw Materials storage	(Security, Fire proof, Ventilation)	1		66	sqm
	Located in basement				
Completed Products storage	Security, Fire proof				
	(Located in basement and 2nd floor)				
Administration					
Offices		2	15 sqm	30	sqm
Storage for cleaning, stationary etc		1		8,5	sqm
Workshops / Education					
Multipurpose Workshops	Lighting, Storage, Ventilation	3	32 sqm		
	(Activities include: Weaving, Beading,		45 sqm		
	Pottery, Painting, Needlework, Wire work)		45 sqm	122	sqm
Reception /Exhibition Space	Lighting, Ventilation, Security				
		1		50	sqm
Communal Spaces					
Kitchenette	Ventilation, Lighting, Connection	1		10	sqm
Courtyard /outside space/ social space		1		50	sqm

Constitutional Court, Braamfontein

by OMM Design Workshop

The Constitutional Court forms part of the Constitutional Hill development on the Braamfontein Ridge in Johannesburg. Intended as a symbolic new public place for the city, it also breathes new life into the surrounding precincts of Hillbrow and Braamfontein. Together with the Human Rights Commission, museums and the historic prison, the Constitutional Court has already become an important tourist attraction for the city. An international competition for the design of Constitutional Hill was held, and OMM Design Workshop and Urban Solution's scheme was chosen as the winner out of 185 received entries.

One of the architects' objectives was to integrate the "impenetrable prison precinct into the Johannesburg city grid." *(Makin, 2004)* Movement and connection across the site was important to connect Hillbrow and Braamfontein. Another important aspect was the interweaving of past and present. Bricks of demolished prison buildings were retrieved and re-used, and stair towers of the old prison were incorporated into the design. *(Makin, 2004)*.

Figure 5-1 Constitutional Court at dusk. *(KZN, 2004)*

The Constitutional Court consists of the foyer, the gallery, the court, law library and administration, and judges chambers. The Precedent Study focuses on the public foyer and gallery. Both these spaces become showcases for South African artists, with artworks that were incorporated into the design of the building.

The foyer was designed as an abstraction of a tree canopy: "The shade of a tree as a place of communal gathering" *(Makin, 2004)* Light falls through glass splinters in the concrete flat roof to create dappled light. Columns are arranged seemingly randomly at angles to reinforce the tree image. Round columns turn square halfway and are decorated with splashes of colorful mosaic.

In the design of the Constitutional Court the architects managed to involve artists in the decoration of architectural and functional elements. This includes small artworks as part of the shading device on the Western façade, the above-mentioned mosaic work on structural concrete elements, as well decorative walls and doors.

Relevance:
The idea of artist involvement in the design and building process is a wonderful aspect of the Constitutional Court Design. This could enrich spaces and detailing. The ideal would be to involve artists as early as the concept stage of design, to create the opportunity for a true integration of artworks into the built form. The effective larger design team would however have time and cost implications, but it is a powerful idea with vast potential. Creating elements that are left 'blank', so to be decorated, is used in the City Building scheme.

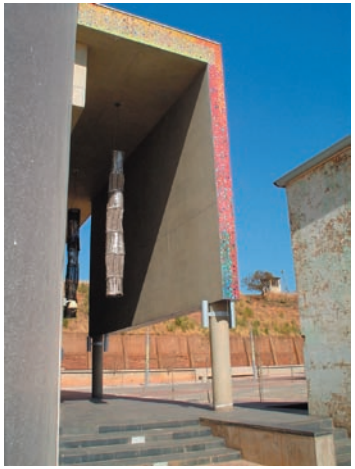


Figure 5-2 Mosaic detai. *(Roos, 2004)*

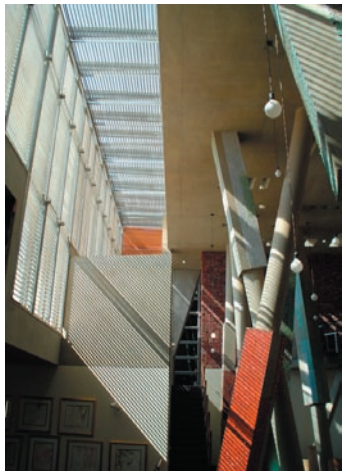


Figure 5-3 Filtered light and column detail *(Roos, 2004)*

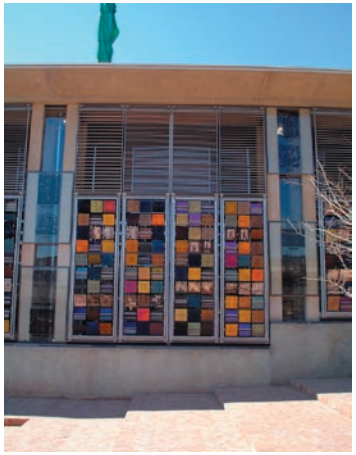


Figure 5-4 Decorative sun-screen panels on Western Facade *(Roos, 2004)*

Figure 5-5 Remnants of demol-ished building incorporated in the design *(Author, 2004)*

Rosenthal Centre for Contemporary Arts, Cincinnati

by Zaha Hadid

The Contemporary Arts Centre (CAC) is Pritzker Prize Winner Zaha Hadid's first major building in the United States. The museum is an urban building, in scale and appearance. It functions as a place to house artworks, but also breathes life into the surrounding city.

The design creates a new energy in the area, with an unmistakably contemporary and dynamic appearance. The "boxy outcroppings above the sidewalk" *(Russel, 2003)* seem to strain against the boundaries of the site. The concrete and slate finish and the irregular shapes bring a new aesthetic to the existing building fabric. Despite this the scale of the building and the simple planes and finishes seem appropriate for a contemporary city building. It sits comfortably between the existing structures, and becomes a new landmark in the Cincinnati cityscape.

Figure 5-6 The Arts Centre in its surroundings *(Halbe 2003)*

Figure 5-7 Concrete outcropping above the sidewalk *(Halbe 2003)*

The interaction at street level is where the design becomes exciting. Hadid calls it an "urban carpet":
"The surface of the street flows into the building and curves up into a dramatic vertical circulation, creating a continuous zone, L-shaped in section, of urban activity" *(Domus, 2003)*. The idea of a vertical urban space and the dissolution of boundaries is manifested in a very simple way, and the architecture grows out of the street. The glazing at street level connects the interior and the street with uninterrupted views, contradicting the solid masses of the upper floors. In this way the street is not left behind on entry and the connection remains.

Relevance:
Whether the expressive and abstract shapes are suitable, and whether the building functions well as a museum is not important for the purpose of the study. The very tangible way in which the connection with the city is made is what makes this a good precedent for an urban scheme. Hadid manages to bring a new object to the city, that appears to have grown naturally out of the site's existing fabric.

Figure 5-8 The "Urban capet" connecting interior and exterior *(Halbe, 2003)*

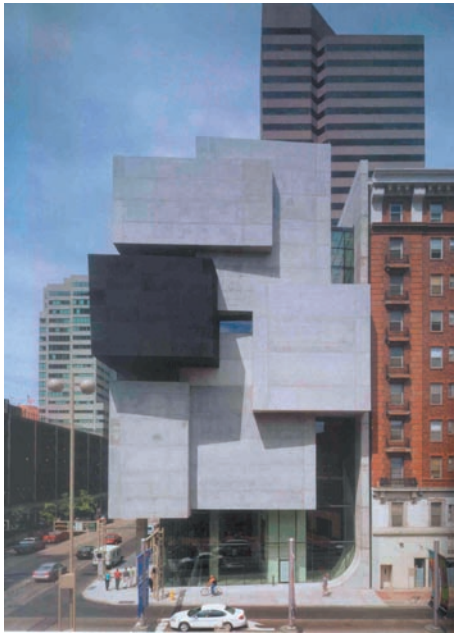


Figure 5-9 Simple planes of Hadid's Art Centre *(Halbe, 2003)*

Rosebank Arts and Crafts Market, Johannesburg

by Kate Otten Architects

Craddock Avenue passes between Rosebank Mall and the Zone Shopping Centre. Previously lined with informal traders, it was seen by Rosebank Mall as a security risk and deterrent for potential clients. The Mall purchased the portion of road from the city, and the Arts and Crafts Market was constructed in its place to "meet the needs of the developers, the informal traders and the greater community at large" *(VAN WYK, 2001)*.

The building functions as an interiorised street, and is filled to the brim with Crafts from Southern and Central Africa. A total of 70 trade stalls fill the 650 sqm ground floor, while the 350 sqm top floor is used as a formal trading space and coffee shop. (*VAN WYK, 2001*) Craddock Street's direction of movement dictates the movement and organization through the building. Light falls into the double volume space through polycarbonate roof sheeting, and is filtered through a reed ceiling, reminiscent of North African streets. The overwhelming amount of crafts and the cramped stalls somehow seems just right for an African Market.

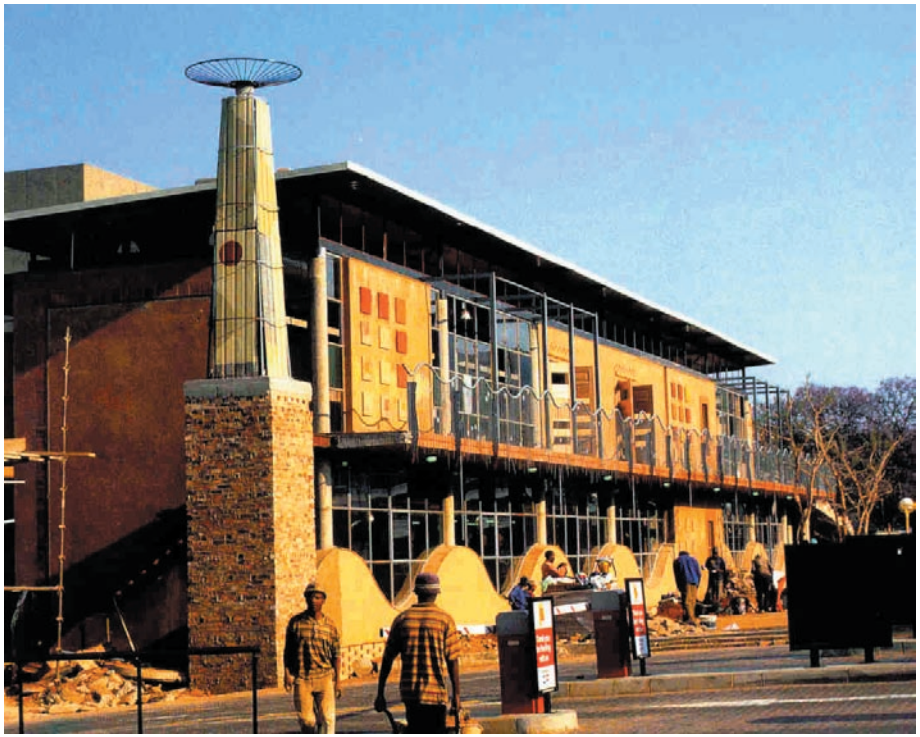


Figure 5-10 TCraft market interior *(Author, 2001)*

Figure 5-11 The Craft market under construction *(Otten, 2001)*

The building aesthetic is well suited to the function. It is an attractive building that depends on its appearance to attract visitors. The detailing is playful and exciting.

Unfortunately the building missed an opportunity to interact with its surroundings. Despite the fact that the façade to the parking area is aesthetically pleasing, it does not have a single door or opening that allows access from this side of the building. Movement is limited in the direction of the street axis. One could conceive an active edge, as opposed to the current approach of turning its back on potential clientele. It also seems that a market may want to expand and contract at certain times. This could easily have been part of the functioning of the building, but the chance has now been lost. The area around it seems somehow neglected, as if a measure of control, which is, from one viewpoint, contradictory to the nature of traditional African trade.

Relevance:
The Rosebank Arts and Crafts Market is a 'pretty' building, and the detailing is uniquely South African and arguably perfect for its function. The idea of an internalised African Street as a concept for the Market is a powerful one with potential that can be tapped. The realization of a need for expansion and contraction for an Arts and Crafts Market came through the precedent study.

Figure 5-12 Playfull Detailing *(Otten, 2001)*

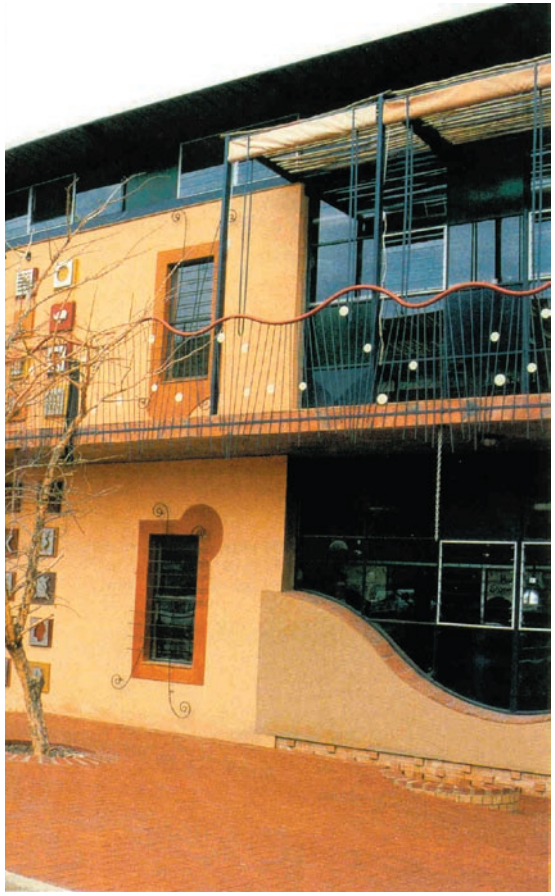


Figure 5-13 Facade to the Parking lot *(Otten, 2001)*

Design Discourse

This section explains decisions made during the design process.

Through a study of the existing Urban Fabric the following decisions were made:
- To link Paul Kruger Street to the existing arcade system.
- To conserve the Savelkoul, Fatti's and Afrik House buildings.
- To leave the Pretoria Office Supplies building untouched, as it is of economic value.

The proposed building is located on a newly created 2002 sqm erf on the c/o Paul Kruger and Schoeman Streets. The existing buildings are demolished, save for sections of the colonnade which are incorprated in the design.

Building Form

The proposed building creates hard edges to Paul Kruger and Schoeman Streets. It is orientated inwards, arranged around an elevated public square. The square is planted, offering a place of rest for the city user. See Fig 6-2 to 6-3 for building mass.

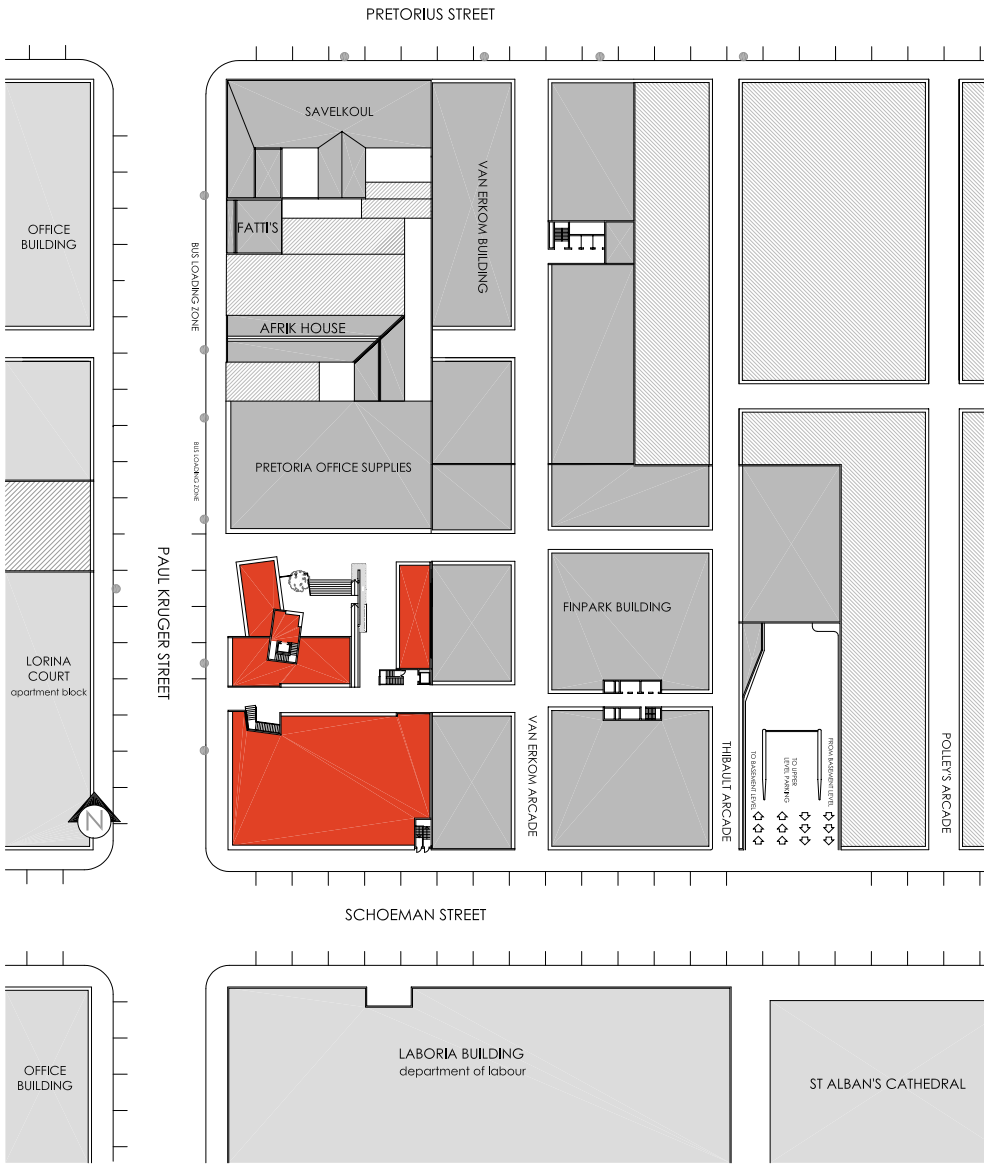


Figure 6-1 Site Layout - Proposed building footprint indicated in red

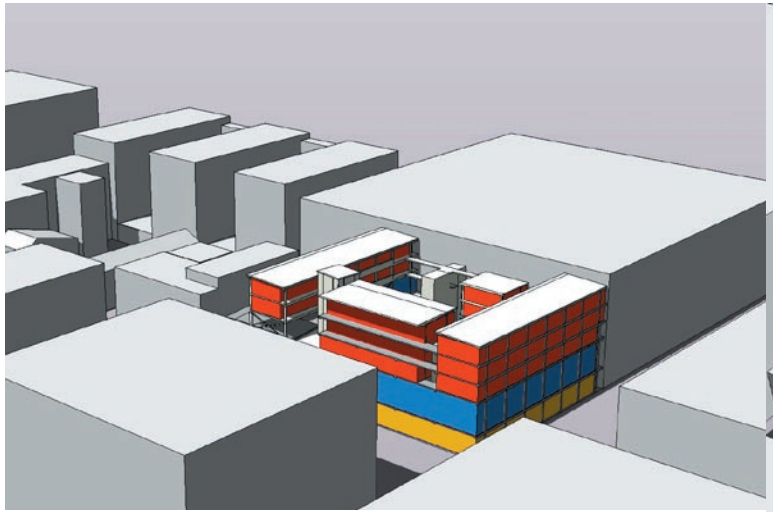


Figure 6-2

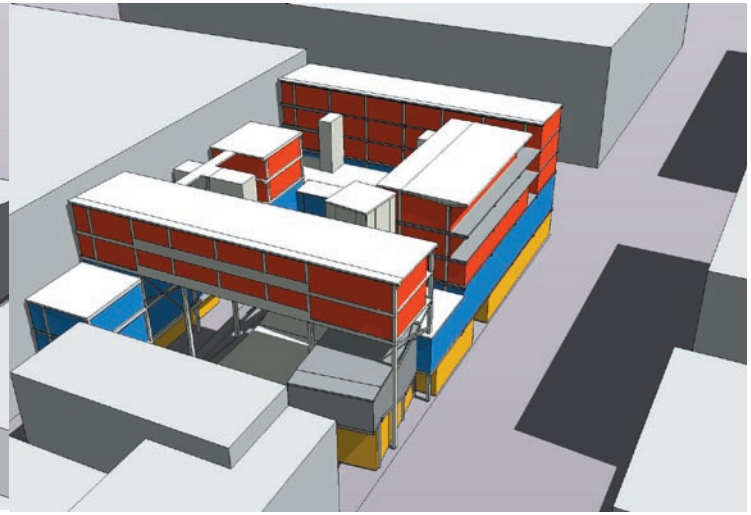


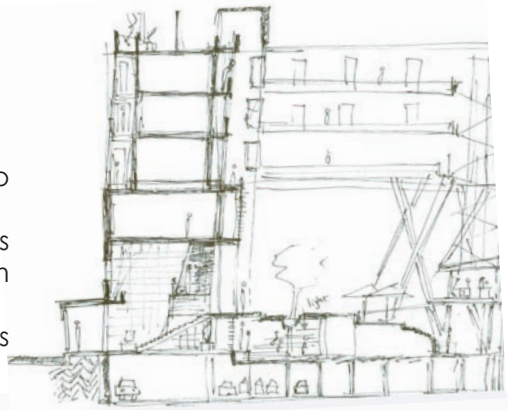
Figure 6-3

Spatial Organization

Vertical Organization:
- Top 3 floors residential (private floors)
- First floor level with cultural activities that live out onto the elevated (public floor)
- Ground floor level with retail activities that includes an arcade linking Paul Kruger Street to the Van Erkom arcade system (public floor)
- Basement level with parking and storage spaces (private floor)

Figure 6-2 and 6-3 show the building form and functional layout. *Red= Residential Blue= Cultural Yellow= Retail*

Services areas for the public levels and the basement are concentrated in the Eastern block of the building. This includes areas for air-conditioning plant rooms, ducts for mechanical ventilation, and is where wet areas of the public floors are located.



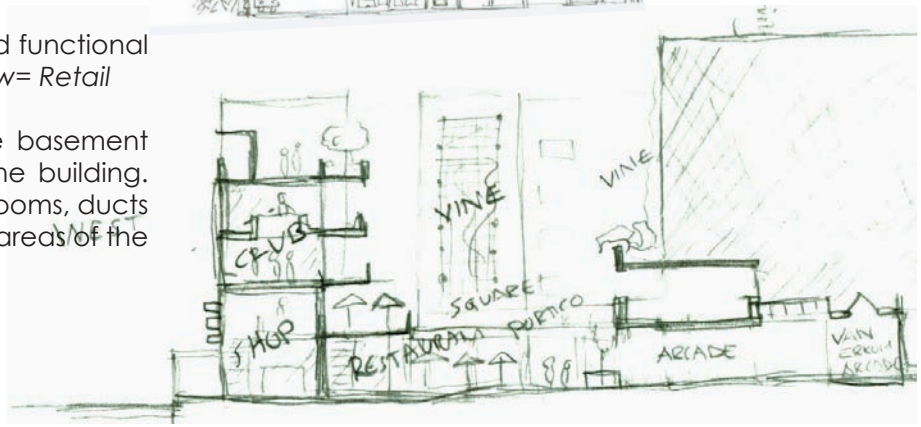


Figure 6-4 and 6-5 Conceptual Development of the Soft Interior

Assumption

The proposed building connects to the neighbouring FinPark building in many ways. The assumption was made that the owners of the Fin Park building would allow and support the proposed connections. This includes the arcade links, the connection at basement level, as well as potential shared use of the Fin Park loading zone. The concept of shared facilities does not have the support of the City Council, but is a proposal and an assumption for the purpose of the study. The resources and space saved by not duplicating a basement entrance and delivery zone makes it justifiable. The resultant increase in total rentable and usable area may well cover the rent payable to establish this.

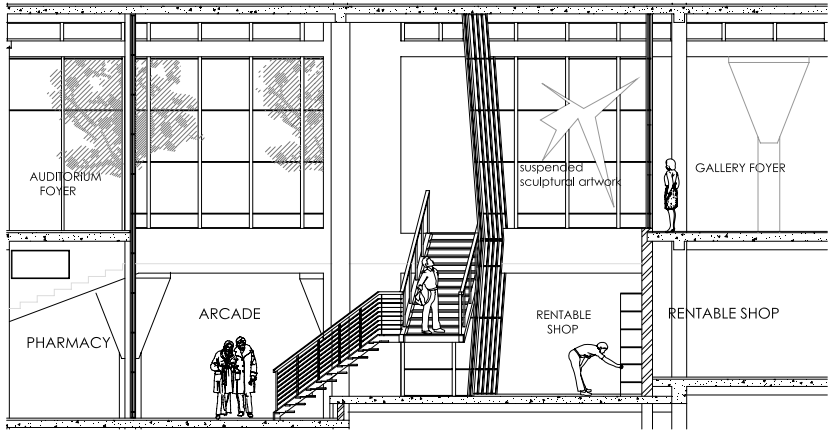


Figure 6-6 Section through arcade atrium

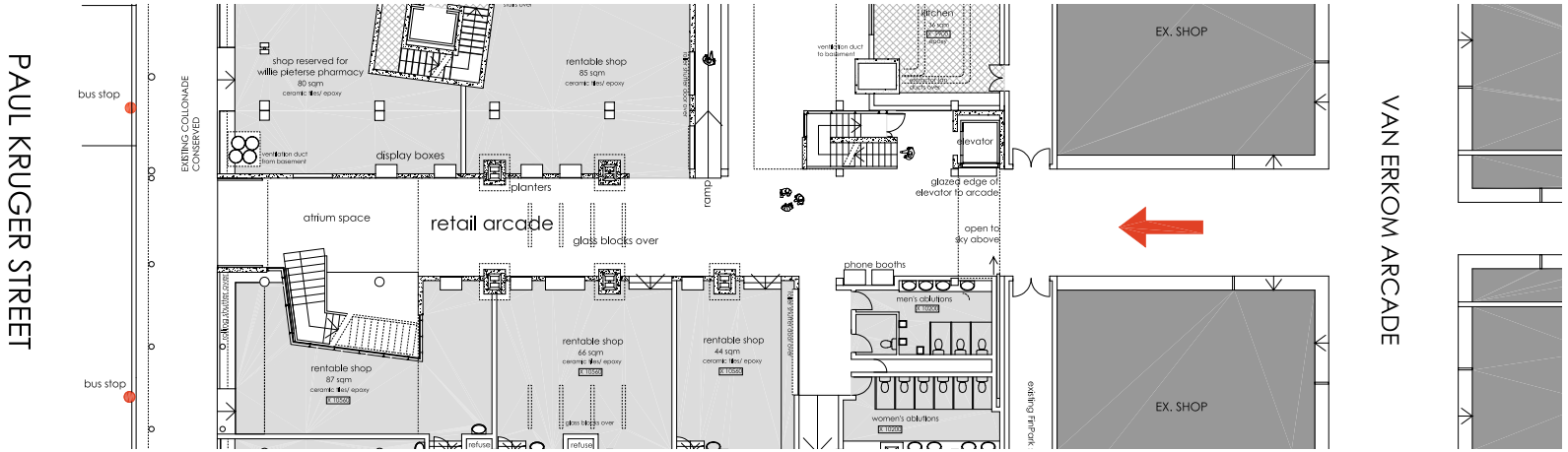


Figure 6-7 Arcade plan

Retail Arcade

A baseline requirement was set for approximate shops sizes of 100 square meters. The arcade creates more active edges and allows more shop fronts. The new arcade position was determined by the existing arcade layout. (See Fig 6-1). A visual link from the vertical circulation core of the FinPark Parking Garage to Paul Kruger Street is created. Passers-by in the Van Erkom arcade will see sections of the new arcade flooded with natural light, while other sections remain shadowed, so inviting exploration.

On entering the arcade from the Van Erkom side (Fig 6-7 Red arrow indicates entry), the ceiling opens to allow a glimpse of sky. Looking up into the void, the building edge above can be seen, with balconies protruding. A sky bridge will be

seen even higher up. A vine partially covers a timber trellis. The Western *Stairs and an Elevator* form the third border to the Arcade entrance, the elevator glazed to the arcade to make vertical circulation apparent, and to lead the eye upwards.

The arcade is edged by shops. Besides allowing access to Paul Kruger Street, the arcade offers four possible routes to explore the rest of the building. The Western Stairs and Elevator is one of these routes.

Past the elevator and stairs, a smaller arcade 'corridor' offers views to the elevated residential block supported on slender columns, as well as glimpses of a raised square. This relatively narrow link is open to the sky. A colonnade softens the Eastern edge. The Western edge is sculptural: A ramp rises over a pond, and the square steps gradually lower. Restaurant tables spill onto the paved surface to activate the space that has movement and linkage as its critical characteristics. The Ramp is the third route from the arcade. It links the Retail arcade to the residential and cultural square levels.

Shop fronts in the Retail Arcade are intentionally designed with minimally glazed surfaces. Products will be set in framed views in an off-shutter concrete wall. This proposed shop front design will suit certain products and shops better than others, but the decision was made because the arcade functions not only to link or sell, but also to act as 'foyer' for the Tshwane Art Gallery on first floor level…

The middle section of the arcade has a relatively low ceiling of 2,7 m. Limited natural light will fall through glass blocks set in the slab above. From the relatively small shop windows that frame their products, electric light shines, to highlight the products rather than the space. Planters for trees above are visible in the arcade. The large concrete shapes protrude into the arcade, as if guarding the space. All of this creates a

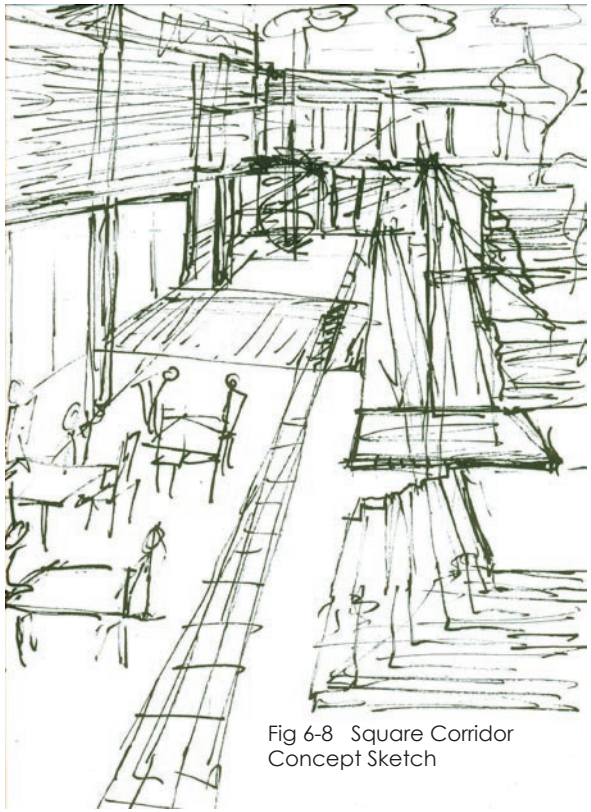


Fig 6-8 Square Corridor Concept Sketch

feeling of enclosure in the middle secion of the Arcade.

As Paul Kruger Street is neared, the arcade with low roof and introverted shop fronts suddenly explodes into a naturally lit double volume space. A steel staircase cuts back into a glass box that deforms from the blow. In the void above the double volume fully glazed shop a sculptural artwork is suspended with cables. (See Figure 6-6)

A conscious attempt was made to make the staircase as inviting as possible. From the arcade, trees can be spotted through a curtain-wall above. The stairs climb to an unobstructed opening, quick and easy to reach,

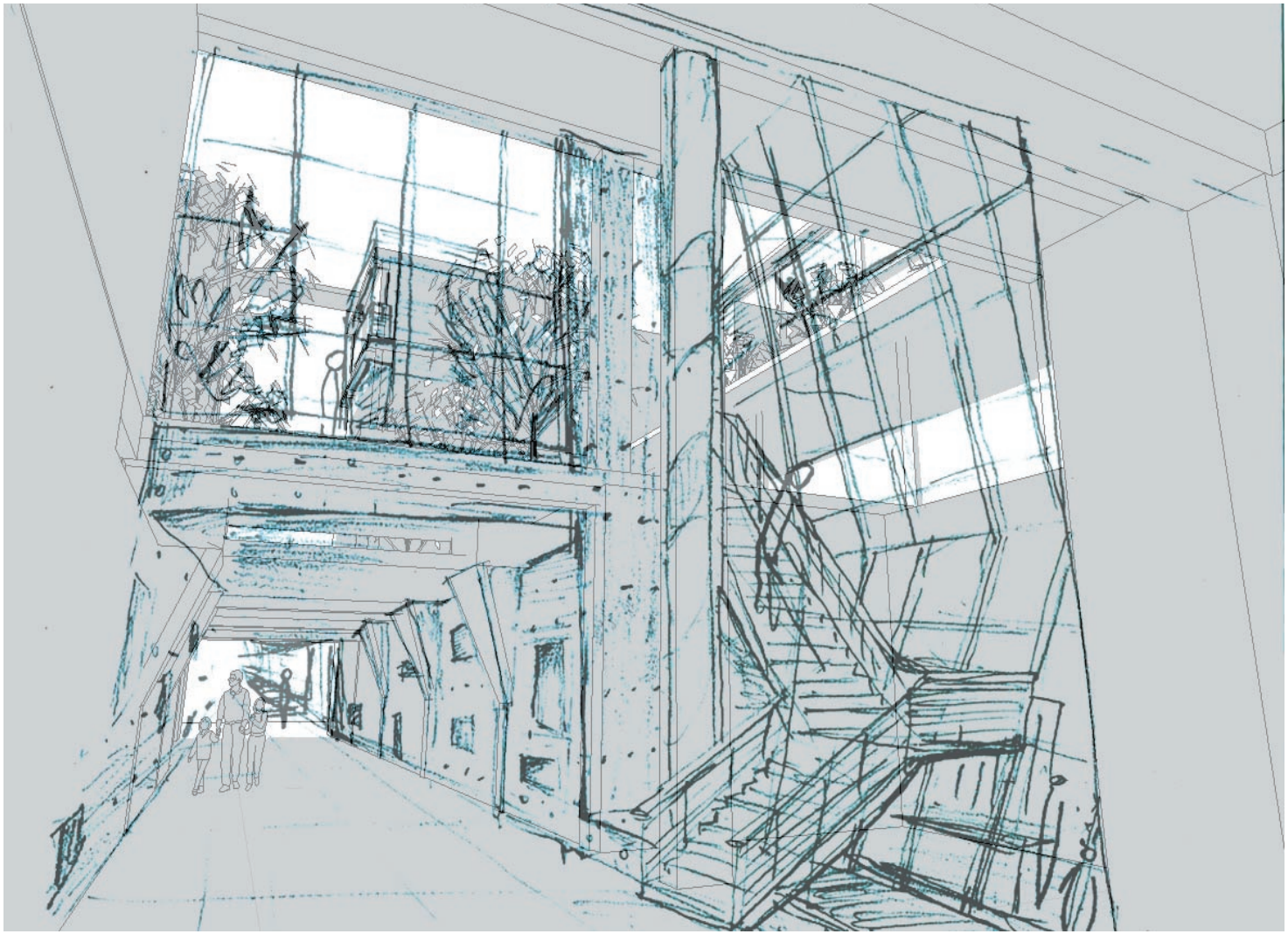


Figure 6-9 View to the elevated square on entering the retail arcade from the Paul Kuger Street sidewalk

and giving an opportunity to inspect the suspended artwork. Once on the stairs, a clear view into the gallery is gained, and more artworks are visible to invite the viewer in. For the first-time visitior, the concrete shapes in the middle section of the arcade will only be understood as planters when stepping into daylight, and onto the square

The Square

The multi-level elevated square is the heart of the building, dictating the layout of the surrounding building functions. The Tshwane Gallery, the gallery coffee shop, the Auditorium foyer, as well as Talking Beads are directly accessible from the highest level of the square, referred to as the cultural square. A lower level of the square gives access to the residential units.

Other than trees planted on the cultural square that offer shade, and possible sculptural artworks, the square is devoid of organizing elements. The square is envisioned as a place that allows for random happenings: Whether open-air art exhibitions, informal markets, government officials on their lunch break or ladies making crafts at Talking Beads utilize the square, the public space would be a city resource. The same can be said for the stairs, a potential meeting or resting place that may function as amfi-theatre for informal gatherings.

The densely spaced trees provide shade, and the surrounding building dampens the worst traffic noise. The gradually ascending staircase offers a seat to watch the activities around and on the square take place. The square will be a pleasant breathing space for the city.

Residential Component

Thrty-eight new flats will be made available in the Pretoria CBD. This includes two-bedroom units, single-bedroom units, and open plan bachelor units. The residential component requires natural lighting and ventilation. The building form is ideal for this purpose.

To avoid the traditional dark corridors often associated with city flats, circulation spaces for the residential spaces were considered as potential communal spaces.

To ensure privacy for flats on the level of communal spaces, the floor level of these flats were raised one metre above the communal space level. A one metre high balustrade wall, or placement of windows at least 900mm above floor level ensures visual privacy. The communal circulation space is placed on the inside of the residential units, allowing views to the square below. The same principle is used for stairways and open corridors. In this way passive observation of the square, as well as the communal space is established. The activities on the square form a backdrop for the flats. Life in the residential component offer the same to the square.

The individual flats were designed to allow ease of use and adaptability. Sliding and folding doors are used to allow edges to disappear and spaces to flow seamlessly into each other. Balconies are split with a folding door: When open the balcony is truly usable for social functions.

The balcony balustrade is an off-shutter concrete panel, decorated with mosaic work. Each individual flat, or floor will have a unique mosaic design. From the square the artwork will be visible, and individual flats can be distinguished.

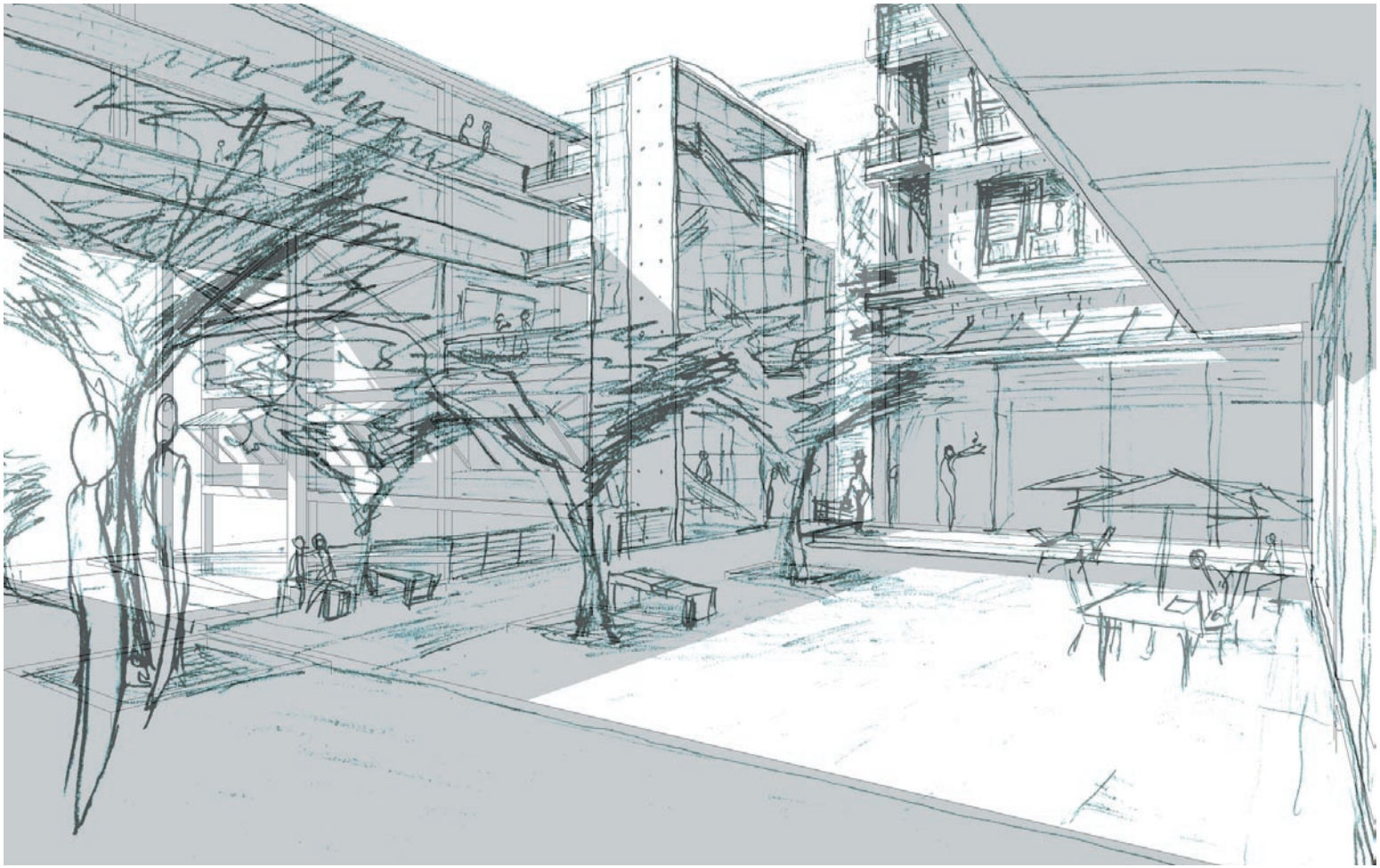


Figure 6-10 VIew on entering the cultural square from the arcade stairs

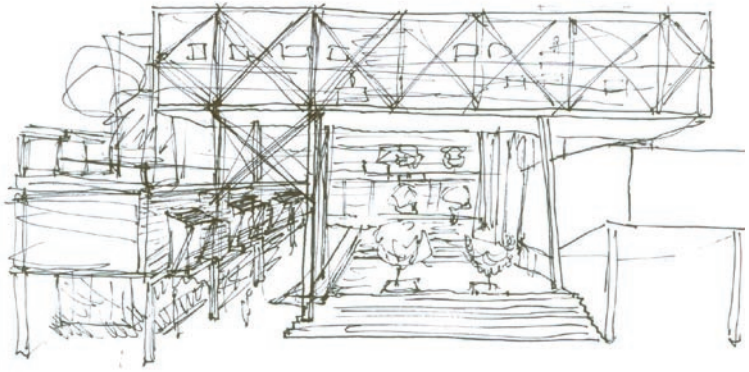


Figure 6-11 Concept Sketch of Multi-levelled Square

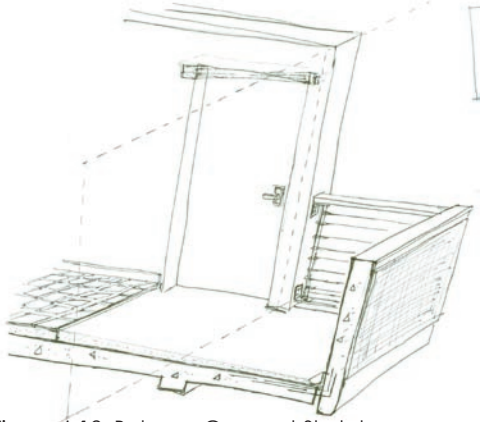


Figure 6-12 Balcony Concept Sketch

Architectural Expression

As with the relation of the square to the flats, city buildings form a backdrop to the activities of the people that occupy the city. With a central public square, as is the case in the design, this is truer than ever.
The material palette was kept small, as the edges of the building are there to give shape to the space. Materials are used honestly and functionally. Robustness of design was a baseline requirement, and influenced the choice of materials. See the technical report for a complete list of applied materials.

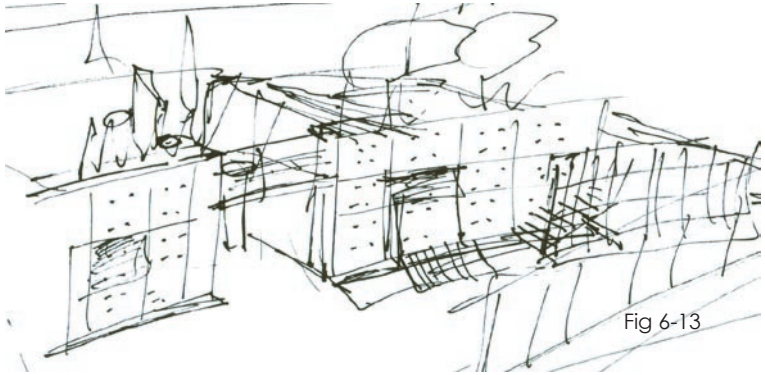


Fig 6-13

Gallery

The gallery's prime location in the CBD allows the perfect opportunity for arts education and public exposure to the South African Fine Arts. While all functions in the building are dependant on each other for their existence, and while all other functions are business orientated (including Talking Beads), the gallery focuses on education. The gallery would not be likely to exist on its own site in the CBD. The multi-functional nature of the building allows for it to exist here.

The gallery is entered from the square. The lobby is dominated by planters overhead that will be decorated, potentially with mosaic artworks, by local artists. The glazed Northern façade of the lobby retains contact with the square. The gallery is also visually connected to the arcade below, which keeps it in contact with the city floor, while being separated from it entirely. (See arcade section Fig 6-6). A walkway over the arcade space links to the Auditorium foyer, which can also become an exhibition space.

Adaptability was a critical design informant for the gallery. Exhibitions can easily expand or contract. The Western and Southern Galleries can join or operate separately. A 66 square meter storage space, easily accessible through the service elevator is available. Exhibitions can expand to the Auditorium foyer, or even onto the square. The client suggested the possibility of a commercial aspect to the gallery. Smaller galleries that can function separately, allow exhibition space to be rented out.

The Gallery Coffee Shop lives onto the square. This allows it to be a generator of income in its own right, while activating the square and still offering refreshment to gallery visitors. It can operate completely separately from the gallery, and so serves the Auditorium.

Lighting is a critical aspect to gallery exhibition. Artworks must be exhibited under consistent lighting levels. Natural light is present in all galleries in the design, but serves as an additional, indirect lighting source, used to lend character to individual galleries, while electric light is depended upon to ensure consistent lighting quality for the artworks. See the lighting section of the Technical report for more detail.

The interior exhibition spaces were designed with minimalism as intent. The walls, floors and roof form a space to view art in, and should not compete with the art on display. An off-shutter pigmented concrete finish is proposed for the interior. The walls will be white

pigmented, while shades of grey power-floated concrete make up the floor. The off-shutter concrete will retain a texture, to break the clinical appearance there-of, without influencing the way the artworks are viewed. The gallery ceiling is shaped to let light reflect downwards, and lightly coloured

It was envisioned early in the design process that the nature of the building would justify installation art. The opportunity was created for this in and around the building, to attempt to make the building a public artwork. Architecture is a functional public art. This may be made understandable through the incorporation of mosaics on off-shutter concrete, as on the planters and balconies. The retail arcade atrium space is sculptural. Visible from the square, the gallery foyer, the arcade, the shop below and the auditorium foyer, and artwork suspended above the shop will be visible from all angles. This space creates the opportunity for artwoks designed specifically for it. Changing the installation seasonally will encourage repeated visits.

Some contemporary South African Artists' work

Fig 6-14 Norman Catherine 's Negotiater 1991 Oil on cancas 90x150cm *(WILLIAMSON, 1996: 30)*

Fig 6-15 Rober Hodgins' Gallows Boy 1995 Oil on cancas 121.5 x 91cm *(WILLIAMSON, 1996: 36)*

Fig 6-16 Jane Alexander's Born Boys 1998 Sculpture *(CANTZ, 2002: 68)*

The Auditorium

The auditorium is available for audio-visual presentation, for use by the art gallery and Talking beads, and rentable for private use. The gallery coffee shop can be rented in conjunction with the auditorium.

Audio-visual presentation as a medium is prevalent in the contemporary art world. The auditorium could also specialize as an art movie house, or as a showcase for independent South African film. The auditorium is suitable as an entertainment venue.
The auction of artworks is another possible source of income for the gallery, for which the auditorium would serve perfectly.
The educational potential of the Auditorium in the city is vast and just as the square, could easily become a resource to the CBD.

The Auditorium form can be clearly distinguished from the exterior of the building. Rotated 7,5 degrees to the vertical on plan, the flat building edge is broken as the auditorium edge steps back, and then projects outwards to gain more presence on the street. In this way the building mass can also be understood as consisting of smaller parts.

Talking Beads Workshops and Offices

Talking Beads produces arts and crafts. The building requirements are minimal, as all activities, including the exhibition of crafts, the offices and workshops simply require *space*. The Western stairs and elevator celebrates, and effectively is the Talking Beads entrance, also giving access to the basement storage space. The public square is available to Talking Beads. Work and sales can spill onto the square, so displaying the goods on offer. An open working area on second floor level, above the square, gives more options to the craft makers and for exhibition of goods. The Talking Beads facilities can be made available for adult education during the evenings. The Talking Beads Market is where the interaction with the street occurs.

Talking Beads Market

Located under the Auditorium, the market is glazed to the street, the arcade and the square. The market celebrates the square entrance, and the first level of the elevated square with trees and benches will be visible. Aligning with the auditorium above, the market edge steps back from the otherwise consistent street edge, broadening the sidewalk and encouraging one to enter. (See Fig. 6-17) The colonnade is broken in front of the market. People can always be seen waiting for the bus on this section of the Paul Kruger Street sidewalk. Seven bus stops line the site. The market offers crafts while-u-wait.

The market activities will happen in clear view of the surroundings. The traditional idea of a market as a place of bargaining and activity determined its important position at the square entrance. Movement is possible through the market to the square, and the activities will surely extend onto the sidewalk and the square.

Tables, or booths in the market can be rented to independent and informal sellers of arts and crafts. The tables/display cases will have be lockable section for overnight storage.

Colonnade

The section of Paul Kruger Street where the site is located is unique in that it has a continuous covered colonnade.

Fig 6-17 View to the building from Paul Kruger Street

The section of colonnade in front of the existing Pharmacy building will be conserved as a memory of the existing, while a new concrete roof colonnade is introduced to maintain the continuous covered walkway. The colonnade is only broken in front of the market, to make the main square entrance more visible.

The colonnade roof at the the Retail Arcade entance Paul Kruger Street is at a higher level. The first floor slab is effectively extended over the street. This roof over the sidewalk is then understood as the roof of the shops, as it extends into the building. This blurs the sidewalk boundary, making the sidewalk part of the building, the building part of the sidewalk. The glazed edge allows passers-by glimpses of the elevated square.

The pharmacy colonnade is conserved specifically, because of the memory of the pharmacy that has been located here for many years. The shop behind this section of colonnade is also reserved for Willie Pieterse Pharmacy.

Figure 6-18 Sidewalk becoming interior space -Concept sketch

Basement

The new basement is reserved for private parking, supplying 42 parking spaces available to the flat residents (single parking space per flat), and 3 parking spaces each for the Gallery and Talking Beads. Extra parking can be rented from FinPark if required. The neighbouring 24 hour parking garage is a resource allowing easy vehicular access to the building.

The basement is accessed through the 24-hour FinPark Parking Garage Basement. Access to the FinPark basement is controlled, gained with a swipe card. The same system will be used to secure access from the FinPark basement to the new basement. Talking Beads and Gallery storage, as well as lockers for flat residents are also located in the basement.

Future Development

As Paul Kruger Street develops as an important axis for Pretoria, the density will increase. The city block will undoubtedly be under development pressure. It is proposed that the following guidelines are imposed on new developments on the city block north of the site:

- The Savelkoul and Fatti's buldings must be conserved and maintained.
- The Afrik House building façade must be conserved - Any new development on the site must integrate the Afrik House façade in such a manner that it is celebrated and remains discernible from the new development.
- Arcade link to Van Erkom arcade must be established, preferably through the current Afrik House site.

- Any new building facing the proposed Cultural square must have an active edge to the square e.g. shops, restaurants, building entrance, vertical circulation, extension of the square, etc.
- Any new building facing the cultural square must be stepped so as to maintain winter solar incidence for the Northern Flats.

Proposed Building functions:
A multifunctional development would be considered ideal.
Retail on ground floor critical, preferably linked to the existing arcade system
Restaurants and entertainment venues on first and ground floors
Offices on higher floors
Residential units on higher floors

Figure 6-19 Future Development
- Proposed Building Groundfloor in red. Buldings to be demolshed in dashed line, Red arrows indicate links

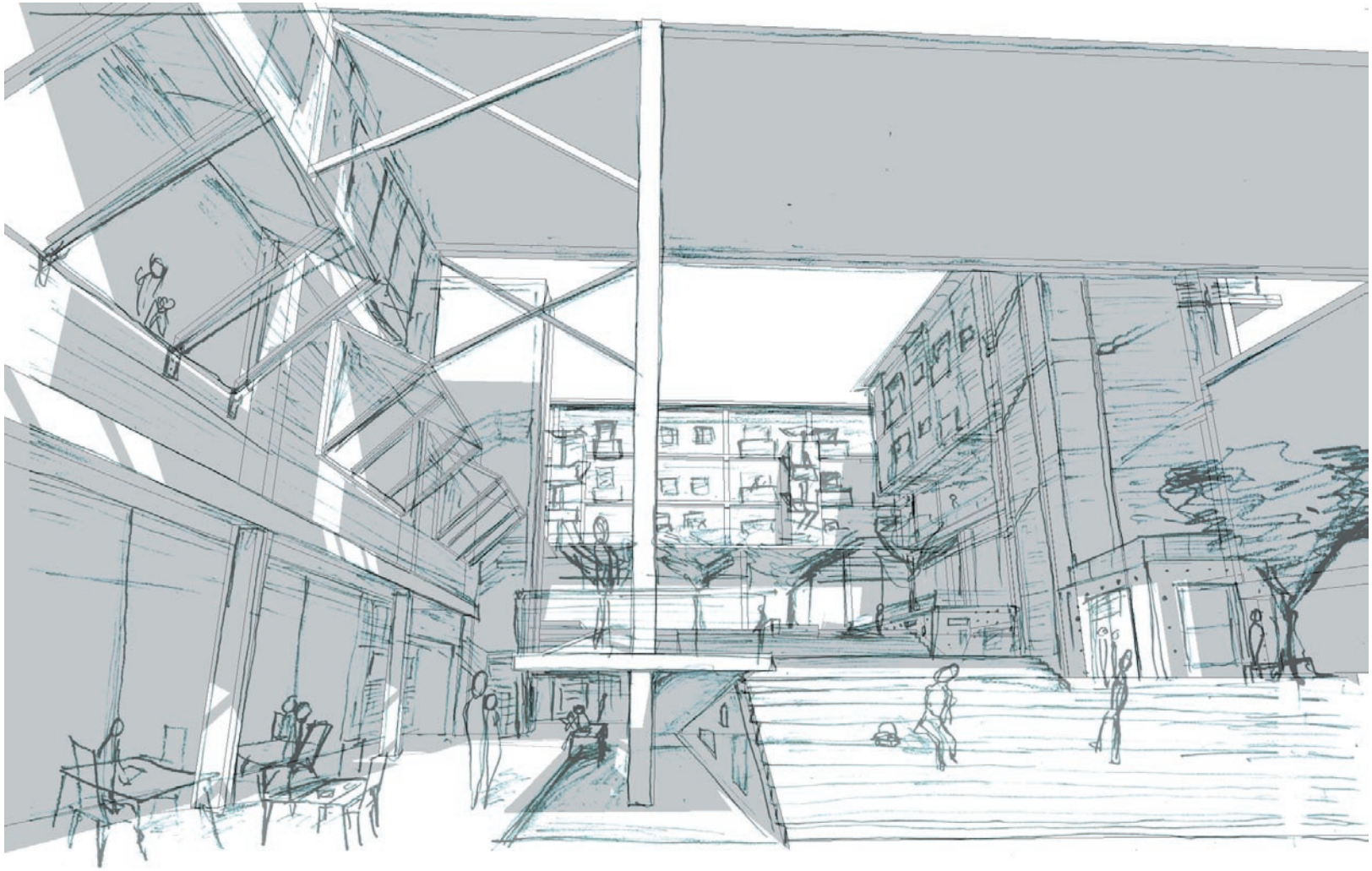
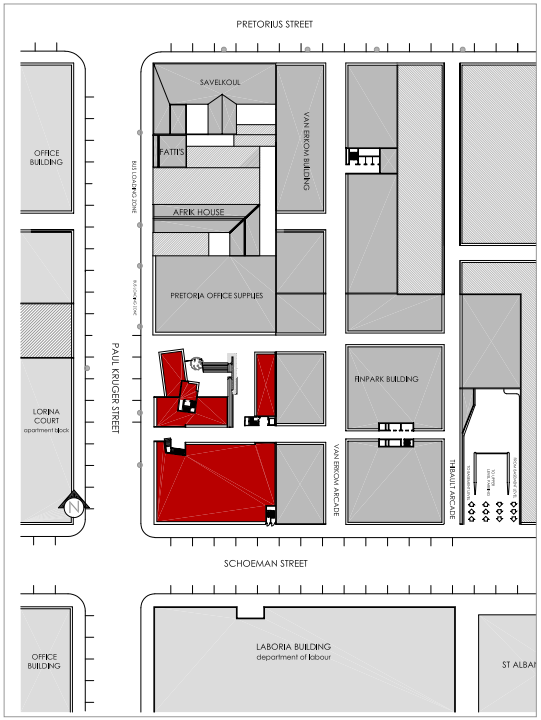
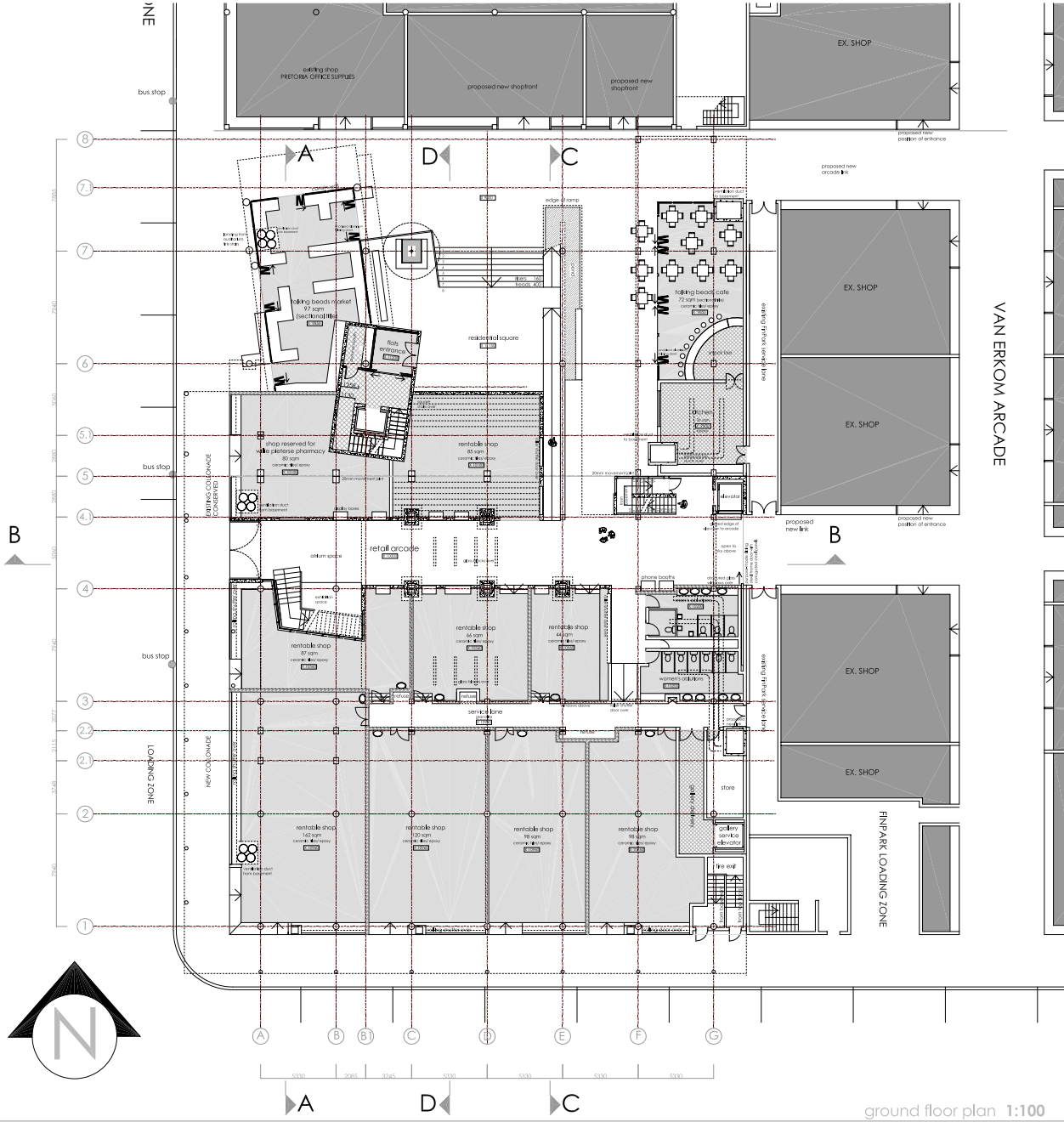


Figure 6-20 View to the square

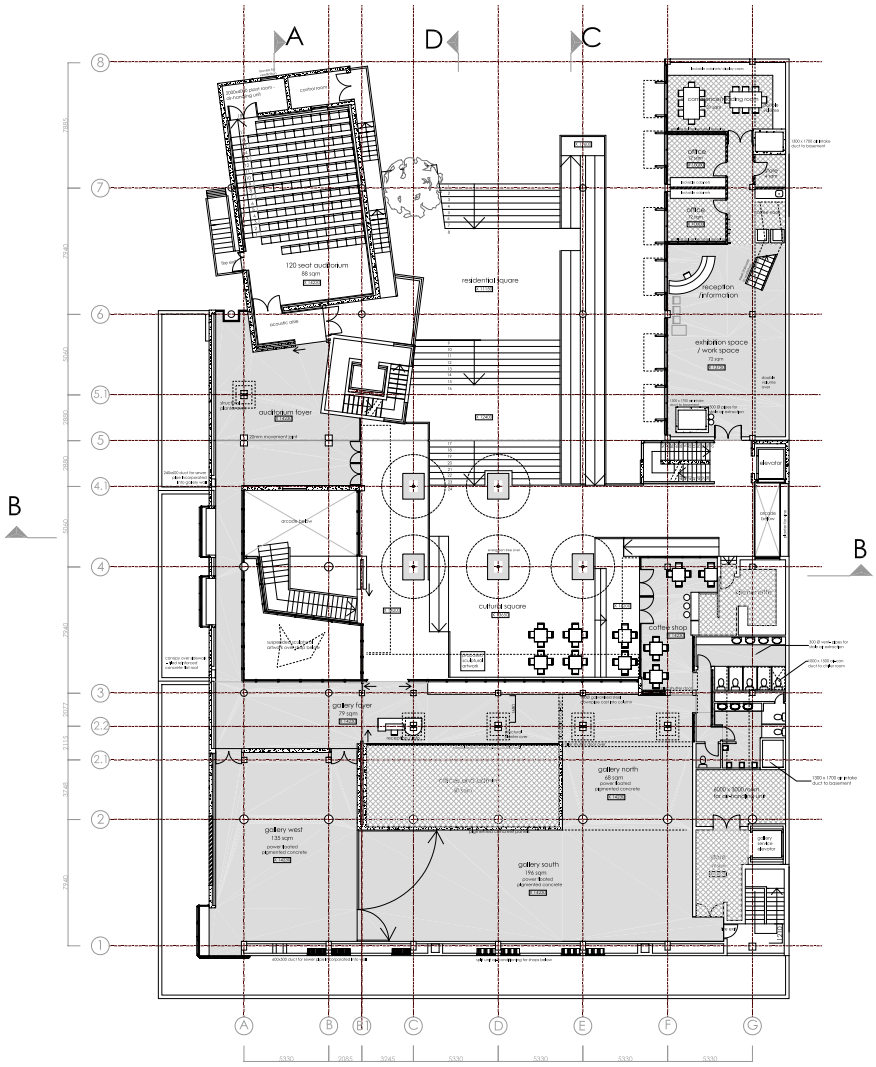


site plan **1:500**

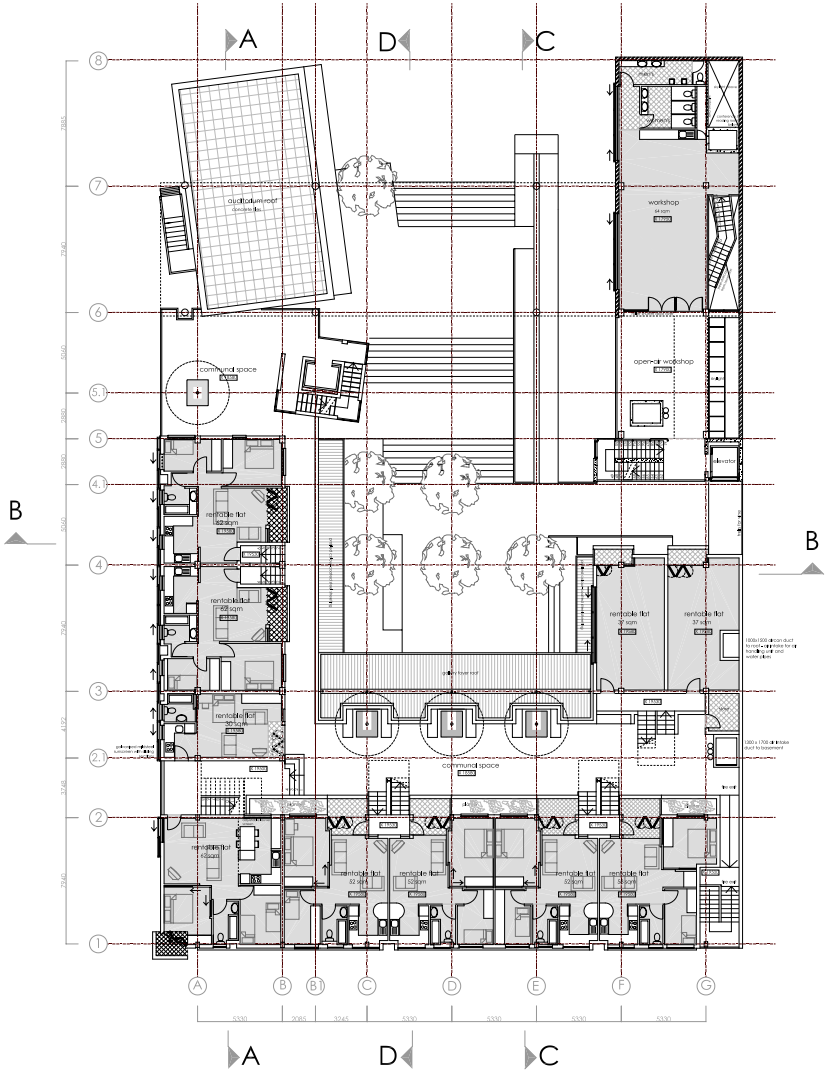


ground floor plan **1:100**

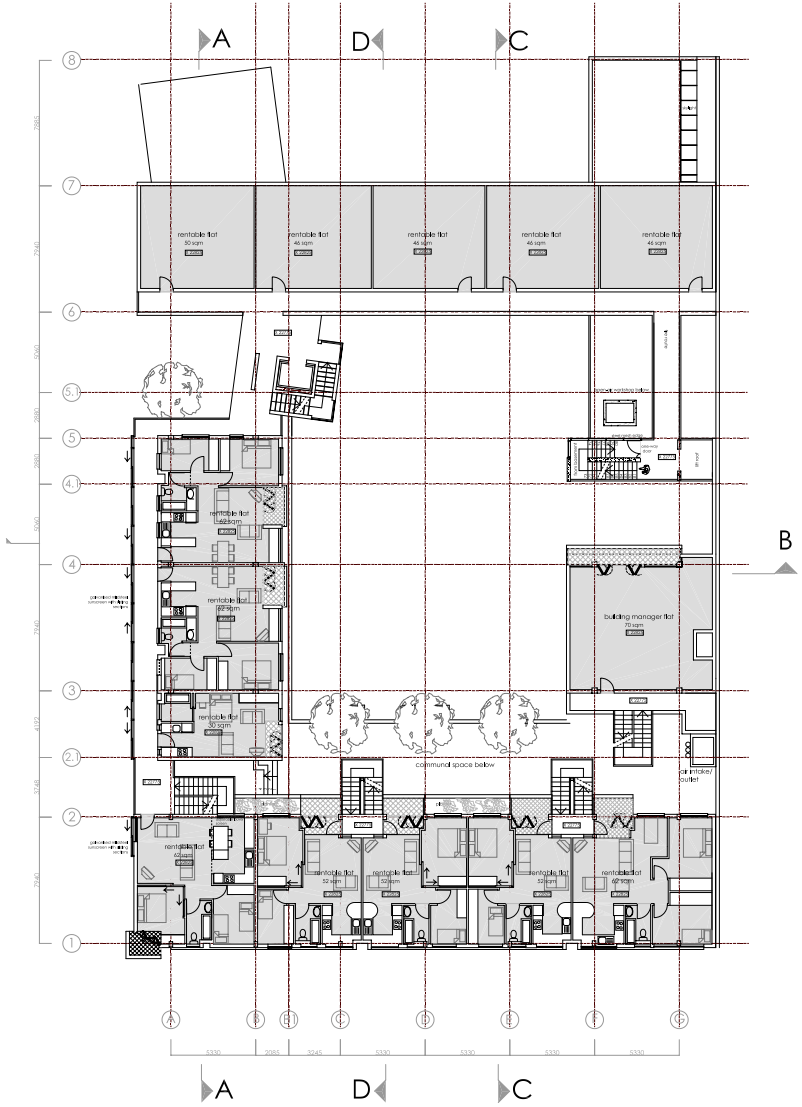
city building
PAUL KRUGER STREET MULTI-FUNCTIONAL BUILDING



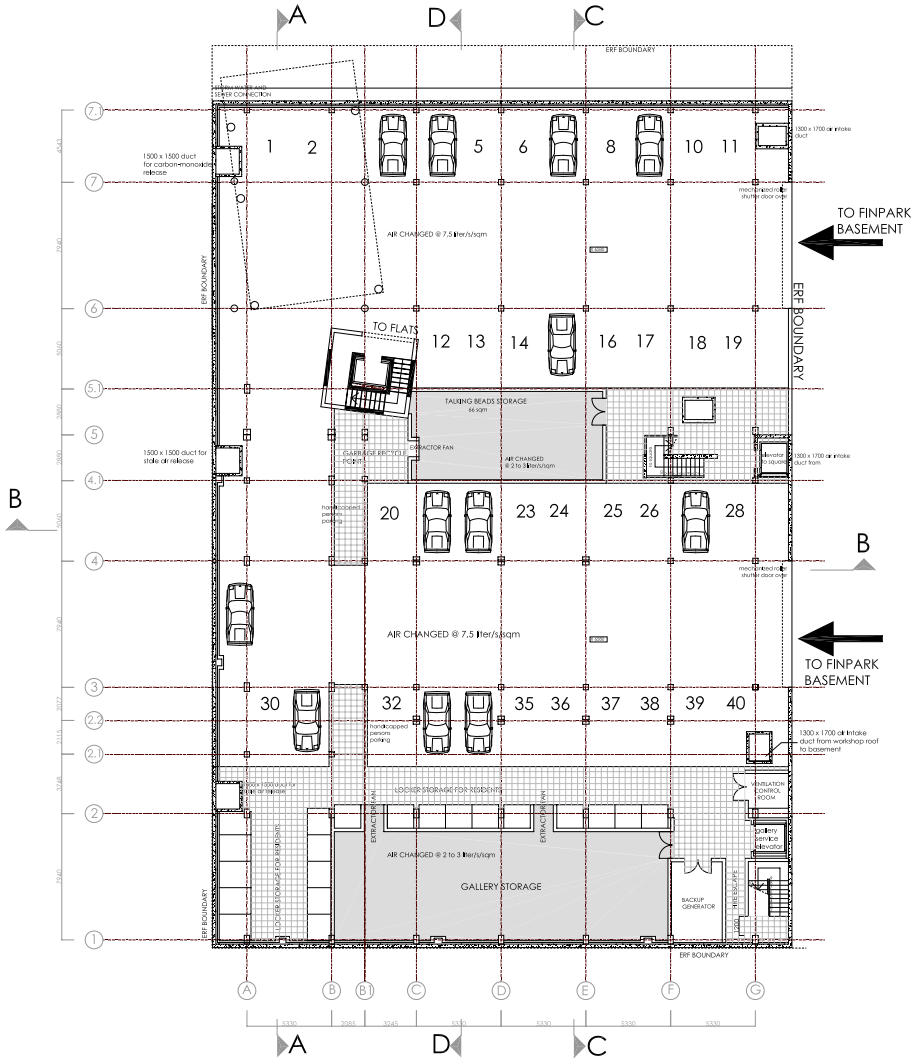
first floor plan 1:100



second floor plan 1:100



third and fourth floor plan **1:100**



basement plan **1:100**

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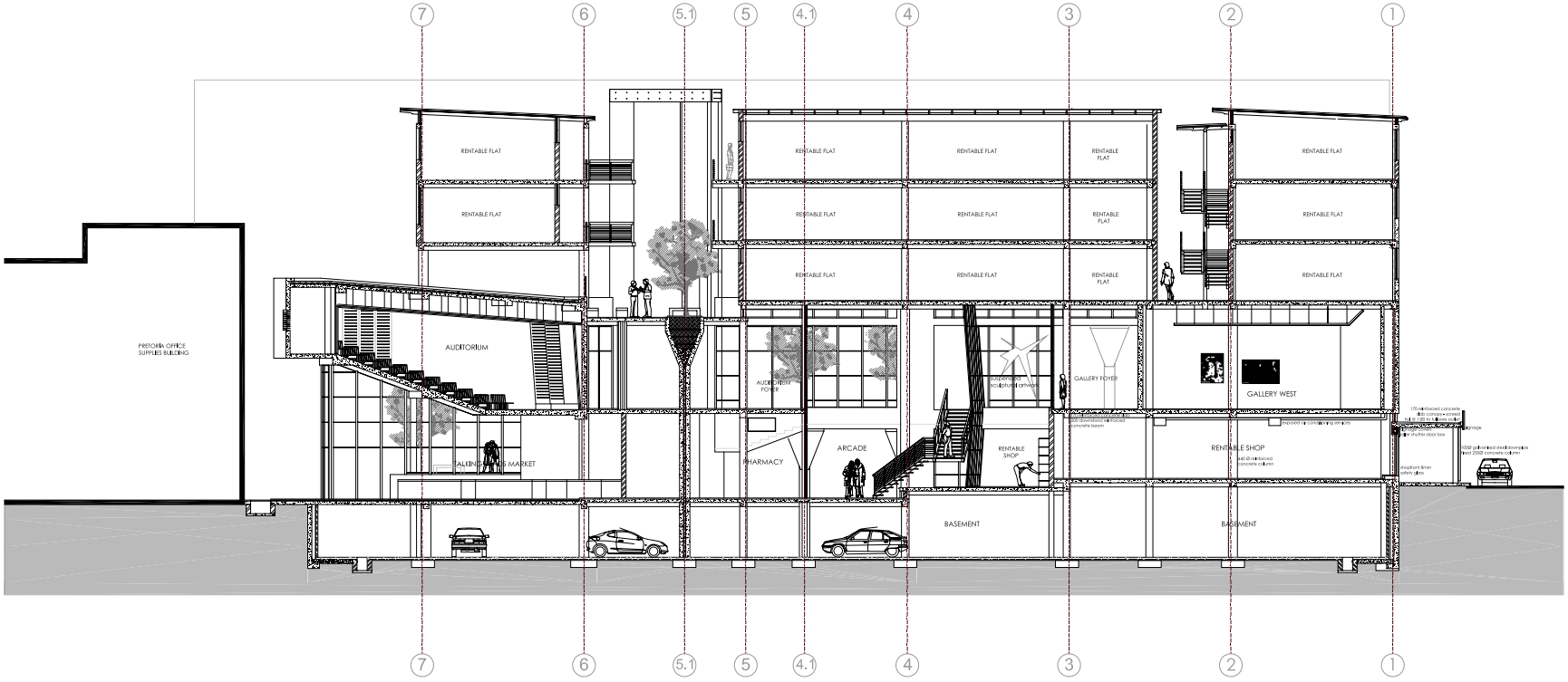

city building

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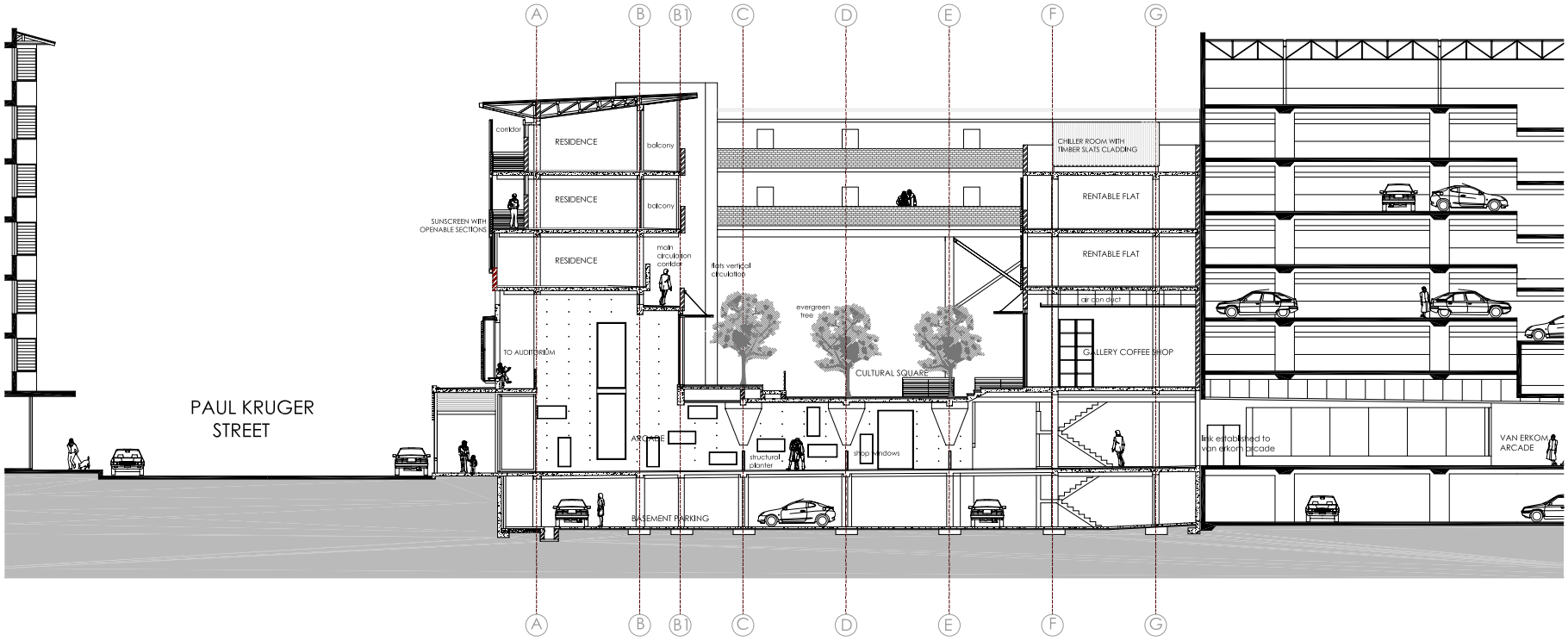
section aa **1:100**



city building

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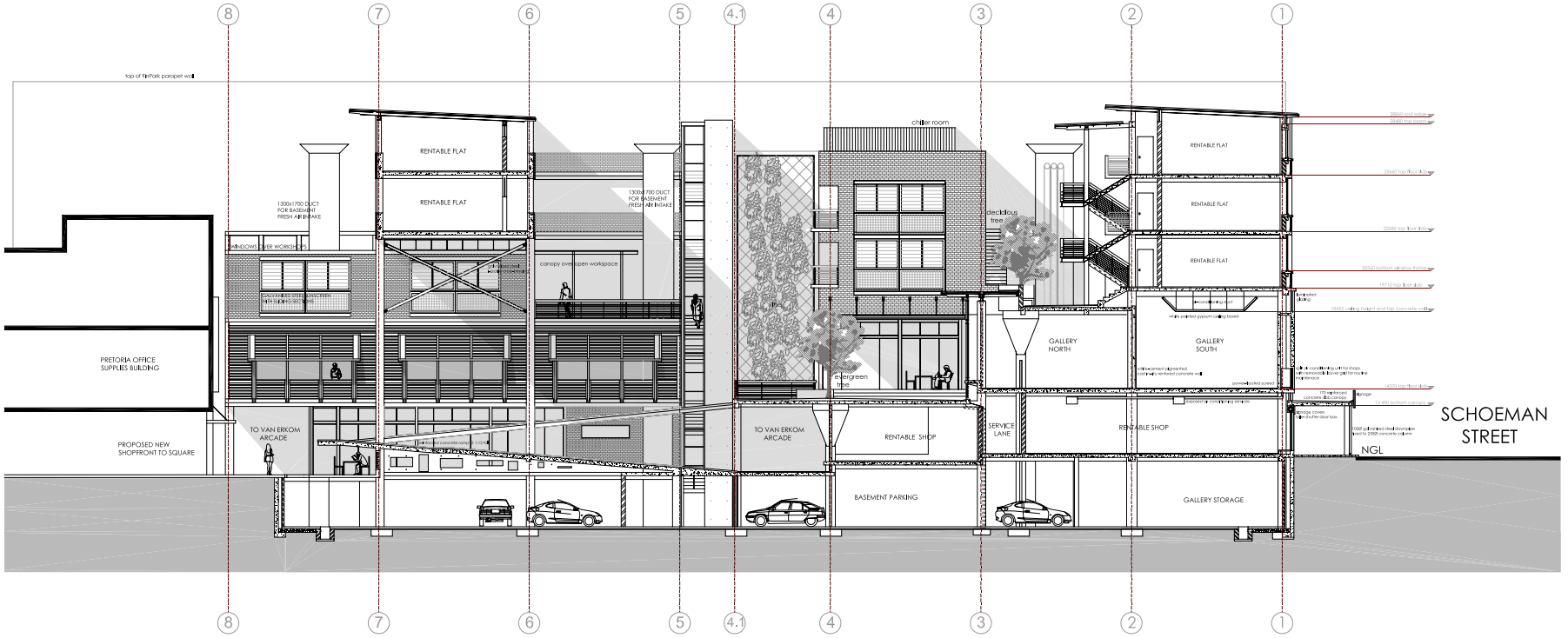
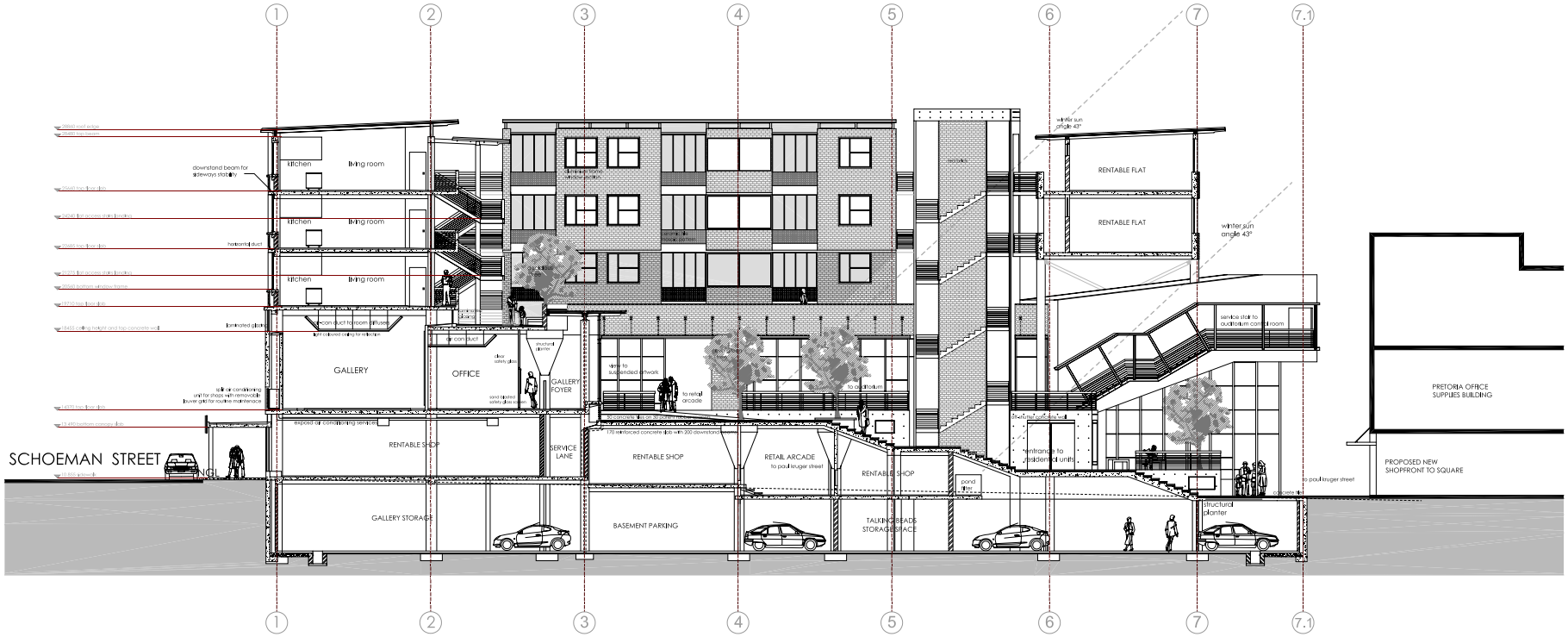
section bb **1:100**



city building

PAUL KRUGER STREET MULTI-FUNCTIONAL BUILDING

section cc **1:100**



city building

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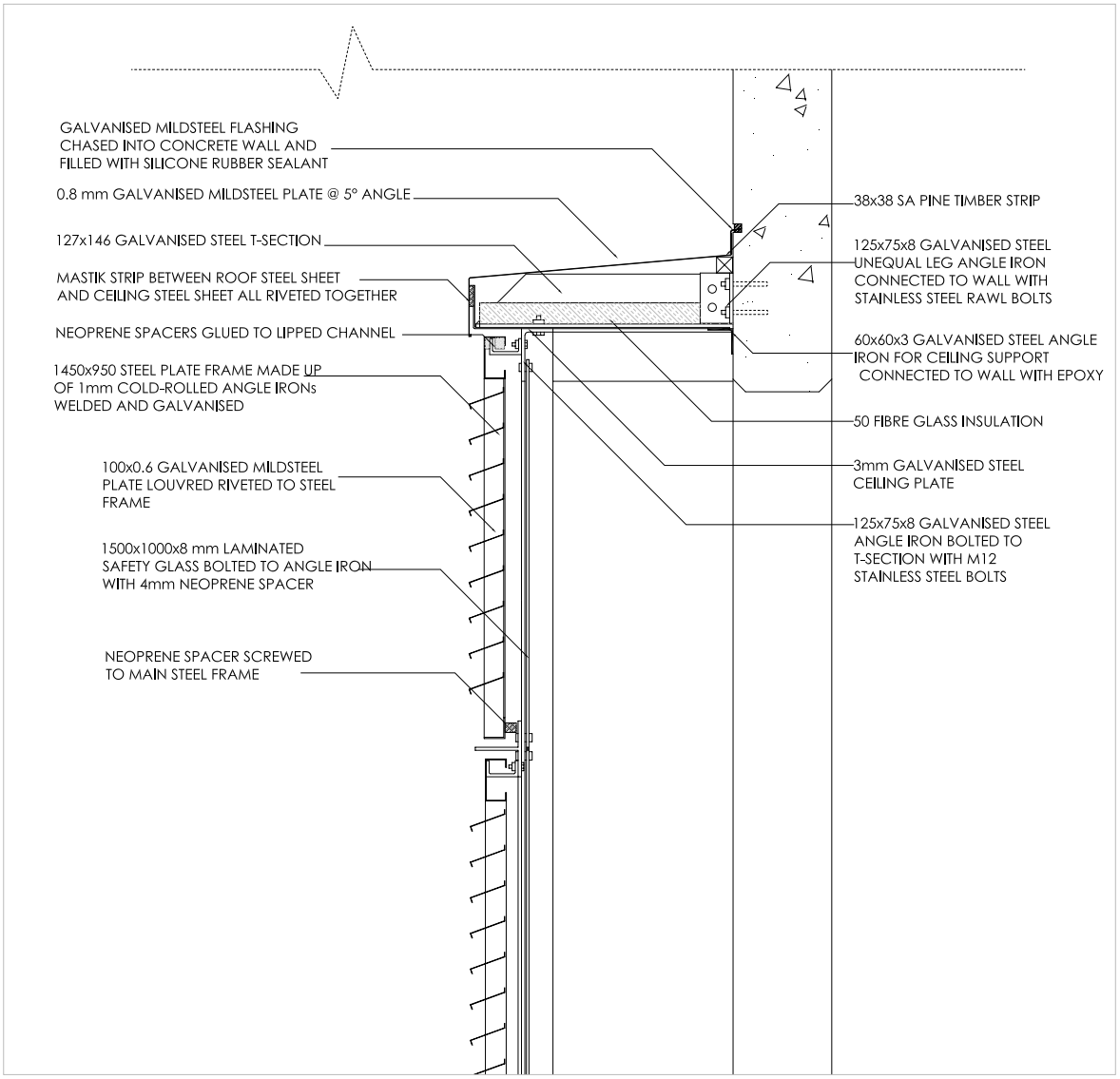
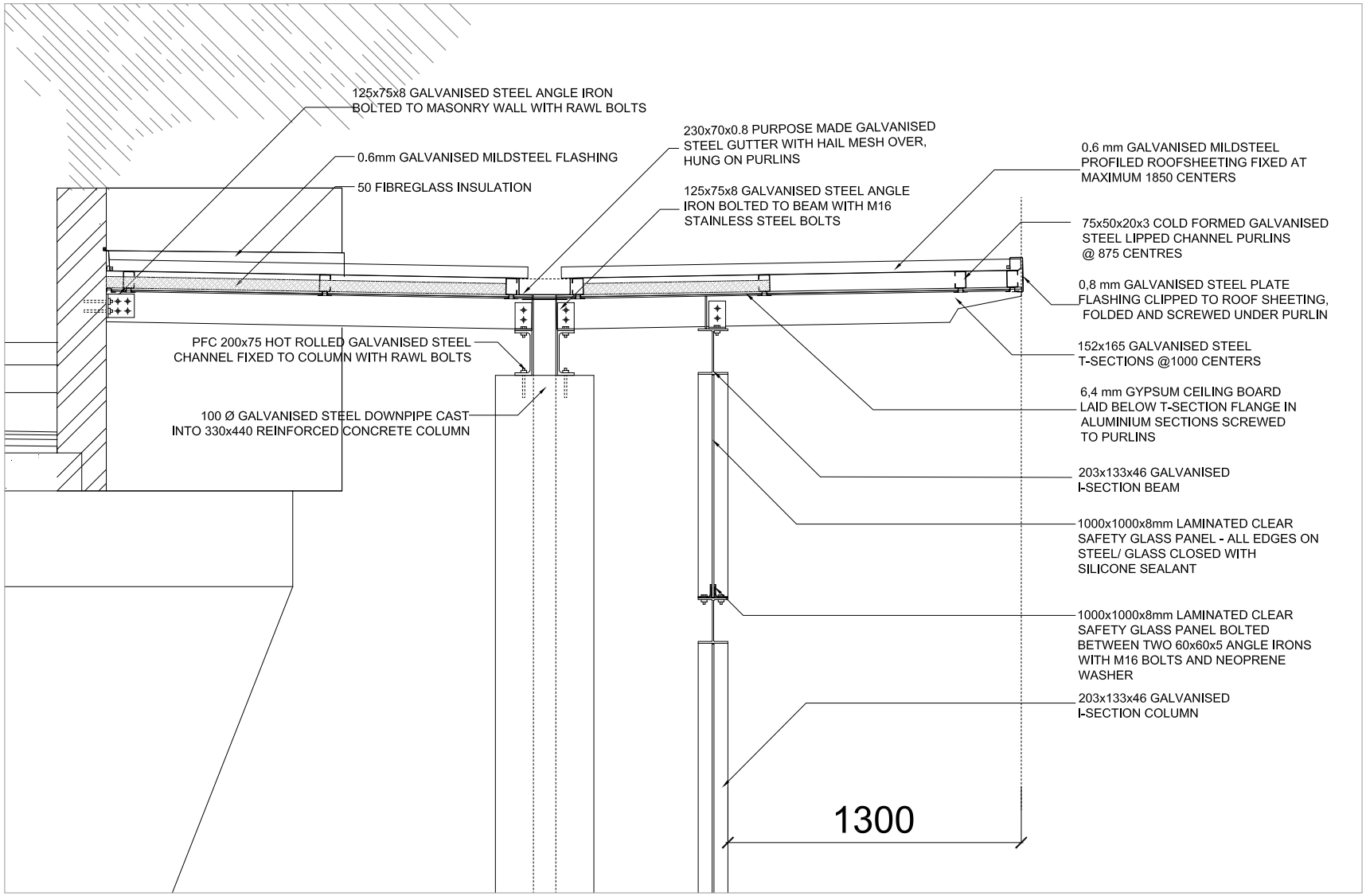
section dd **1:100**



city building

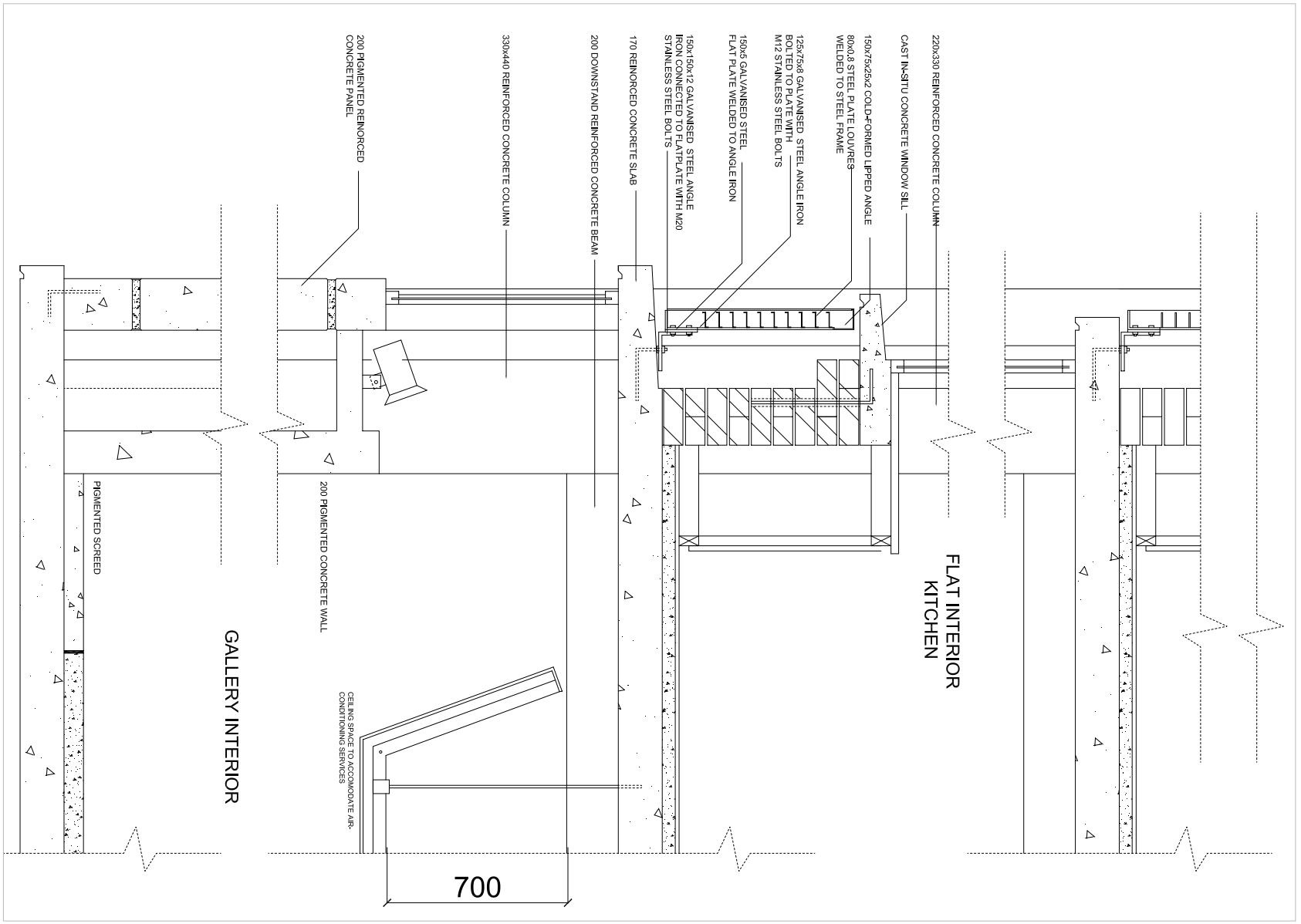
PAUL KRUGER STREET MULTI-FUNCTIONAL BUILDING

detail 1 gallery box **1:10**



city building
PAUL KRUGER STREET MULTI-FUNCTIONAL BUILDING

detail 2 gallery roof edge 1:10



detail 3 louver screen southern facade 1:10

city building

PAUL KRUGER STREET MULTI-FUNCTIONAL BUILDING

Site Conditions

The site falls 1,2m in a Northerly direction over its 55 m length. of the site . A new storm water and sewer connection will be required on Paul Kruger Street at the North-Westerly corner of the site, which is the lowest point of Natural Ground Level. A water and electricity connection will be required at the opposite South Eastern corner of the site on Schoeman Street.

The soil and ground water conditions are unknown, and tests are currently impossible as the site is built up. Very few building plans are available from the City Council for buildings on the site itself. Normal soil conditions were reasonably assumed, through a study of neighbouring building plans that were available from the City Council. The FinPark and Van Erkom building sections show concrete footings. The Lewis building (on the site) on c/o Schoeman and Paul Kruger Street on the site has an existing basement level, but detail on the type of basement could not be acquired. It was thus assumed that no trouble soil is present, and that basement construction is viable.

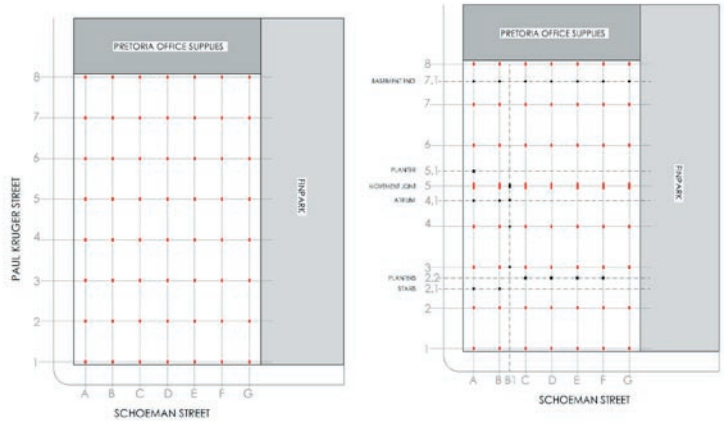


Fig 8-1 Column grid: Base grid and addtions

Superstructure

A reinforced concrete post and beam structure was chosen as the most suitable for the Super-structure of the building. The speed of steel construction and the smaller workforce required compared to concrete frame construction makes structural steel an attractive option, but with a building height of 18 m, as in this case, fire regulations prohibit the use of unprotected structural steel: Special treatment of structural members, e.g. cladding the steel in concrete (!) or vermiculite is required for structures higher than 15m (*SABS, 1990:170*). This increases the price margin between steel and concrete (with steel construction already approximately 10 to 15% more expensive) and makes steel financially unfeasible.

The South African Building Industry is geared towards concrete frame construction, and a tradition of concrete construction exists. A concrete structure has the added advantage of providing building mass that acts as a solar heat store, providing an ideal thermal lag effect. Despite the intensive use of shuttering associated with concrete, steel shuttering can be re-used for other projects.

Reinforced concrete further more has lower embodied energy than steel. This is based on information from Bjorn Berge's Ecology of Building Materials. 100% recycled steel receives a Primary Energy Consumption Value of 10, compared structural concrete that receives a value of 1. *(BERGE, 2003: 20)* Albeit measured by European standards, this was assumed to be relatable to the South African context.

Basement parking, the existing city grid and the set baseline requirement of street edge definition for Paul Kruger and Schoeman Streets determined a rational grid.

330x440 reinforced concrete columns set at 7,9m x 5,33 m centres form the base grid. The column size remains consistent through basement, ground and first floor levels, after which 220x330 suffice for the top 3 residential floors. Spatial needs and architectural elements such as the double volume atrium, level changes and tree planters create secondary grid lines.

To account for thermal contraction and expansion the building is separated from neighbouring FinPark Building with a 50mm movement joint filled with polystyrene sheets. A 20 mm movement joint is incorporated within the building on grid line 5.

A 200 mm steel reinforced concrete slab spans 5m between 200mm downstand beams. The beams span 7,8m between columns on the North-South axis. Lateral stability is ensured by 200m downstand beams in the short 5,33m East-West axis. Where used, these lateral stability beams are incorporated only on South facing facades to maximize Northern light entry into rooms, with windows taken to ceiling height. Slab cantilevers are limited to 2m, strengthened through 200mm downstand beams.

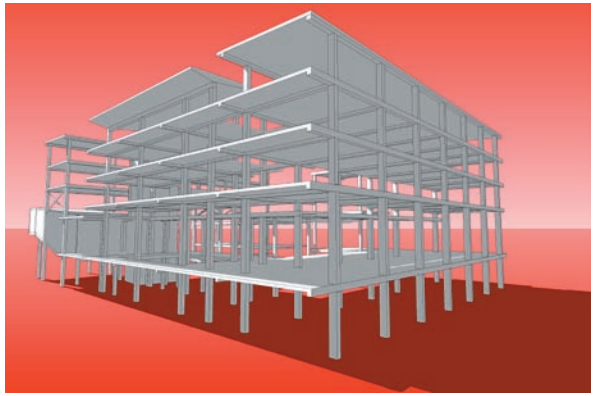


Fig 8-2 Reinforced concrete Post and Beam Structure

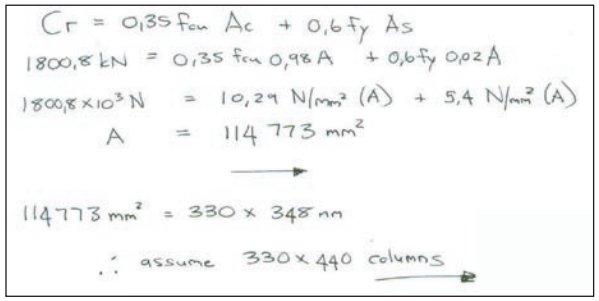


Fig 8-3 Structural Calculation for column size - See Appendix D for complete calculations

The Basement

The basement will extend up to the building line on the Southern and Western edges. Because excavation can not take place over the building line and to keep the pavement untouched and usable for the period of construction, piles will be required to stabilize the soil, after which excavation of the basement can take place.
The outer wall of the basement works with a Drained system: a cavity wall ensures that damp stays well out of the basement. Water is pumped to the stormwater connection. The cavity was made 200mm wide, to allow sewer and rainwater pipes from the building above to turn in the space. The design of the foundations and retaining wall be administered by a structural engineer according to SABS 0161 after soil tests have been completed.

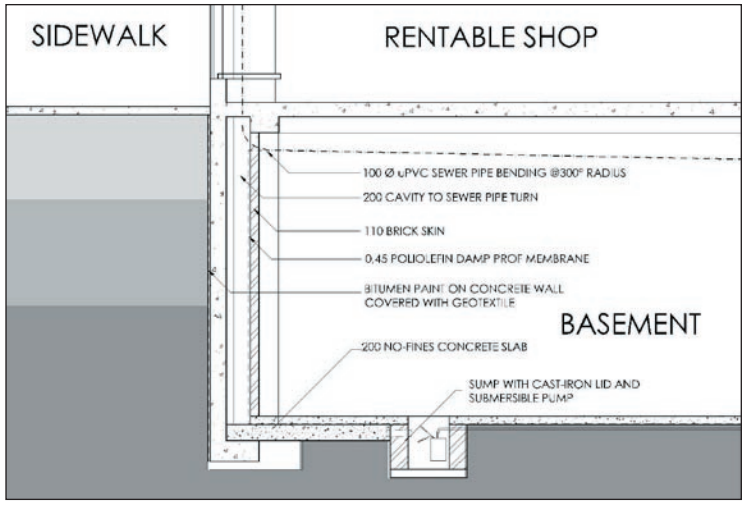


Fig 8-4 Section through basement edge - Informed by Drained system detail in *(WEGELIN, 2000: 26)*

Material Palette

Red brick masonry work

Pretoria has a redbrick aesthetic, and in the CBD numerous red brick buildings can be seen, including neighbouring Laboria building on the Southern corner of Schoeman and Paul Kruger Streets (see Fig 7-7), the Old Raadsaal and various other historic buildings on Church Square.

Red Brick masonry is a good absorber of heat. Structural brickwork has a density of 2500 kg/m3, the same as reinforced concrete, while non-structural brickwork has a density of 2000 kg/m3. *(Smit, 2000)* The matte finish of brick and the darker, typically ruby colour there-of increases the material's heat absorption capacity.

Fair-face Concrete formwork

Fair-face Concrete is a contemporary building aesthetic. Through the use of pigments colour variations can be implemented where required. The cost of adding pigments to the concrete mix can be justified through the robustness of the product compared to plaster and paint. Steven Holl uses white and grey pigments to great effect in the Fukuoka housing scheme (see fig 7-5). Pigmented concrete will specifically be used for interior spaces. In the gallery lighter shades can be used for the wall exhibit, while darker shades can be used to demarcate zones on the floor.

Reinforced concrete formwork, with its high density of 2500kg/m3, is ideal for use on the Western façade: Solar heat is absorbed and released into the building at night. An off-shutter finish will increase absorption.

Glass or Ceramic Mosaic Tiling

Talking Beads manufactures hand-made Arts and Crafts, and so the artists are available to design and implement mosaic artworks. Mosaic tiles can be used to distinguish elements and mark important places as required. The artworks can be splashed onto the robust concrete elements in subtle or generous degrees. Colourful mosaic on brute concrete is a contempor ary South African architectural aesthetic, as can be seen in the Constitutional Court design by OMM Design Workshop and Urban Solutions (see Precedent Study), as well as in the design of bollards and seating at the recently completed DTI Campus by Studio 3 (fig 7-8).
Ceramic tiles will also be used selectively on the public square, as well as for interior tiling in the residential component.

Galvanised Steel Elements

Galvanised mild steel is used to construct lighter elements that clip on to the main concrete structure. Stairways, louver systems, glazing support systems and roof elements create a consistent aesthetic, while different grains of roughness can be used to define different places, as is the case in the Department of Trade and Industry Campus in Sunnyside. (fig7-9 to 7-10) Steven Holl clips lighter steel elements to the main structure at the Fukoaka housing scheme (fig 7-6) to celebrate the element.

Glass

Windows allow light to enter spaces. It can be opened to ventilate and cool. Clear glass will be shaded and used in most instances. Safety glass is used as required by building safety regulations. 8mm laminated glass without opening sections is used for acoustic purposes in the gallery.

Miscellaneous

Timber is used selectively in interior applications for balustrade detailing and movable panels in the gallery. Anodised aluminium sections are selectively used for window frames and ceiling systems.

Fig 8-5 Pigmented concrete by Steven Holl - Fukuoka Housing *(ASSENSIO, 2000: 295)*

Fig 8-6 Steel stariway clipped to main concrete structue: Steven Holl *(ASSENSIO, 2003: 296)*

Fig 8-7 View to redbrick Laboria building looking west down Schoeman Street *(Author, 2004)*

Fig 8-8 Mosaic on bollard detail at DTI Campus Sunnyside by Studio 3

Fig 8-9 Galvanised Steel Panel for solar control on Eastern Facade at DTI Campus by Studio 3

Fig 8-10 Detail of galvanised steel louver shading system at DTI Campus,Sunnyside by Studio3

Flats

The residential units are naturally ventilated. The 8,5m deep flats have at least two outer edges with openable windows or louver systems that can be controlled by occupants to allow cross-ventilation.

Talking Beads

The Talking Beads workshops and offices are naturally ventilated with openable window sections to the West and hot air release at roof level in the East. The Workshops and offices may be air-conditioned with split air-conditioning units if so required. A single unit can cool a total floor area of 120 sqm. The unit(s) can be accommodated on the accessible roof used as an open-air workshop by Talking Beads. This will make routine maintenance an easy process.

Gallery And Auditorium

A Multi-zone, variable air volume air-conditioning system is proposed. A central chilled water plant room is located on the roof of the Western residential unit block. Cold water pipes from the Chiller Room are ducted to air-handling units. *(KÖHLER, 2004)* One air-handling unit is used for the gallery level (18sqm room) serving the Gallery offices and exhibition galleries, and another air-handling unit for the auditorium (8 sqm room).

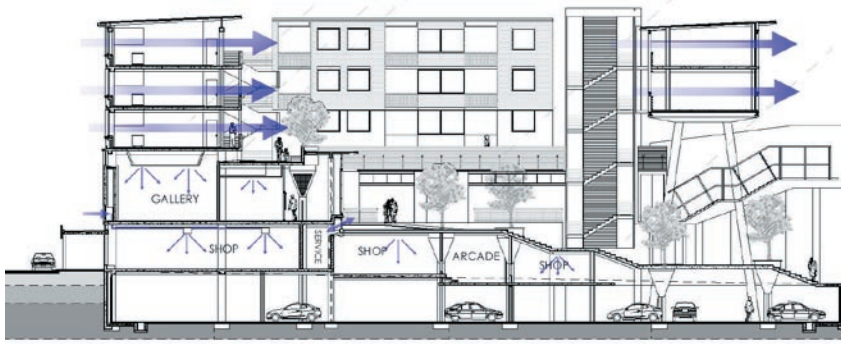


Fig 8-11 Natural ventilation for flats and air-con ducts for gallery and shops

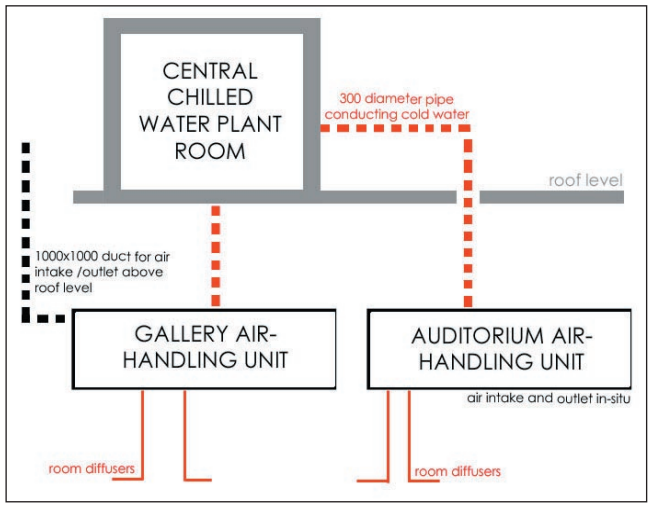


Fig 8-12 Air-conditioning layout diagram

The gallery air-handling-unit room has no outside wall, and a 1000x1000 shaft connects it to the roof for air outlet and intake. The auditorium air-handling unit room has an outer wall through which air can be changed. From the air-handling units air is ducted to room diffusers, for which the required ceiling space of 700mm *(KÖHLER, 2004)* was allowed.

Retail

Shops are air-conditioned with single-zone split units that serve up 120 sqm of floor space. An indoor evaporator unit is connected to outside condensing units through refrigerant piping. *(KÖHLER, 2004)* Condensing units are accommodated in the gallery outer wall, covered with a removable louver screen for routine maintenance See solar control section for information on screens.

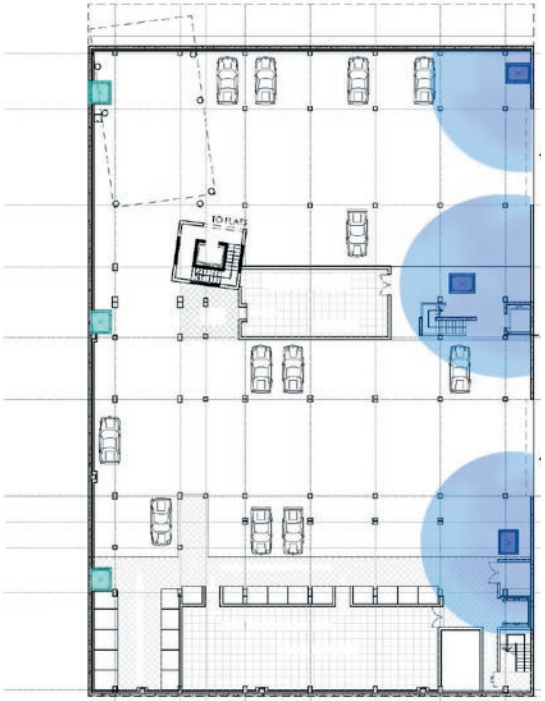


Fig 8-13 Mechanical Basement ventilation
Blue blocks = intake Cyan blocks = oultet

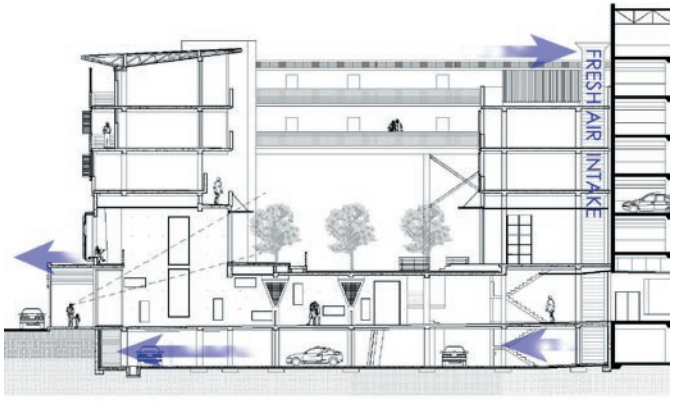


Fig 8-14 Stale air released above street canopy

Kitchens And Bathrooms

Stale air is extracted with extractor fans through 300 diameter pipes to above the residential roof level.

Basement

The basement is mechanically ventilated with a supply and extract system. Air is changed at 7,5 l/s per sqm. *(Köhler, 2004)* No fresh air can be drawn from the entrance of the basement as is the standard procedure, as this would affect the existing ventilation system of the FinPark basement.

The multilevel square allows for air to enter the basement, specifically under the pedestrian ramp. Air also enters the basement through the central stairwell. A ventilation expert should determine whether these would supply enough fresh air to not necessitate mechanical air intake. It was assumed that mechanical air-intake will be needed, and incorporated into the design.

Fresh air is drawn from the level of the highest residential units through three 1300x1700 ducts located on the Eastern edge of the basement. (This air may still require a filter system.) Air is then extracted at the opposite (Western) basement edge at floor level through three 1500x1500 ducts, specifically to get rid of carbon monoxide, after which it is released above the street canopy level. The ducts are placed so as to prevent the occurrence of dead spots (no air movement) in the basement.

Storage space in the basement needs to have air changed at 2 to 3 l/s/sqm. Air can be extracted with fans and released into the main basement. These fans need only work when persons occupy the storage spaces.

Solar incidence and Control

Northern sun is controlled through roof overhangs designed to summer and winter sun angles.
Eastern sun into the gallery is passively controlled through louvers and roof overhangs.

For residential units with an East-West orientation Eastern sun is considered desirable as the main source of heat in winter, and so the flats were orientated as such, with living and sleeping spaces to have maximal Eastern sun exposure.

Glazing to the West was consciously minimized. Where glazing to the West was a necessity, as is the case in some residential units, louver screens are propsed for solar control. These sunscreens on the Western facade include sliding sections, so that Western sun can be blocked entirely during summer months, while late afternoon sunshine desirable during colder winter months can be let in.

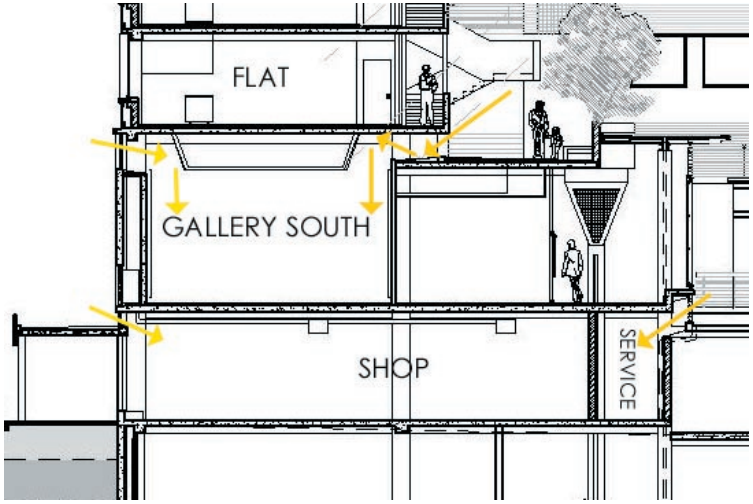


Fig 8-15 Natural Light into the Gallery, Service Lane and Shop

Screens

Louver screens are used extensively in the building, and are functional for security needs, as well as the screening of unsightly services. Sewer pipes, storm water pipes and air-conditioning units are kept to the outer façade, and screens are easily removable.

All louver panels are constructed as lightweight frames with louvers from cold-rolled steel plate sections that are bent, welded and drilled off-site. The entire panel is then galvanised, and bolted to a main support structure. The main support structure consists of hot-rolled galvanised steel sections, connected to the concrete or masonry structure with expansion bolts.

Lighting

Maximizing natural lighting is a baseline requirement and a design informant. The multi-leveled square that forms the heart of the building allows spaces around it access to natural light.

Flats

All rooms have access to natural light. Glazing is taken to ceiling level, to maximise light into the room. Interior walls of the flats will be plastered and painted white/ light colours. Electric light will be required only to add to natural light where sufficient lux levels is not reached. (Required light levels set in Schedule of Accommodation).

Gallery

The gallery has limited natural light, due in part to its Western façade and the need for acoustic control. The exhibition of artworks requires consistent lighting levels, and the lighting of the artworks will, for the most part be dependant on electrical lighting.

Natural light is used in addition to electric light. Different lighting qualities for individual galleries ensure distinguishable spatial qualities.

The Auditorium Foyer / Exhibition space receives light through a glazed Eastern façade. Two louvered glass boxes protrude to the West to bring filtered light into the space.

The Western Gallery receives side-lighting through the South-Western corner window box that is louvered to the West. A louvered clerestory strip window adds some louvered top lighting.
The Southern Gallery receives top-lighting through reflected Northern light and Southern light, both strip windows at ceiling level. Ceilings and bulkheads that hide air-conditioning services are painted white and shaped to maximize natural light onto exhibition walls.

The Northern gallery receives light through the glazed Northern façade shaded with a 1300mm roof overhang. The central gallery offices share in light from the Northern glazed façade: A curtain with sandblasted glass up to a height of 2m ensures light without compromising privacy,. Clear glass above brings light and allows views to the outside.

Handicapped persons access

An external ramp with a 1:12 fall gives disabled persons access to the raised public and cultural square and effectively the gallery. An elevator connects the basement, retail level, and Talking Beads level, and also gives quick access to the public square. Both the ramp and elevator are located centrally.

The auditorium is supplied with 2 x wheelchair spaces required according to the SABS (over 50 and under 400 seats), and two disabled parking spaces are available in the basement.

Fire Safety

Flats

(defined as occupation class H3 in SABS 0400)
34 persons on 2nd floor (calculated @ 2 persons per bedroom)
54 persons on 3rd
50 persons on 4th
The communal space on 2nd floor doubles as an escape route. It may have to accommodate the total of 138 persons. 1300 wide escape route provided (SABS section TT 21.2) Structural Elements/Components of a residential block in a 5 storey building require 60 minutes fire safety.

The Eastern public staircase doubles as a fire escape route, giving users access to the square. It is linked with bridges from the Northern block with one-way doors in the direction of movement for controlled access. The stair is linked to the basement with a one-way door ensuring that direct access is not possible. The 1300 mm wide staircase is partially covered with glazing and mesh as required for a staircase higher than 18m by SABS regulation TT27.1

Gallery

(defined as occupation class C2 in SABS 0400)
1 person per 20 sqm = 590 sqm/20 = 30 persons
1300 escape route adequate

Auditorium

(defined as occupation class A2 in SABS 0400)
A possible 130 persons in the auditorium
(incl. 120 seats and possible speaker/ performers/ personnel etc.)
Escape route of 1200 provided as to SABS 0400 regulations. The steel fire stairs clip to the Western Façade of the Auditorium, and the ladder extends onto the sidewalk when needed.

Talking Beads workshops

(defined as occupation A3 – educational, as the facilities

may be used for adult education. This occupation class would entail the largest possible number of people that could potentially use the building)
275 sqm / 1 person per 5sqm = 55 persons
1100 staiway required for persons up to 120. The 1300 mm Eastern stairway is sufficient, less than 45m from the farthest point in the workshops.

Security

The City Council is in the process of installing Closed Circuit Television (CCTV) systems in the Pretoria CBD to make it a safer environment for its users. Church Street already has a fully functioning CCTV system. Hopefully this will soon be the case for the entire CBD.

Passive surveillance is the prevalent security measure for the proposal. The Gallery, residences and Talking Beads are all entered from the Square, and flats and circulation spaces have views onto the square. The public spaces will be busy during the day, but at night other measures may be required:

The arcade can be closed to Paul Kruger Street, and a sliding door allows the arade to be locked to Van Erkom arcade. A security guard could easily monitor the single remaining entrance next to the market at the North Eastern corner. Alternatively a CCTV system for the building can be installed, and entrances monitored at the flat reception.

Retail Shops on ground floor have roller shutter doors to the street and the arcade.

Flats Visitors report to the reception, where the person on duty will buzz the individual flats to allow visitors in or not. A laminated glazing product (e.g. Smartglass Armourplate) will ensure the safety of the doorman. A swipe card gives access to residents. This system is typically used for City Properties residential blocks in the CBD. Interior circulation occurs along corridors and communal spaces that are clearly visible, with views to the square.

Gallery Security of the artworks was a concern raised by the client. The glazed surfaces to the gallery and auditorium foyers are 8mm laminated glass. If access is gained, the galleries and the auditorium will still be closed off. While the Auditorium is used, all or individual galleries can be closed off. The kitchenette /coffee shop area can be used together with the auditorium, without compromising the security of the artworks.

Basement Basement parking is controlled and reserved for residents and personnel. Access to the FinPark basement is gained with a swipe card, and the new basement will again have a door. From the square a key will be required to open the one-way door.

Vertical Services

Sewer and rainwater pipes are reticulated to the basement, where it joins the sewer- and stormwater connections. Wet areas are grouped on the outer Southern and Western walls of the Flats, where sewer pipes are grouped through horizontal ducts to vertical shafts. Rainwater pipes from the roof are grouped in the same shaft. Shafts are hidden in the double-skinned Southern and Western walls of the gallery to allow uninterrupted exhibition walls. At basement level all pipes turn @ 300mm radius to fall at a 1:80 to the North-Western corner of the site.

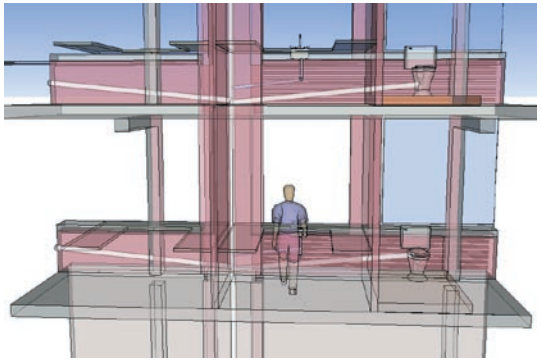


Fig 8-16 Vertical Services

Auditorium

The Auditorium is constructed as a 200 mm reinforced cast in-situ concrete shell. The massive structure enables the outer wall to be an effective beam. This allows for an irregular column grid, which is necessary for vehicular movement in the basement below.

Parapet walls are 'folded over' to hide and protect the edging of the bitumen sheet waterproofing. The waterproofing is further protected with 500x500 concrete-paving tiles laid on patent adjustable underlay pads. Multiple coloured concrete tiles will be laid randomly to create a 'tapestry', framed by the oversized parapet walls. This decision was made to avoid a potential eyesore due to the visibility of the roof from the flats and circulation spaces.

The shell provides acoustic insulation from noisy Paul Kruger Street. An acoustic corridor with highly absorptive panels will block potential noise created from the arcade. The auditorium is slanted to ensure that all rows will have a view to the speaker, and that sound is not blocked. The stage area and the back third of the auditorium will be covered with sound absorptive panels to prevent sound reflected back to the source, e.g. speaker/performer, while the rest will be covered in reflective panels to maximise the spread of sound waves through the auditorium. A sound engineer will be responsible for the detail design of the sound panels.

Fig 8-17 Auditorium section

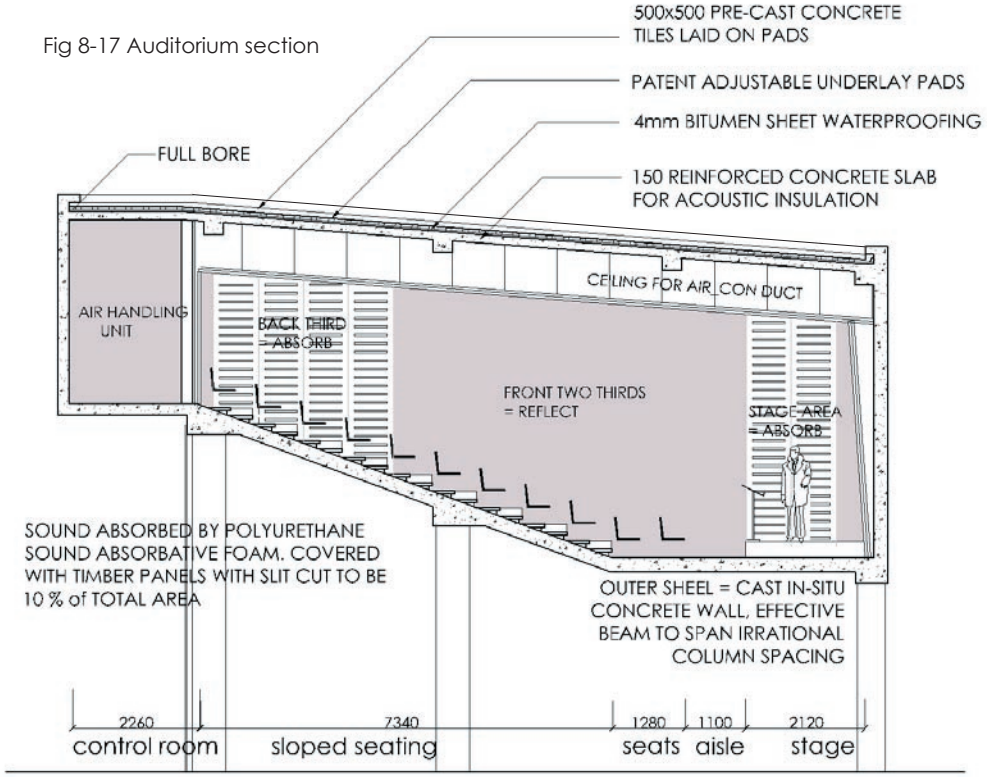
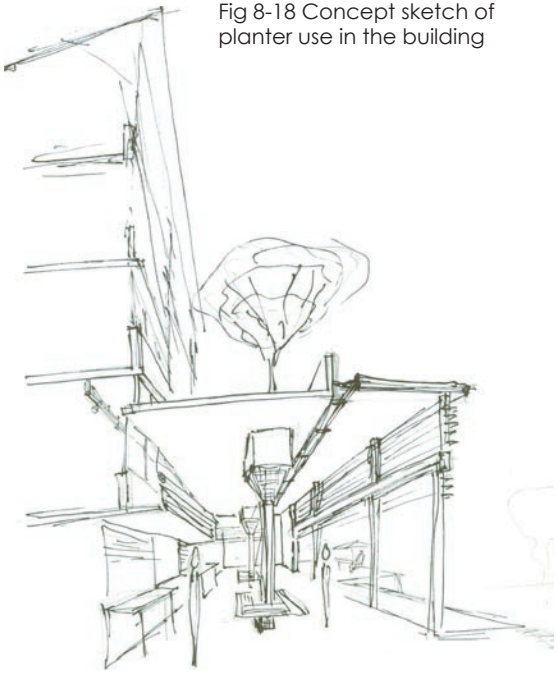


Fig 8-18 Concept sketch of planter use in the building



Structural Planters

The harsh environment of the city with hard surfaces will require tough indigenous species. Evergreen species were chosen that give deep shade, e.g. the Paperbark Thorn with its large canopy. Deciduous trees show the change of seasons on the square, e.g. the Coral tree with its red flowers in spring, and deep green leaves in Summer. Proposed species include:

Deciduous trees

Coral tree *Erythrina lysistemon*
Witstinkhout *Celtis africana*
Paperbark Thorn *Acacia sieberana woodii*

Evergreen trees

Olienhout trees *Olea africana*

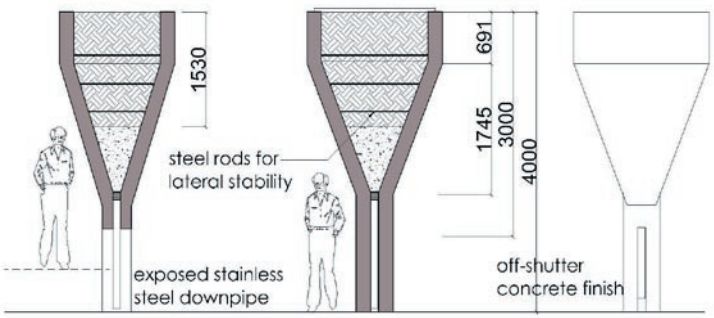


Fig 8-19 Planter Detail

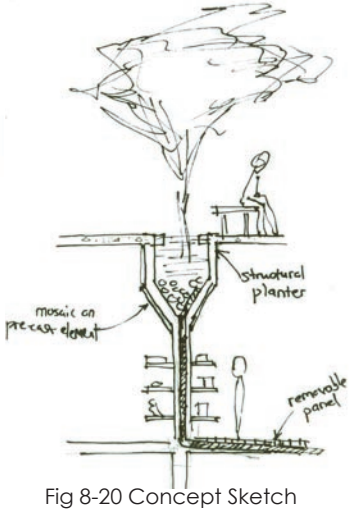


Fig 8-20 Concept Sketch

To achieve effective growth cast in-situ structural planters were designed that can hold over 2 cubic meters of soil. Planters are present in the arcade, the gallery entrance foyer and the auditorium foyer. They become beacons of important places in the building, and can be decorated with mosaic tiles. The planters are imposing structures, and mosaic work could help to lighten the appearance of the form.

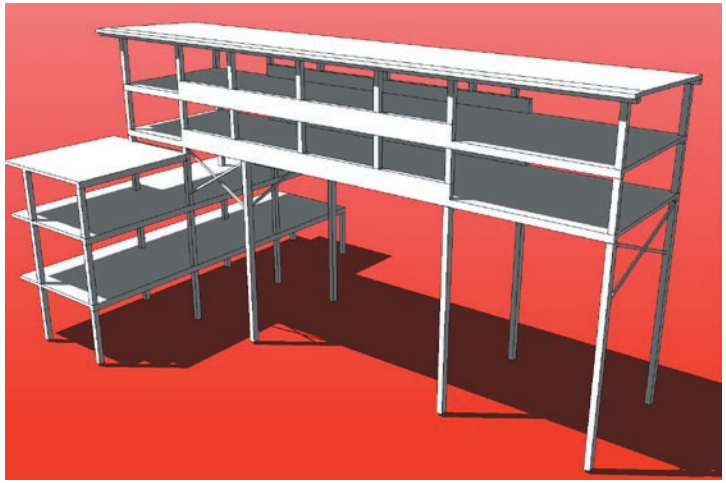


Fig 8-21 Elevated Block Structure. Columns on the right are afforded lateral support through Auditorium under

Elevated Residential Block

The double-storey elevated block with a clear span of 14 m is elevated 12m above the lowest level of the square. To overcome this a 800mm deep reinforced concrete beam is cast-in-situ between 450 diameter reinforced concrete columns. The columns are stabilized laterally through steel cross bracing, allowing reasonably slender columns. The two storeys are supported with separate beams. Floor slabs are positioned at the bottom of the beams, so that the structural element becomes part of the outer wall. A redbrick outer skin is glued to the exterior of the beam so that no apparent structure remains visible from the square below.

Existing Building Analysis

See Street Façade/Building Key Site Analysis Drawings on p 3-13 to 3-15

LEWIS Building

Current Use

- 2 storey Commercial building
- Furniture Sales
- Basement level used for storage
- First floor used as showroom
- No council drawings available

Importance

The existing structure is valuable:
Concrete frame with face brick infill and a corrugated steel roof. Large steel frame windows to the street were boarded up and Lewis signboard constructed over. If removed and windows replaced the façade would have a simple and honest appearance. The building requires some maintenance and upkeep - e.g. some broken windows. The building is not important for Paul Kruger Street's character and contributes nothing to the street. However, the structure is valuable and simple - might be incorporated into the project.

Proposal

Possible Integration into the scheme. Adaptive re-use. To fit the scale of the CBD a structure will have to be constructed over it. The cost of this intricate process vs. an entirely new building must be considered however.

Fig A-1 Lewis Interior

AM CELLULAR

Current Use

- Single storey commercial, currently (June 2004) empty.
- The building extends to the back of the erf since a back section was added. Owned by City Properties
- No council drawings available.

Importance

The building is not important for the character of Paul Kruger Street. It does not fit the scale or architectural expression of the CBD. The many additions and changes leave nothing of the original, and thus no historical value. Maintenance needed.

Proposal

Demolition of building structure

Fig A-2 AM Cellular Exterior

PHARMACY

Current Use

- Single storey commercial, including Downtown Take Aways and Willie Pieterse Pharmacy.
- The Pharmacist L.Fine owns the building that has functioned as a pharmacy for a number of years.
- Downtown Take Away, Restaurant and Pub rents from Mr. Fine.
- No council drawings available.

Importance

The colonnade is of historic importance. It contributes to the Paul Kruger Street character. The Building itself does not fit scale or character of CBD. It requires maintenance and is of no architectural or historic importance. The interiors are very interesting however. The original ceilings can be found, and the Pharmacy has original cabinets and light fittings. Both shops feature interesting mezzanine levels, used as an office and a bar.

Proposal

Conservation of colonnade and integration into new project. Conservation of Interior of Pharmacy and possibly restaurant, as conservation of the memory connected with the site.

Fig A-3 Pharmacy Entrance

WHOLESALE RETAIL

Current Use

A Single storey commercial building that includes Fin Con Cash and Wholesale Retail. Fin Con consists of a single desk standing in a large space that until recently was a Standard Bank (The tellers can be seen). Wholesale Retail sells clothes and miscellaneous items. No permanent fittings can be found. No council drawings are available.

Importance

Colonnade is of historic importance and important for Paul Kruger Street character. The Building itself does not fit scale or character of CBD and requires maintenance. The courtyard at the back of the building is used as a dumping yard and currently very unhygienic conditions exist.

Proposal

Conservation of colonnade and integration of colonnade into new building. Demolition of building. Possible re-use of building rubble.

Fig A-4 Wholesale Interior

PRETORIA OFFICE SUPPLIES

Current Use

Triple Storey Building:
Commercial activities on ground floor, including Pretoria Office Supplies and Hope Engravers Goldsmith & Jewelry suppliers. Offices and Storage on 1st and 2nd floors.
Owner - Julian Edelson.
Council Drawings Available

Importance

Exterior has been recently improved and is in good condition. Interior in a good condition. No architectural or historical value, but valuable structure: Concrete frame and Painted brick infill, Aluminum frame windows and corrugated steel roof sheeting.
The building is not important to Paul Kruger Street's character and 3 storeys not ideal for the CBD scale.

Proposal

Adaptive re-use of buildings and integration into project with new façade introduced. Possibly add lightweight structure to add height.

Fig A-5 Pretoria

AFRIK HOUSE

Current Use

Double Storey Building: Commercial on ground floor, including Picture Frames and Moldings, Curtains and bed sets. Framing workshop on first floor. Council drawings not available.
Owner - Jean-Pierre Beaumont.

Importance

Built ca 1902. One of the few remaining examples in Pretoria of commercial architecture from late-Victorian period. (Le Roux, 1990) The exterior is still intact but the interior has been entirely changed. Important for Paul Kruger's character.
The smaller structures to the left and right of the Afrik House are later additions and of no historical or architectural value.

Proposal

Conserve and Maintain / Restore exterior and the adaptive re-use of interior
The building position is ideal to make a link to the arcade system through the building.
Demolition of smaller structures.

Fig A-6 Lewis Enterior

FATTI'S

Current Use

- Triple Storey Building: Commercial on ground floor: Photo Smile photo development and Sports Fly Restaurant and Pub at the back of the site with an alley entrance from the street.
- Apartments on 1st and 2nd floors.
- No Council Drawings available.
- Owner - Jean-Pierre Beaumont.

Importance

Example of Art Deco building in Pretoria. Important for Paul Kruger Street's character. Fully rented out and in reasonable condition.

Proposal

Conservation and maintenance. No change in function, but potential of linking Sports Fly Bar at the back of the site to the proposed scheme.

SAVELKOUL

Current Use

- Commercial on ground floor: Hair Salon and Cash Wise Cash Loan company. Offices in upper floors. Savelkoul itself is a men's clothing store on over two floor levels.
- Owner - Jean-Pierre Beaumont.
- No Council Drawings available.

Importance

Built during 1940's (Le Roux, 1990). Fits the scale and character of the CBD. Important part of Paul Kruger Streets' character.

Proposal

Conservation of building. No change in function.
Possible link to pedestrian movement.

Fig A-7 View to restaurant behind Fatti's

Fig A-8 Savelkoul interior

Fig A-9 Savelkoul ont the corner of Pretorius and Paul Kruger

SBAT Analysis

The Sustainable Building Assessment Tool (SBAT) document was used as a base document to inform the design planning processes, and to highlight issues that that were of importance in ensuring sustainable building and management practice. The existing SBAT criteria were adapted where needed to make it more relevant and suited to the City Building project. The SBAT tool is not, however, used to quantify the building performance in a numerical value (which is a very subjective process), but rather to determine certain qualities that must be present in the design.
Where requirements are specific to certain building functions, it will be so indicated, while elsewhere the requirements can be considered applicable to the entire development.

This main body of the document was written at the beginning of the Design process. The sections in colour are a critique of the design in regards to the SBAT, written after completion of the design. It is an evaluation of how well the intentions were realised, if at all. It is a personal review and evaluation of the end product, and may theoretically be used to further the design. or to consolidate lessons learned for future projects.

Green text signifies that the goal was realized.
Blue text signifies moderate or partial success
Red text signifies that the goal was not realized.

Social

Occupant Comfort

The building envelope must protect occupants to allow them to live and work comfortably in the building despite a possibly hostile environment outside. This must be done with minimal reliance on mechanical or electrical systems. The following basic considerations are important during the design process:

Ventilation

Natural Ventilation to be the preferred, allowance for cross-ventilation of rooms must be made where possible. All habitable rooms must have openable window sections.

This was successfully implemented in the Residential units and in Talking Beads. The Gallery and Retail levels are dependant upon Mechanical ventilation.

Thermal Comfort

Passive solar design through knowledge of the local climate is required:
Maximize the Northern Orientation of the building and rooms.
Use overhangs or exterior screens to limit sun incidence in summer.
Maximize Northern and Eastern sun incidence into the building during winter.
Minimize unwanted heat loss or heat gain through effective insulation.

Solar design was effectively implemented. Northern sun is passively controlled, Western sun is user controlled through louver systems. Sun is kept off glazed surfaces of air-conditioned spaces.

Lighting
Natural sunlight must be the preferred method of lighting. This applies specifically to work and living environments. No space should have to be permanently day-lit with electric lights.
(GALLERY)This will be a challenge for gallery spaces, where sunlight on the artworks and noise from the street are not wanted.
Successfully implemented for residential units.
Natural light maximized for the gallery. Electric light will be used for additional lighting, but will not be required permanently.
Not effectively implemented into the design. Natural light made available will not be sufficient, because of shop depth. Shops will likely use electric light.

Views
(RESIDENTIAL, RETAIL, ARTS/CRAFTS) Where people spend a lot of time, e.g. shops, offices or apartments, they should have views to activity or greenery, thus to the street or to an arcade / courtyard.
Successfully implemented

Noise
(RESIDENTIAL) Functions with opposing life cycles should not be grouped together e.g. late-night restaurants or music venues with apartments.
(GALLERY) Gallery will require no or little noise, which will be a challenge along Paul Kruger Street. A Study of soundproofing materials is needed and the location of the galleries away from the street might be considered to use other functions as a sound buffer.
Residential units will be exposed to city noise. This was unavoidable.
Gallery acoustics successfully controlled

Indoor /Outdoor connection
Give building users access to outer spaces, e.g.
(RESIDENTIAL) Balconies must be sized to make them useful to their users.
All occupants must have access to a communal oudoor space.
(ARTS-CRAFTS) Social/Relaxation Space to be supplied for Skills training Center.
Succesfully implemented

Inclusive Environments
The building must be designed with the needs of all its potential users in mind.

Transport
The building is situated within the CBD, with excellent access to public transport. This was a consideration in the choice of the site, and **can be considered successful.**

Routes
Disabled persons must be able to access all public spaces. This implies ramps with a fall of not more than 1:12 or lifts of sufficient size. Surfaces must be smooth enough to allow easy wheelchair operation.
Successfully implemented

Circulation
Circulation spaces will be considered as potential social spaces. These spaces have the function of movement, but also of meeting places.
Successfully implemented

Furniture and Fittings
Robustness in design is important for ease of maintenance and public seating should be provided to encourage social interaction.
Successfully implemented

Toilets and Kitchens
Sufficient toilets for disabled persons must be provided.

Sufficient ablutions for building functions as specified in the National Building Regulations will be supplied.
(Talking Beads) Access to sanitation and a place to prepare food will be provided.
Successfully implemented

Access to Facilities
As mentioned above, the building is located in the Pretoria CBD, which gives users access to most facilities suggested as necessary by the SBAT. The following are suitably provided for within the existing CBD context:
- Banking
- Communication
- Work
- Retail

The insertion creates even more opportunities for work/ jobs as well answering the need for residential units in the CBD.
Successfully implemented

Childcare
The existence of childcare facilities in the CBD must be investigated. This facility could be provided for employees/ trainees of the Arts and Crafts Training Centre, and could be used by Museum employees, shop owners and employees as well residents.
Not incorporated into the design.

Participation and Control
When building users can control and adjust their environment, or personalize a space, a sense of ownership is created. So doing occupants will care for the building, which extends the life cycle.

Environmental Control
Occupants must be able to open windows and adjust sunscreens or shutters.
Successfully implemented

User manual/ training
The building should not be dependant on systems that require the training of its users. Systems should be easy to understand and have simplicity and robustness as characteristics.
Successfully implemented

Social Spaces
Seating will be required in public places and along routes that are regularly used to encourage interaction of users.
(RESIDENTIAL) The apartments will have a communal social space, and corridors, staircases or lobbies, etc, will be considered as potential places.
(Talking Beads) A social space is a requirement by the client. At an educational facility a social space can be considered a necessity.
Successfully implemented

Amenity
All users of the building must have access to ablution facilities and refreshment points, e.g. coffee machine. Water fountains must be provided.
Not specifically implemented

User adaptation
Internal partitions, furniture and fittings must allow for rearrangement by the user.
(ARTS/CRAFTS) Must allow for personalization, e.g. billboards or opportunity to store personals, place for plants, etc.
(GALLERY) Ditto, but the above is specifically applicable to offices.
(RESIDENTIAL) Personalization is very important where people live. Flower boxes may be introduced. Users should be allowed to paint the interior of flats, etc.
Can only be measured as the building is used

Local community
No community exists in the CBD. At least not in a formal, structured way. People who live there rent flats, and the community changes constantly. Talking Beads, the client of the Arts and Crafts Centre, teaches skills to many people, and is effectively connected to many communities. Public transport makes the CBD accessible to these communities. Through Talking Beads artists and unskilled labourers can be engaged, and involved in the process.
(Talking Beads/Gallery) By involving artists in the design of the building from an early stage, freedom of expression will be given to them. This will enrich spaces and create a sense of ownership. Spaces can then be decorated or ornamented through the creative inputs of numerous artists.
Facilities such as the Auditorium and Workshops could be available after hours for further adult education programs, etc. Access to Internet facilities and the creation of a reading room must be considered.
Successfully implemented

Education, Health and Safety
Opportunities for education on Health Issues, specifically HIV AIDS must be created, e.g. billboards where information can be pinned. Condom dispensers, etc. must be supplied.

Education
(ARTS-CRAFTS) The Arts, Crafts and Skills Training Centre is an educational facility. Furthermore Internet facilities will be made available, and a reading room to give students access to newspapers and magazines.
(GALLERY) The site is very accessible and passed everyday by many people. The Museum Gallery must engage the city user to educate and so make the fine arts more accessible. Having pupils of Pretoria Inner City schools visit the gallery is an ideal opportunity for arts appreciation and education.
Talking Beads facilities integrated, but not as accessible to public as envisioned.
Gallery has presence to public movement. Considered successful.

Safety and Security
The building must be accessible without any risk to the safety or security of users. Spaces should be visible for different users to allow policing by the occupants ("eyes on the street"), and could be used diurnally.
Successfully implemented

Smoking
Places should be created for smoking that do not force non-smokers into the same space.
Successfully implemented

Indoor air quality
A working and /or living environment must be pleasant and healthy for its users. Natural ventilation of all spaces and adjustable windows/ doors are a necessity.
Successfully implemented

First-Aid
First Aid Kits and Fire Extinguishers must be easily accessible and the location of it clearly indicated.
Not implemented at time of going to print

Exercise & Recreation
The building location in the city provides its users access to public parks, e.g. Burgers Park and the Zoological Gardens, and public transport makes most facilities within the larger city available to city users.
(FLATS) Communal Spaces will be provided for residents.
Successfully implemented

Economic

Local Economy

Local contractors

Building contractors from Tshwane will be used, and these contractors must be prepared to train and involve unskilled workers, identified by Talking Beads. This must be made clear during the tender process. All the skills required will be made available within 15km of the site, and all workers will conceivably be able to access the site with public transport.

Successfully implemented- Only when construction starts will we know.

Local building material supply

Materials will be sourced from Tshwane only, to limit transport and energy costs. Re-use of material from buildings demolished on the site will be investigated.

Reasonably successful

Local components

Local businesses and craftsmen of Talking Beads will be the preferred suppliers.

Outsourcing Opportunities

Small business must be encouraged and helped where possible. Facilities must be made available to help small business people when needed. This is a management consideration and requires the education of the Building management.

(ARTS/CRAFTS) Users must be able to lock away valuables if the spaces are used for other activities at other times.

(RETAIL) Shops provided will be especially aimed at smaller businesses, e.g. approximately 100.square meters floor area.

Successfully implemented

Repairs and maintenance

Local contractors and skills will be used. The robustness of the building, and sensitive use of technology to minimize the need for repairs and maintenance is vital.

Successfully implemented

Efficiency of Use

Space Use

Space should be considered to have the potential for diurnal use, and adaptability and robustness of all spaces is a basic requirement.

Successfully implemented

Occupancy schedule

The building spaces must be occupied a minimum of 30 hours a week. Diurnal use and effective management could ensure this.

(RETAIL, RESIDENTIAL) A variety of functions with a wide spectrum of users will be part of the building, which will ensure activity. More clients also neutralize the danger of a single large client's departure resulting in large vacancies.

Successfully implemented

Management of space

Offices could be shared, and workspaces shared: 'Hot-desking.' The spaces must be adaptable enough to allow various activities

Hot-desking not Implemented

Spaces are reasonably adaptable

Useable Space

The non-useable spaces, such as WC's and circulation should be minimized, and preferably kept under 20% of total area.

Successfully implemented

Disruption & downtime

The building must allow for repairs or maintenance of certain functions without the disruption of other

functions.
Successfully implemented

Adaptability and Flexibility

The Pretoria CBD is a very dynamic place, and the building function may well change over time. The design must take this into account.

Vertical dimension

Higher ceilings create an opportunity for mezzanine levels and storage space while more easily accommodating future changes in function. This should be weighed up against financial implications before a decision is made.
Gallery and Talking Beads Levels adaptable. Residences reasonably adaptable.

Internal partitions

Larger spaces should be allowed by the structure, while internal partitions can be non-structural.
Successfully implemented

Services

Easy access to electrical, communication and sanitation services should be possible, without excessive breaking of the building structure.
Not implemented to a satisfactory level

Structure

Allow adaptability and robustness of use, while not limiting potential layouts or future functions, where possible.
Successfully implemented

Ongoing Costs

Maintenance

Robustness and simplicity of design, the choice of materials and simplicity of services will limit the cost of future maintenance.
Successfully implemented

Cleaning

Materials and surface treatments that do no require intensive cleaning will be specified. Access to areas that have to be cleaned regularly (such as windows or glass surfaces) must be ensured. This will limit costs for specialist cleaners (e.g. window cleaners).
Moderate Success- Market curtain wall will require specialist cleaners.

Security/ Care taking

Design defensible space that can be monitored by its users and residents, and avoiding blind alleys or deserted space will ensure less expenditure for security.
Reasonably successful. The public nature of the building limited this.

Shared Costs

Having different functions share spaces and functions and sharing emergency exists and parking facilities with neighbouring buildings makes financial sense, and the cost of upkeep will be minimized.
(Talking Beads, GALLERY) An Auditorium could be used by both facilities and rented out other users.
Successfully implemented

Cost monitoring

Management of the building needs to ensure an awareness of any wastage of resources, and limit this. Using daylight switches for public space lighting will ensure that it will be turned off during the day, so electricity is conserved.
Not possible to assess.

Capital Costs

Choices concerning capital expenditure can only be made with complete information regarding costs and profits that are associated with the development. Some issues that Capital Costs consideration raise:

Use of existing structures
Existing Structures and facilities should not be dismissed and can be incorporated into the design where possible and feasible.
Incorporated to a limited degree

Shared cost
All stakeholders share in the profit and so proportionally in the capital costs.
Various clients involved – Sectional title development.

Build-ability
The building should be designed to be easily and cheaply built, through choosing simple structures and local materials.

The material palette was kept simple
The structure was not designed to most efficient level.

Proportions of cost/ building size
IA slightly larger building might offer more adaptability and future usefulness despite an increased initial cost. The most cost effective solution may therefore be limiting in many respects.
The size of the building, and multifunctional nature of it is more cost-effective

Environmental
Water

Rainwater
Harvesting of rainwater so as not to use potable water for the watering of plants or for production purposes is essential.
Not implemented. This goal was an unrealistic goal.

Water Use
Creating a culture of not wasting water is important, both during the construction phase and the functioning of the building. Education of the user is important. The contractor must be made aware of this requirement during the tendering process, and the building management must continue the work.
Not possible to assess.

Grey water
Recycling of Grey water to be used for gardening or production purposes would save potable water. The cost, space and required maintenance for a Grey water system is an issue however. A commitment is needed by the users to make this system work. Users who rent buildings might be reluctant to take part and accept the extra implications. Needs to be investigated further.
Not considered applicable to the specific project

Runoff
Rainwater runoff is another potential source for water harvesting but with certain implications of management for its users. To be investigated.
Not considered applicable to the specific project

Planting
Through planting endemic species the need for watering and maintenance will be limited. This saves water.
Indigenous species were selected

Energy

Transport

Local contractors and materials shorten transport distance and also the embodied energy and implied costs. The existing Pretoria CBD public transport system makes it easier to visit the building.

Successfully implemented

Ventilation

Through giving all rooms open able windows or designing to maximize cross ventilation, air can be circulated and naturally cleaned, while air conditioning costs can be curtailed.

Moderate Success

Environmental control

Allowing users the ability to adjust sun shutters and open windows, and through limiting unwanted heat loss or heat gain through effective insulation, this goal can be reached.

Successfully implemented

Appliances and fittings

Limiting appliances that have large energy implications such as air conditioning. Light fittings should fluorescent/ low energy consumption. Educating building users to set geysers to lower temperatures and turn off lights in empty rooms is important. This is a concern of the building management.

Moderate Success

Energy sources, Renewable Energy

Solar water heaters could be used, which would limit the massive energy use associated with geysers. Photovoltaic panels could be implemented to supplement electricity, but the associated maintenance and installation costs must first be investigated.

Not implemented

Waste

Organic Waste

Facilities that process organic waste within the inner city must be identified. A central organic waste collection point will be established for the building users, from where waste can be transported to recycle points when needed.

Successfully implemented

Inorganic Waste

As with organic waste, the facilities for recycling of waste in the inner city do exist, and must be identified. A collection point where glass, metals, paper and plastics can be separately collected must be included.

(Talking Beads) The potential for the re-use of inorganic waste in the making of crafts and artworks is an important possibility.

Successfully implemented

Sewerage

Sewerage would be exposed of through the existing city infrastructure. Space for alternative measures do not exist, and is not supported by building regulations.

Successfully implemented

Construction Waste

Waste of materials will be minimized through modular design. Contractors must explicitly be made aware of the need for careful construction site management during the tender process.

Not possible to assess

Site

Brownfield Site

The site is built up. No Greenfield sites or natural resources will be affected.

Successfully implemented

Neighbouring buildings
The building will link and work closely with neighbouring buildings. Effective integration will benefit the entire area. Infrastructure can be shared with its immediate neighbours. The building must not have a negative effect on neighbouring buildings, e.g. through shading other buildings. By respecting the existing scale of buildings in the CBD this will be minimized.
Successfully implemented

Ecosystems and Vegetation
No natural ecosystems exist on the site itself. An attempt will be made to maximize vegetation on the site through the introduction of plants where possible.
Successfully implemented

Construction process
The process must have as a priority the effective use of materials so as to limit wastage. Water must be conserved and penalties for wasting water must be implemented, and contractors made aware of this during the tendering process.
Not possible to assess

Materials and Components
Material / Component Sources
Will be sourced from within Tshwane, and local craftsmen, contractors and businesses will be involved. Components made from renewable resources.
Not fully incorporated

Embodied Energy
The cost of transport and production of materials will be considered (No materials may be imported), as well as the skill level of the workforce employed: A contractor will be used, but training of unskilled labourers will be required.
Implemented to a satisfactory degree

Manufacturing processes
Details and finishes that requires unskilled workers and can be done on site is preferred.
Implemented to a satisfactory degree

Recycled & reuse of materials & components
The demolished buildings have materials that could be re-used, and finer residue would be preferred for fill material.
(Talking Beads) The Centre will look at the re-use of materials for the making of crafts and artworks.
Implemented to a satisfactory degree

Modular coordination
A modular design will allow ease of construction and the ensuing standardization would result in lower construction costs.
Successfully Implemented