Entopia

creating an urban transition space

Olckers 2011

ENTOPIA: CREATING AN URBAN TRANSITION SPACE

Entopia: Creating an urban transition space
by Heinrich Olckers

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Submitted in fulfilment as part of the requirements for the degree Masters in Architecture (Professional)

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Plagarism Report

In accordance with Regulation 4(e) of the General Regulations (G.57) for dissertations and theses, I declare that this thesis, which I hereby submit for the degree Master of Architecture (Professional) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

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

I further declare that this thesis is substantially my own work. Where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in the text and list of references.

Heinrich Olckers

Project Summary

Full dissertation title:	Entopia: Creating an urban transition space
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Degree:	Master of Architecture (Professional) - MArch(Prof)
Department:	Department of Architecture.
Faculty:	Faculty of Engineering, Built Environment and Information Technology.
University:	University of Pretoria.
Program:	Urban Transition space.
Site:	corner of Paul Kruger and Scheiding Street, Pretoria CBD.
Client:	Public/ Private partnership.
Users:	Commuters entering and leaving the city.
Site Location:	Erf R/785 corner of Paul Kruger and Scheiding Street, Pretoria.
GPS Coordinates:	25°45'22.86"S, 28°11'21.23"E.
Theoretical Premises:	The role of Environmental Psychology and New Urbanism in socially concious architectue.
Architectural Approach:	Creating an urban transition space that facilitates desegregation social cohesion.
Research Field:	Urbanism and human settlements.
Main Research Question:	What is the role of architecture in facilitating social cohesion and community formation?

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Abstract

Keywords: Post-Apartheid, segregation, social cohesion, community formation, *entopia*

The study addresses the continuous segregation within Post-Apartheid cities. The project aims to determine the role of architecture with regards to social cohesion and community formation and aims to establish whether architecture can be instrumental to the reversal of segregation.

The architectural building type that will be investigated is an urban transition space that will facilitate movement into and out of the city through the creation of a gateway or urban threshold.

An architectural space that facilitates social interaction will be investigated by determining appropriate environments for different types of interaction.

The architectural intervention will make use of social design strategies and adapt them to the local context in order to achieve *entopia* (achievable space).

Terminology

Architecture – The term architecture collectively refers to the three schools of architecture and includes: architecture, landscape architecture and interior architecture.

Built Environment –The term built environment is used to describe all man made alterations to the environment. The term includes buildings and structures as well as interventions within the landscape such as parks.

Urban waiting room – An urban waiting room is defined as a space within the urban environment which is open to the public and serves the main function of waiting or the passage of time while waiting for a different event to occur.

Entopia – The term *entopia* translates to achievable space. *Entopia* relates to architecture of the every day and aims to address problems within the built environment that is unique to its place and setting.

Social Cohesion – Social cohesion is defined as a multidimensional phenomenon where there is a sense of belonging for all communities. The main characteristic of social cohesion is the ability to develop strong and positive relationships between people of different backgrounds and ethnicities.

Genius Loci – The prevailing spirit, character or atmosphere of a place.

CBD – Central Business District

SETA – Sector Education and Training Authority

ABET – Adult Basic Education and Training

Acknowledgement

Thank you to my parents, Lelanie, Z + Charl for your continuous support and understanding and to Rudolf + Jacques for your leadership and guidance.

Chapter 1
Introduction

"This is the age of the shrug... Our civilization could well die of indifference within it before succumbing to external attack"

F. Herbert, 1967: 53

Background + Context

The apartheid based model for city development formed during the early nineteen hundreds was based on control and separated cultures by locating 'white' suburbs around the central business district surrounded by buffer zones while placing townships on the outskirts of the city perimeter (Osman & Hindes, 2005: [59]). The buffer zones generally consisted of industrial areas and eventually resulted in degeneration and discontinuity within the city grid. This mode of city planning promoted a fragmented environment, unpractical for required urban densities and integration. The result is a South African context where cities are highly disconnected, developments are low in density and segregation is promoted (Osman & Hindes, 2005: [59]).

Although pass laws and the Groups Areas Act which designated residential areas for different ethnicities was scrapped respectively in 1986 and 1991, South African cities, after the transition to democracy in 1994, are still characterised by racial segregation (Morris, 1998: 763). According to Mueller-Friedman (2007: 37) closer inspection of societal groupings and spatial layouts in Post-Apartheid cities such as Pretoria, Johannesburg and Windhoek reveal that Apartheid ideologies have not sufficiently been overcome and that the city continues to be segregated along racial and societal lines years after the end of Apartheid.

Post-Apartheid urban strategies should aim at overcoming social division and spatial segregation produced during the Apartheid era (Mueller-Friedman, 2007: 33). Integrated public space that promotes gathering, community formation and a homogenous urban environment needs to be provided within Pretoria CBD.

Fig. 1.1: Women resisting apartheid on 9 August 1956

Fig. 1.2: Continuing segregation two weeks after blacks were allowed to travel on 'whites-only' buses on February, 1990

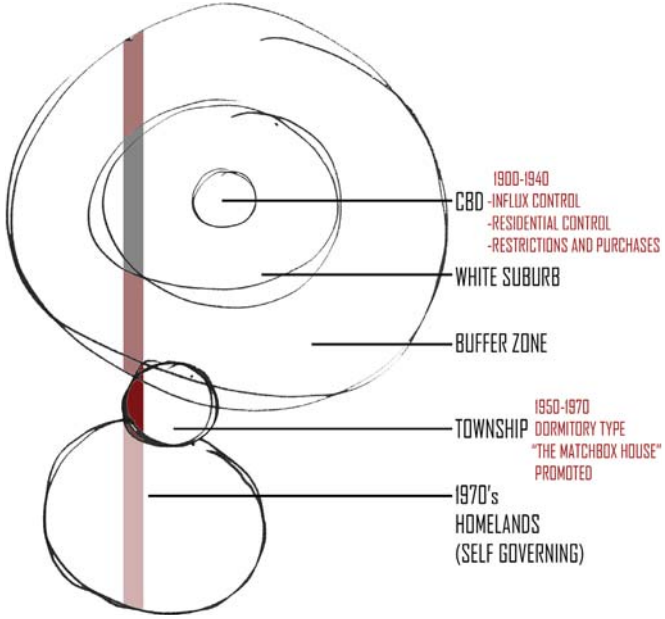


Fig. 1.3: Apartheid Space Planning

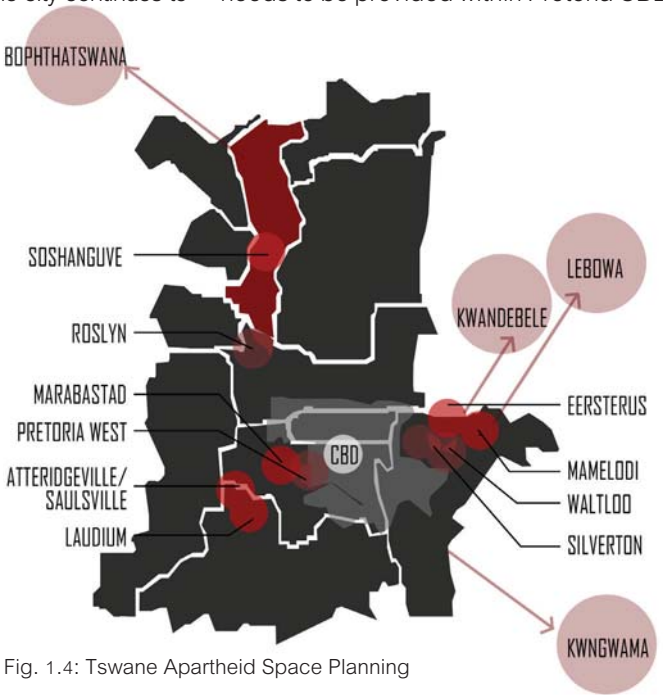


Fig. 1.4: Tswane Apartheid Space Planning

Choice of Site

The site selected for the proposed scheme is on the Eastern corner of Scheiding and Paul Kruger Street within Pretoria CBD directly opposite Pretoria Station. The site is located close to a major traffic node that contains the Metro Train station, Gautrain Station, proposed BRT route, bus stops (both long distance and local) as well as taxi ranks. Due to the nature of the traffic node the area is characterized by high levels of pedestrian movement.

The area chosen for the study is situated along an important axis since Paul Kruger Street forms the original link between Pretoria Station - where the main public transport routes in and out of the city are located - and Church Square. From Church Square, the Paul Kruger axis continues and forms a direct link to the Pretoria Zoological Gardens.

The site forms part of an important gateway to the city which is currently completely neglected.

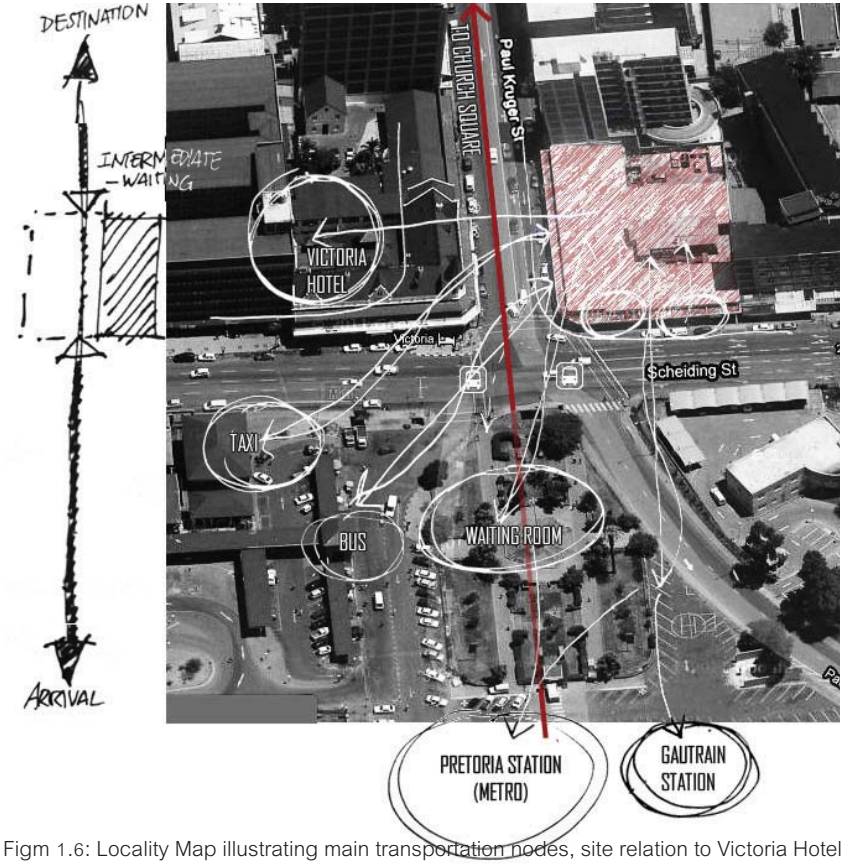
An initial analysis as to current uses around the site has indicated that in addition to expected uses such as relaxing around Station Square and movement to shopping and travel destinations the area serves as a waiting space. There is however no adequate shelter provided for this with the weather posing a continuous problem for pedestrian use.

Additionally, the site demands sensitivity with regards to historical consideration as direct views to heritage sites such as Pretoria Station, Station Square and the Victoria Hotel are possible.

The site requirements can be summarized as follows:

- Potential gateway formation,
- Provision of functional resting and waiting space,
- Sensitivity with regards to context and heritage sites.

Figure 1.5: Panorama of threshold



Figm 1.6: Locality Map illustrating main transportation nodes, site relation to Victoria Hotel and the only current available urban waiting room.

Importance of the Project

The built environment has a central role in the production and facilitation of social life and can directly influence the success of social cohesion. In Pretoria however, a lack of cultural integration and limited social cohesion is evident (Mueller-Friedman, 2007: 37).

The document aims to investigate social cohesion, formation of space and what enables people to successfully interact within their environment by researching theories with social design applications and relevant precedents. The research will be distilled into principles on how to encourage social cohesion and community formation with specific application to design in architecture.

These principles in turn can be applied to other projects thereby further encouraging social cohesion throughout the urban environment and is deemed important within an environment characterized by segregation.

Aim

The study aims to identify ways in which architecture can promote social cohesion and help overcome lingering apartheid ideologies. The study further aims to derive specific principles that can be applied to a design irrespective of building program.

Design Problem

Although Pretoria is a Post-Apartheid city, it would appear that the urban environment within Pretoria remains largely segregated (Mueller-Friedman, 2007: 37). This segregation includes groups of different cultures, ethnicities, ages and physical capabilities. Segregation within South African cities contributes to inhospitable environments and non interactive public space. As stated by Morris (1998: 773) the Post-Apartheid city remains an inhospitable environment.

Numerous articles, books and theories state the power of architecture to influence people's way of thinking as well as the ability of architecture to alter behavioural patterns (Mueller-Friedman, 2007: 37; White, 1987: 137; Cave, 1998:1). It can then be said, that architecture and the built environment have the ability to encourage social interaction and reduce segregation within South African cities. It is however, never clearly stated how this can be achieved.

During this dissertation, research will be done in order to determine the role that architecture plays in the formation of social cohesion and how it can contribute to the advancement of an integrated society. Additional research will aim to determine how space is formed in the physical setting as well as the cultural mind and what determines how people respond to and perceive space.

Research Methodology

During the course of the study, specific attention has been given to site, context and history to ensure that the program is applicable to its context and environment on a physical and metaphysical level.

In an attempt to resolve the problem identified in the dissertation, a matrix has been created illustrating major theories that have been influential during previous years of study. Applicable theories have been identified and further investigated in order to determine the role of social design in architecture and the role of socially conscious architecture with regards to a segregated society.

Research has been conducted through literature reviews and precedent studies. Projects selected for the precedent studies are limited to Pretoria CBD in order to ensure contextual applicability of the precedents.

To gain information a mixed method has been used, combining both qualitative and quantitative aspects. Subjective perceptions of the city have been collected through informal interviews on site.

Qualitative information produced through questioning regular users of the area identified for the study, has then been used to interpret the applicability of factual, quantifiable aspects generated through research and literature reviews.

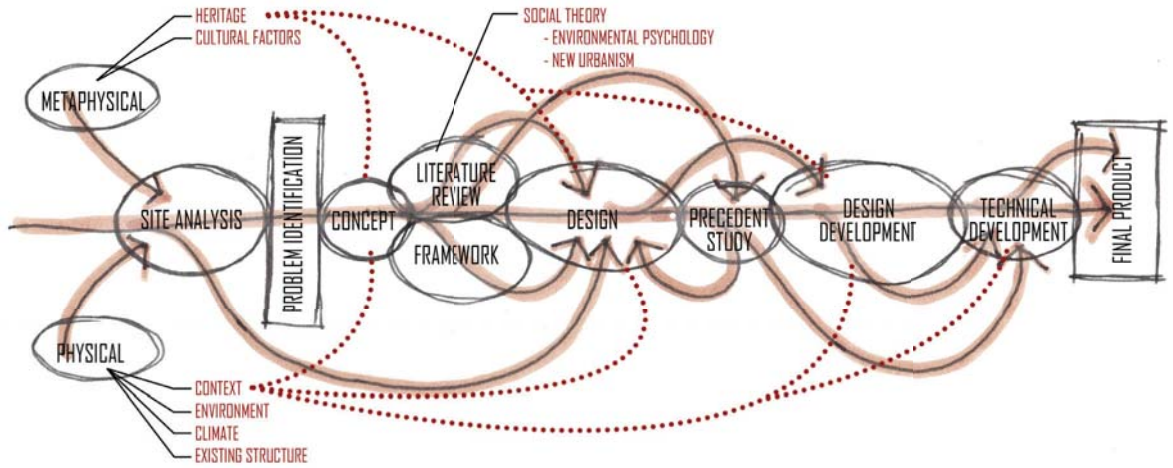


Fig. 1.7: Design process followed ruring the project

Assumptions + Delimitations

The selected site contains an existing building which does not fit or contribute to the context in which it is located. It is proposed that the current single storey building be demolished as it can be assumed that the existing structure cannot support the addition of five to six storeys as is needed within the environment.

It is accepted that the design cannot aim to reduce segregation within every sub-community housed within the city of Pretoria. The design is therefore focused on cultural integration.

The Gautrain Pretoria Station has recently been completed and is situated adjacent to the existing Pretoria Station close to the chosen site.

It is assumed that all predicted demographics in the area due to the new station are correct and that proposed improvements to public transport and distribution routes are to be followed as indicated on Gautrain plans.

Fig. 1.8: Existing building on site

Chapter 2

Reasoning and Project Justification

"The *transition* from one domain to another is a critical problem when we want to concretize a system of existential domains...We find it in nature as a straight or a pass, and on the urban level as the city gate which symbolizes the transition from nature to civilization."

Norberg-Schultz, 1971:58

Eutopia, Outopia + Entopia

Topia is Greek for place. In Greek, the word *eutopia* translates to good place and *outopia* translates to no place (Gifford, 1997: 412). The aim of design should not be to create the perfect unachievable world which *eutopia* has come to represent or be content with the lack of place and identity that *outopia* signify, but rather focus on what is real, needed and applicable. It is suggested that design rather focus on *entopia* which translates to achievable space. *Entopia* will focus on architecture of the every day, catering to real world needs of building users and addressing problems within the built environment that is unique to its place and setting.

For *entopia* to be successful it needs to be firmly grounded in creation of place, place identity and *genius loci*. The African cosmology is considered to be holistic, integrative, and anthropocentric. Humans and culture stands at the central point of African cosmology where all space is seen public except for ritualistic and private spaces (Ntuli, 2002: 54). Within the context of Pretoria, *entopia* will therefore strongly relate to social design.

Entopia lies somewhere between the ideal place and the non place – *eutopia* and *outopia* and therefore translates strongly to the in-between or liminal.

Liminal is a metaphysical or subjective state of being on the threshold (Freidus & Romero-Daza, 2009: 685). Homi Bhabha, a Professor of English and American Literature and Language at Harvard University, defines liminal space as 'in-between' space. Liminal space exists between two different states, thereby attributing transcultural, trans-geographical and transitional qualities to it (Turner, [1974]).

As a prefix, 'trans' signifies over, beyond or through. Transition space could then be defined, as space which offers all of the functions needed to facilitate movement through one area into another.

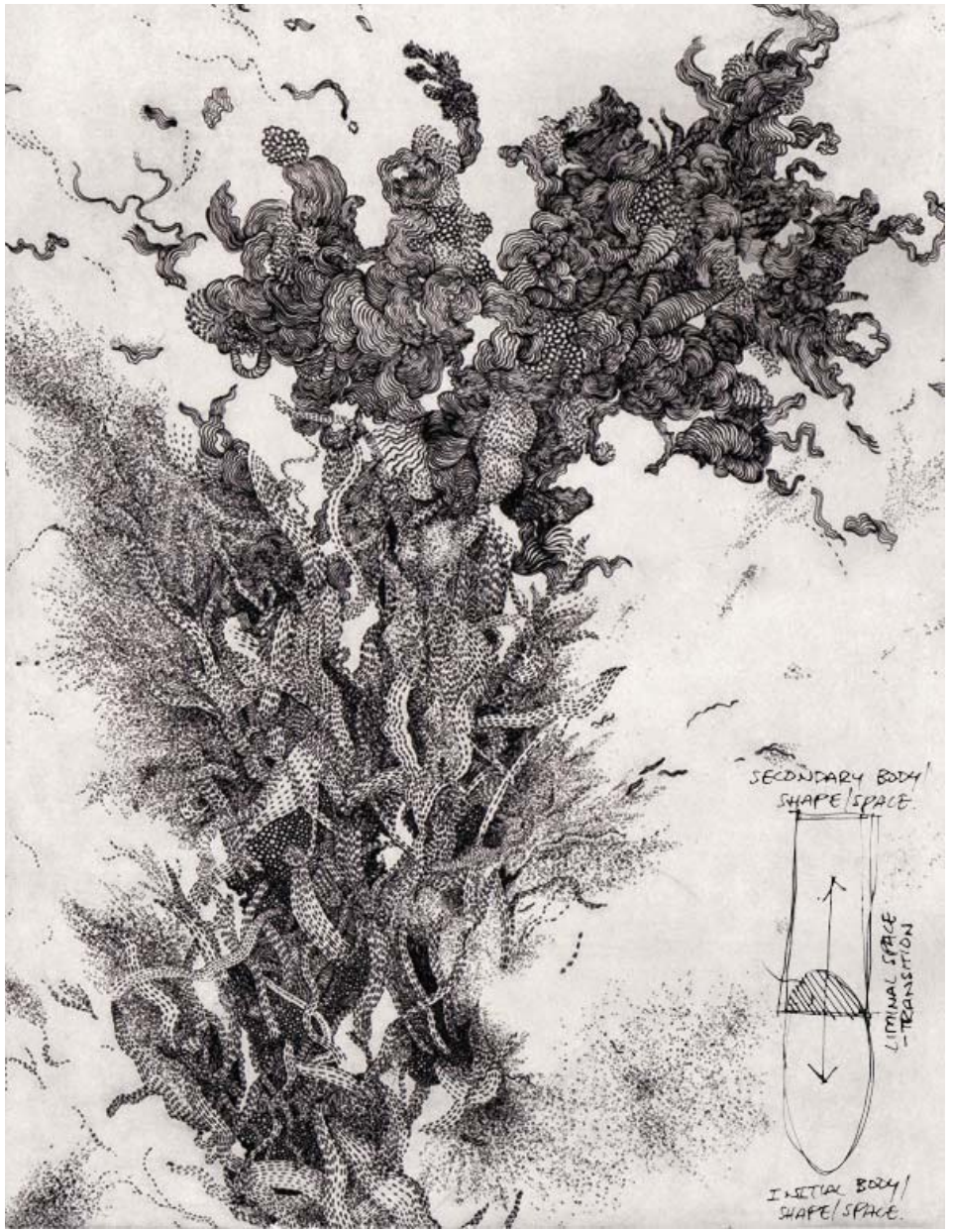


Fig. 2.1: Liminal Deploy by Karla Hackenmiller

Fig. 2.2: Liminal Deploy analysis

Choice of Program

Within the liminal space enclosed by the city boundary and inner city, including the buildings which house the different public transportation systems on the southern side of Scheiding Street, little to no auxiliary public programs are located.

At present, Pretoria Station merely houses the platforms, ticket office and restrooms serving metro rail with little consideration given to resting space, waiting rooms and secondary programs. The same is true for the new Gautrain Station, with only provision made for the actual transportation system and service spaces needed to operate it.

Other transportation services forming part of the traffic node similarly only offer the bare essential programs needed for the system to be functional, thereby forcing pedestrians within the area to re-appropriate Station Square into an urban waiting room which is unsheltered and still does not offer needed programs within the area.

The new design aims to generate a defined gateway to the city by creating a transition space with a distinct public nature which does not enclose or segregate public space from potential users. The building will therefore focus on providing everyday programs which has been neglected within the area but are needed at a threshold into and out of the city.

These programs will include: waiting rooms, tourist information, restaurants, a bar, communication facilities, a job centre, office space, adult education facilities, a reading room and overnight housing facilities focused on short term city visitors. Interaction between different programs will ensure activity levels throughout the day and well into the night.

Tourist information is needed for way finding and optimal use of the precinct with restaurants and the bar functioning as meeting space that service and activate the waiting rooms.

Educational facilities provided offer short term programs suitable for commuters or people in transition and offers a chance at improving knowledge, skills and work opportunities.

Educational programs are serviced by the office space, reading room and communication facilities where research or work can be done while waiting for transport into or out of the city and will in turn activate the job centre.

Overnight facilities are aimed at short term, low cost stay thereby complimenting the Victoria Hotel which provides expensive rooms for longer periods of visit.

Placement of the different programs will be influenced by the hierarchy of public to the progressively private nature of the programs as well as levels of contact between different users and the building resulting from different levels of transition and its associated programmatic needs.

Fig. 2.3: Existing Skyline with little attention given to gateway

Fig. 2.4: Creating a gateway

Client

The project will have both institutional and private commercial clients leading to a public/ private partnership to fund the development.

The site forms part of the Pretoria City Improvement District (CID) with the City of Tshwane as client for various key projects.

ABET and SETA are non profit, government sponsored entities catering for basic adult education and skills training. Training programs available focus on providing basic skills needed for social, economic and political participation (ABET, 2010).

Educational aspects of the building as well as non profit programs such as tourist information will be funded by the City of Tshwane and commercial spaces privately rented. Dining spaces will be rented by established restaurant chains with the Protea Group serving as main client for overnight facilities.

Problem Statement

South African society boasts an extraordinary diversity of cultures and races which after the transition to democracy in 1994 were believed to start the process of desegregation. The goal of racial harmony however remains elusive ([Bean], [2010]).

Within South African cities such as Pretoria, the slow pace of desegregation is evident, as years after apartheid, the city remains segregated amongst racial lines (Morris, 1998: 763). South-Africa continues to battle racism, with some even believing that the social condition within South African cities has worsened in comparison to the situation before the 1994 elections (Hunter-Gault, 2011).

According to Marx any medium can be used to manipulate the community to believe in a false consciousness and participate in their own oppression (White, 1987: 137). Since the false consciousness has been constructed, the reverse statement is true as well.

The built environment has a central role in the production of social life (Mueller-Friedman, 2007: 37) and can therefore form an integral part in the success of community formation and desegregation.

This document aims to investigate how architecture can facilitate and encourage social cohesion, interaction and desegregation between different people and cultures within a post apartheid environment.

Research Questions

- Can architecture facilitate social cohesion?

- What role does architecture play in community formation?

- How can architecture encourage desegregation?

- What influences the perception and experience of space?

Hypothesis

Public spaces are believed to enhance and encourage social interaction as well as strengthen social bonds while facilitating social cohesion.

It is hypothesised that by incorporating social design principles in the design process socially responsive architecture can be created that facilitates social cohesion and community formation thereby reducing cultural segregation within the city of Pretoria.

Chapter 3

Theoretical Investigation

"Rather than attempting to provide spacious gardens or solitude in search of some impossible pastoral existence, building design should encourage healthy, lively contact among neighbours"

Freedman, 1975:28

Introduction

Zorbaugh (1929: 232) states that there is no phenomenon more characteristic of urban environments, as contrasted with rural communities, than that of segregation.

This is even more evident in cities that have a history of apartheid such as Pretoria. All South African cities continue to be overwhelmed by their apartheid history (Morris, 1998: 764). The city remains segregated and social activity within the urban environment is uncommon between different groups of people. African urban environments are in desperate need of a new understanding and interpretation of the conditions concerned within an African city (Manau et al, 2005: 62).

The environment that we move and live in can completely change the way in which we behave (Cave, 1998: 1). When researching the effect that the built environment has on behavioural patterns and how people act within the social sphere, numerous theories can be referred to.

Within this chapter, two of the main theories with regards to social design within the built environment - environmental psychology and new urbanism - will be explored. The theories will be illustrated with precedents found in Post-Apartheid cities such as Pretoria and Johannesburg in an attempt to determine their applicability to the local context.

Environmental Psychology

Environmental psychology is an interdisciplinary field examining the relationship between environments and human behaviour (De Young, [1999]). The field incorporates relevant theories and methods from related fields which include architecture, psychology, sociology, anthropology, biology and ecology. Within the field of environmental psychology, the term environment is defined very broadly and incorporates all that is natural on the planet, the built environment as well as informational and learning environments (De Young, [1999]).

Gifford (1997: 1) argues that when people change their environment, it influences their behaviour and experiences. This sentiment is echoed when Stewart Brand, an American author, states "first we shape our buildings, then they shape us and then we shape them again - *ad infinitum*" (Brand, 1994: 3). Resources available within the environment may contribute or be detrimental to social interaction (Brebner, 1982: 143).

While environmental psychology might offer several principles with regard to different settings and can be applied to numerous applications, this investigation focuses on how changes within the environment directly influence social activity.

Sociofugal + Sociopetal

In his book Environmental Psychology in Building Design, Brebner (1982: 129) divides space into two categories. The terms sociofugal and sociopetal spaces are originally attributed to Humphrey Osmond (1917 - 2004) where sociofugal refers to space that isolate people within them from one another and the term sociopetal is used to describe space that encourage people to come to them and promote their interaction within them.

There is a definite role within the built environment for both sociofugal and sociopetal spaces but within an architecture that aims to promote social interaction, the characteristics of sociopetal space may prove valuable (Gifford, 1997: 115). The placement of people and how it promotes eye contact, non-verbal communication and expressive gestures along with spatial characteristics such as orientation, distance and relative height are the main attributes which determines the sociofugal or sociopetal nature of space (Brebner, 1982: 129). As an example, Humphry stated that corridors are sociofugal and that circular spaces tend to be sociopetal in nature (Gifford, 1997: 115).

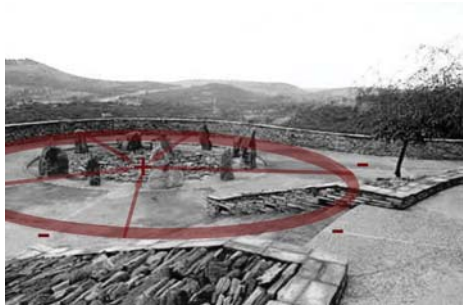


Fig. 3.1: Isivivane sociopetal space

Fig. 3.2: Isivivane sociopetal seating

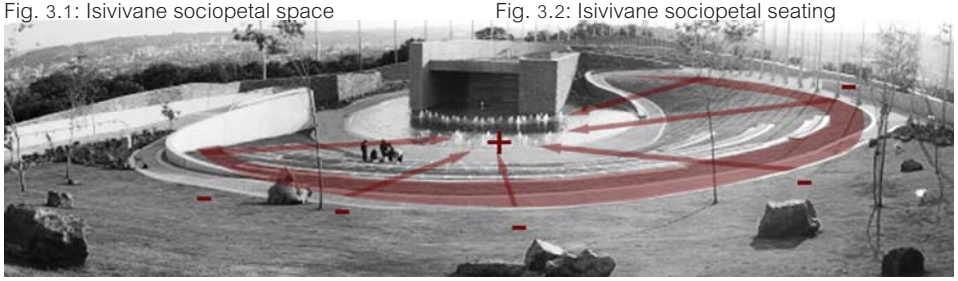


Fig. 3.3: S'khumbuto sociopetal main gathering space

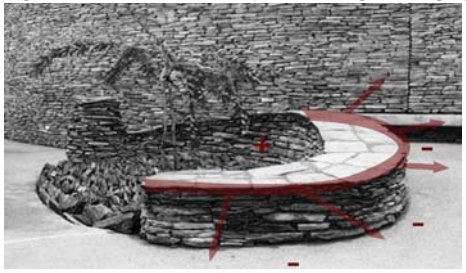


Fig. 3.4: Isivivane sociofugal seating

Fig. 3.5: Wall of names - sociofugal corridor

Fig. 3.6 : Gallery of leaders sociofugal space

Precedent

Freedom Park, Phases 1 and intermediate is located on Salvokop, Pretoria and serves to illustrate the use of sociofugal and sociopetal space within the context of Pretoria.

The project was designed by Gapp Architects in joint venture with Mma Architects, Mashabane Rose Architects and NBGM Landscape Architects.

The first phase entitled the Garden of Remembrance, makes use of sociopetal space surrounding *Isivivane* - a symbolic resting place. The circular space with surrounding sociopetal seating serves as accidental meeting space and encourages interaction, and discussion.

The second phase - *S'khumbuto* - includes the main gathering space in sociopetal arrangement as well as the wall of names and gallery of leaders, both which forms sociofugal corridors. Sociofugal space discourages social interaction when moving through the wall of names and may lead to discomfort in the gallery of leaders where in conjunction with the sociofugal nature of the corridor the roof weighs down oppressively.

Interpersonal Distances

There are numerous aspects which contribute to successful social interaction.

Based on the original theory on communication channels by Edward Hall, Gifford (1997: 97) relates four main interpersonal distances. The distances are defined as intimate distance, personal distance, social distance and public distance. The distances reflect the relationship between the participants and offer varying amounts of sensory information.

Within public environments these distances tend to be influenced by different factors including culture, fear, security and status.

The built environment plays an integral role in the perception of interpersonal distance. Examples of architectural influence on interpersonal distance include the effect of dimmer lighting, which contribute to make close distances appear uncomfortable and influence people to move further apart and narrow, wide space, which encourage closer distances between participants.

Gifford (1997: 104) further states that within a public setting, people tend to inhabit space in corners of rooms or public squares as opposed to the centre and that when the amount of physical space is low interpersonal distances increase.

As Brebner (1982: 131) notes, personal space cannot be used as a standard unit of measurement within the built environment. This is unachievable due to the changeability of interpersonal distance. Design should however, take into account acceptable distances required for successful interaction within a particular setting.

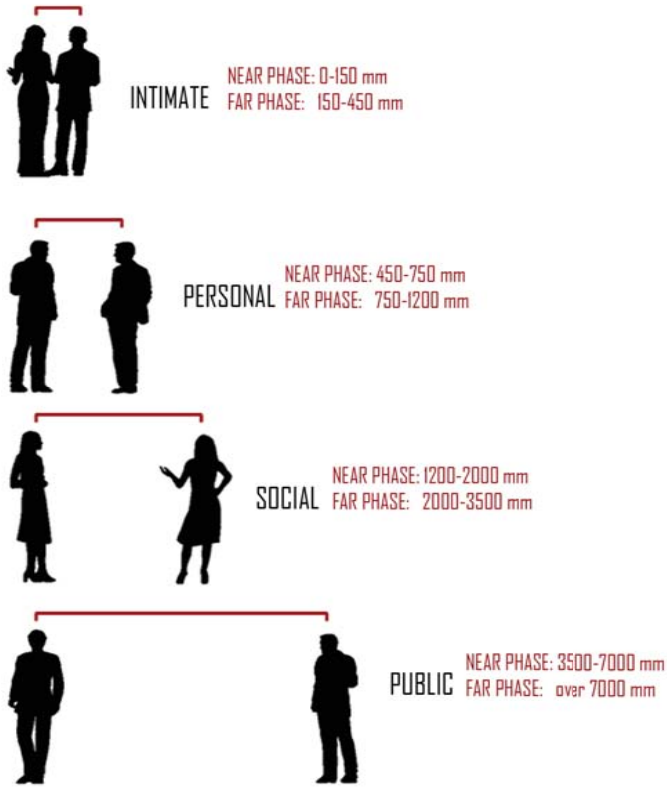


Fig. 3.7: Interpersonal distances


Fig. 3.8: Sammy Marks Square with empty central space and inhabited sides


Fig. 3.9: Empty centre


Fig. 3.10: Inhabited side


Fig. 3.11: Formal garden with empty central space and partially inhabited sides


Fig. 3.12: Urban rooms


Fig. 3.13: Urban rooms

Precedents

These principles are clearly illustrated in Sammy Marks Square situated on the corner of Church and van der Walt street, Pretoria, designed by Staunch Vorster Architects in joint venture with Uys & White Landscape Architects.

The square is a prominent public space within Pretoria CBD yet appears to be ominously empty for large portions of time. In truth the square is not empty; although the space is drastically under used, most of the users of the square remains to the side of the space with the only people to be found in the central area of the square those who move through it on route to a different location. With the amount of space available being too vast for the users to consume, interpersonal space increase thereby giving Sammy Marks square its deserted appearance.

Another example of this is Station Square, Scheiding Street, Pretoria; recently redesigned by KWP Landscape Architects. The central space of the garden remains largely empty with only the side spaces being used at regular intervals. The central part of the square is lowered with enclaves forming part of the retaining walls in the sunken sections. Apart from the side terraces, the enclaves are the most frequently used part of the space. This is representative of people's tendency to move to the corners or sides of spaces but may also be largely contributed to the subdivision of space into urban rooms.

In addition to its numerous uses, the square serves as an urban waiting room. The design of the garden, with its long, slightly narrow spaces as well as the placement of the enclaves towards the perimeter of the central space where people tend to meet, makes the design perfectly suited towards this purpose. With the lack of shade giving trees and adequate shelter however, the space allows little protection from the elements and therefore remains under utilised to a large extent.

Crowding

Research indicates that small spaces may lead to defensive withdrawal from social interaction (Brebner, 1982: 136) thereby proving the assumption that they promote intimacy and should therefore encourage interaction to be incorrect. Spaces however, may also prove to be too large and promote crowding which is detrimental to successful interaction (Brebner, 1982: 137).

Two of the main pedestrian corridors within Pretoria CBD are the axis along Paul Kruger Street linking Pretoria Station to Church Square and Church Street to the east of Church Square which is pedestrianized up to Prinsloo Street. The lack of programming and management in this section of Church Street, along with the vast amounts of people moving along this wide pedestrian corridor results in crowding, which in turn contributes negatively to perception of safety and an increase in crime activity within this area. This is true to such an extent that police officers are stationed within this area on a daily basis in order to deter negative effects caused by the mismanagement and improper use of space.

Crowding can also be witnessed along the Paul Kruger street axis just north of Scheiding Street. Crowding along this axis can largely be attributed to the lack of humanised space and the inability of the narrow sidewalk to serve the amount of pedestrians moving through the area.

Fig. 3.14: Crowding in Church Street

Fig. 3.15: Crowding in Paul Kruger Street

Fig. 3.16: Entrance to Sammy Marx Mall

Crowding refers to an individual's experience with regards to the number of people within the vicinity (Gifford, 1997: 143). The physical setting within the built environment has a direct influence on the perception of crowding. Long corridors, curved walls and living in a high-rise building have been found to promote the perception of crowding with the opposite being true with the application of higher ceilings and an increased amount of natural light within a building (Gifford, 1997: 153).

The entrance to Sammy Marx Mall to the east of Sammy Marx Square is clearly indicative of a space where architectural intervention has negated the effects of crowding. Although numerous people move along this corridor, double volume space and ample allowance of natural light successfully counteracts crowding.

Psychological Effect

Defensibility and an improved quality of space within the urban environment are stated to have a positive psychological effect on building users by heightening self-concept and self-esteem (Brebner, 1982: 145).

Psychological security and heightened quality of space results in an enhanced civic pride thereby, increased use of the public space and defensibility thereof. Spaces within the environment should be designed not to allow a stimulus overload (Brebner, 1982:141). Spaces should be easily understood and readable. The absence of readability and the presence of unexpected information tend to interrupt the smooth sense of behaviour (Brebner 1982: 28). Ambiguities, strange use of perception or duplicitous environments creates illusions and serves to illustrate the plasticity of interpretation of sensory experience thereby causing psychological distress (Zeisel, 2006: 148).

Precedent

Melrose Arch in Johannesburg serves as excellent example for harbouring civic pride. High quality space and aesthetically pleasing architectural interventions as well as readability on pedestrian level, promote usability and defensibility within this area. Unfortunately, Melrose Arch simultaneously illustrates territoriality where the space is perceived not to be accessible to all members of the public but rather reserved for the higher classes or upmarket clients.

Fig. 3.17: Melrose Arch, Johannesburg


Fig. 3.18: Streetscape activation: Scheiding Str.


Fig. 3.19: Natural resting space: Burgers Park


Fig. 3.20: Natural resting space: Church Square

Lively Communities

With regards to creating lively communities environmental psychologist Sidney Brower relates strongly to new urbanist principles. These principles include the activation of street front, providing amenities and services within walking distance, reducing the speed and number of cars and the increase of natural resting spaces that cater to different groups of people (Gifford, 1997: 239). These approaches are said to encourage walkability, social interaction, natural surveillance and safety while promoting activity. The frequency at which strangers meet and the conditions under which this occurs has a direct effect on the probability of them conversing and community formation (Brebner, 1982: 133)

New Urbanism

New Urbanism is a movement that came to fruition during the 1970's to 1980's and aims to emulate as well as modernise historic urban patterns (Ellis, 2002: 261). Historic urban patterns refer to pre-19th century urban design where as Talen (2008: 55) states, socially mixed settlements were the norm due to economic necessity.

Although the movement is highly criticized there appears to be numerous advantages to New Urbanist principles. One of the most sited advantages of New Urbanist planning is an increased sense of community and social cohesion (Kim & Kaplan, 2004: 313). In truth, it may appear that New Urbanism is fundamentally flawed in certain aspects. Principles employed by New Urbanism may appear to be nostalgic, rigid, boring and overly prescriptive (Sorkin, 2009: 185). It is possible however to implement New Urbanist theories that have already indicated positive results without ascribing to everything that the movement entails as there are numerous ways to interpret New Urbanist principles (Ellis, 2002: 262).

Where diversity within the social sphere is characterized by a mix between different races, ethnicities, income levels and ages; New Urbanism attempts to sustain social diversity through what New Urbanism practitioners would call 'good urban form' (Talen, 2008: 5). Diversity is seen as the primary generator of urban vitality due to its nature to increase interactions among multiple urban components (Talen, 2008: 35). Diversity additionally promotes economic health and fosters opportunity (Talen, 2008: 37).

Building Typology

Research indicates that building typology plays an integral role in facilitating (or impeding) social interaction.

Studies indicate that architecture based on courtyard typologies better facilitates the development of social bonds through the increased chance of casual contact. By providing an outdoor semi public courtyard, residents have a space to linger within a familiar setting thereby increasing chance of causal contacts as opposed to corridor typologies that favours flow and pedestrian traffic (Julian & David, 1995). Kim and Kaplan (2004: 333) note that higher densities may enhance social cohesion. Higher densities encourage social diversity and the use of public space (Talen, 2008: 128).

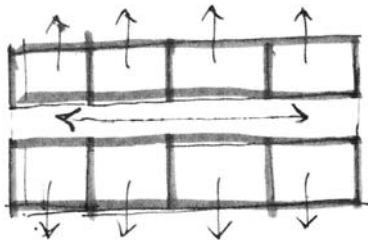


Fig. 3.21: Corridor typology

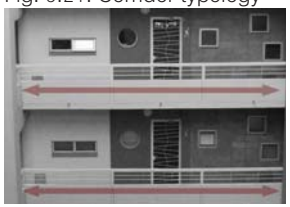


Fig. 3.22: Unicrest, Hatfield - corridor typology

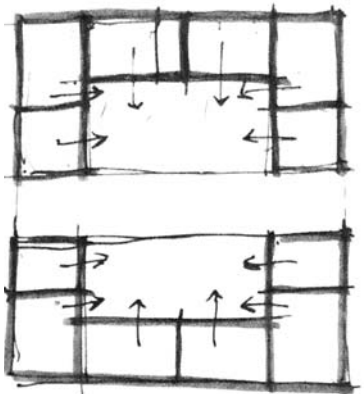


Fig. 3.23: Courtyard typology

Fig. 3.24: Apartheid Museum courtyard, Johannesburg


Fig. 3.25: Schubart Park illustrating residential blocks and courtyard

Single Use + Multi Use

According to Julian & David (1995), residents in mixed use areas are inclined to experience a greater sense of community and social cohesion. Residents in mixed use areas tend to walk between destinations as opposed to residents in single use areas whom according to study, would rather make use of vehicular transport. Julian & David (1995) deduced that increased pedestrian movement would increase chances of casual contact, thereby increasing chances of interaction between residents and a higher probability for scenarios in which social cohesion can develop.

Precedent

Schubart Park on the corner of Schubart and Vermeulen Street, Pretoria, designed by Joubert Owens and Van Niekerk, was completed in 1976.

Although now in a serious state of dilapidation, the project illustrates numerous new urbanist principles including the benefits of multi-use areas. The high-rise apartment blocks included office space, retail and a day care centre organised around a raised plinth with roof gardens and offered residents a mixed use, humanised environment where pedestrian activity enjoyed favour over vehicular modes of transport. Vehicular access to the building is completely hidden from view thereby promoting walkability.

Severe crowding became characteristic of Schubart Park, with up to 20 people living in one unit (Basemjondolo, 2008). Unfavourable living conditions in combination with years of neglect and lack of service delivery, followed by a series of fires forced the buildings to be evacuated.

The buildings are now seen as hazards that not only prove dangerous to human health but to safety as well (Stuijt, 2010). Although this may be true, the design functioned well and promoted social interaction during its lifetime.

Natural Features + Open Spaces

Natural features and open spaces plays an important role in New Urbanist theory (Kim & Kaplan, 2004: 313). In a comparative analysis to determine whether New Urbanist predictions are valid, Kim and Kaplan (2004: 331) noted that residents in a New Urbanist environment formed better social bonds. Research on what facilitated social cohesion indicated that items and spaces that closely represented the natural environment enhanced social interaction and a sense of community. Natural environments may include humanised streetscapes, footpaths or parks to name but a few. Natural environments further functions to define and connect neighbourhoods and districts thereby creating a coherent urban form (Ellis, 2002: 262).

There are numerous natural features and open spaces in Pretoria CBD. Successful open spaces within the city include Church Square, Burgers Park, and the Union Building gardens, with the area in front of the Reserve Bank along Church Street and entrance behind the Department of Public Works on the corner of Vermeulen and Bosman Street forming part of the CBD's examples of humanised streetscapes.

Although Pretoria CBD contains examples of humanised streetscapes, these spaces within the city are vastly outnumbered by streetscapes that do not encourage walkability. To a large degree, these spaces are not connected or barricaded from the public, thereby prohibiting them from forming a network. As a result these spaces do not define or connect neighbourhoods and districts as New Urbanists propose and contribute to non coherent urban form.


Fig. 3.26: Church Square


Fig. 3.27: Reserve Bank garden


Fig. 3.27: Paul Kruger axis


Fig. 3.28: Department of Public Works entrance


Fig. 3.29: Scheiding Street taxi rank


Fig. 3.30: Bloed Street taxi rank

Fostering Pedestrianism

Urban landscapes have been noted to be hostile to pedestrians (Ellis, 2002: 265). According to Kim and Kaplan (2004: 317) a sense of community may be enhanced where the community has access to needed services within easy walking distance. It is further noted that adequate public transport systems may also encourage social cohesion. It can be deducted, as has been done by numerous social theorists, that a dependency on privatised motor transport reduces the chance of social interaction and is one of the main attributes to the lack of social cohesion in numerous cities (Julian & David, 1995). The New Urbanist ideal of fostering pedestrianism further translates into pedestrian scale streets and street side activity. Kim and Kaplan (2004: 317) states that humanised streetscapes may make residents comfortable enough to interact socially and participate in street side activity. Increased importance with regards to pedestrianising would further entail the discreet placement of garages and parking spaces to avoid vehicular dominated environments (Ellis, 2002: 262).

According to New Urbanist theory, street side activity results from walkable cityscapes with access to needed services. Street side activity within Pretoria, rather stems from the lack of needed services within the area and entrepreneurial possibilities resulting in an abundance of informal trading stalls. This is illustrated where vendors erect stalls supplying fresh produce and food close to transportation nodes such as the taxi ranks in both Bloed and Scheiding Street. Informal trading stalls, in accordance with new urbanist theory, serves as spaces where social interaction occur spontaneously.

Accessibility + Proximity

Where access and attachment to valued spaces has been severed residents develop feelings of alienation and distress (Ellis, 2002: 266). It can therefore be stated that public open spaces need to be highly accessible.

Increased use of parks and open spaces has been noted where they are open to the streets (Kim & Kaplan, 2004: 335). Ball-Rokeach, et al (2001: 397) notes that the layout of public space as well as the proximity of social and civic buildings has a direct influence on the use of public space. Connections to community organisations can directly enhance perceived levels of belonging and interaction (Ball-Rokeach, et al, 2001: 397).

Barnett, Krieger and Saunders (2009: 106) are of the opinion that by ignoring the civic component of urbanism, sidewalks and public spaces are merely utilitarian places that only serve to provide passage, light and air.

Freedom Park within Pretoria is a civic space that received high levels of press during recent years. The civic space is however separated from the city and major pedestrian corridors by barriers which discourage pedestrian activity to the park.

The location of this iconic national public space, prohibits it to fulfil its function optimally which is “to act as memorial of South Africa’s pre-colonial, colonial, apartheid, and post-apartheid history and heritage” (Freedom Park, [2011]) since access to the site is limited. The community receives limited benefit from inaccessible civic space.

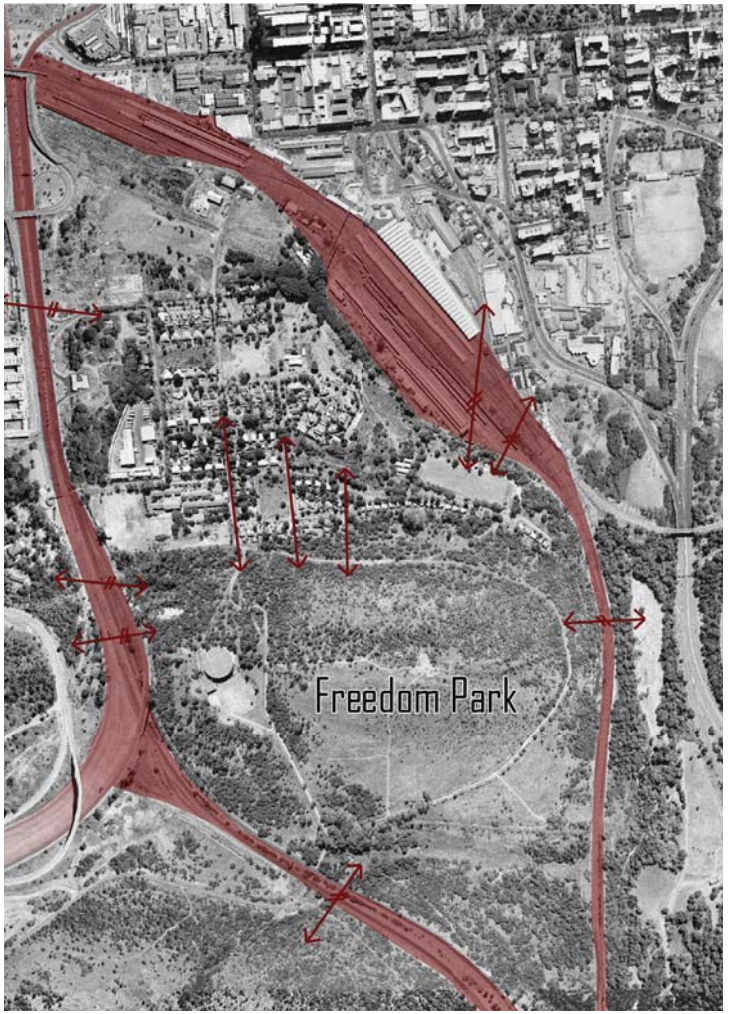


Fig. 3.31: Freedom Park aerial view

Conclusion

Social design is not always needed in the design process...[such as] where everyone works together in a time-tested architecture. These traditions, called preindustrial vernacular, evolved an architecture that already fits community and cultural norms, individual interests, local climate, geography and materials quite well (Gifford, 1997: 384).

After Apartheid the social and cultural norms within South African cities have changed. The way that architecture and the urban environment is approached however, has to a large extent remained the same.

Urban practices in South Africa are having difficulty in living up to new sets of social and cultural needs. This can be seen in current ways of approaching urban problems as they bear sad testimony to the identity crisis found in African cities that reflect outdated thinking based on a historic and biased assessment of what is acceptable and needed within a city (Dewar, 2004: 40). Dewar further states that institutional mechanisms developed during the organization of the struggle during apartheid have not adapted well to becoming mechanisms for development (Dewar, 1998).

The preindustrial vernacular, although still applicable to elements such as climate, geography and materials, has been lost and needs to be re-investigated in order to facilitate the new paradigm – that of a post apartheid environment where integration is preferred over segregation.

The precedents discussed illustrates that the city contains a large amount of social design principles and elements. Nevertheless, by employing these design interventions inappropriately and in isolation within the city, the advantages of social design do not manifest within the local urban environment.

By applying social design principles identified within the theoretical investigation correctly and in combination with one another, socially conscious architecture and urban environments can be created. Spaces that incorporate social design principles will fit the new paradigm by promoting integration and desegregation.

This is achieved through architectural facilitation of social cohesion and community formation by creating space that is active and vibrant where people are inclined to spend more time thereby increasing the possibility of community formation through accidental meeting.

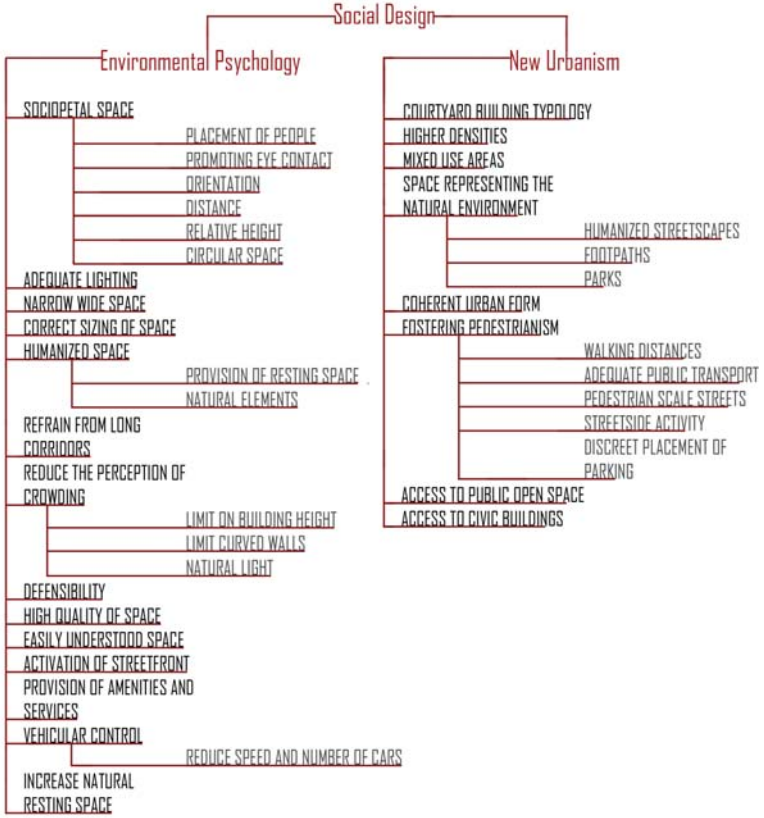


Fig. 3.32: Social design principles

Chapter 4

Framework

Location

The precinct which is to serve as urban laboratory for the study is situated within Pretoria CBD. The precinct is located within the boundaries created by Skinner Street to the north, Nelson Mandela drive on the east, Pretoria Station to the south and Potgieter street on the west. The proposed Burgers Park Framework (BPF) focuses on the identified precinct and serves to inform design decisions on an urban level.

Identity

The Burgers Park precinct is contradictory in character. To the eastern side of the area, centred around Burgers Park, the precinct is quiet and mainly residential. This is juxtaposed with the western side of the precinct where commercial activity is focussed along the Paul Kruger axis with transportation activities to the south and cultural activities to the north.

Even though building use on the eastern side of the precinct being focussed on residential development, the area consists largely of mixed use buildings. The area includes civic and cultural functions within walking distance such as churches, clinics, museums, government buildings and educational facilities which all contributes to its diverse environment.

The alignment of the transportation node with Church Square and the Paul Kruger Street axis leads to the formation of an important gateway where the axis nears the station. Due to the transportation node, the gateway (though currently not expressed through architecture) and axis ensures activity throughout the day and a continuous stream of pedestrians.

With high levels of pedestrian movement and numerous existing residential developments situated within the area, twenty four hour activity within the Burgers Park precinct is likely to be successful.

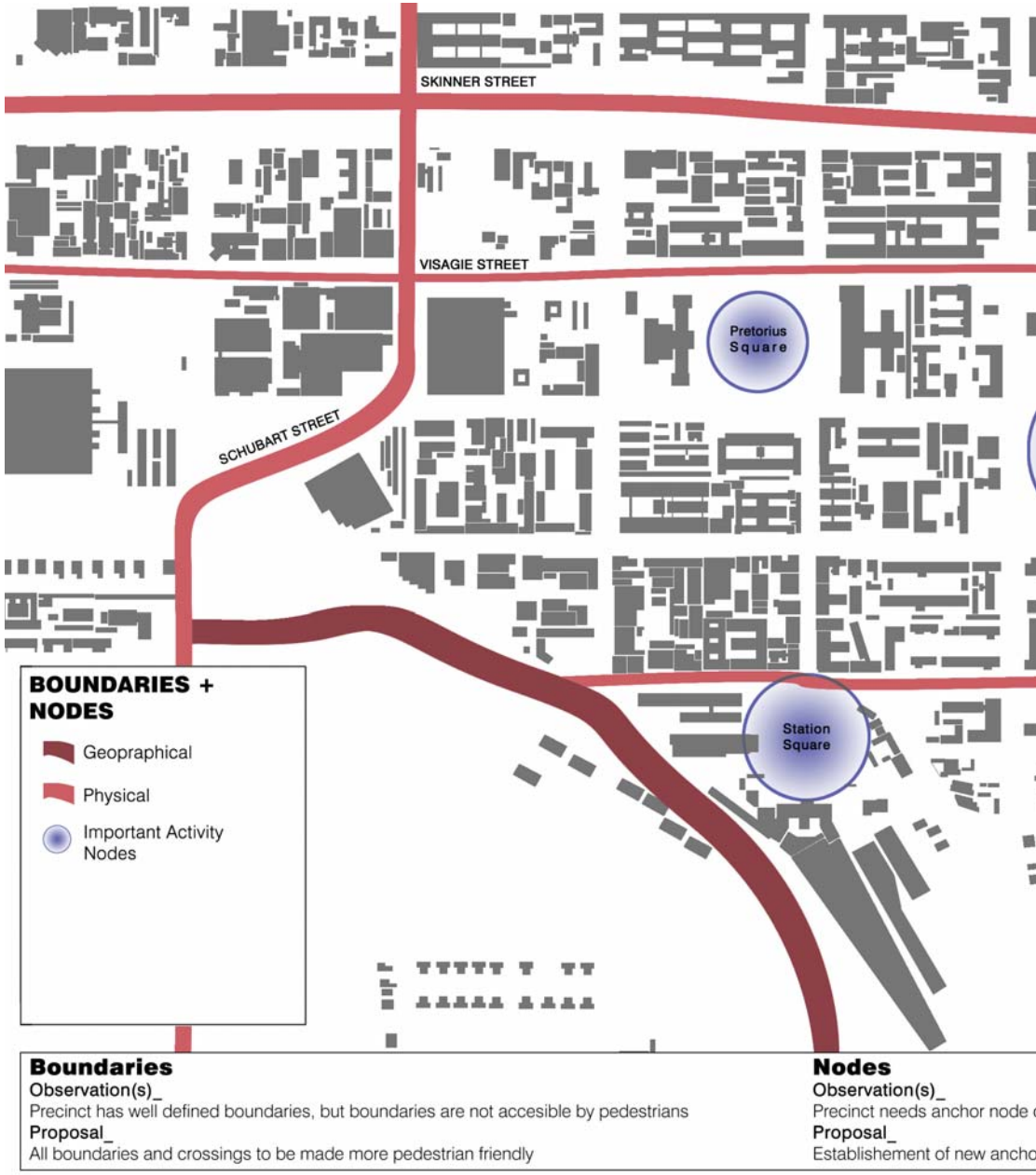


Fig. 4.1: Precinct analysis: boundaries + nodes


Fig. 4.2: Pretoria Station

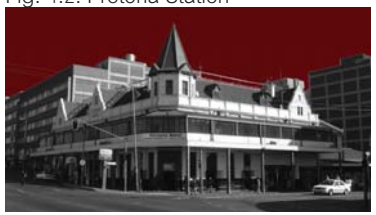


Fig. 4.3: Victoria Hotel


Fig.4.4: City Hall


Fig. 4.5: Pretorius Square with Transvaal Museum


Fig. 4.6: Burgers Park


Fig. 4.7: Melrose House

Attractions

Numerous attractions and destinations are located within the precinct. These include, Freedom Park and the Salvokop Village (which although not included within the precinct adds to the genius loci of the area and can be reached on foot), Pretoria Station, the Blue Train, the Victoria Hotel and the Museum Park district.

The Museum Park district is situated within the BPF and contributes to the identity and vision for the area. The Museum Park redevelopment program was established in 1995, and was based on the Smithsonian Institute in Washington D.C., United States of America (Krige & Van der Waal, 1995: 2). The Redevelopment program aimed at linking the different museums to form an identifiable whole while creating an environment where museums can spill into the city enhancing urban experience, tourism and educational potential (Krige & Van der Waal, 1995: 26).

The area identified as Museum Park is defined by Visagie street on the north, Van der Walt street on the east, Minnaar Street on the south and Schubart street on the west. Museum Park includes the National cultural history museum, City hall, Pretorius Square, the Museum of natural history (Transvaal Museum), Burger's park and Melrose house.

Fig. 4.8: Museum Park district

Problem

The Burgers Park precinct is faced with unique problems within the urban area and plays a critical role within the urban context of Pretoria CBD.

Pedestrian Movement

The area concerned with the BPF serves as transitional zone and gateway for pedestrians and commuters moving to and from the CBD by train, Gautrain, bus and taxi. Due to the concentration of public transport modes at this entrance to the city, the area is characterised by high levels of pedestrian movement. The area however, does not meet the needs of people moving through the precinct and is evident where vehicular transport currently surmounts the importance of pedestrian movement. Sidewalks along the Paul Kruger axis are too narrow to handle the amount of pedestrians moving through the area and does not contribute to interactive streetscapes or humanised environments as is needed in high pedestrian areas.

Fragmented Identity

The Burgers Park precinct does not form a coherent, legible whole but is characterised by a fragmented identity. The traffic node on the southern perimeter, residential area to the east and Museum Park district to the centre of the precinct are in contest due to the lack of a unifying element. The undeveloped identity in the area leads to the perception that the Burgers Park precinct is a transitional space and not as a destination where undefined gateways serve as weak introduction to the city.

Minnaar Street

Minnaar Street is central to the precinct and the main axis through Museum Park. With only the northern side of the street developed for pedestrian use the street actively turns its back on the rest of the precinct. On a smaller scale, problems can be identified within the museum park district itself.

Although the National Cultural History Museum forms part of the Museum Park development, the museum cannot be accessed through Minnaar Street which forms the main spine for Museum Park. Numerous barriers and accessibility problems with regards to cultural spaces and buildings can be found along the Minnaar Street axis, preferring rather to close off public space.

Activities do not extend beyond the cul-de-sac at the western end of Minnaar Street, resulting in the reduction of pedestrian activity beyond Bosman Street and the isolation of the precinct.

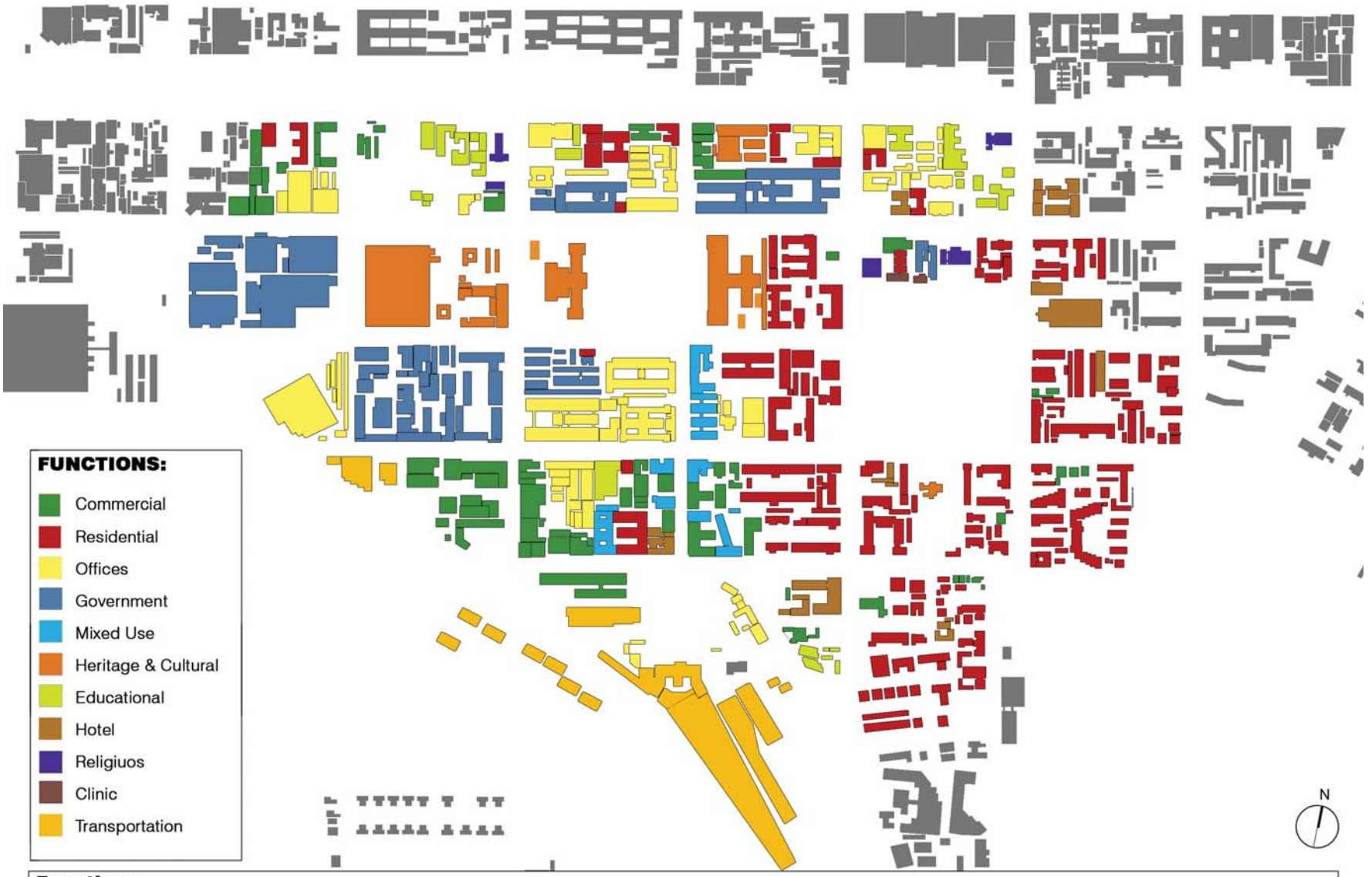
Public Buildings

With the addition of the Gautrain to the precinct, the lack of tourist infrastructure and building interface becomes increasingly problematic.

The Gautrain is estimated to be used by more than 55 000 people on a daily basis and will encourage tourism as well as pedestrian use. Pedestrian links will therefore need to be upgraded as well as the addition of new tourist infrastructure and the revitalisation of existing tourism resources.

The area is characterised by a lack of precinct specific and appropriate community functions such as public facilities, restaurants, shops and services for example tourist information. The existing public buildings within the precinct do not interact adequately with the street and the cultural facilities such as museums appear neglected and unfrequented.

Fig. 4.9: Analysis_1: strengths weaknesses and threats



Functions
Observation(s)_
Very good mixed use characteristic per city block within precinct. Lack of community functions. Existing museum buildings do not function optimally.
Proposal_
Introduction of more mixed use functions per individual buildings. Reconsider community functions within precinct as well as museum functionings.

Fig. 4.10: Building functions within the area

Public Space Network

Observation(s)_

Well established public space network, but lacks complexity and all spaces are not fully integrated and amalgamated with daily life

Proposal_

Introduction of a more intricate spatial network with a hierarchy of public spaces. Existing spaces to be made more accessible by removal of boundaries

Fig. 4.11: Public space network

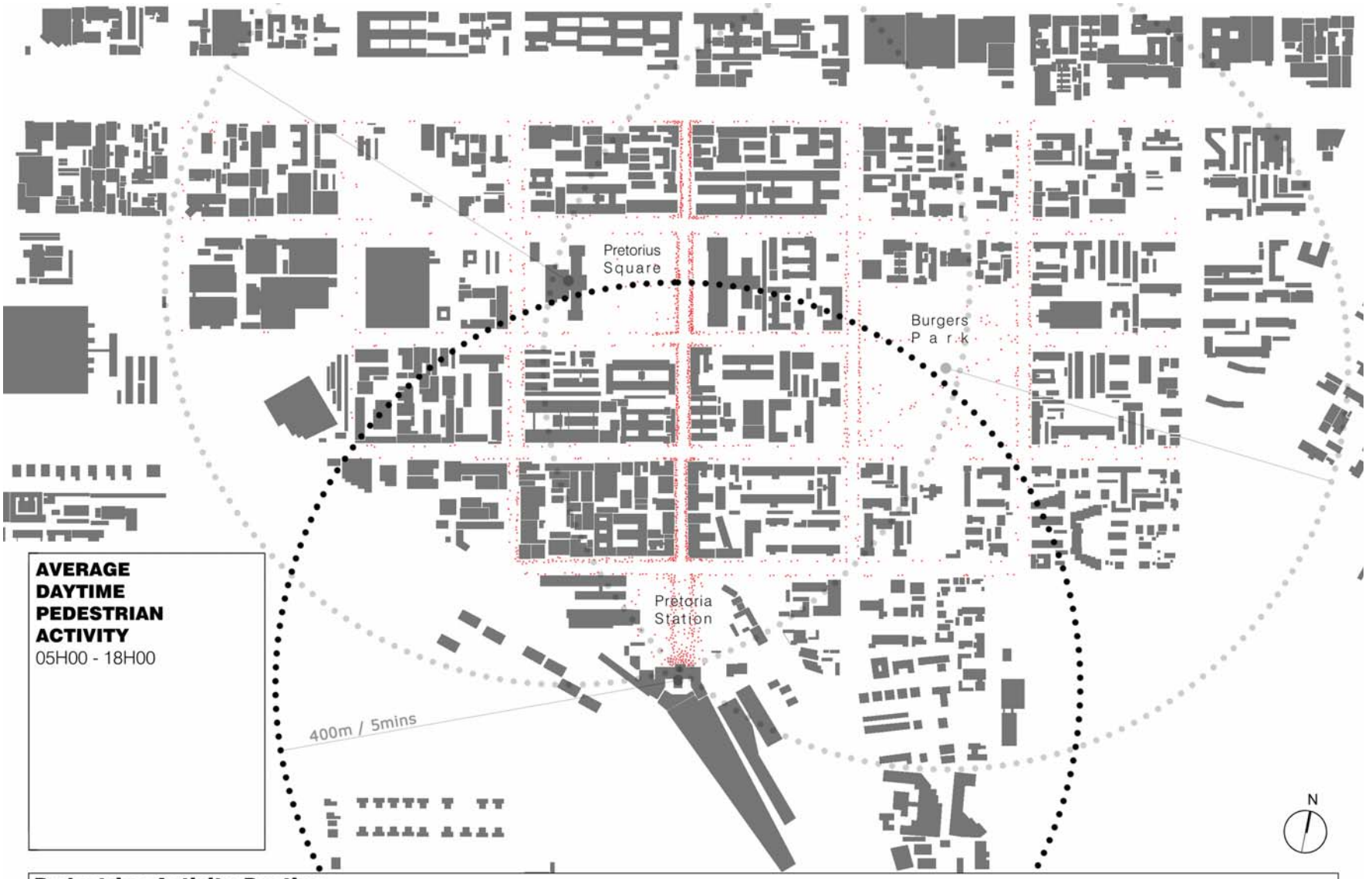


Fig. 4.12: Average daytime pedestrian activity

Fig. 4.13: Average night time pedestrian activity

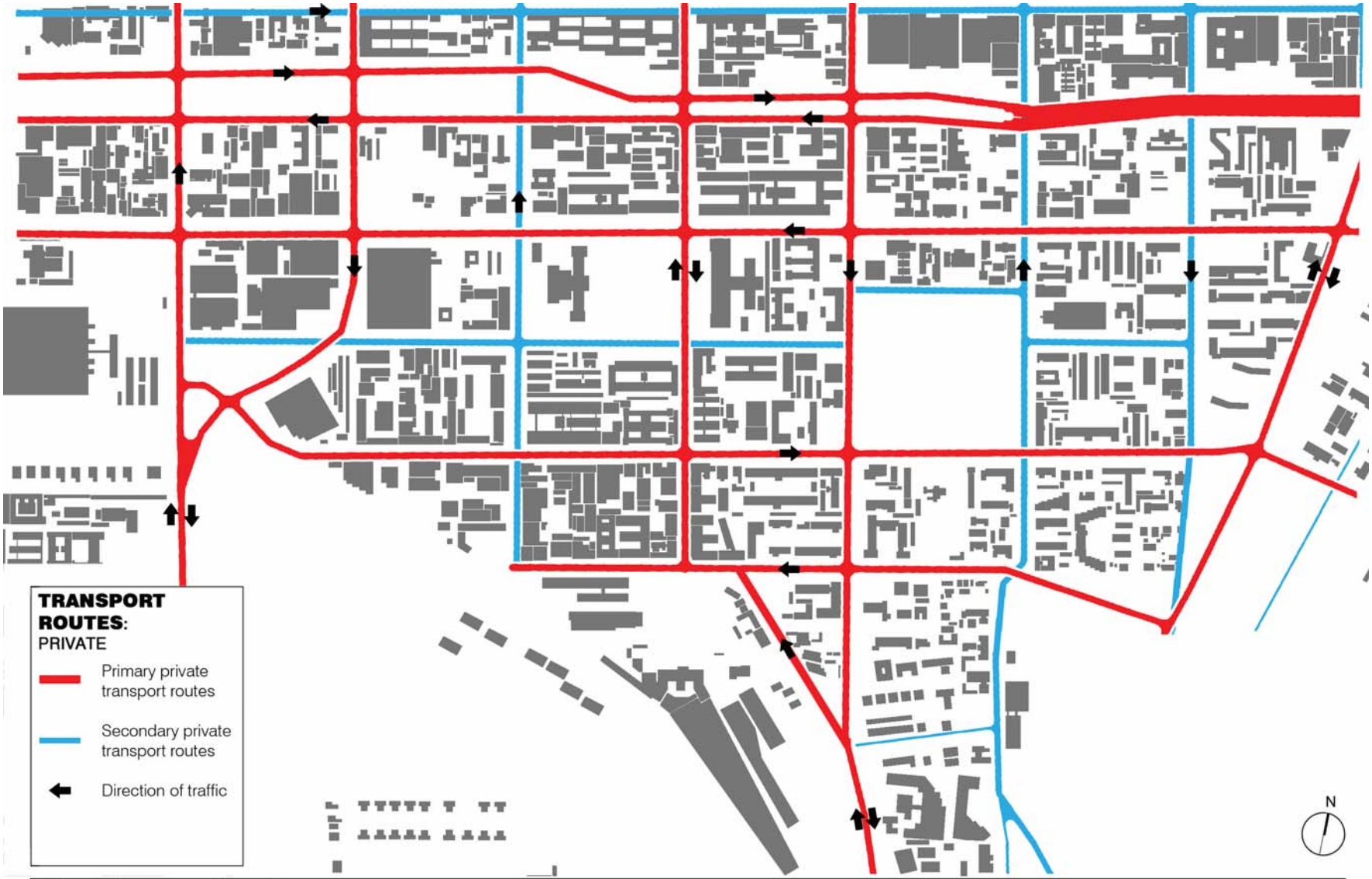


Fig. 4.14: Vehicular transportation routes

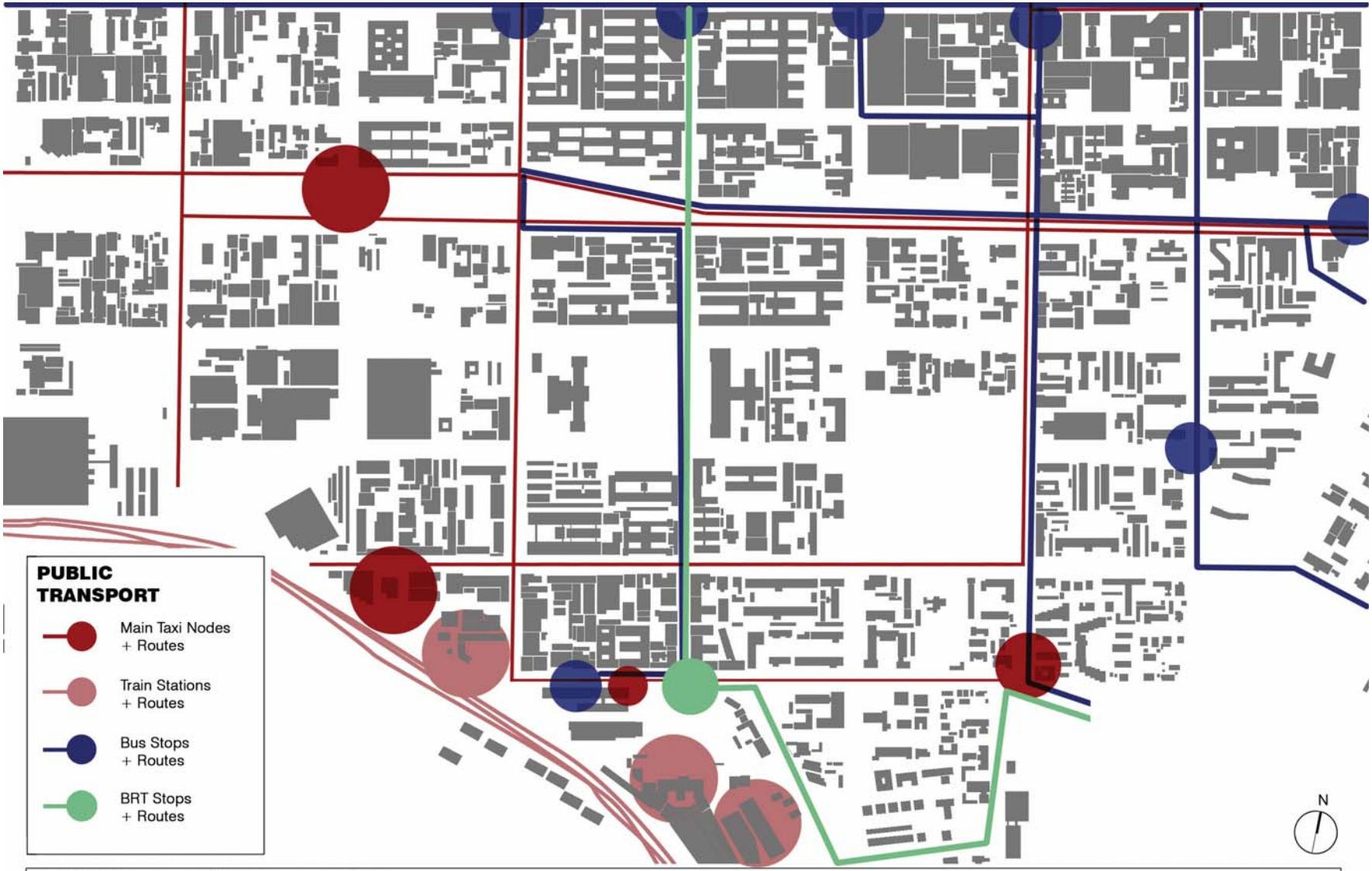


Fig. 4.15: Public transportation routes + nodes

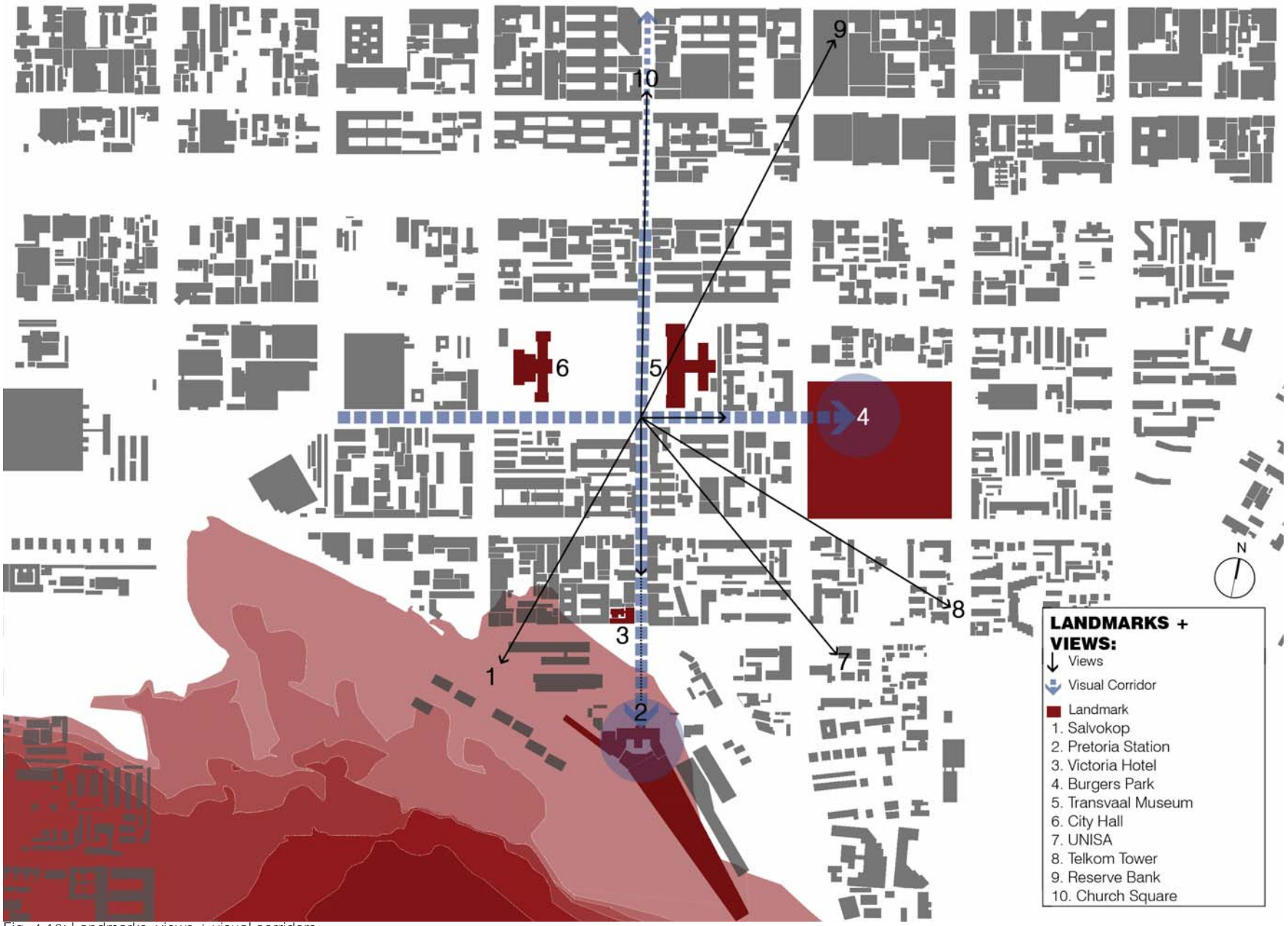


Fig. 4.16: Landmarks, views + visual corridors

Fig. 4.17: Analysis_2: opportunities

Target Group

The BPF focuses on three groups of people. The framework focuses on tourists, people moving through the precinct in order to get to a different location and people making use of the area itself.

Tourists include people visiting the city, Citizens of Tshwane visiting the area unfamiliar with the environment and educational groups such as school fieldtrips. People moving through the area will include commuters who are either moving to a destination deeper within the city, or making their way to Pretoria Station in order to leave the city. Lastly the third group will include people who currently reside within the area, workers who make a living within the Burgers Park precinct and locals to the area.

Vision + Aims

The BPF aims to establish the identity of the precinct by consolidating the fragmented identity currently within the study area. The museum district should not be isolated within the precinct but should rather be linked with the mixed use environment surrounding it as well as the residential area and the transportation node to the south.

Due to the location and dominance of the transport node, pedestrian movement within the precinct should enjoy higher levels of attention with regards to movement routes, crossings and street side activity. Environments should be safe and secure for use by tenants, commuters and visitors. Twenty four hour activity should be promoted where well defined public space, civic buildings, building interface and social interaction is of the utmost importance.

The BPF aims to create an environment which attracts museum and art education institutes, thereby facilitating the relocation of all museums in Pretoria to Museum Park and the Burgers Park precinct. In order to achieve this, museums need to play a bigger role in the public realm by making the spaces physically more accessible, or by associating the museum with public programmes. By attaching public programmes such as restaurants, after school care and children participation educational centres to museums it is hypothesised that these cultural spaces may be perceived to be more accessible and open to users.

Framework Proposal

The guidelines for the urban framework are based on the theories of Kevin Lynch and New Urbanism. Additionally the framework was informed by mapping done within the area, the target groups as well as the vision and aims for the precinct.

The BPF propose the establishment of the Burgers Park precinct as a pedestrian based environment with the facilitation of pedestrian crossings at every intersection. Pedestrian interventions will be focussed along the Paul Kruger axis connecting Pretoria Station in the south with the rest of the CBD to the north as well as the Minnaar Street axis that links the east and western extremes of the precinct.

The Minnaar Street axis will be completed by providing a new cultural node at the western end of Minnaar Street which is to be highly public in nature and should incorporate cultural programs and public green space. The existing Government printers are to be adapted to be a working museum with a permeable interface toward the south thereby linking it with the new node. The Pretoria Art Museum which is currently situated on Schoeman Street will be moved to new facilities provided along the edge of the node.

The east-west axis will be articulated by developing the southern side of Minnaar Street as well as continuing the line of trees to the western extreme of the axis. All public buildings along this axis are to be orientated with the main entrance along Minnaar Street as well as the placement of new cultural and civic buildings in order to increase activity within the area.

The north-south axis will be articulated and pedestrianized by widening the sidewalk and creating a boulevard in accordance with the Re Kgabisa Tshwane framework allowing for the incorporation of natural elements and a generous flow of pedestrians. Plant species are to be regulated in order not to spoil the existing visual axis to Pretoria Station. A new gateway is to be designed at the corner of Paul Kruger and Scheiding Street thereby articulating the entrance to the city.

All buildings along the axes are to have public programs at ground floor. Existing cultural and historical buildings (City Hall, National History museum, Natural Cultural museum, Victoria hotel and Melrose House) must be adapted to include or reinforce public functions.

Hope Street and Christina Avenue – currently mere alleyways – have been identified to become pedestrianized arcades connecting Scheiding and Jacob Mare Street with Christina Avenue extended as a pedestrian link into Minnaar Street. The surrounding buildings are to be densified and to respond to the arcades in program and typology, thereby making these currently unused areas safe for pedestrian use.

Urban Problems
Identified within the Study Area

1. Minnaar street termination
Poor spatial beginning for prominent road within precinct

2. Minnaar street / Schubart street intersection
Dangerous for pedestrians and unarticulated

3. Crossings within precinct
Orientated towards vehicular use

4. Current museum buildings
Severely underutilised and neglected

5. Palisade fences and brick walls
Prevents urban and pedestrian amalgamation of space

6. Underutilized and vacant lots
Degrades urban character of precinct

7. Taxis along Jacob Mare street
Creates dangerous urban edge to street

8. Government Buildings
All government, office and institutional buildings to have public interface ground floors

9. Block thoroughfares
Poorly defined and severely under utilized arcades

10. Pretorius square
Poorly functioning public space - no established hierarchy

11. Pretorius square / Paul Kruger street edge
Edge not defined - public space bleeds into street

12. Paul Kruger street
Street and edges need revision in order to improve pedestrian environment

13. Informal off-street parking
Street edge definition and pedestrian environment compromised

14. Buildings close to Pretoria Station
Densities too low to accommodate increased economic activities from Gautrain

15. Pretoria Station crossing
Dangerous for pedestrians and unarticulated - lacks "gateway" to precinct

Fig. 4.18: Urban problems identified within the study area

Interventions + Opportunities

1. Minnaar street termination
New civic space and anchor node to be established
Post office building to be demolished and relocated to Post office precinct west of Potgieter stree

2. Minnaar street / Schubart street intersection
Crossing to be articulated and made highly pedestrian orientatec

3. Crossings within precinct
Articulated and orientated towards pedestrian use

4. Existing museum buildings
Museums to be fully refurbished and modernised.
What is exhibited needs to be showcased and propagated to the public

5. Palisade fences and brick walls
Boundaries to be removed to allow for better spatial utilisation and amalgamatior

6. Taxis along Jacob Mare street
To be accommodated in newly developed taxi rank south of Jacob Mare stree

7. Government Buildings
All government, office and institutional buildings to have public interface ground floors

8. Block thoroughfares
Connection between city, pedestrian and public space need to be considerec

9. Pretorius square
Square to be programmed and hierarchy to be introducec

10. Pretorius square / Paul Kruger street edge
Edge to be articulated and densifiec

11. Informal off-street parking
Parking to be landscaped and formalized in order to improve identity and character of precinc

12. Buildings close to Pretoria Station
Replacing existing low-rise structures with high density mixed use buildings

13. Pretoria Station crossing
Crossing to be articulated and made highly pedestrian orientatec
Establishment of gateway necessary

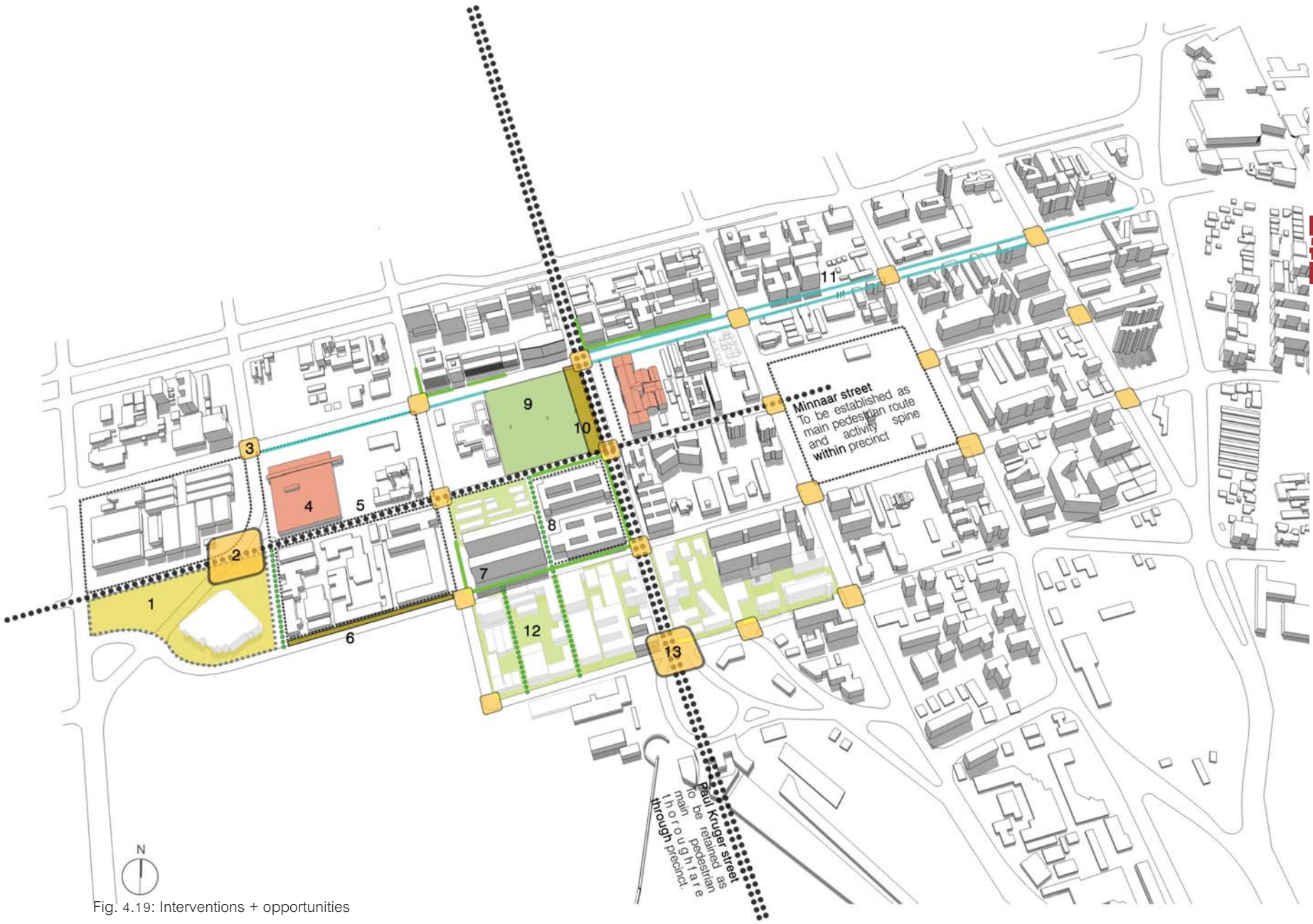


Fig. 4.19: Interventions + opportunities

Urban Design
Proposal for the Precinct

1. Minnaar street termination
Creation of a new pedestrianised anchor node. The node will include new landscaped areas as well as new cultural facilities.

2. Relocation
New site for the relocation of the Pretoria Art Gallery.

3. Reprogram
Government Printers to be reprogrammed in order to interact with the new node as well as gain museum / educational functions.

4. Minnaar street / Schubart street intersection
Crossing to be paved in order to facilitate a change in texture as well as level. Current termination of Minaar Street to be non-mountable.

5. Crossings within precinct
Crossing to be paved in order to facilitate a change in texture as well as level in order to indicate the predominance of pedestrian use.

6. Paul Kruger street
Sidewalks along Paul Kruger Street to be extended by one lane on each side in order to better facilitate informal trade as well as flow along the Paul Kruger axis. Boulevard to be created through the addition of a pedestrianised island in the middle of the road in accordance with the Re Kgabisa Tshwane framework. Landscaping to be dealt with as appropriate.

7. Block thoroughfares
Thoroughfares to be articulated as arcades. Building interfaces and landscape to be dealt with as appropriate.

8. BRT Station
Proposed BRT Station to be moved north one city block.

9. Buildings close to Pretoria Station Western block
Building densities to be increased and reprogrammed as mixed use high density development. Perimeter blocks to define street edge with a building height of 5-10 storeys.

10. Buildings close to Pretoria Station Eastern block
Building densities to be increased and reprogrammed as mixed use high density development. Buildings above 5 storeys to be considered for adaptive re-use.

11. Pretoria Station crossing
Crossing of Scheiding Street to be adapted as to facilitate high levels of pedestrian movement.

12. New cultural / civic building
Existing structures to be demolished and underutalised site to be developed. Program to be cultural / civic based and highly public in nature. Building height to be between 7 and 9 storeys. Public parking to be included.

13. Vacant / underutalised lots
Vacant sites to be developed. Buildings to be highly public in nature with the building height in accordance with existing built fabric.

14. Melrose House
Bicycle rental facilities to be provided.

Fig. 4.20: Urban design proposal for the precinct

Response to Framework

The project is informed by the framework by responding directly to various problems identified within the study area.

During the framework development it became evident that the establishment of a gateway is necessary at the corner of Paul Kruger and Scheiding Street which is achieved through the new urban transition space.

The design additionally responds to the framework with regards to Paul Kruger and Scheiding Street by broadening the sidewalk along Paul Kuger Street to facilitate informal trade and pedestrian flow. In contrary to the framework a boulevard, which has been proposed by the framework, has not been created in order to retain the visual corridor along Paul Kuger Street to facilitate exit from the city.

Pedestrian movement over Scheiding Street is facilitated in accordance with the proposed framework as well as a re-evaluation with regards to appropriate building height.

Selected sites

The various designs developed within the new framework relates strongly to one another with regards to the nature of the projects.

All new projects are public in nature and aims to promote and establish the pedestrian nature of the precinct.

Additionally all new projects identified relates to context and site location on order to determine the correct programmatic response.

1. Heinrich Olckers
Urban transition space

2. Deirdre Marais
Dance studio and community centre

3. Alexia Philippou
Art museum

4. Gavin Williams
Library

5. George F. Pieterse
Museum of typography

6. Isabel van Wyk
Cultural centre for architecture and planning

Fig. 4.21: Selected sites within the precinct

Chapter 5

Fig. 5.1: Site location

Context

The Site selected for the scheme is situated at the corner of Paul Kruger and Scheiding Street and forms part of the Burgers Park precinct within Pretoria CBD. The site forms part of a mixed use area and is identified as a potential gateway to the city that is currently neglected within the precinct.

Site
(corner of Paul Kruger and Scheiding Street)

Climate

The Pretoria CBD is classified as a temperate interior zone (South African National Standard, 2008). This zone is characterised by warm summer temperatures and relatively cold winters.

Pretoria winds are calm and moves predominantly in a north easterly direction in the morning and south easterly direction in the afternoon (Wegelin, 2009: 129).

Pretoria has high levels of direct sunlight and a low amount of cloud cover with an average relative humidity ranging between 29 and 75% (BBC, 2011)

Axis + Transport

The area of investigation forms part of the Paul Kruger axis which links the Pretoria Zoological Gardens to Church Square and Church Square to Pretoria station where the axis culminates in a transportation node.

The transportation node includes the metro train station, the new Gautrain main station, a major taxi node as well as long distance and short distance busses. The area is therefore characterised by high levels of pedestrian movement.

Historical Consideration

The Burgers Park precinct contains numerous buildings and heritage sites with historical value of which three can be found within close proximity to the site. These sites include Pretoria Station, Station Square and the Victoria Hotel which should all be taken into consideration when designing on the selected site.

Pretoria Station + Station Square

The initial station buildings were constructed during 1892 as part of the NZASM (Nederlandsch Zuid-Afrikaansche Spoorweg Maatschappij) plan to connect Pretoria with Delagoa Bay (now named Maputu).

Due to the topography of the site, the railway lines could not fit into the orientation of the city blocks which led to the railway as well as the initial station buildings to be built diagonal to Scheiding Street. The open area formed by the diagonal was later to be developed into Station Square (le Roux, 1993: 27).

The current Pretoria Station building was designed by Sir Herbert Baker in 1908 (le Roux, 1993: 27). On 19 February 2001 the station was set on fire by angered commuters which caused the destruction of the clock tower as well as the entire roof structure. Renovations to the building started in June 2001 and were completed during February 2002 (Davie, 2002).

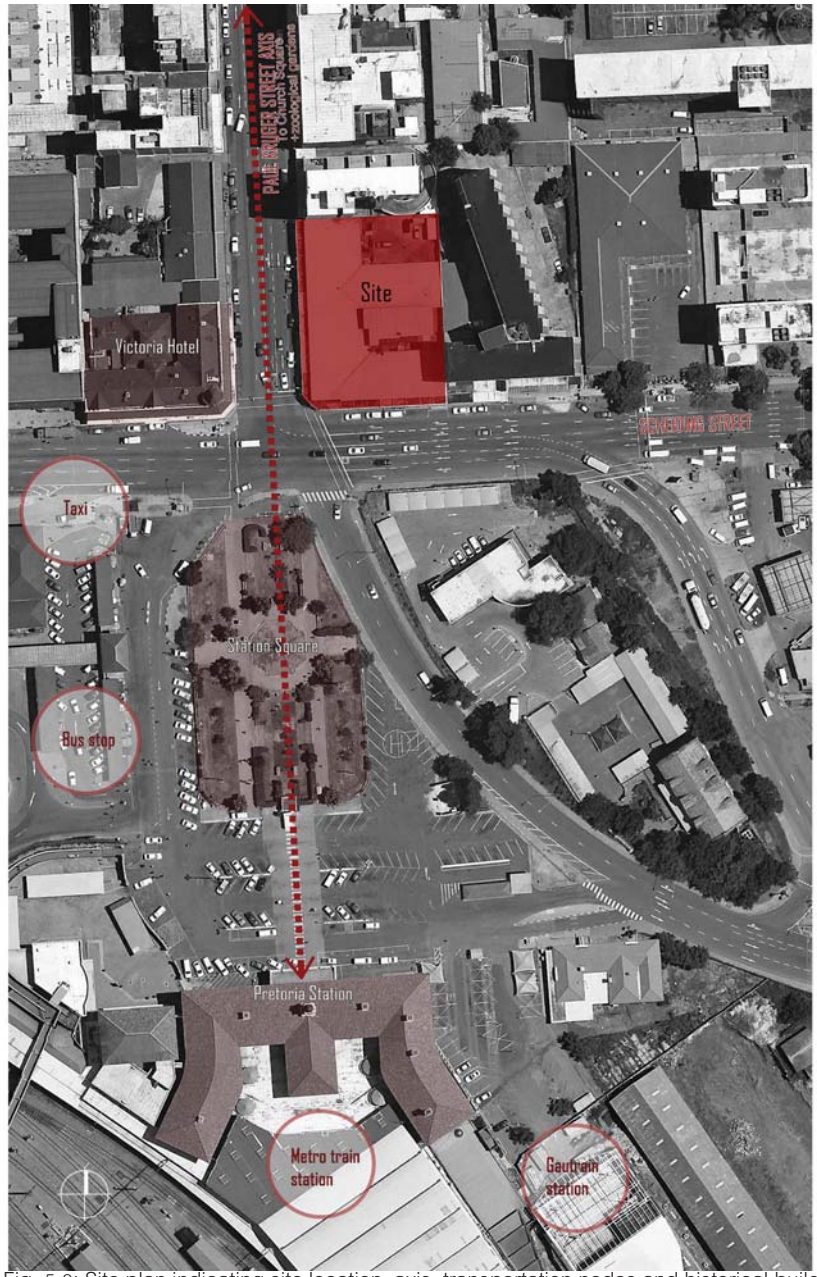


Fig. 5.2: Site plan indicating site location, axis, transportation nodes and historical buildings

Victoria Hotel

The site for the Victoria Hotel was bought from the Reformed Church by TW Beckett in 1890. Together with the neighbouring site, the site could be leased from1894 on the prerequisite that hotels be constructed in order to provide overnight facilities to travellers entering the city (le Roux, 1993: 28).

Originally named the Hollandia Hotel (designed by an unknown Dutch architect in 1900), the Victoria Hotel was renamed by Lord Roberts in honour of the English queen. The Victoria Hotel is the oldest remaining hotel in the city and one of the few remaining Victorian buildings within Pretoria CBD (le Roux, 1993: 29).

Although numerous alterations have been made to the structure such as the addition of the second floor before 1902 and the removal of the cast iron balcony and balustrade in 1945 which has been replaced with the current columns and plastered wall, most of the fittings and structure remains original thereby adding to the historical value of the building (le Roux, 1993: 29).

Gautrain

With the addition of the Gautrain station to Pretoria Station it is estimated that Pretoria Station will become one of the main commuter nodes into Pretoria CBD (Gautrain, 2011). The station will have an important tourism role as it is to be the starting point for tours through the CBD and is expected to stimulate urban renewal within the rest of the city. The new station will increase the number of pedestrians in the area.

Materiality

Materiality within the precinct is one of the few elements contributing to identity and a homogenous environment. With the proximity of the train station, materiality and the application of materials are indicative of industrialism with a predominant use of prefabricated steel elements and the re-use of railway lines as pergolas and bollards.

Architecture within the precinct consists mainly of masonry construction with an exposed concrete structure and steel window frames. Masonry building envelopes within the liminal space are mostly in stretcher bond with few instances where the material is treated differently. In such cases exposed brick is often painted or plastered with the introduction of changes in masonry bond and the creation of shadow lines.

Use of timber within the area is limited to the Victoria Hotel and the trader/ food stalls on the southern side of Scheiding Street. Exposed timber window frames in the Victoria Hotel and exposed timber trusses in the vendor stalls are the only instances where this material is evident within the liminal space.

Additional materials used within the area include corrugated iron and mosaic tiles as well as limited use of sandstone and slate and roof tiles. Use of glass as building envelope has been added to the precinct with the construction of the new Gautrain main station.

Material Response to Typology

Use of material responds to a large degree to building typology and scale within the precinct.

Buildings under three storeys are at times plastered, such as the Victoria Hotel and the Police station. Lower buildings within the liminal space often have pitched roofs constructed of timber trusses and roof tiles.

Buildings higher than three storeys may have small plastered surfaces and mosaic tiles on the facade but as stated previously, are mostly masonry construction. Low pitched or flat roofs for taller buildings are common in the precinct. These roofs are predominantly flat concrete roofs with washing facilities or building services or are alternatively constructed using low pitched corrugated iron.

Fig. 5.3: Railway line steel pergola

Fig. 5.4: Masonry and mosaic tile facade

Fig. 5.5: Masonry and exposed structure

Tafelberg building, 517 Paul Kruger Street
Fig. 5.6: Masonry and exposed structure


Ceres building, 229 Jacob Mare Street
Fig. 5.7: Masonry and exposed structure


179 Scheiding Street
Fig. 5.8: Masonry and steel window frames


The Oval, 31 Loop Street
Fig. 5.9: Masonry and exposed structure


Manhattan Hotel, 241 Scheiding Street
Fig. 5.10: Painted masonry and use of soldier bond


Colombo building, 230 Scheiding Street
Fig. 5.11: Masonry and use of brick on edge bond


Vendor Stalls, 179 Scheiding Street
Fig. 5.12: Sheet metal roof + exposed timber truss


Victoria Hotel, 200 Scheiding Street
Fig. 5.13: Timber window frames


Vendor Stalls,179 Scheiding Street
Fig. 5.14: Masonry construction and shadow lines

Victoria Hotel, 200 Scheiding Street
Fig. 5.15: Decorative plaster finish


Police Station, 588 Paul Kruger Street
Fig. 5.16: Smooth plaster finish and steel shading

308 + 218 Scheiding Street
Fig. 5.17: Building height and roof construction

Uses Around Site

The site is bordered to the north by a ten storey residential building and a six storey residential building to the east, both with retail space on ground floor. The neighbouring corner site to the west is occupied by the Victoria Hotel with Pretoria Station and Station Square across Scheiding Street to the south.

Along Scheiding Street more residential developments can be found with retail space and bars on ground floor to the west and little interaction with the sidewalk to the east as the precinct progressively becomes more residential towards Burgers Park. The Paul Kruger axis is lined with retail space on ground floor with either residential or office space above.

Pedestrian use of the area varies. Numerous people move through the liminal space on way to work, home or in-city destinations including shopping or entertainment.

Station square is most used by commuters, but serves the additional function of relaxation space, unsheltered waiting room and meeting place, whether waiting for transportation or social purposes. Numerous people can be found at the termination of the Paul Kruger axis during most portions of the day.

Fig. 5.18: Uses around site

Fig. 5.19: Panorama indicating site within context and building functions

Problems

Although located close to the traffic node provided by Pretoria Station and situated within a highly pedestrianized environment, the selected site is faced with numerous unique problems and design considerations. The problems include climate control and orientation, gateway formation, bridging the barrier formed by Scheiding Street and precinct identity.

Lack of Identity

The effects of a fragmented identity within the Burgers Park precinct are evident when nearing the end of the Paul Kruger axis at Scheiding Street. In contrast with the residential environment around Burgers Park en the cultural, more pedestrian friendly environment of the Museum Park district, the area around Pretoria Station and Scheiding Street can be described as liminal. The liminal area is characterised by a lack of identity, being neither outside of the city nor within it, but resting on the boundary between inside and outside.

Barrier

Scheiding Street was originally the southernmost Street in Pretoria CBD from where its name was derived indicating the division between the city and pastoral lands (le Roux, 1993: 27). Today, Scheiding Street remains a barrier, now dividing the outer limits of the city from the rest of the Burgers Park precinct.

The orientation of Pretoria Station with regards to the important axis along Paul Kruger Street completes the visual corridor forming a direct axial relationship with Church Square thereby making the Paul Kruger axis one of the few completed streetscapes within the city (le Roux, 1993: 28). When reaching Scheiding Street however, the disjunction of Pretoria Station and Station Square

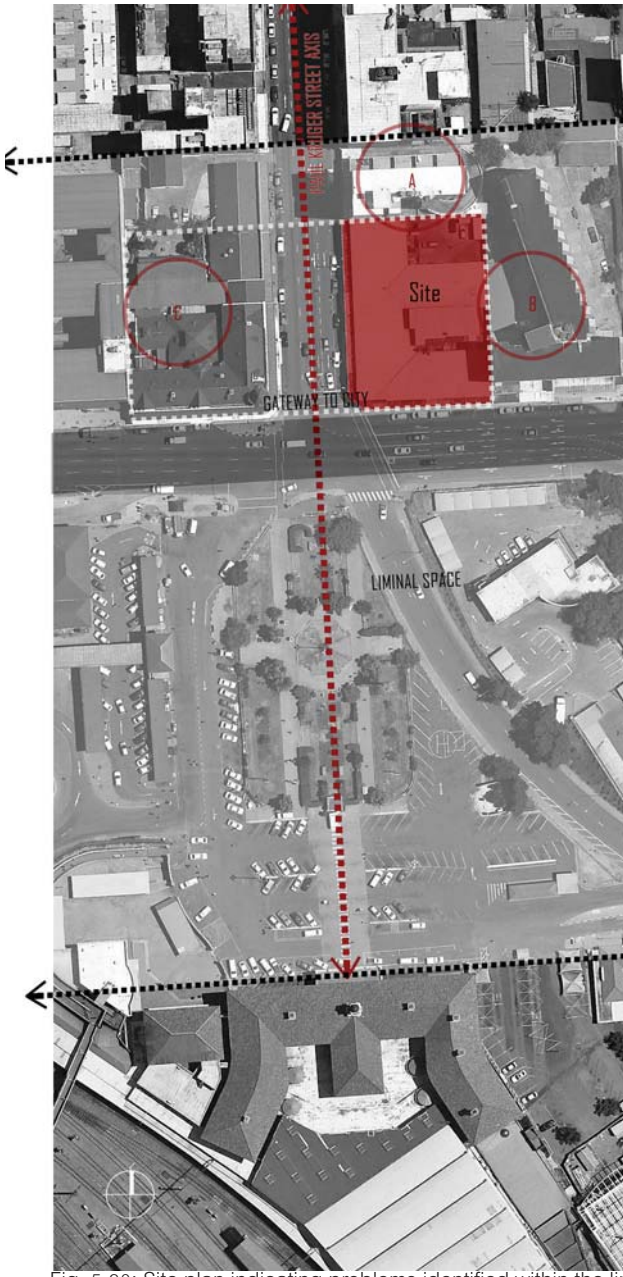
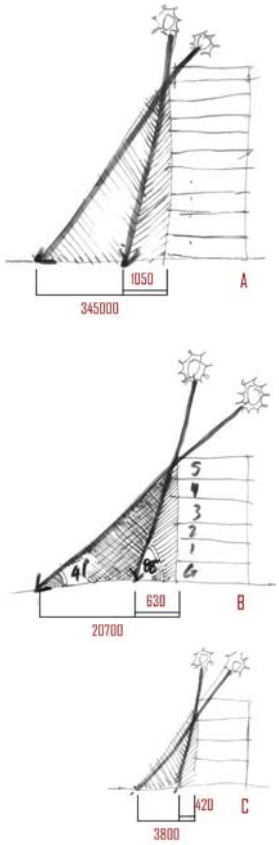


Fig. 5.20: Site plan indicating problems identified within the li

minal space



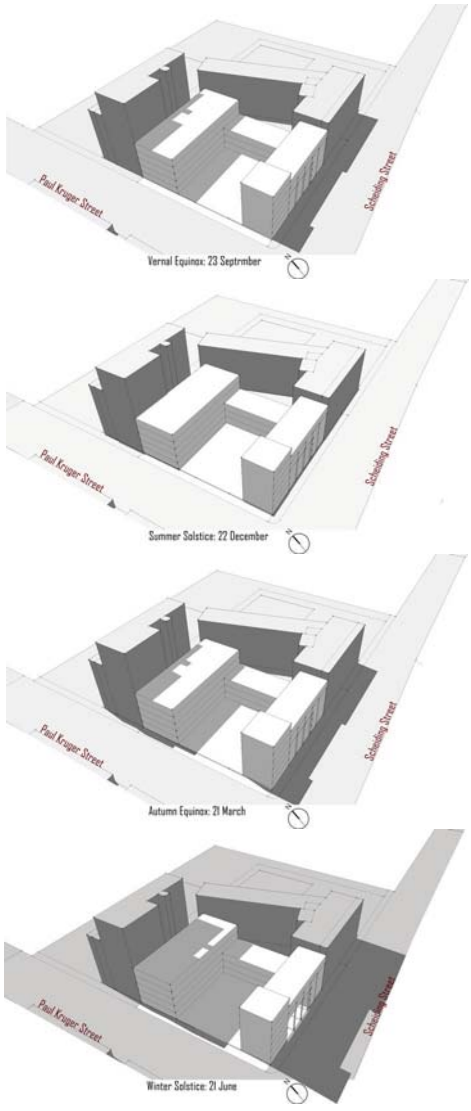


Fig. 5.21: Shadows on site

with the rest of the Precinct is evident. Station Square has recently been redesigned in order to address this problem, yet the square remains isolated from the rest of the precinct and therefore the rest of the city, thereby grounding it firmly within the liminal character around Scheiding Street.

The problem of liminal space can be solved by unifying the area around Scheinding Street with the rest of the precinct. This can be achieved by defining the Paul Kruger axis and extending the public space of Station Square, thereby bridging the barrier of Scheiding Street.

Site orientation

Being located on the eastern corner of Paul Kruger and Scheiding Street with an existing 6 storey building east of the site and the existing 10 storey Rosandra building bordering the site to the north, the corner site offers mainly opportunities for southern and western elevations, leaving the site with heat control and glare problems. Additionally the Rosandra building bordering the northern edge of the site blocks much needed sun throughout the winter months.

Alternative passive design systems suited for low solar conditions will need to be explored in order to ensure comfort within the internal environment of the building.

Gateway

The lack of a properly defined gateway to the southern side of the precinct deducts from the pedestrian nature and identity of the area. The current single story building at the corner of Paul Kruger and Scheiding Street nullifies the well designed visual termination of the Paul Kruger axis at Pretoria station. The lack of a properly defined gateway reduces Scheiding Street and Station Square to a mere traffic area through which orientation and access to the city becomes increasingly difficult.

Resting Space

Station Square is a highly used public space with activity evident throughout the day and well into the night. The Square does not however provide much needed functions such as sheltered resting space. Sheltered resting spaces as well as auxiliary functions such as communication and inclusive dining areas are in general absent within the liminal area of the precinct, thereby deducting from the social and public potential of the entire area

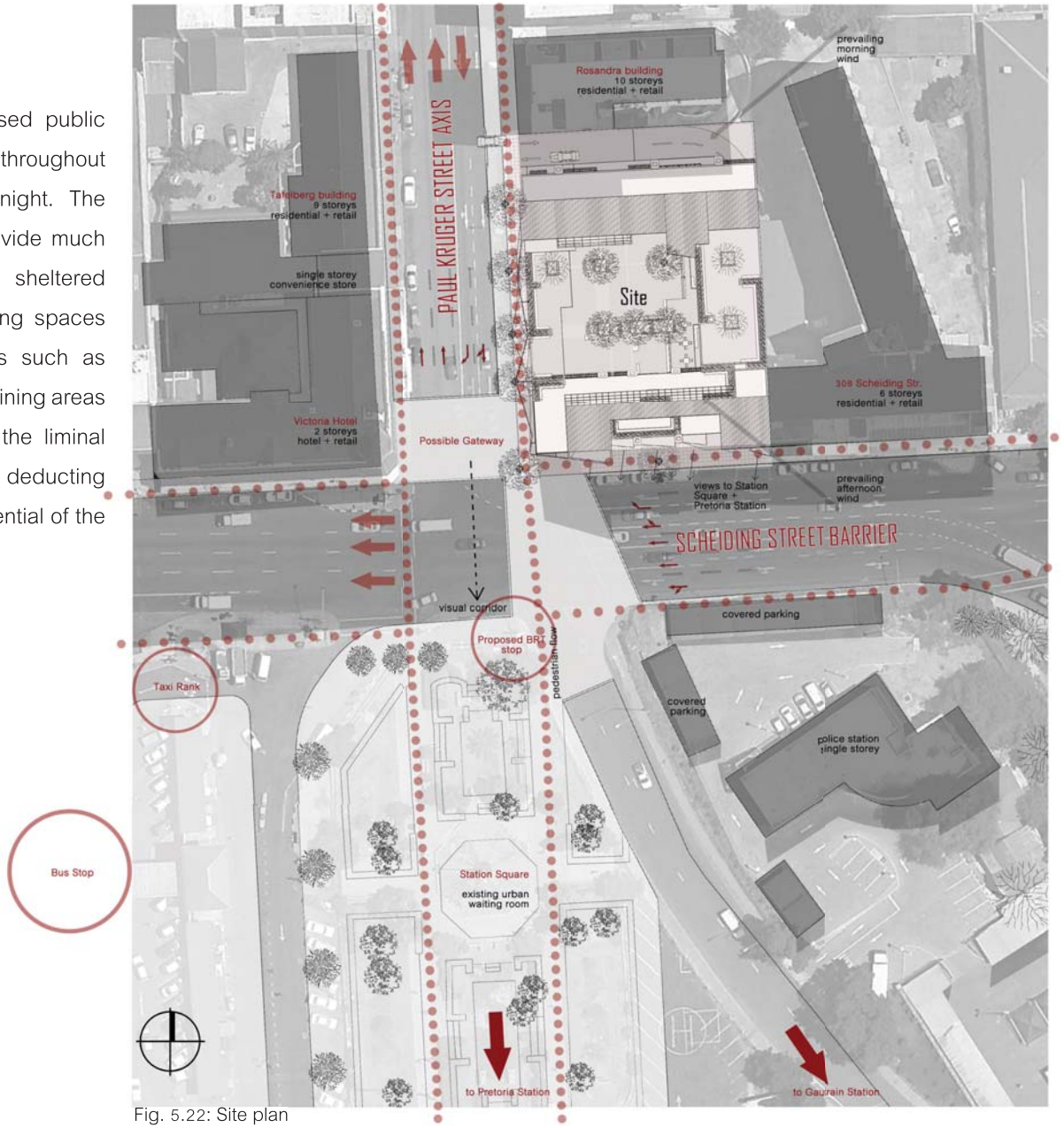


Fig. 5.22: Site plan

Conclusion

An appropriate gateway building is needed at the corner of Paul Kruger and Scheiding Street. The aforementioned gateway is needed to complete the space horizontally as well as vertically. This will symbolise entrance to the city while completing the skyline, establishing orientation and reclaiming as well as extending the public space of Station Square.

The gateway building needs to provide forgotten functions within the area. This will include sheltered resting space and highly public programs needed when entering or leaving the city.

Chapter 6

Design development

"The physical environment that we construct is as much a social phenomenon as it is a physical one."

H. Proshansky

Introduction

In this chapter the concept development and its proposed solution is discussed by illustrating key elements and their development during the design process.

Development depicted in this chapter have been reorganised in order to indicate the development of specific elements throughout the year. These elements explored have been identified through theoretical investigation as well as contextual, programmatic and environmental problems specific to the site and area of investigation.

Entopia

Throughout the design development, the question of how *entopia* can be achieved has been asked.

Since *entopia* revolves strongly around real world needs of building users and problems specific to place and setting, the design exploration started by focussing on applicable programmatic response, space creation and the development of volumetric form that is sensitive to needs within its environment and context.

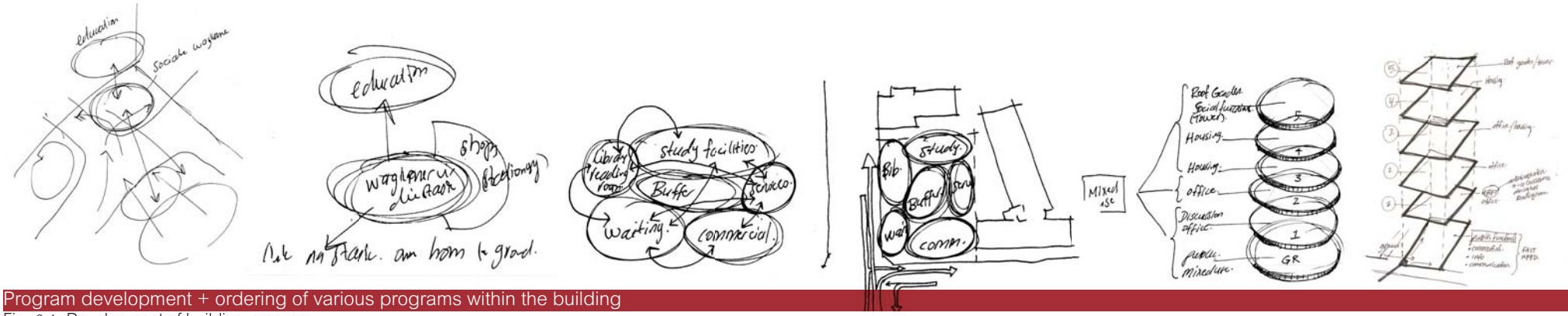
Programmatic Response

The program was derived from an analysis on current uses within the area. From this analysis it became clear that certain programs needed at a gateway to the city are neglected within the liminal space.

A need for sheltered waiting rooms has been noted as well as programs that will encourage use of the area while promoting way finding, communication and facilitate transition while still retaining people within the area in order to encourage social cohesion.

The need for educational facilities en route has been observed in order to improve low levels of work opportunities experienced by a large group of people moving through the area due to lack of basic education and skills.

The provided programs are all associated with different levels of waiting. Public users of the space are all people in transition with the amount of time spent on site being influenced by the level of contact needed with building functions.



Program development + ordering of various programs within the building

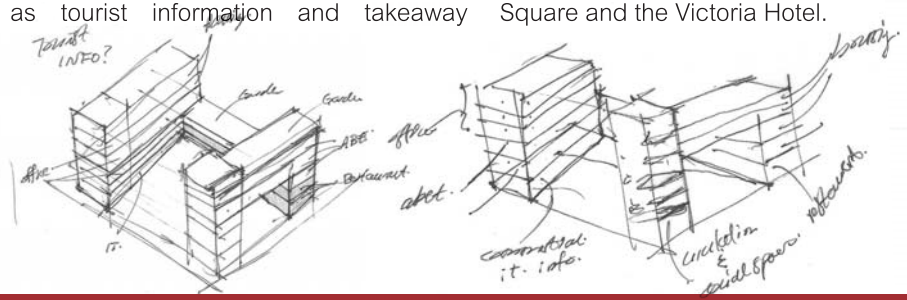
Fig. 6.1: Development of building program

Levels of contact have been facilitated during the design process through hierarchy and the placement of the various programs on site as well as through the provision of different edge conditions as is needed for the corresponding levels of contact.

Programs with a public nature have been placed on ground floor level with building use becoming progressively private towards the higher storeys with time duration spent on site increasing towards the centre and top of the building.

Programs involved with the first levels of contact and shorter time duration such as tourist information and takeaway restaurants, are placed towards the perimeter of the site to facilitate fast use. Programs that entails longer involvement with building functions are located towards the centre of the site and on higher floors. These programs include the urban waiting rooms, sit down restaurant and ABET/SETA administration centre with offices, classrooms, reading room, job centre and roof gardens located higher within the structure.

Overnight facilities have been separated from other programs in order to facilitate privacy. These facilities are located on the southern side of the site to increase exposure of northern sun to rooms and allow views of Pretoria Station, Station Square and the Victoria Hotel.



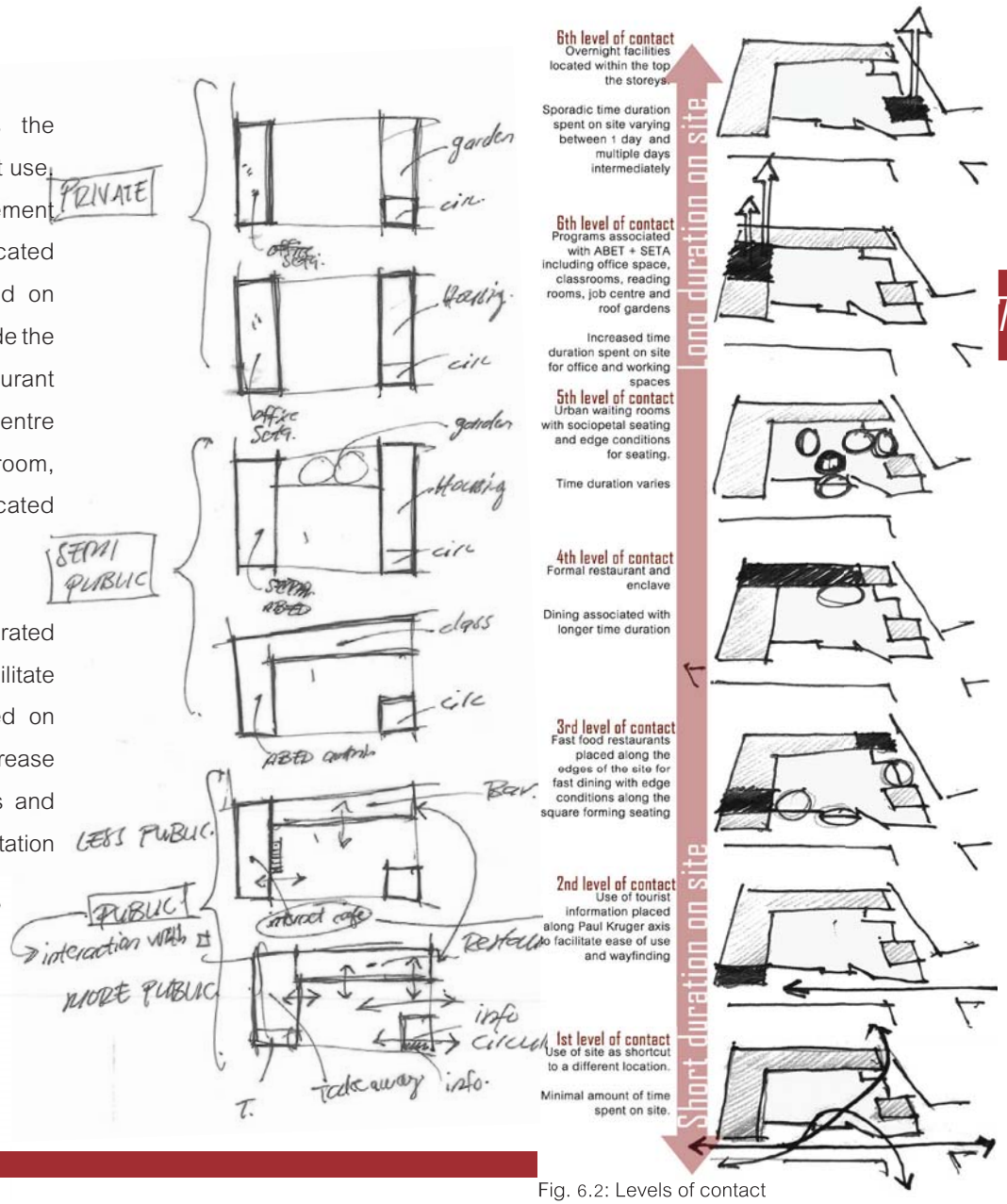


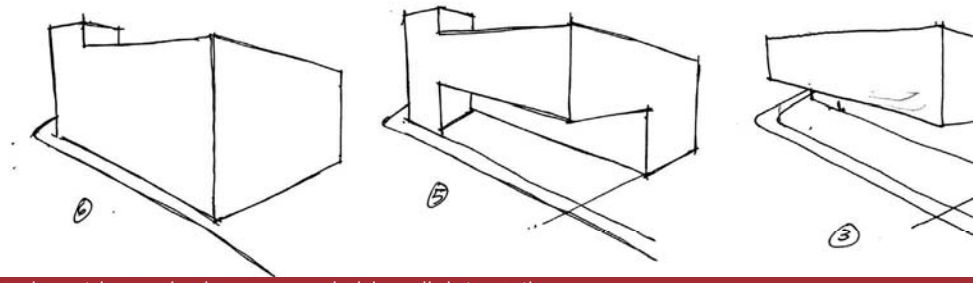
Fig. 6.2: Levels of contact

Volumetric Exploration

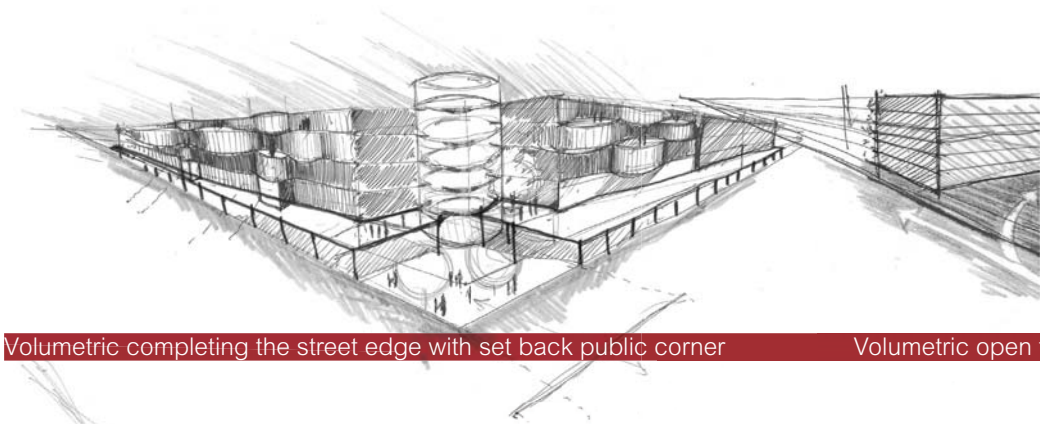
The aim behind the volumetric exploration was to generate a form that responds to context and its environment. Emphasis has been placed on the south western corner to relate to the Victoria Hotel tower and encourage gateway formation.

Building scale has been changed from the current single storey development on site to a six storey building in order to complete the skyline and relate better to buildings within its context.

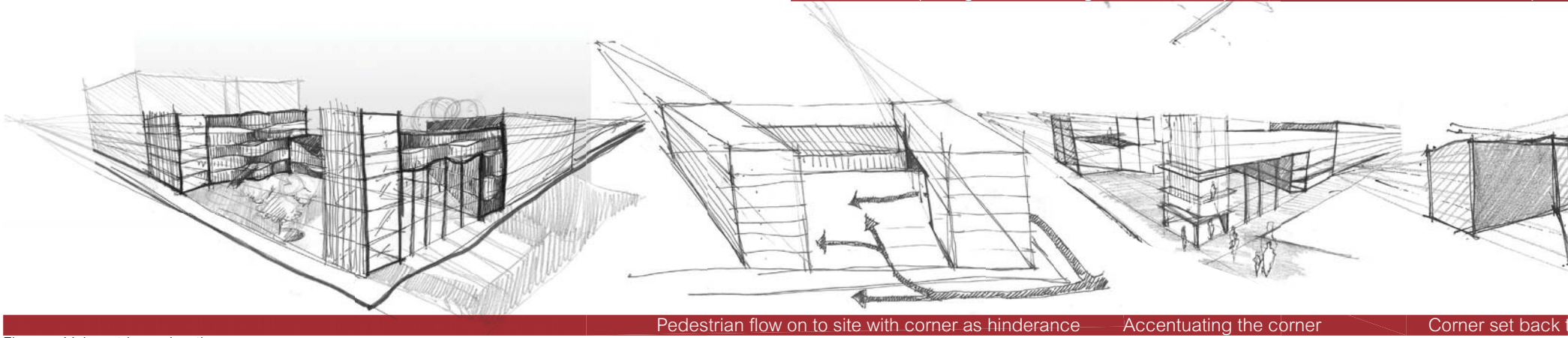
The volumetric evolved from a single mass to a courtyard typology, thereby creating a public square and extending the urban floor. Volumetric form encourages retention of people on site instead of flow thereby promoting use and accidental meeting. The courtyard is open to the west and completely accessible along the Paul Kruger axis to reduce crowding. The volumetric responds to the Victoria Hotel by being open to the west and embracing the hotel instead of bordering the street edge. The southern wing of the massing model is lifted off the sidewalk thereby relating to station square, promoting views to Pretoria Station and extending public space to the newly created square.



Basic volumetric as single mass and sidewalk interaction

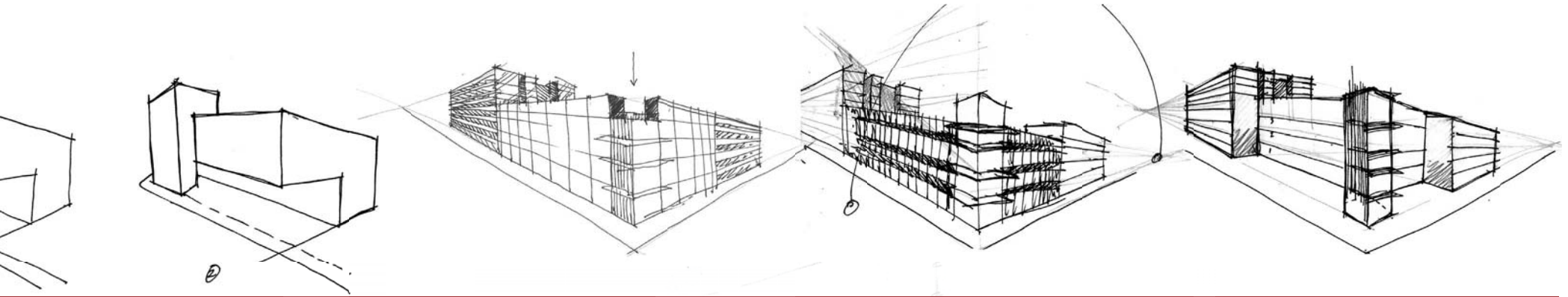


Volumetric completing the street edge with set back public corner | Volumetric open



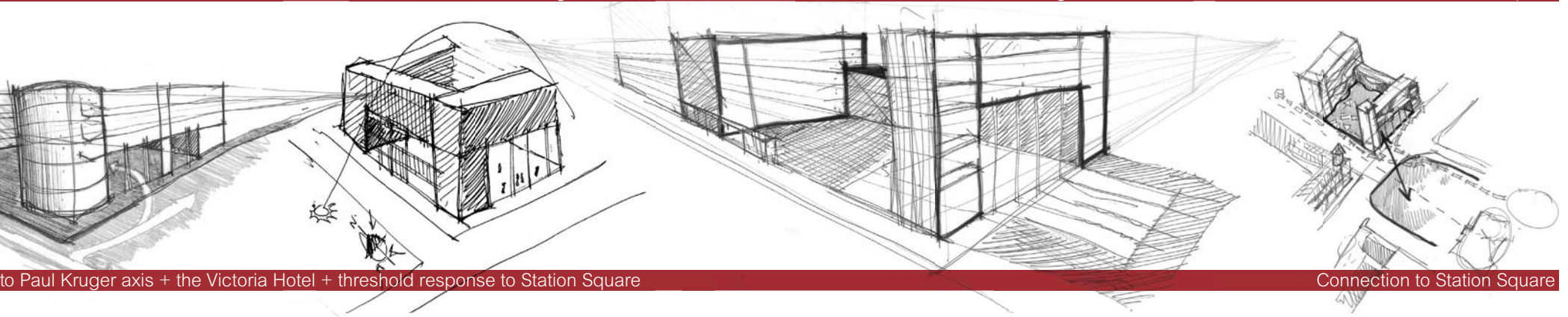
Pedestrian flow on to site with corner as hinderance | Accentuating the corner | Corner set back

Fig. 6.3: Volumetric exploration



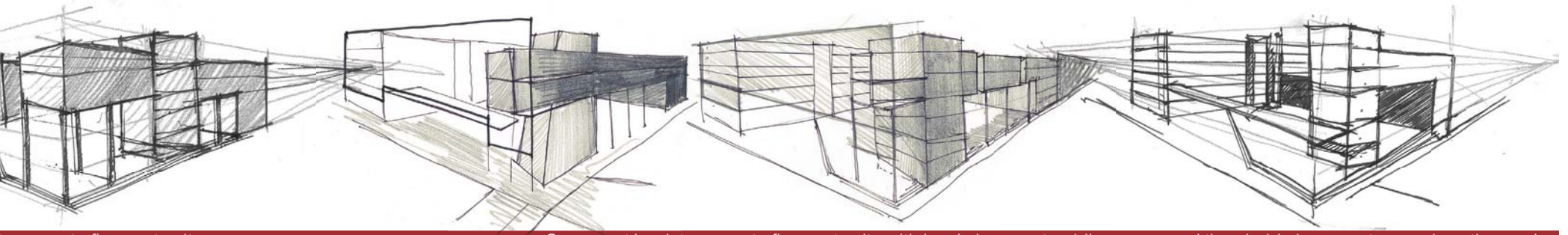
Accentuating the corner

Setting back the facade to extend sidewalk and create relief space



to Paul Kruger axis + the Victoria Hotel + threshold response to Station Square

Connection to Station Square



to promote flow on to site

Corner set back to promote flow on to site with level change at public square and thershold along western and southern edge

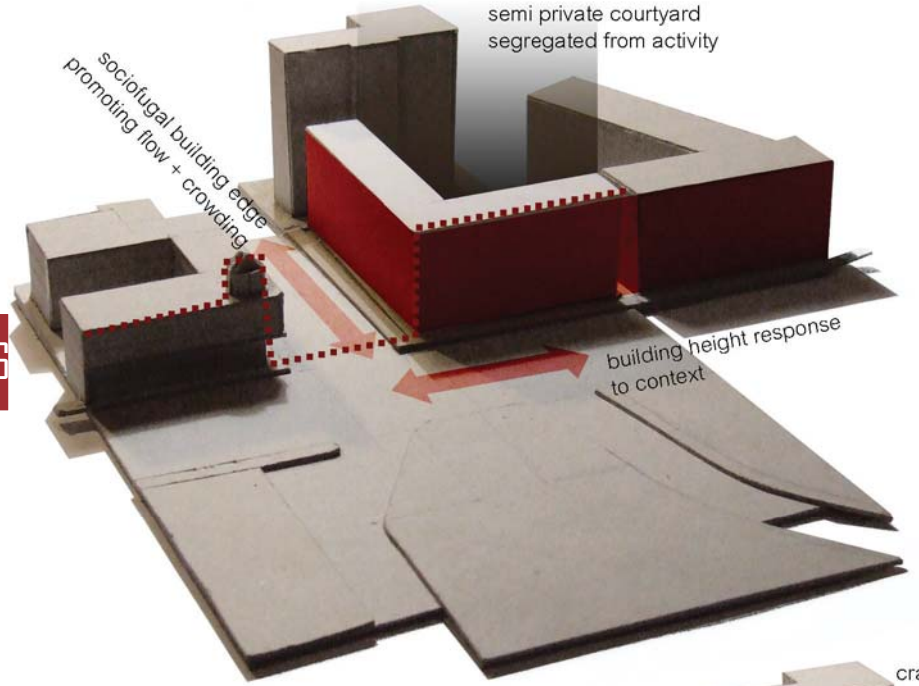


Fig. 6.4: Model #1

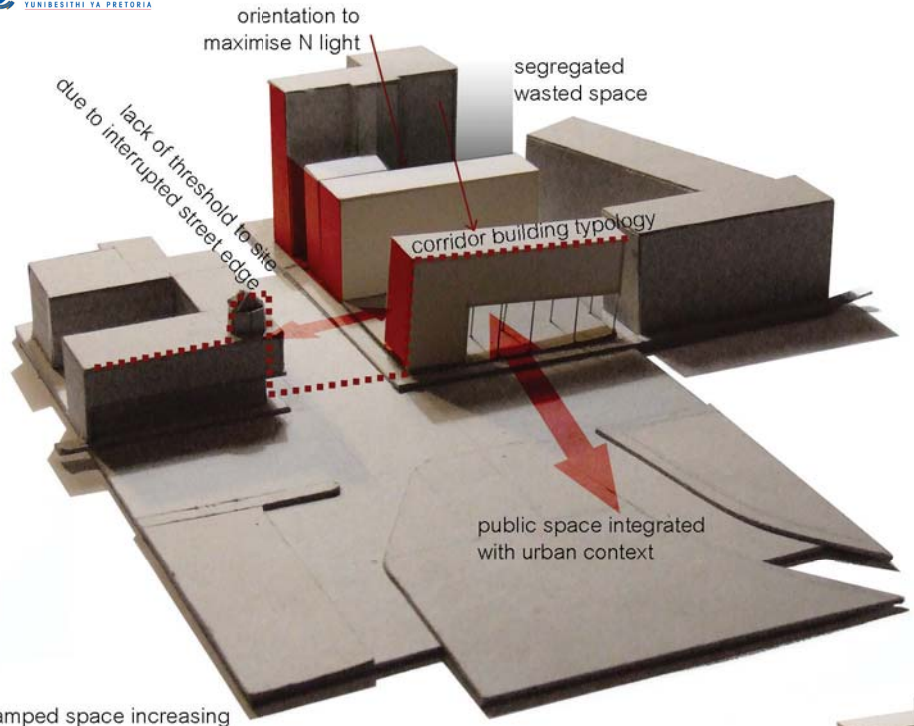
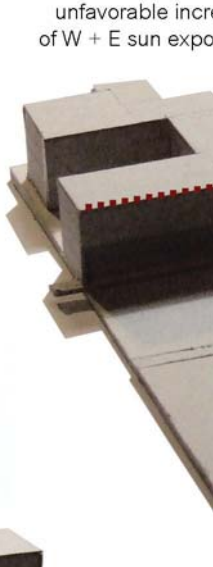


Fig. 6.5: Model #2



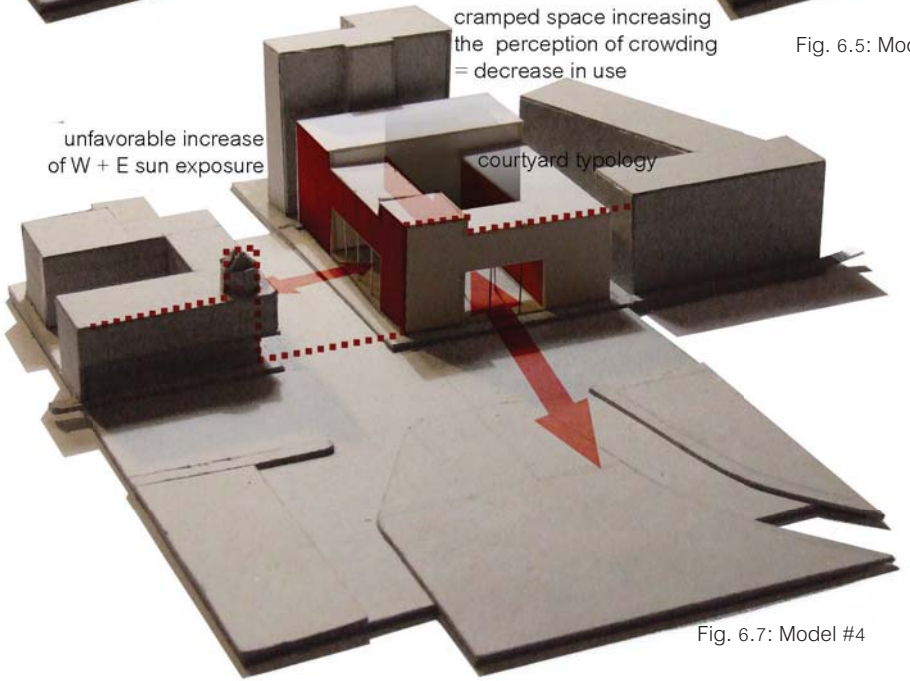
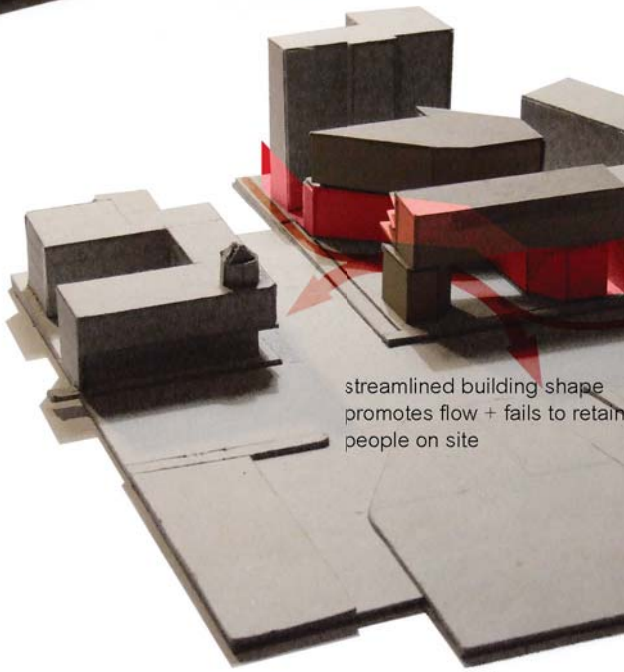


Fig. 6.7: Model #4



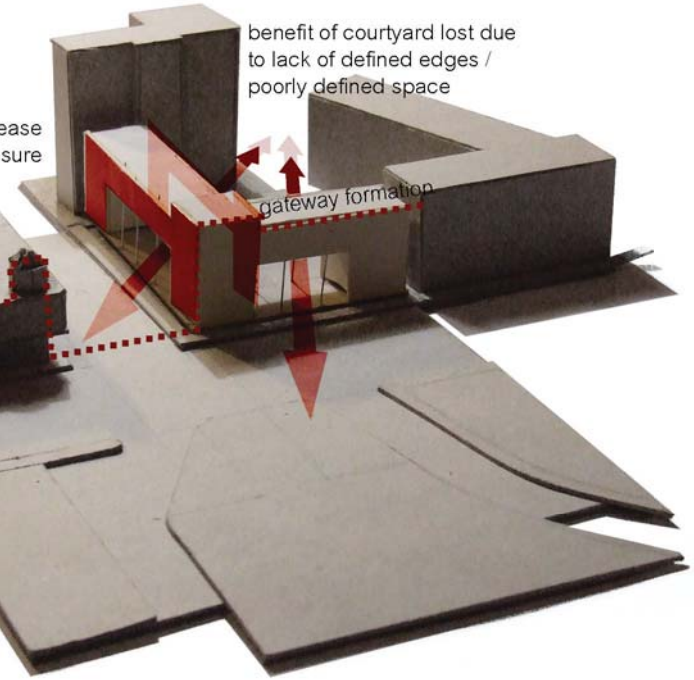


Fig. 6.6: Model #3

Fig. 6.8: Model #5

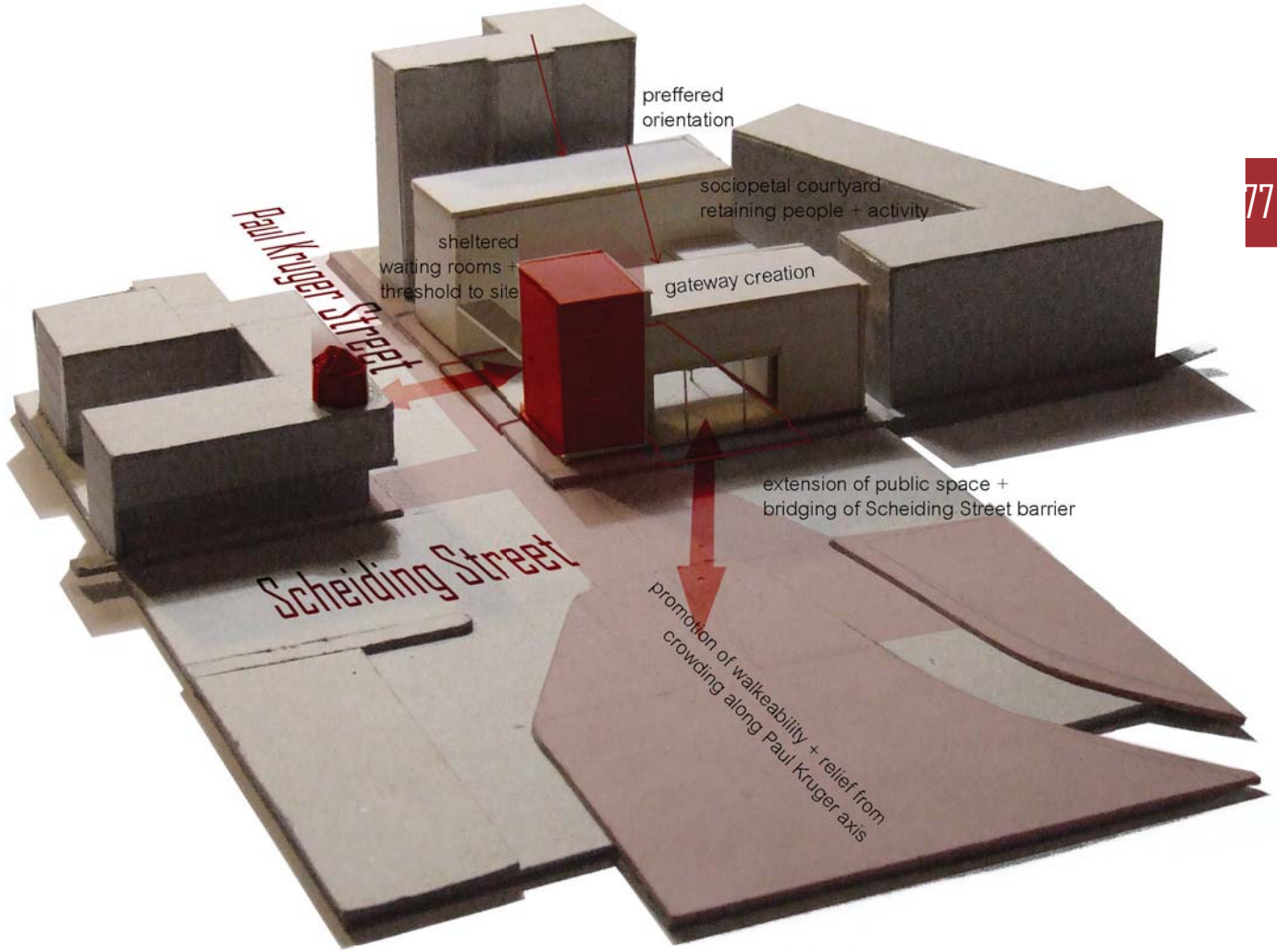


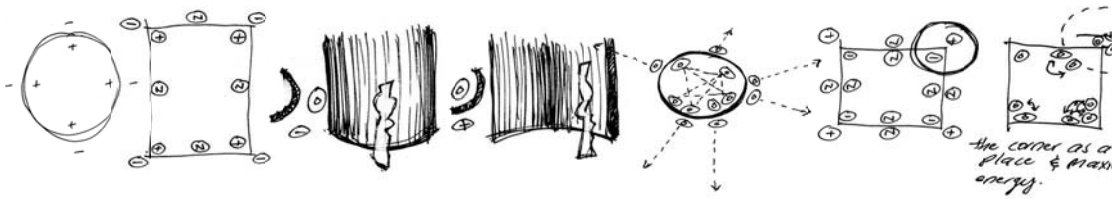
Fig. 6.9: Model #6

Theoretical Elements

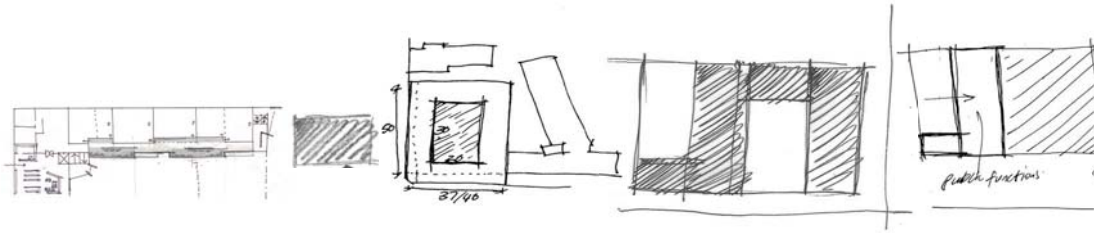
During the theoretical investigation a set of social design principles has been identified. These principles have been explored and developed through a series of diagrams and conceptual drawings in order to refine the proposed volumetric and establish a social narrative that will encourage social interaction and accidental meeting.

A courtyard typology has been developed with the building enclosing a public square as research indicated the benefit of courtyard typologies on the development of social bonds. The structure is open to the street edge as to increase accessibility to the public square and promotes ease of use while the inclusion of a variety of programs generates a multi use environment thereby increasing chances at interaction between different people.

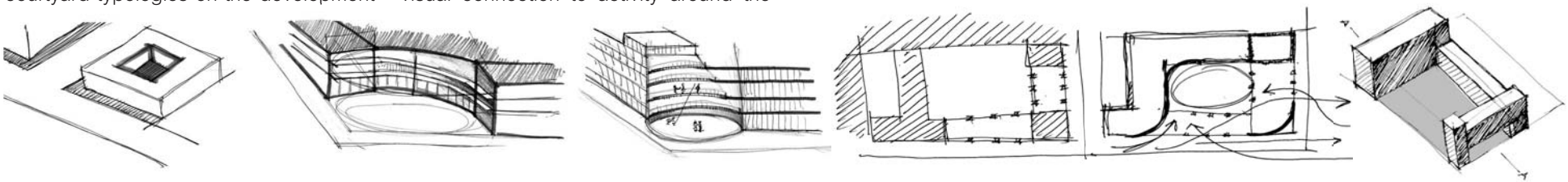
The square is divided into smaller spaces (urban waiting rooms) which prevent the central space from appearing empty and increase edge conditions which is preferred for habitation. Views and visual connection to activity around the



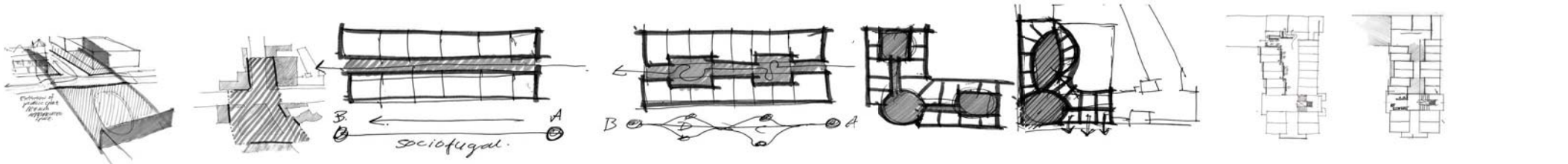
Sociopetal + sociofugal exploration



Sociopetal spill out space Evolution of building typology

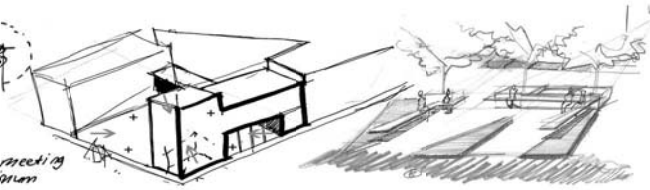


Courtyard typology Offset corner acting as courtyard Atrium acting as courtyard Courtyard typology open to street edges



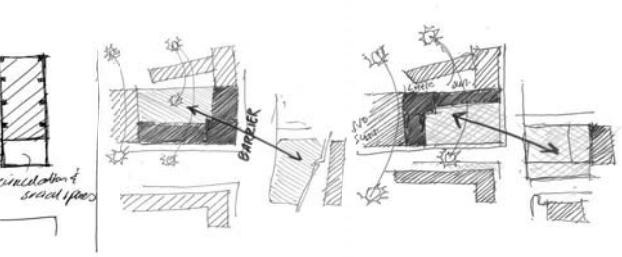
Urban floor forming courtyard with other buildings Sociofugal corridor Sociopetal corridor Corridor approach in southern wing

Fig. 6.10: Development of theoretical elements

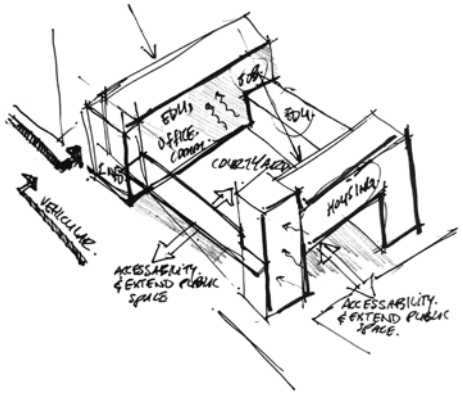


Sociopetal volumetric

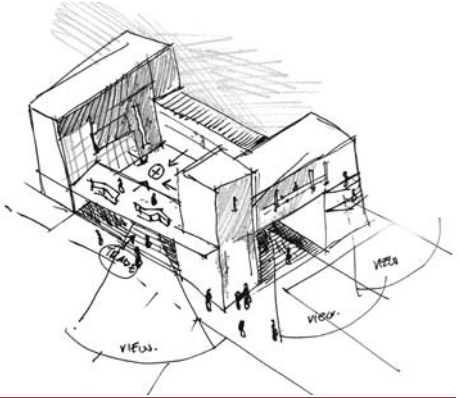
Sociopetal seating



Building open to street creating a courtyard



Accessibility, vehicular access + mixed use



Views, and sociopetal courtyaed

square has been promoted to reduce the perception of abandoned public space.

Sociopetal space has been created through volumetric form which enfolds the newly created square. Sociopetal space is created in the building as well, through setbacks in the facade and the extension of walkways to create spaces throughout the design where meeting and group formation are likely to occur. Seating within these spaces and as well as within the public square are placed in sociopetal arrangement to facilitate and promote interaction.

The extension of the sidewalk and addition of the pedestrian walkway together with the creation of a humanised streetscape and increased natural elements promotes walkabability and fosters pedestrianism while relieving crowding along the Paul Kruger axis and reduces the speed of cars within the area.

Vehicular access to the building which includes refuse removal, parking and deliveries are removed from the side of the road and placed within the basement thereby hiding it from public view. This reduces the number of cars on the street edge and promotes pedestrian use of the area.

Provision of sheltered space for vendors increase street side activity and contributes to the creation of a lively community strengthened by the mixed use environment.

Space that is readable and easily understood by pedestrians through hierarchy and the placement of programs according to levels of contact needed with building functions, promotes psychological comfort and ease of use. Architectural language fits within the context and reduce stimulus overload which may lead to uncomfortable space and psychological distress.

Long corridors have been avoided throughout the design. Where corridors could not be avoided they are broadened at predetermined points in order to offer relief from crowding and serve as accidental meeting space.

High levels of natural light is allowed to penetrate the building in order to prevent interpersonal distances from increasing and acts together with increased ceiling heights to prevent the perception of crowding.

Parti Diagram

The parti diagram has been developed by combining the main design objectives and elements taken into consideration during the design process and refining the theoretical stance with regards to the project. The parti diagram communicates the combination of ideas as three main aspects. These aspects are:

- Extension of public space and the urban floor
- Gateway creation
- How architecture can act as a communication activator

These three aspects serve to illustrate concept and design intent by highlighting important considerations specific to the project and its locality in combination to its sub problems and elements taken into account during the design process.

Fig. 6.11: Square connection to Pretoria Station, Station Square + Victoria Hotel

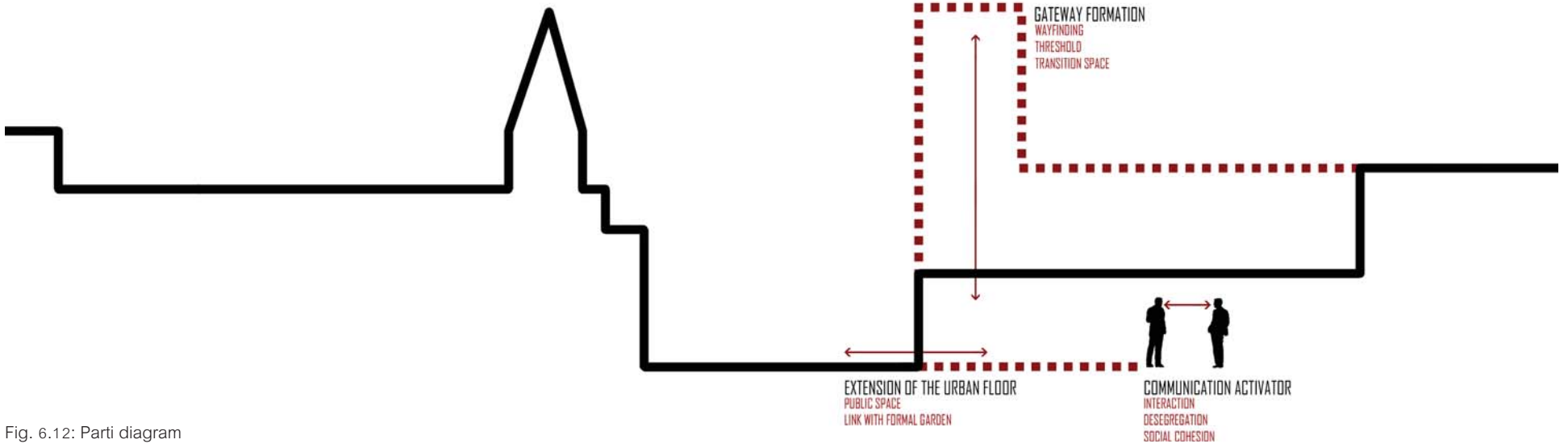


Fig. 6.12: Parti diagram

Fig. 6.13: Square Connection to Victoria Hotel + Paul Kruger Street

Fig. 6.14: South western perspective

Fig. 6.15: North western perspective

Extension of Public Space

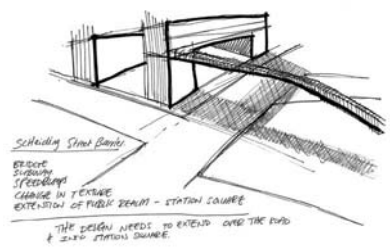
Public space and the urban floor are extended in multiple ways throughout the design.

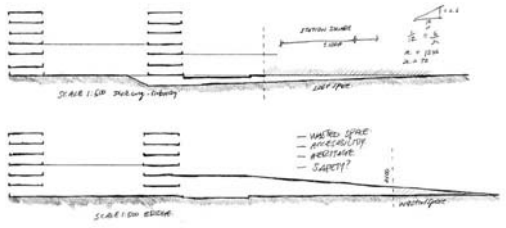
The new public square bridges Scheiding Street and connects to Station Square through the provision of a pedestrian walkway. The walkway is 150mm high, a contrasting material to the street and edged with mountable curbs thereby slowing traffic and promoting pedestrian use within the area. The square consists of two levels which creates urban rooms relating to program and hierarchy while defining threshold and indicating movement into a new space.

The corner of the site, which serves as main entry to the building and square is celebrated. Built structure is offset from the corner and connects to the walkway with a ramp that bridges level change onto the square. Overhangs and level change indicates entrance to the space while having it open for pedestrian use and preventing the genius loci of Station Square to spill onto the site.

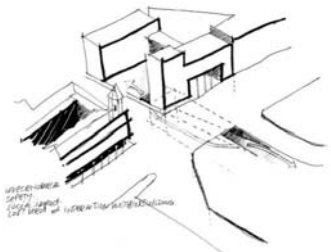
The building extends public space through the manipulation of volumetric form. The southern wing is lifted off the sidewalk thereby establishing a visual and physical link to Station Square by allowing the urban floor to move unhindered underneath the structure and onto the new square. The structure is open along the Paul Kruger axis with the square set back to allow extension of the sidewalk on site thereby relieving crowding and providing a sheltered urban room for informal trade and social meeting.

Public and meeting space is scattered throughout the building and extends toward the square by providing semi public roof gardens on three different levels.

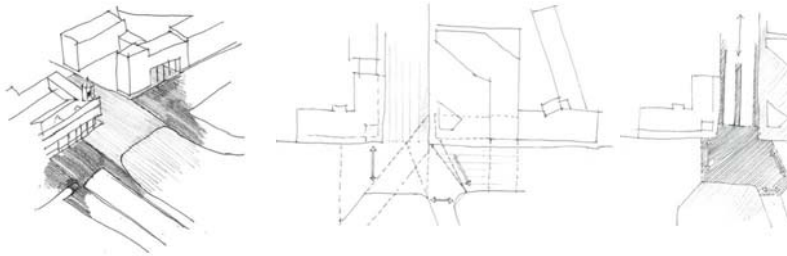




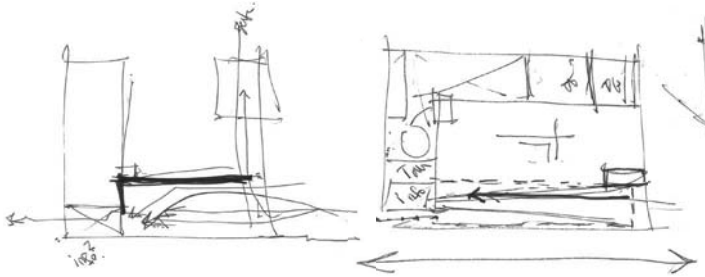
Link with bridge

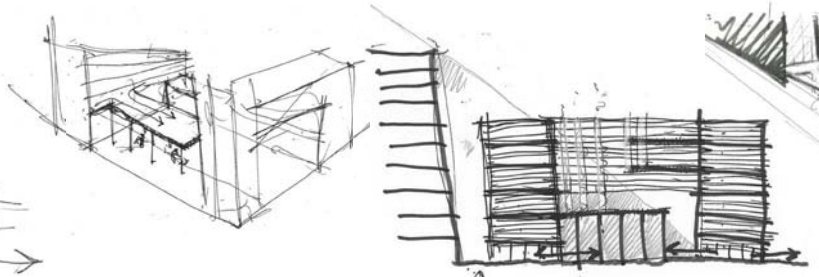


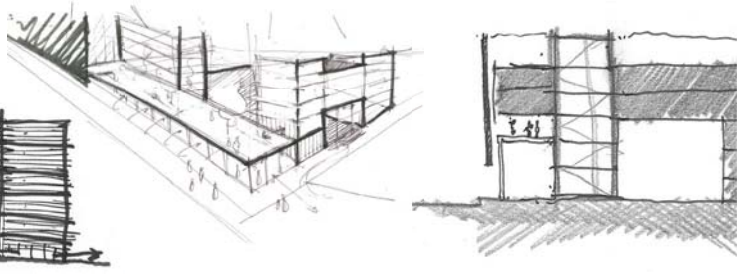
Link with subway



Link with walkway development

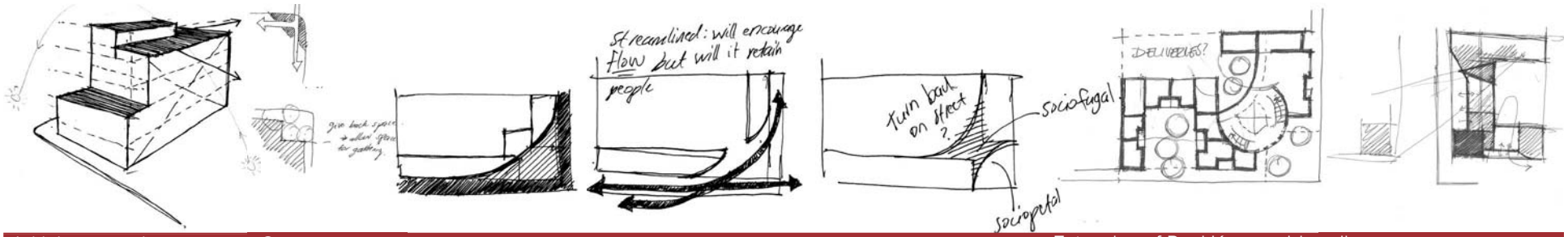




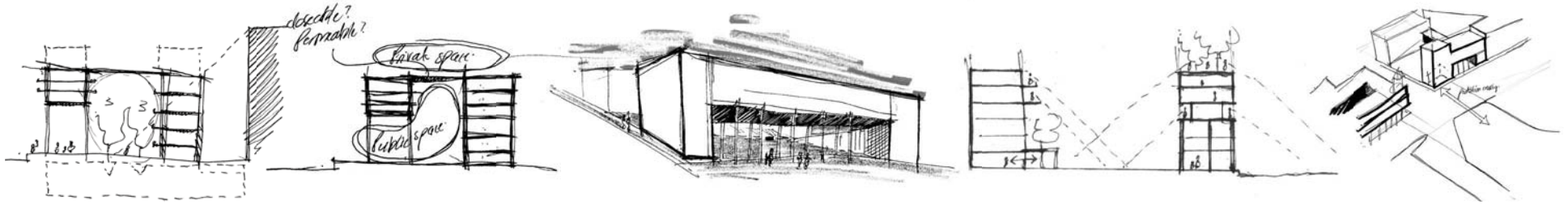


Western roof garden and extended sidewalk development

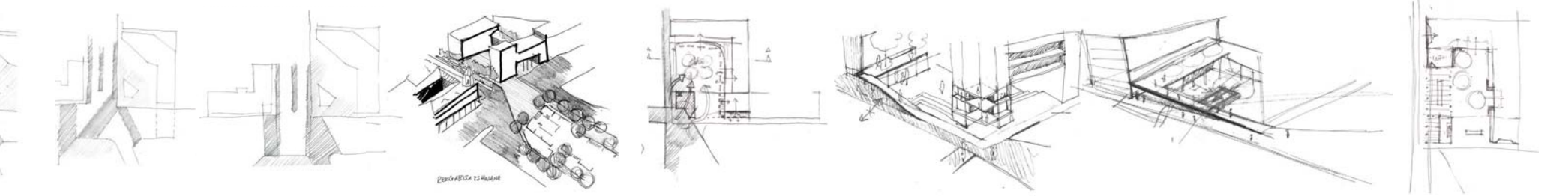
Fig. 6.16: Extension of public space development



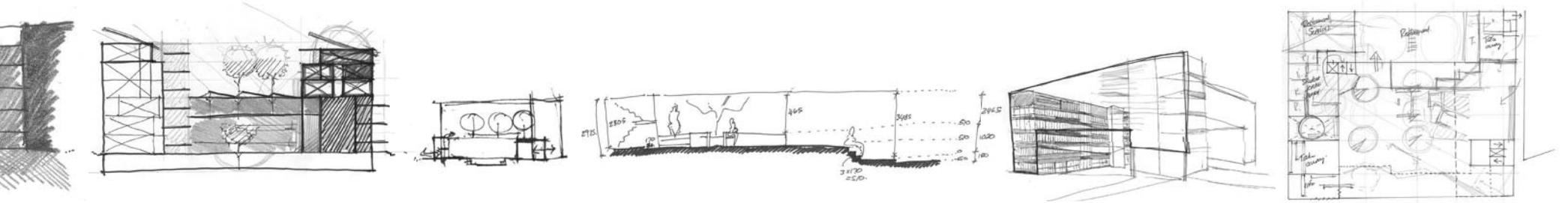
Initial approach | Corner treatment | Extension of Paul Kruger sidewalk



Structure lifted off Scheiding Street to allow urban floor to extend | Views + addition of roof gardens | Link to Station Square



Addition of public space with ramp access | Addition of semi public western roof garden



Semi public eastern roof garden | Public square level change | Volumetric response to extended space | Extended space on ground floor

Gateway Formation

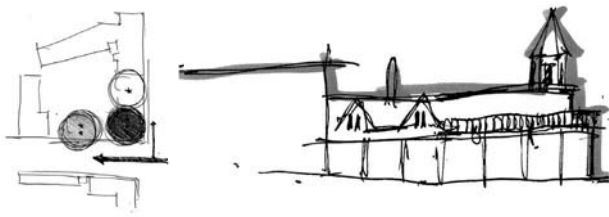
Gateway formation occurs firstly through an increase in building scale to complete the skyline and allow the site to relate to context.

The circulation tower on the south western corner is taller than the rest of the built structure and in constant dialogue with the tower on top of the Victoria Hotel. The tower structure on both sides of Paul Kruger Street promotes uniformity and symbolises gateway formation.

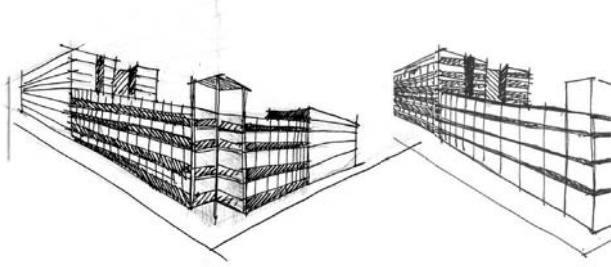
Apart from volumetric response, gateway formation is enhanced through architectural language that relates strongly to the Victoria Hotel which forms the existing half of the city portal.

The building responds to the Victoria hotel by lifting the structure off the ground thereby creating shade and resting space as well as framing the sidewalk with columns. The existing hotel achieves this through a continuous balcony over the sidewalk with a similar approach to column use.

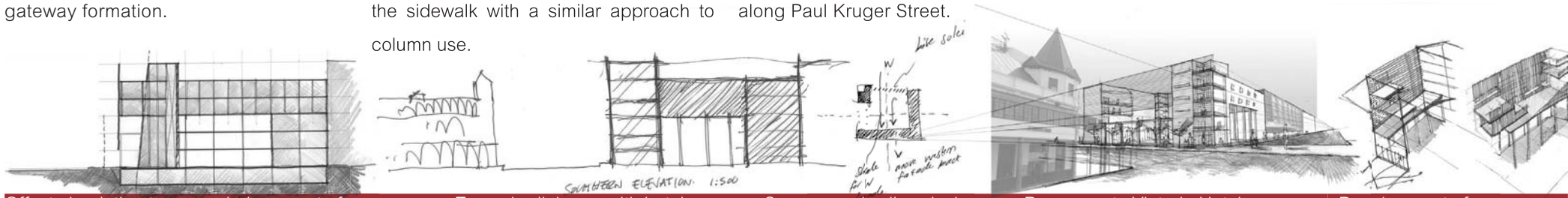
The screen, which shades the western facade of the building, responds to the Victoria hotel in texture and materiality by reinterpreting patterns found on the Victoria hotel. The screen wraps around the building, becoming balustrades and northern horizontal shading devices respectively. At predetermined intervals the screen steps away from the building and cantilevers over the sidewalk thereby facilitating way finding and indicating the presence of the gateway when moving along Paul Kruger Street.



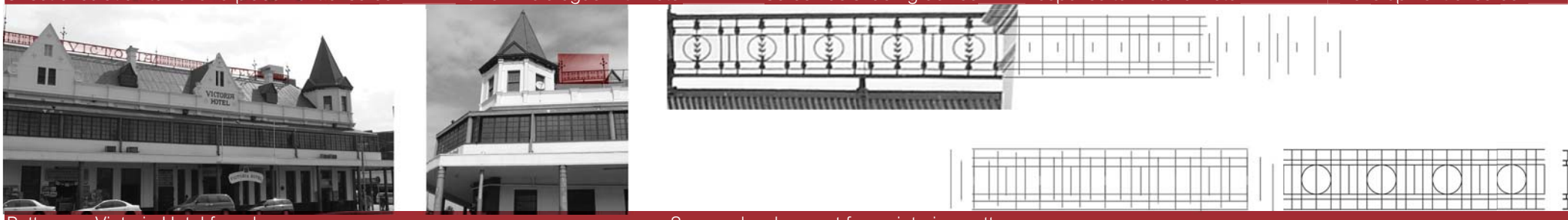
Corner importance | Change in Scale



Treatment of tower

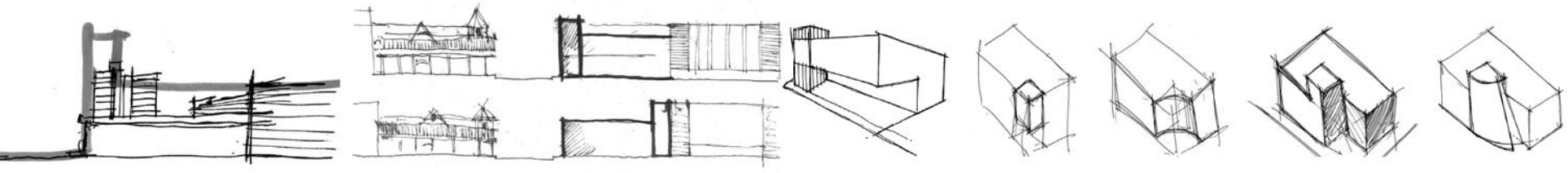


Offset circulation tower and placement of screen | Tower in dialogue with hotel | Screen as shading device | Response to Victoria Hotel | Development of screen



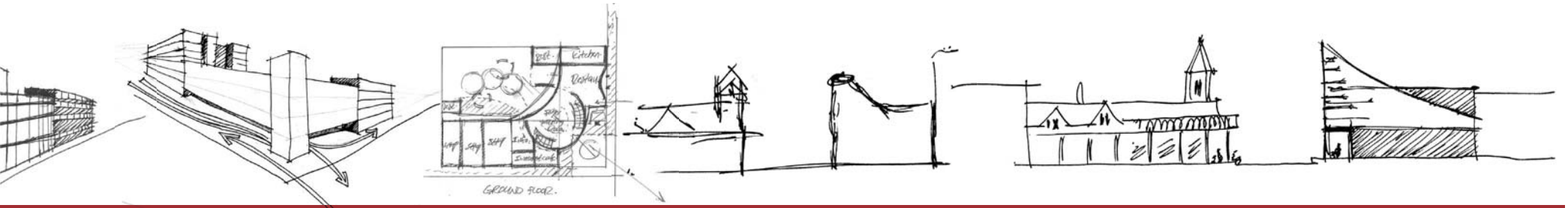
Pattern on Victoria Hotel facade | Screen development from victorian pattern

Fig. 6.17: Gateway formation development



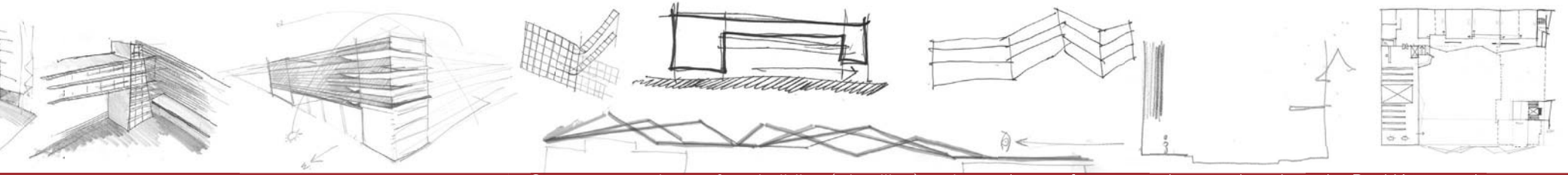
Tower placement

Volumetric approach to corner

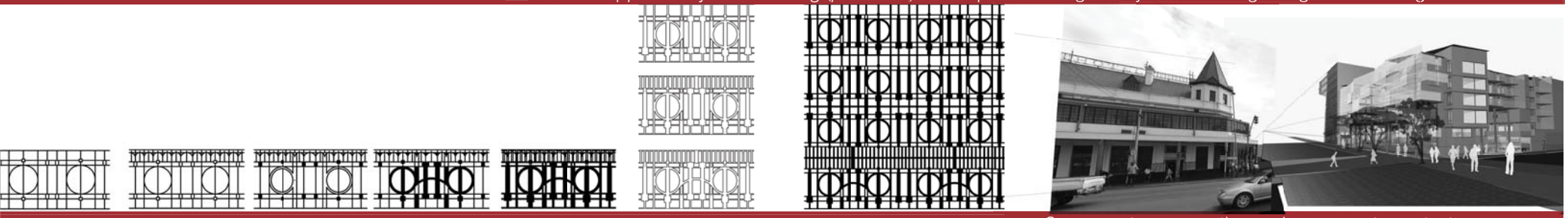


Initial approach to Victoria Hotel with structure above sidewalk

Exploration with tower translated literally



Screen stepped away from building (*plan libre*) and experience of gateway when moving along the Paul Kruger axis



Screen gateway creation and response to context

Communication Activator

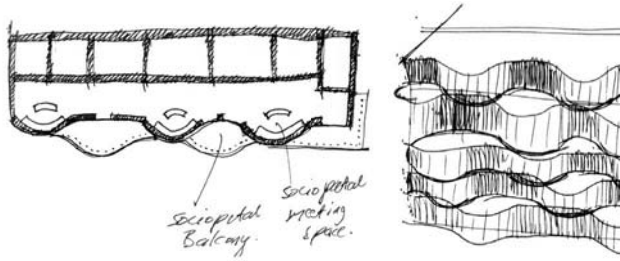
Since *entopia* relates strongly to social design within the context of Pretoria, it has been explored how architecture can act as communication activator through built form and spatial creation.

The design responds to its role as communication activator firstly through programmatic response. Choice of program and a mixed use environment will encourage diversity and allow high levels of activity and possible interaction on site throughout the day until late at night.

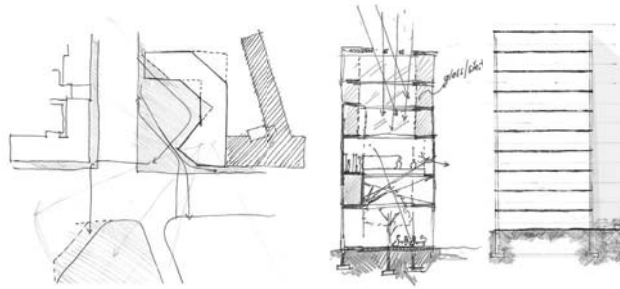
The project additionally acts as communication activator through built form as well as the creation of sociopetal public space and urban waiting rooms. Social, waiting and spaces where accidental meeting can occur are incorporated throughout the design through placement thereof in the square, building and along circulation routes.

The square has been designed to retain people instead of promoting pedestrian flow and consists of two levels with the second level being an adequate height for seating. This allows level changes to the square to serve the additional function of social meeting space. Seating is incorporated into planters with additional seating in sociopetal arrangement around it within both sheltered and unsheltered urban waiting rooms while still offering views of Pretoria station and the sidewalk. Due to these considerations, urban waiting rooms may be used for and encourage gathering and group formation while giving users of the space choice of shelter, sun or shade.

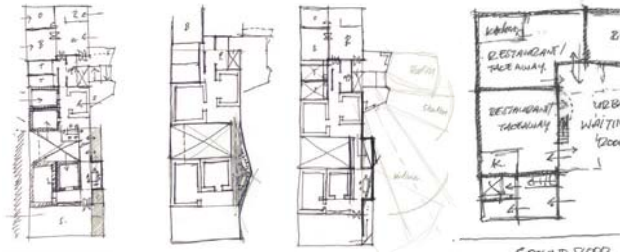
Social space is placed throughout the building. These spaces are incorporated within landings, office discussion space, balconies, roof gardens as well as spill out space to classrooms thereby allowing any of these spaces to act as communication activator.



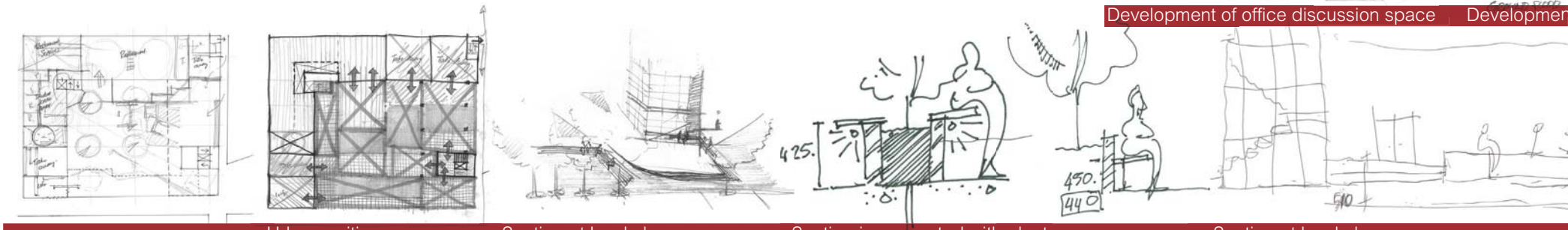
Initial response | Sociopetal balconies



Interaction through atrium | Urban waiti

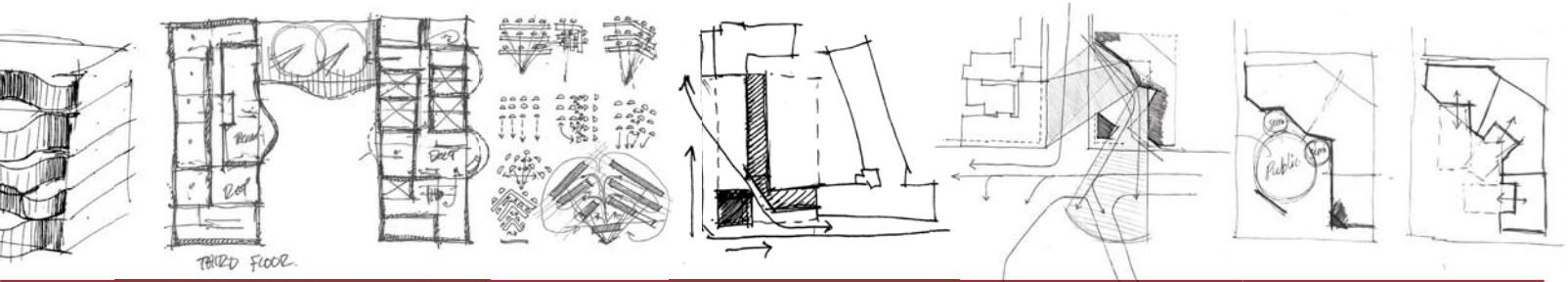


Development of office discussion space | Developmer



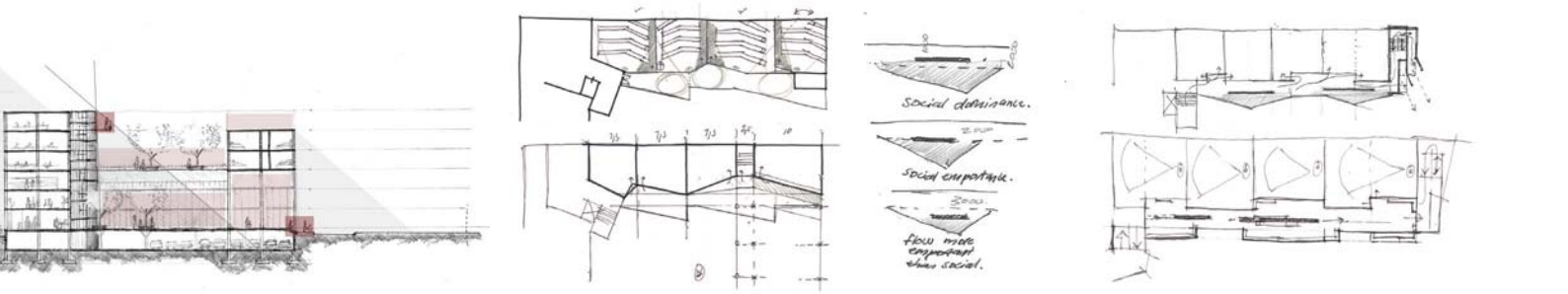
Urban waiting rooms | Seating at level change | Seating incorporated with planter | Seating at level change

Fig. 6.18: Communication activator development



Seating orientation promoting interaction

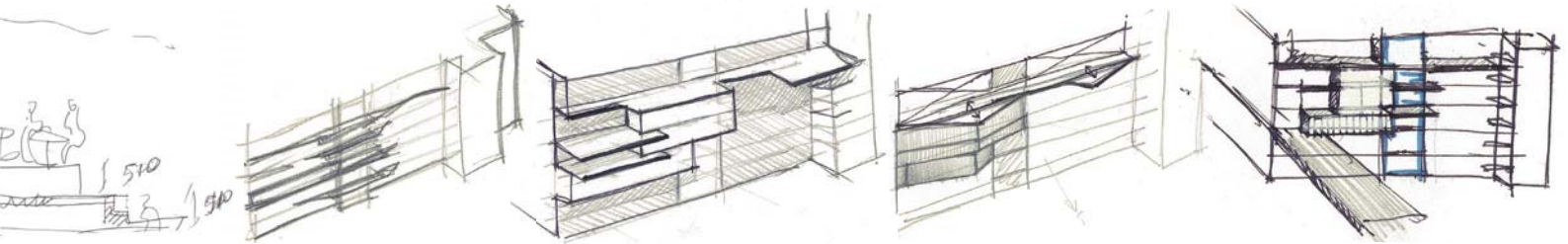
Building form promoting flow



ng rooms and social nodes

Development of social spill out spaces for ABET classrooms

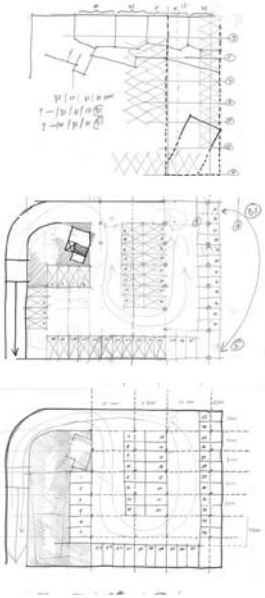
t of public square and urban waiting rooms

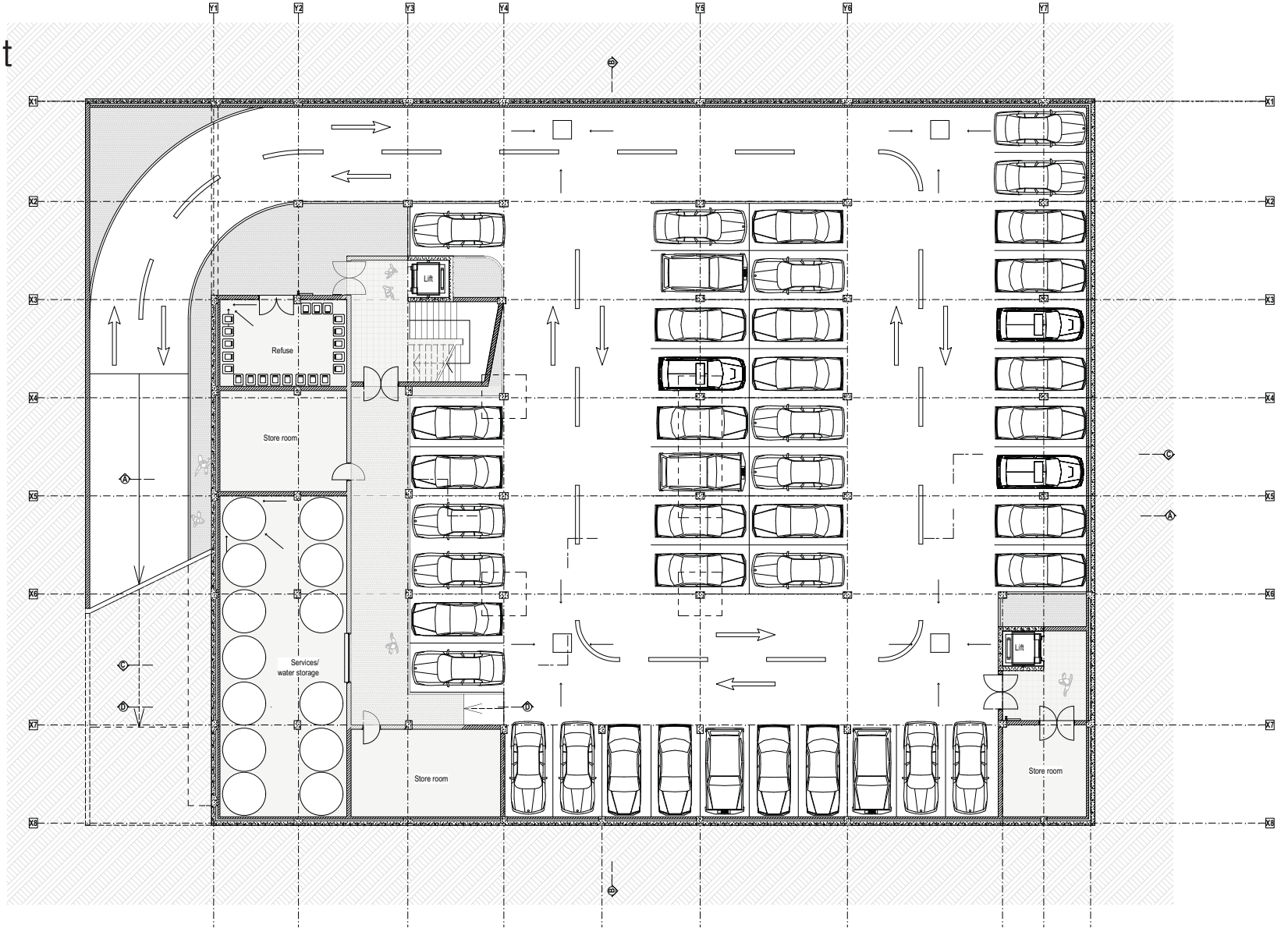


Facade development indicating social space

Social space within the building

Plan Development



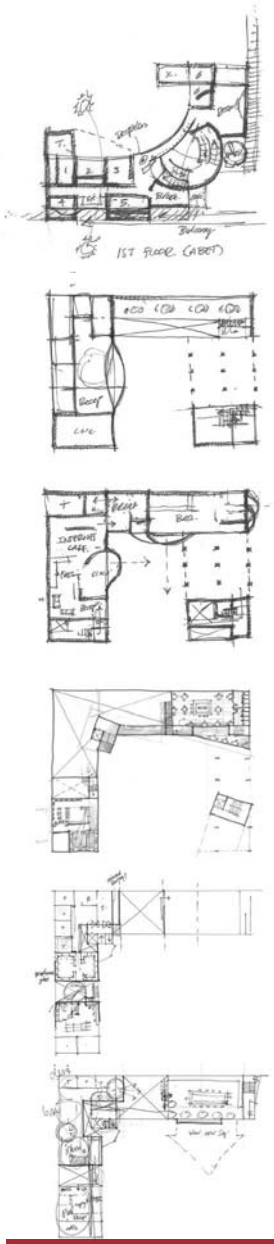


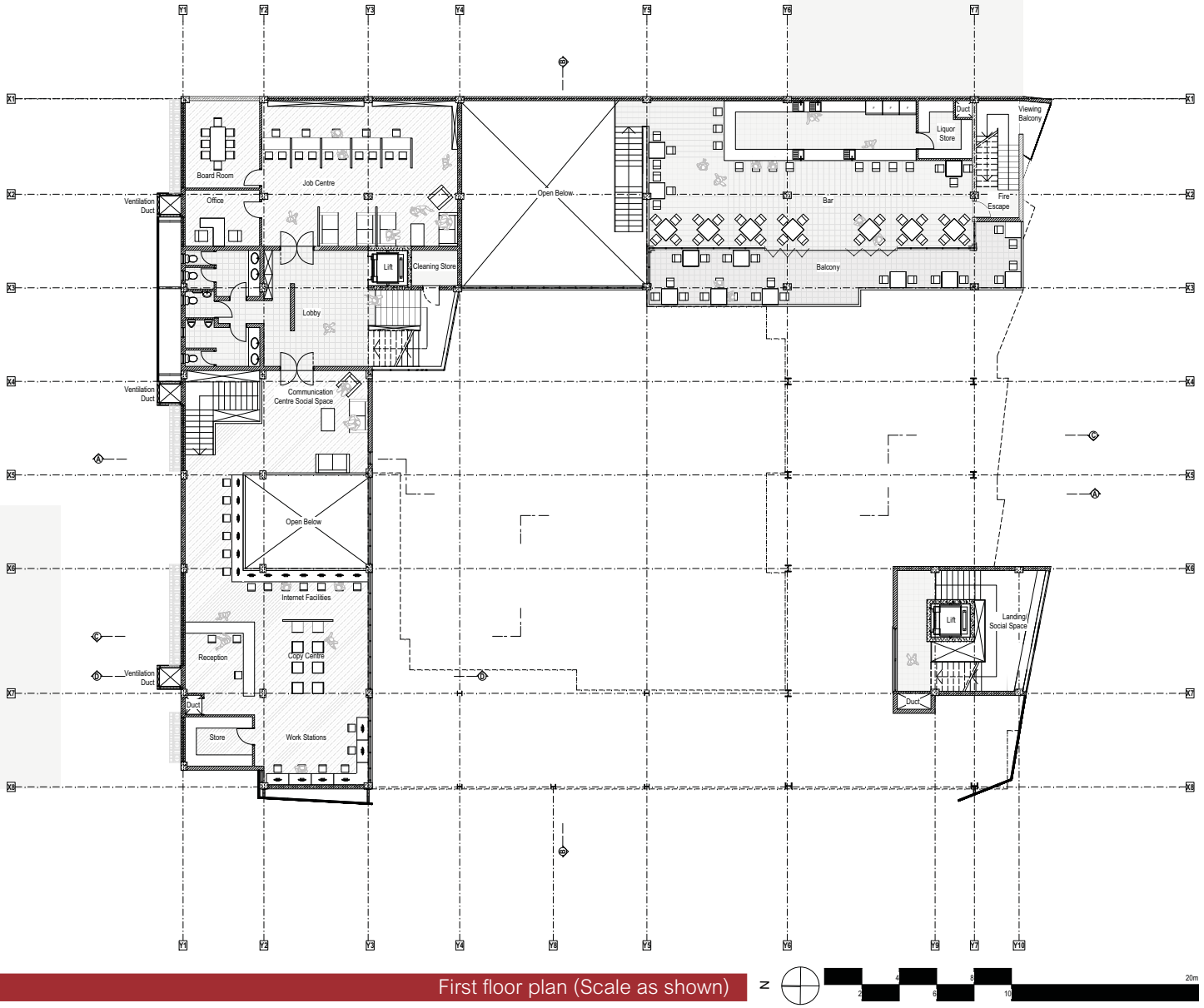
Development — Basement plan (Scale as shown)

Fig. 6.19: Basement plan and development

Ground floor plan (Scale as shown) Development

Fig. 6.20: Ground floor plan and development

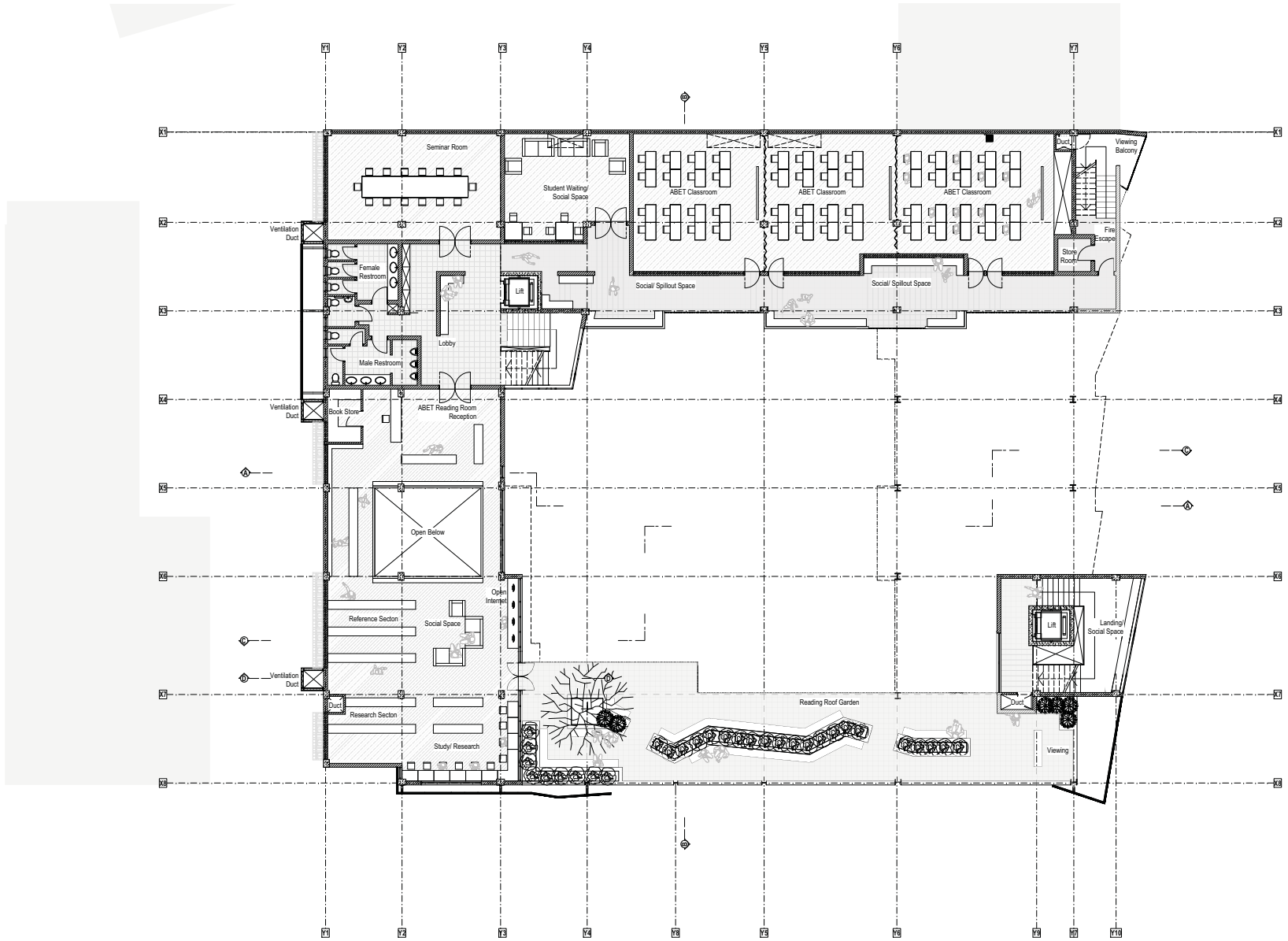


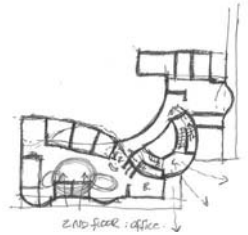


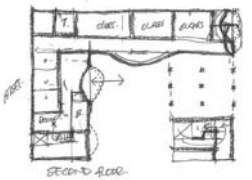
Development

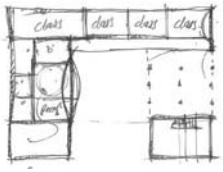
First floor plan (Scale as shown)

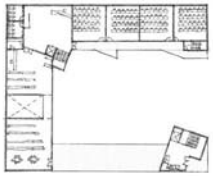
Fig. 6.21: First floor plan and development









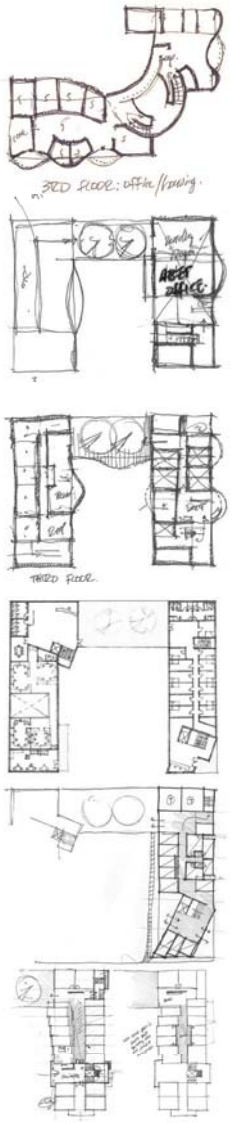


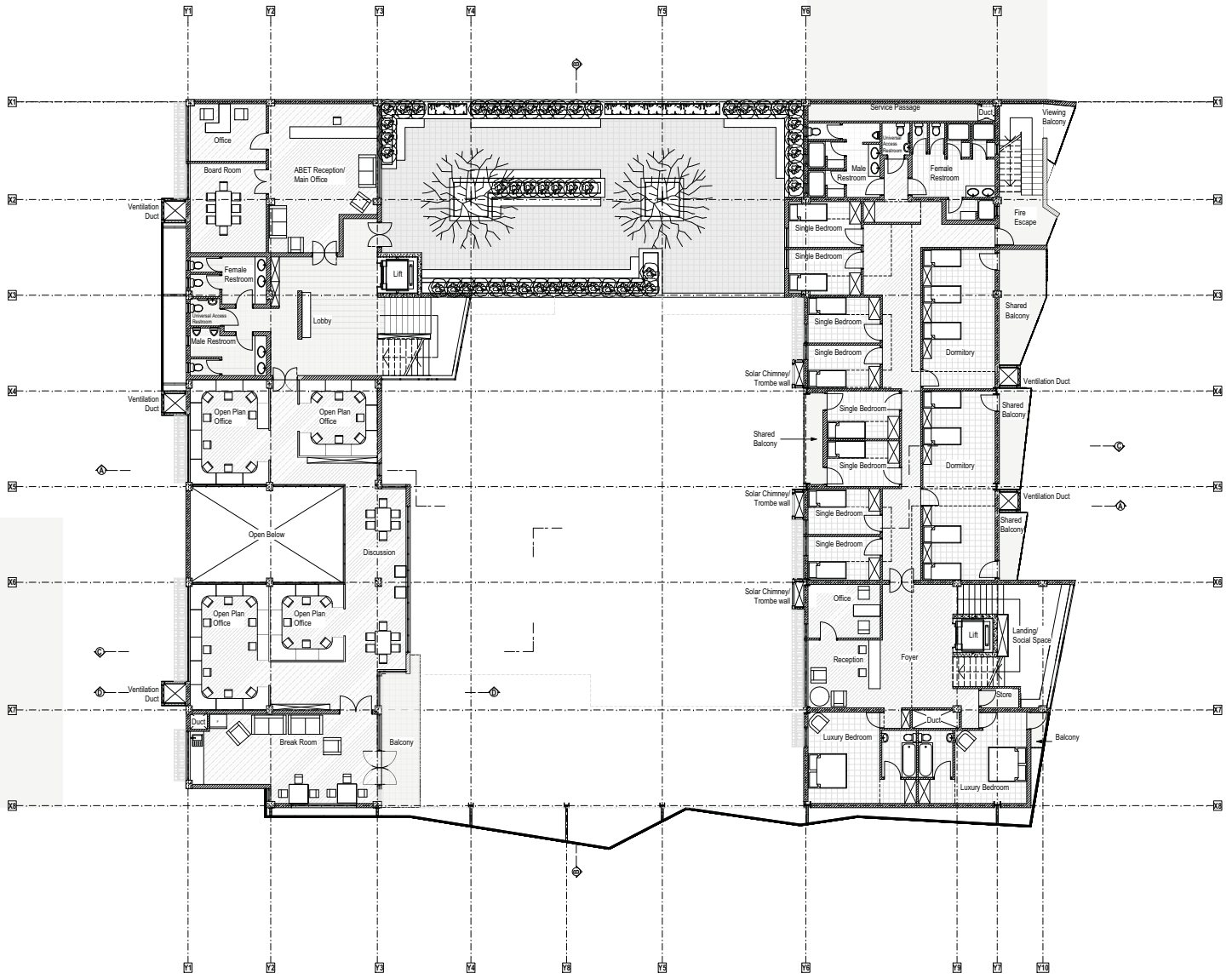
N

20m

Second floor plan (Scale as shown) Development

Fig. 6.22: Second floor plan and development



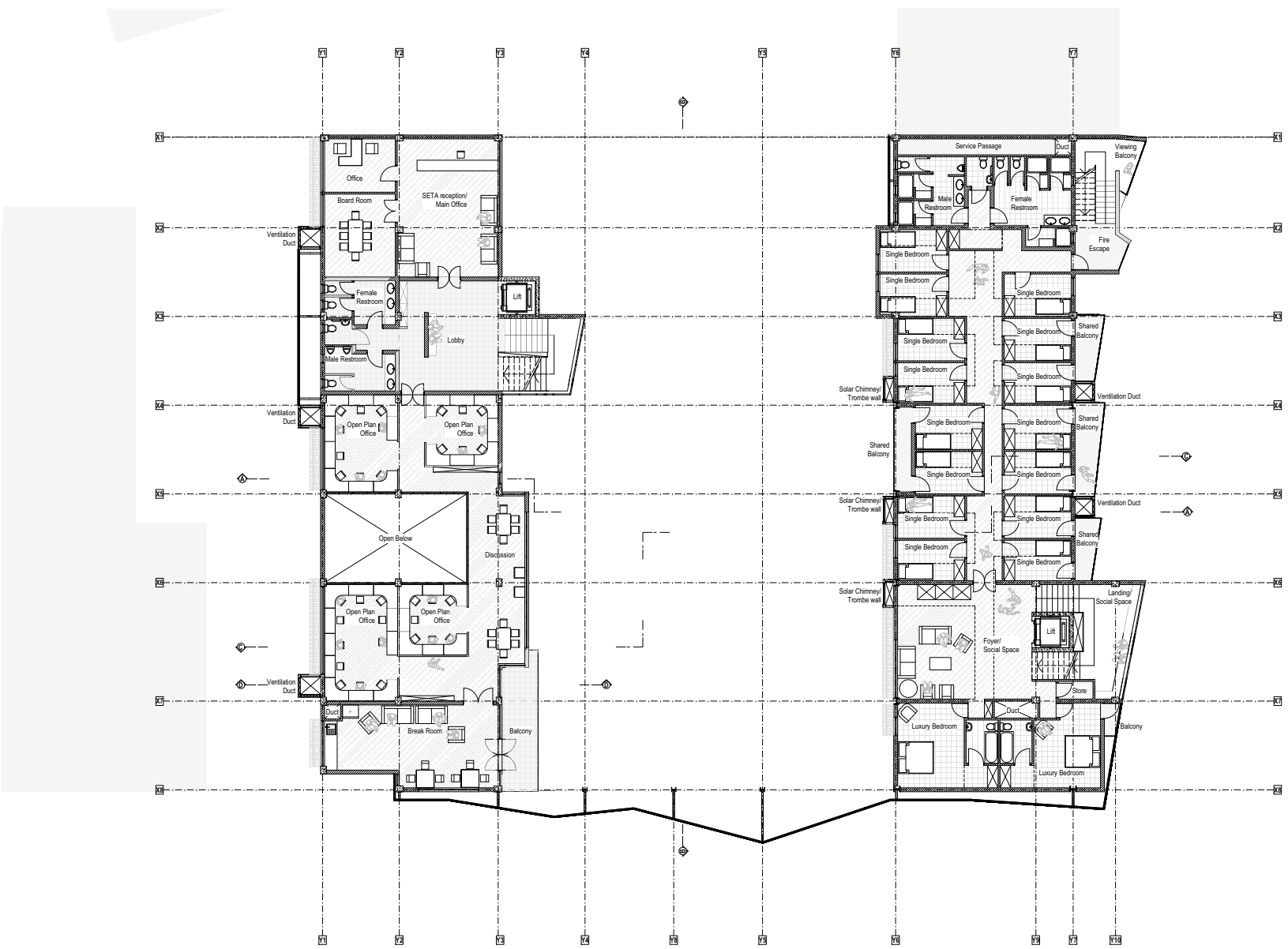


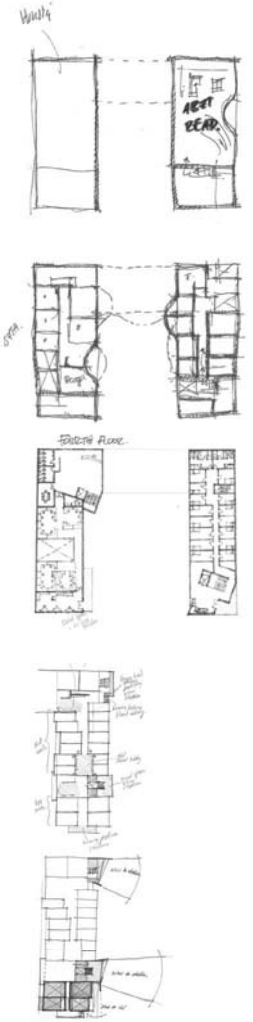
Development

Third floor plan (Scale as shown)

N

Fig. 6.23: Third floor plan and development



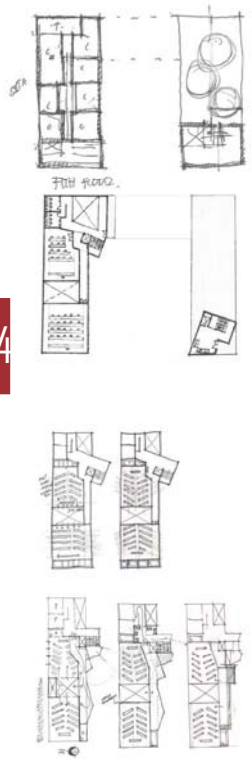


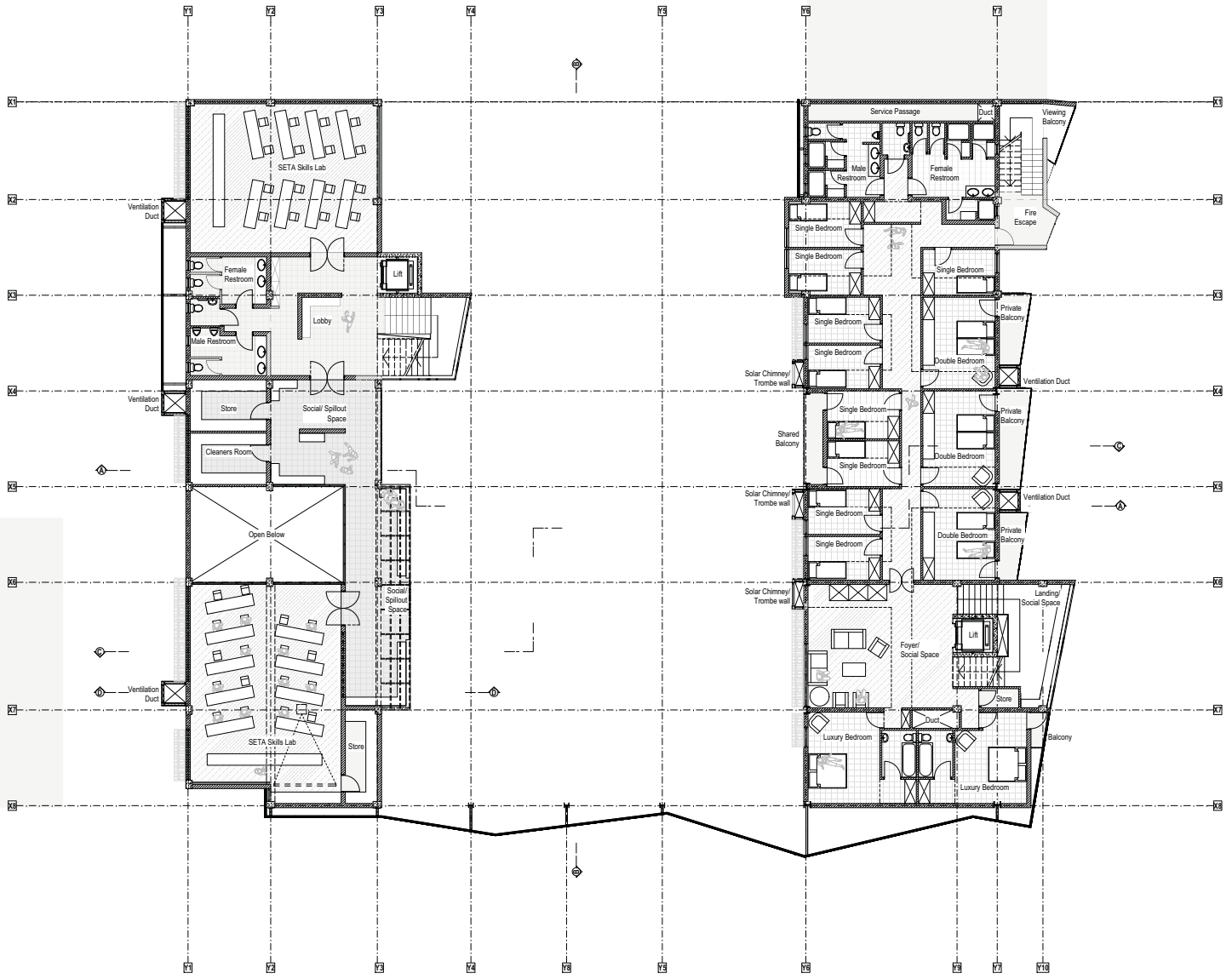
N

20m

Fourth floor plan (Scale as shown) Development

Fig. 6.24: Fourth floor plan and development





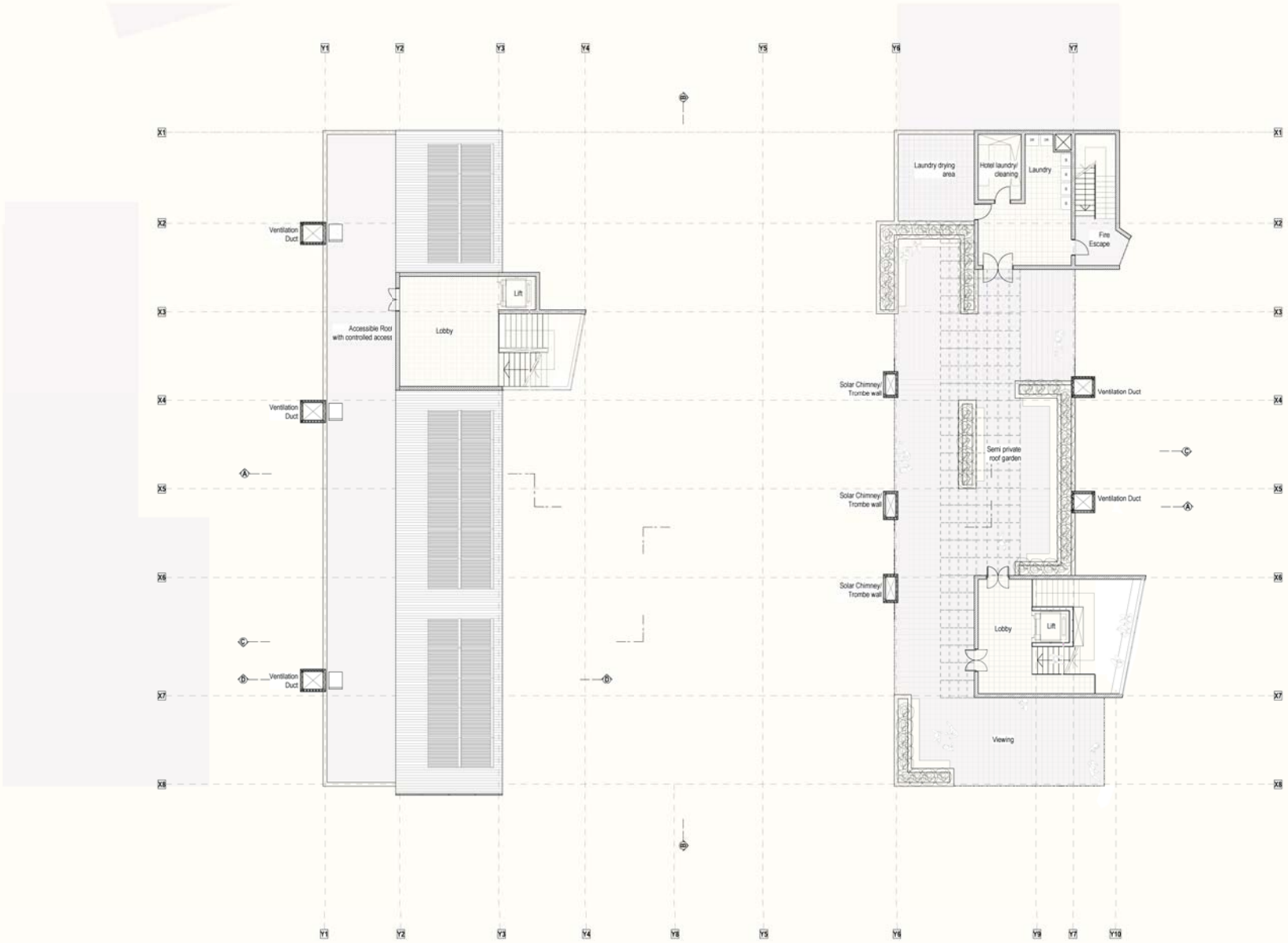
Development

Fifth floor plan (Scale as shown)

N

2 4 6 8 10 20m

Fig. 6.25: Fifth floor plan and development



N

Roof plan (Scale as shown)

Development

Fig. 6.26: Roof plan

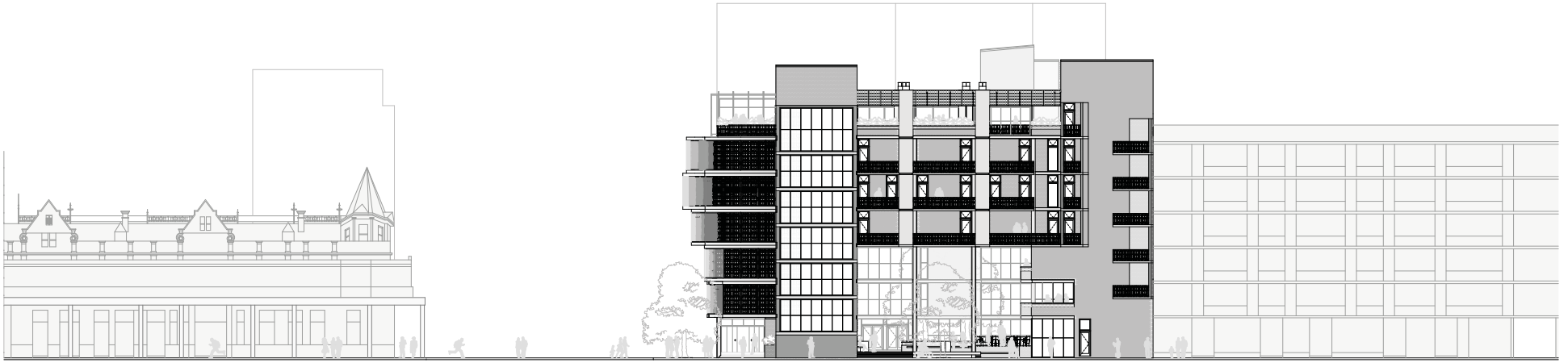


Fig. 6.27: Southern elevation

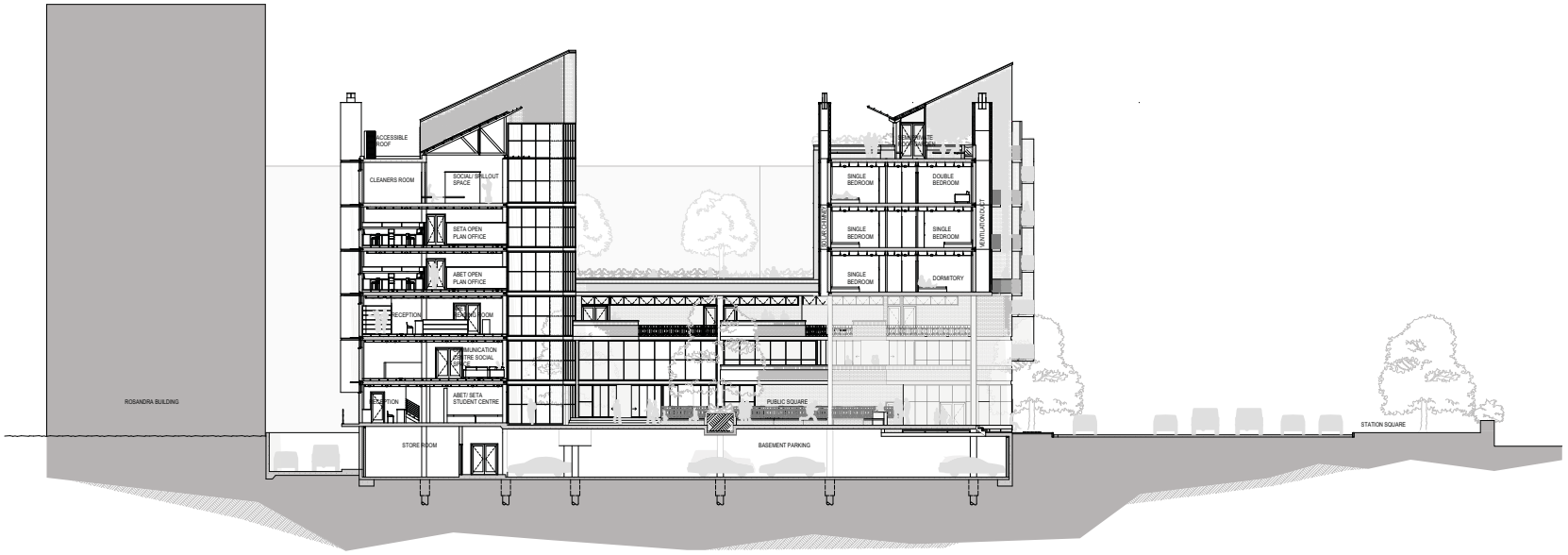


Fig. 6.28: Section AA

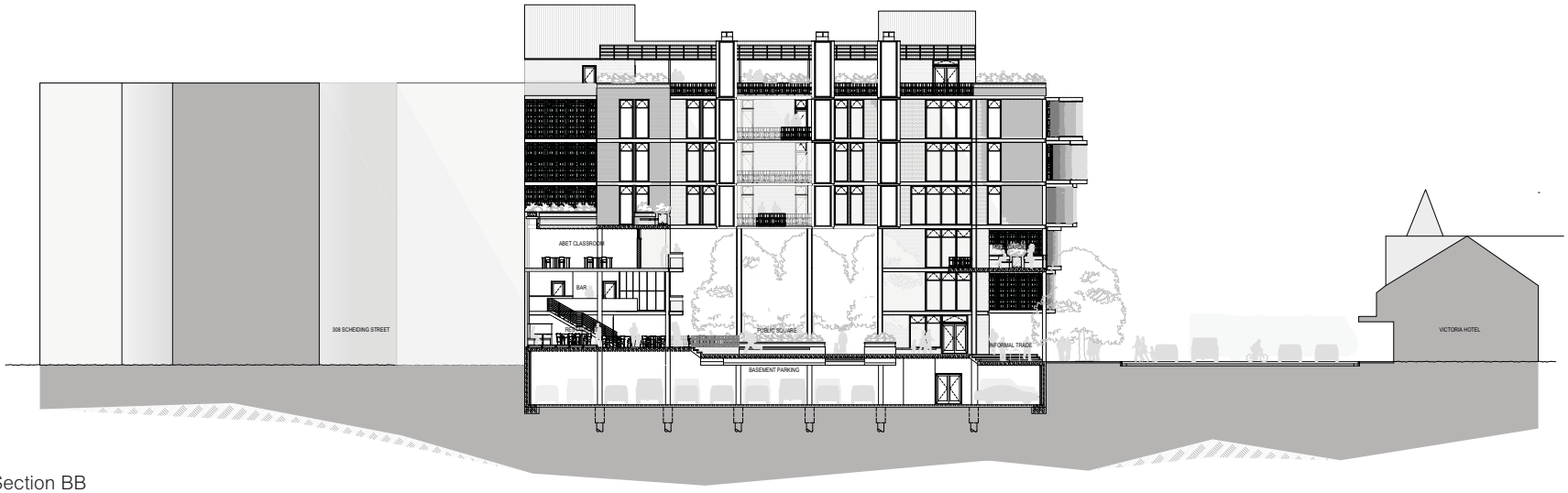


Fig. 6.29: Section BB

Chapter 7

Introduction

Tectonic decisions are influenced by the parti diagram through response to architecture as communication activator, extension of public space and gateway formation. *Entopia* is created through response to context, thereby influencing material selection, roof design, hierarchy of space and selection of passive systems.

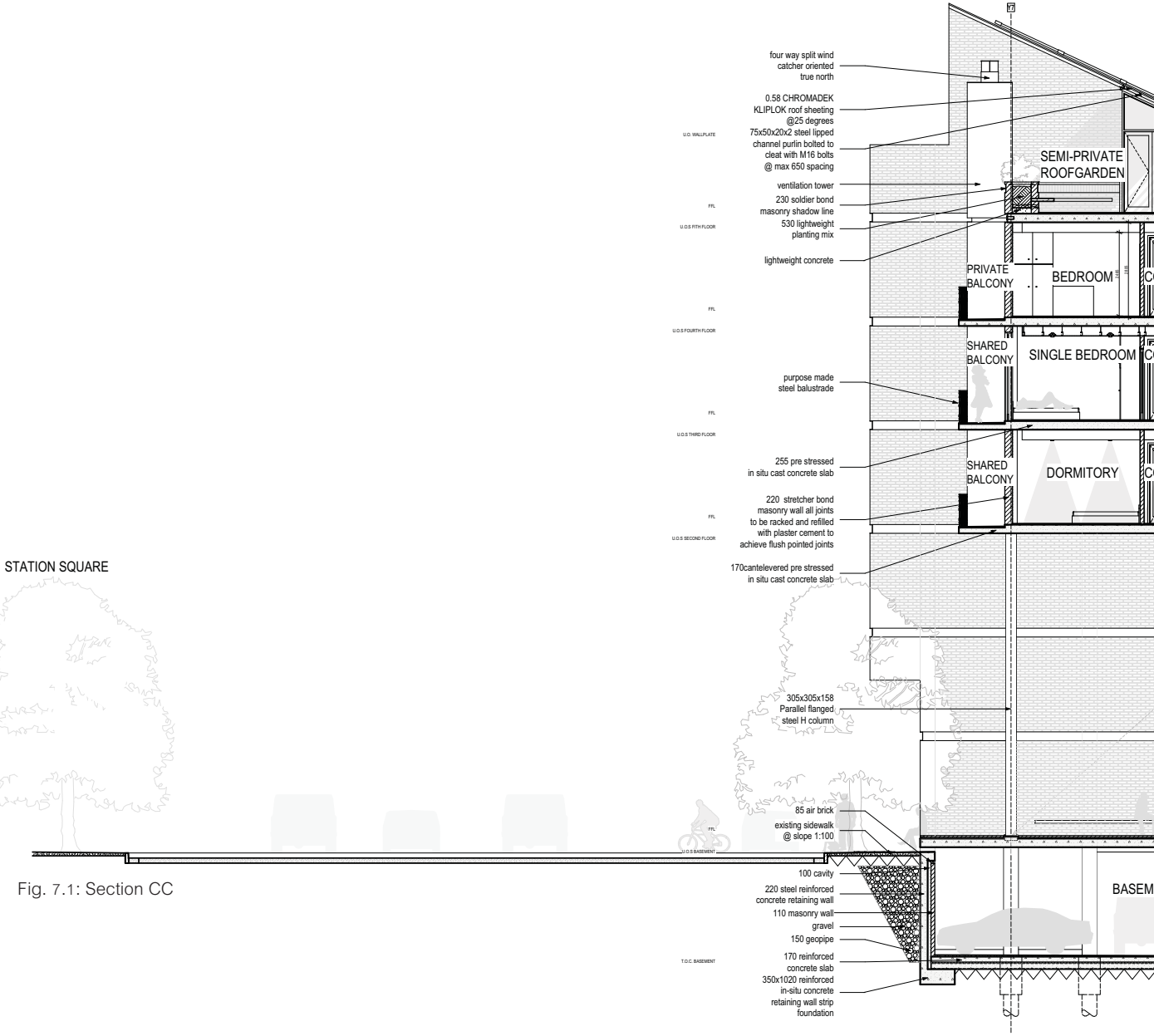
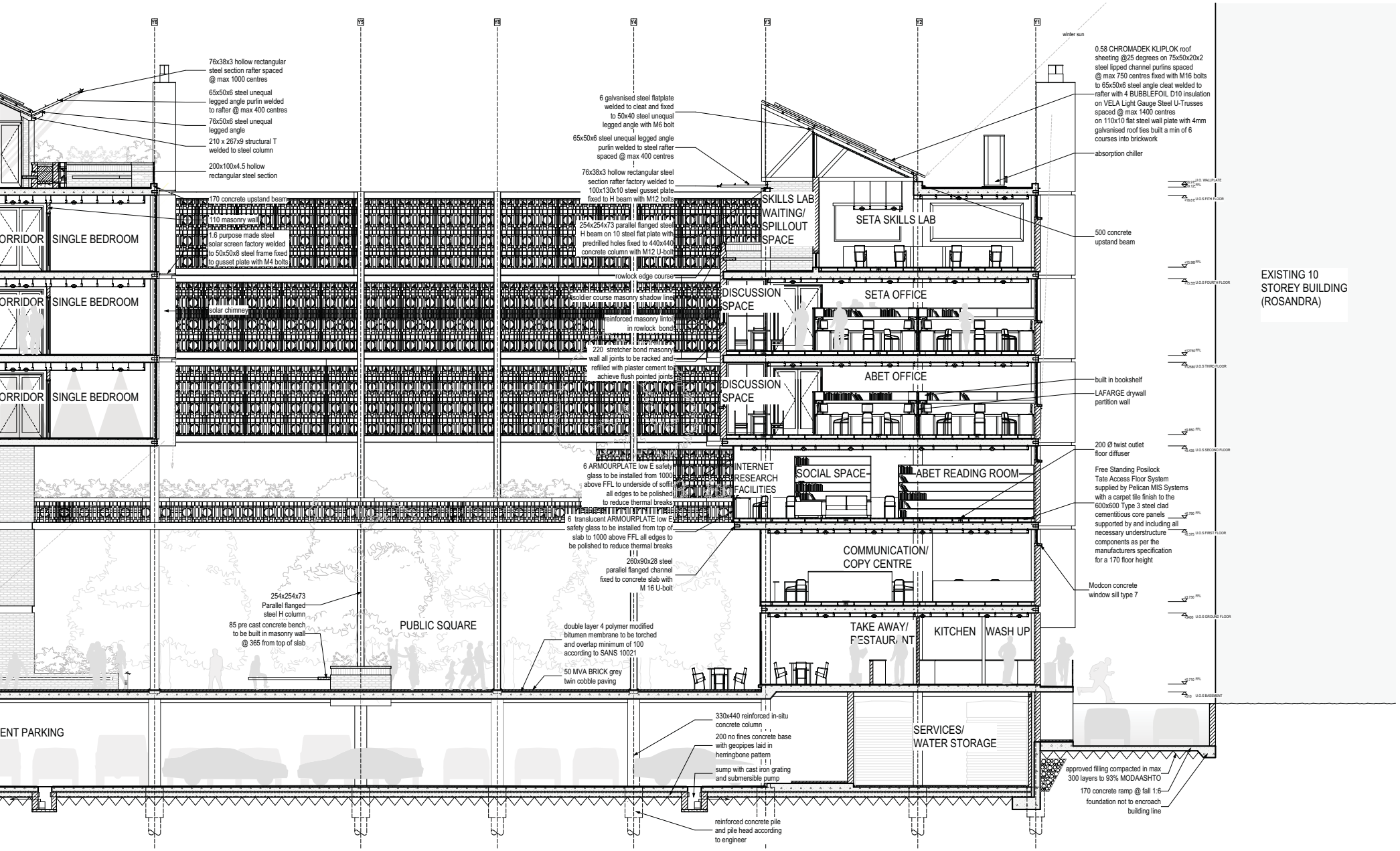


Fig. 7.1: Section CC


Y6
Y5
Y4
Y3
Y2
Y1
winter sun
76x38x3 hollow rectangular steel section rafter spaced @ max 1000 centres
65x50x6 steel unequal legged angle purlin welded to rafter @ max 400 centres
76x50x6 steel unequal legged angle
210 x 267x9 structural T welded to steel column
200x100x4.5 hollow rectangular steel section
170 concrete upstand beam
110 masonry wall
1.6 purpose made steel solar screen factory welded to 50x50x8 steel frame fixed to gusset plate with M4 bolts
solar chimney
6 galvanised steel flatplate welded to cleat and fixed to 50x40 steel unequal legged angle with M6 bolt
65x50x6 steel unequal legged angle purlin welded to steel rafter spaced @ max 400 centres
76x38x3 hollow rectangular steel section rafter factory welded to 100x130x10 steel gusset plate fixed to H beam with M12 bolts
254x254x73 parallel flanged steel H beam on 10 steel flat plate with predrilled holes fixed to 440x440 concrete column with M12 U-bolts
rowlock edge course
soldier course masonry shadow line
reinforced masonry lintol in rowlock bond
220 stretcher bond masonry wall all joints to be racked and refilled with plaster cement to achieve flush pointed joints
6 ARMOURPLATE low E safety glass to be installed from 1000 above FFL to underside of soffit all edges to be polished to reduce thermal breaks
6 translucent ARMOURPLATE low E safety glass to be installed from top of slab to 1000 above FFL all edges to be polished to reduce thermal breaks
260x90x28 steel parallel flanged channel fixed to concrete slab with M 16 U-bolt
0.58 CHROMADEK KLIPLOK roof sheeting @25 degrees on 75x50x20x2 steel lipped channel purlins spaced @ max 750 centres fixed with M16 bolts to 65x50x6 steel angle cleat welded to rafter with 4 BUBBLEFOIL D10 insulation on VELA Light Gauge Steel U-Trusses spaced @ max 1400 centres on 110x10 flat steel wall plate with 4mm galvanised roof ties built a min of 6 courses into brickwork
absorption chiller
500 concrete upstand beam
built in bookshelf
LAFARGE drywall partition wall
200 Ø twist outlet floor diffuser
Free Standing Posilock Tate Access Floor System supplied by Pelican MIS Systems with a carpet tile finish to the 600x600 Type 3 steel clad cementitious core panels supported by and including all necessary understructure components as per the manufacturers specification for a 170 floor height
Modcon concrete window sill type 7
254x254x73 Parallel flanged steel H column
85 pre cast concrete bench to be built in masonry wall @ 365 from top of slab
double layer 4 polymer modified bitumen membrane to be torched and overlap minimum of 100 according to SANS 10021
50 MVA BRICK grey twin cobble paving
330x440 reinforced in-situ concrete column
200 no fines concrete base with geopipes laid in herringbone pattern
sump with cast iron grating and submersible pump
reinforced concrete pile and pile head according to engineer
approved filling compacted in max 300 layers to 93% MODAASHTO
170 concrete ramp @ fall 1:6
foundation not to encroach building line
ORRIDOR
SINGLE BEDROOM
ORRIDOR
SINGLE BEDROOM
ORRIDOR
SINGLE BEDROOM
SKILLS LAB WAITING/ SPILLOUT SPACE
SETA SKILLS LAB
DISCUSSION SPACE
SETA OFFICE
DISCUSSION SPACE
ABET OFFICE
INTERNET RESEARCH FACILITIES
SOCIAL SPACE
ABET READING ROOM
COMMUNICATION/ COPY CENTRE
TAKE AWAY/ RESTAURANT
KITCHEN
WASH UP
SERVICES/ WATER STORAGE
PUBLIC SQUARE
ENT PARKING
EXISTING 10 STOREY BUILDING (ROSANDRA)

Parti Diagram

The role of architecture as communication activator is expressed in the building envelope. The building envelope responds to function and hierarchy of space and allows the nature of the program to be legible from the outside of the building.

Programs with public functions opening onto the square directly or visually makes use of glass curtain walls, thereby creating continuous visual activity to internal spaces. Programs where higher levels of privacy is required such as overnight facilities, classrooms and discussion spaces within the offices are constructed from a masonry envelope thereby solidifying the facade and achieving higher levels of privacy.

The expression of hierarchy on facade and establishing visual connection to activity within the building contributes to pedestrian legibility and understanding of the design as well as counteracts the experience of abandoned public space that reigns in numerous public squares within Pretoria CBD.

Extension of public space and the urban floor are expressed tectonically at thresholds to the square and internal spaces.

At thresholds to the square, extension of public space is articulated through material choice which continues the palette used in Station Square and the cantilevered slab of the new public square floor plate. This blurs the boundary firstly between the site and Station Square, and secondly the threshold between the sidewalk and newly created public space. The threshold to internal spaces is also blurred through the use of shadow lines at entrances. Shadow lines are created by extending the floor slab 100mm over the square with the slab thinning to 85mm to accommodate the shadow line underneath.

Gateway formation is translated tectonically through the resolution of the screen which responds to context, shades the site from western sun and announces entrance onto site and into the city.

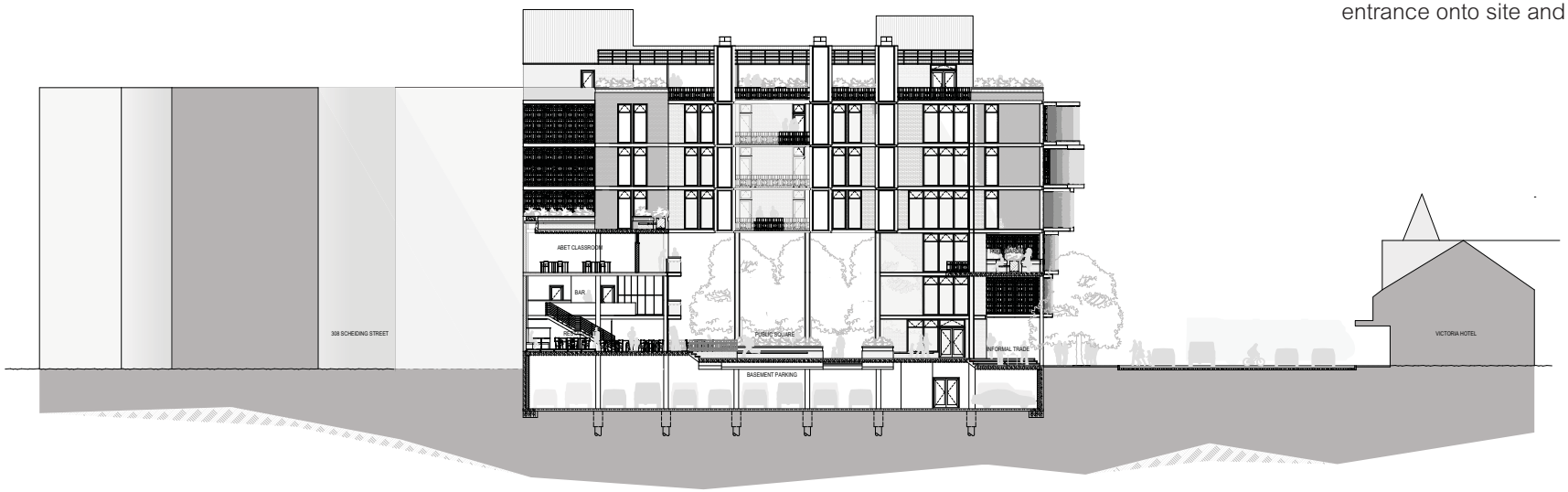


Fig. 7.2: Section BB

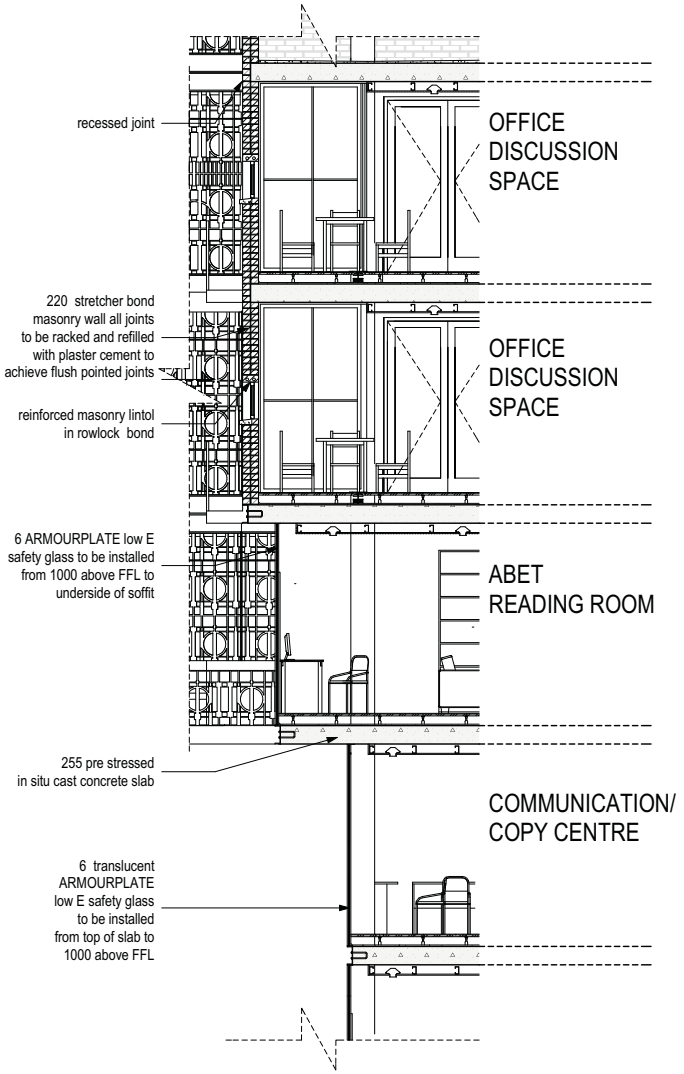


Figure 7.3: Strip section indicating response to function and hierarchy through building envelope

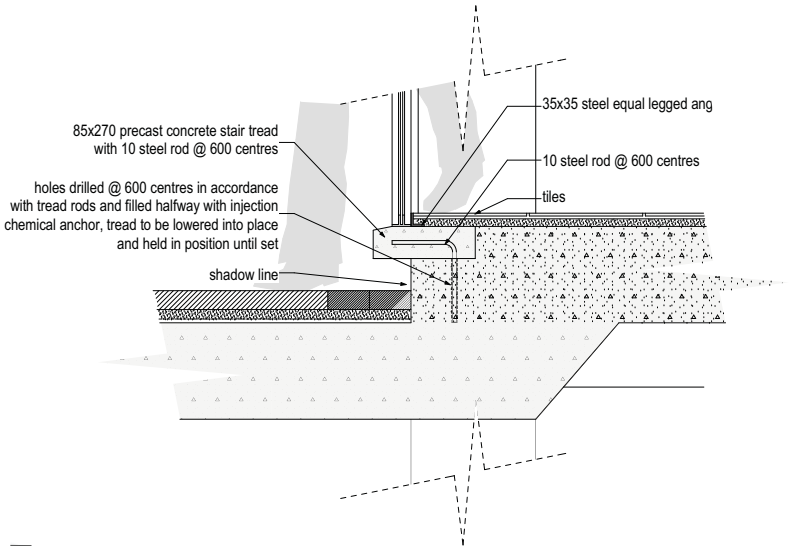


Figure 3.24: Detail: shadow line at entrance to internal space

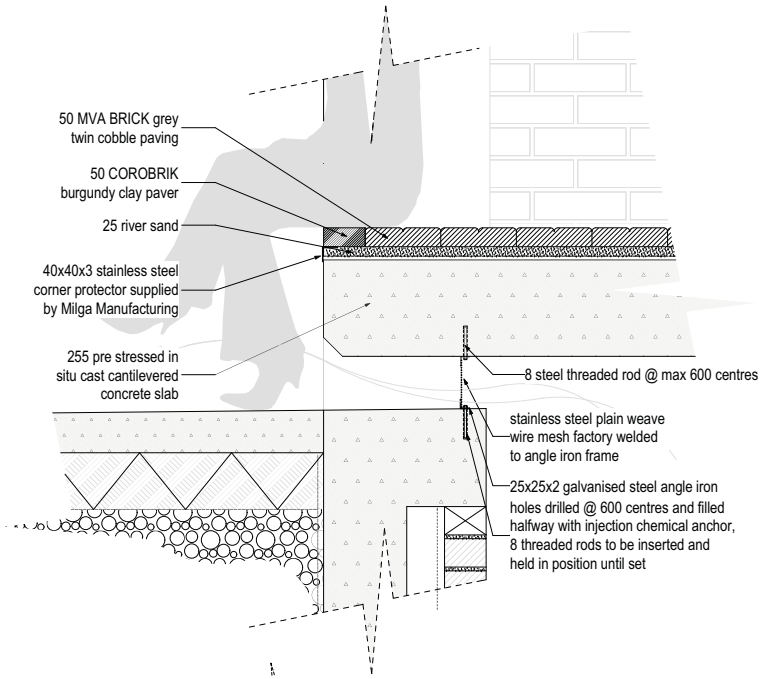


Figure 7.4: Detail: cantilevered slab of new public square

Building Structure

During the technical investigation the building structure was developed through consultation with Civil Engineers Professor Walter Burdzik and Carl von Geyso.

Column spacing has been determined by the basement layout in combination with programmatic spatial requirements. The grid allows parking and circulation within the basement while accommodating modular sized units within the overnight facilities and preferred sized classrooms and still allows the structure to be adaptable in order to accommodate possible future change in program or envelope. This allows the building to adapt to changing needs within the environment thereby strengthening *entopia* and extending the building lifetime.

As is the case in most of the buildings within the context, building structure is expressed on facade. The structure is exposed through the use of shadow lines and steel channels fixed directly to the concrete slabs allowing a recessed connection. The channel acts as permanent shuttering for the floor slabs and additionally facilitates fixing of elements to the building facade such as the screen, solar shading devices and ventilation towers.

Primary Building Structure

The primary building structure consists of 255 deep pre-stressed concrete slabs with 330x440 reinforced concrete columns.

Steel columns are used in part for the southern and western wings of the structure to accommodate deflections that will occur due to the lack of horizontal support. In the southern wing where the columns span three storeys, 305x305x158 Parallel flanged steel H columns has been selected with smaller H columns used to support the screen and bridge the two storeys without lateral support in the western wing.

Use of steel columns in these areas allows the use of less material and prevents large columns intruding within the urban waiting rooms.

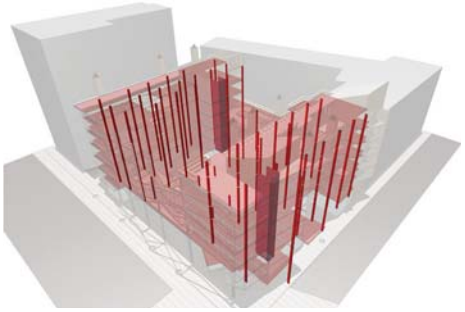


Fig. 7.5: Concrete columns and slabs

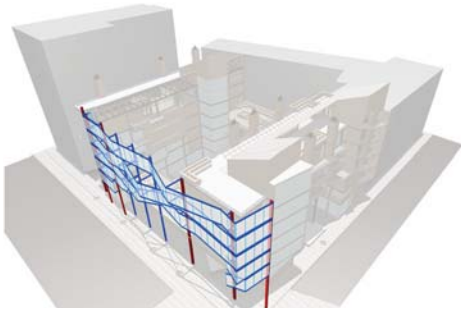


Fig. 7.6: Screen structure

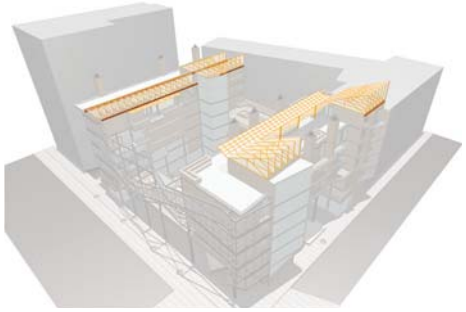


Fig. 7.7: Roof structure

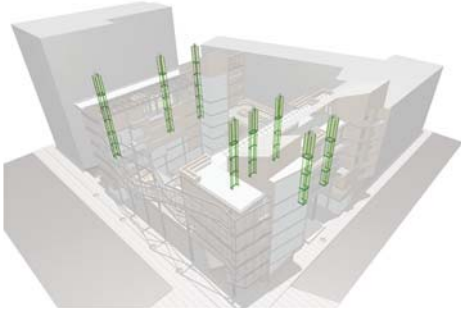


Fig. 7.8: Ventilation towers structure

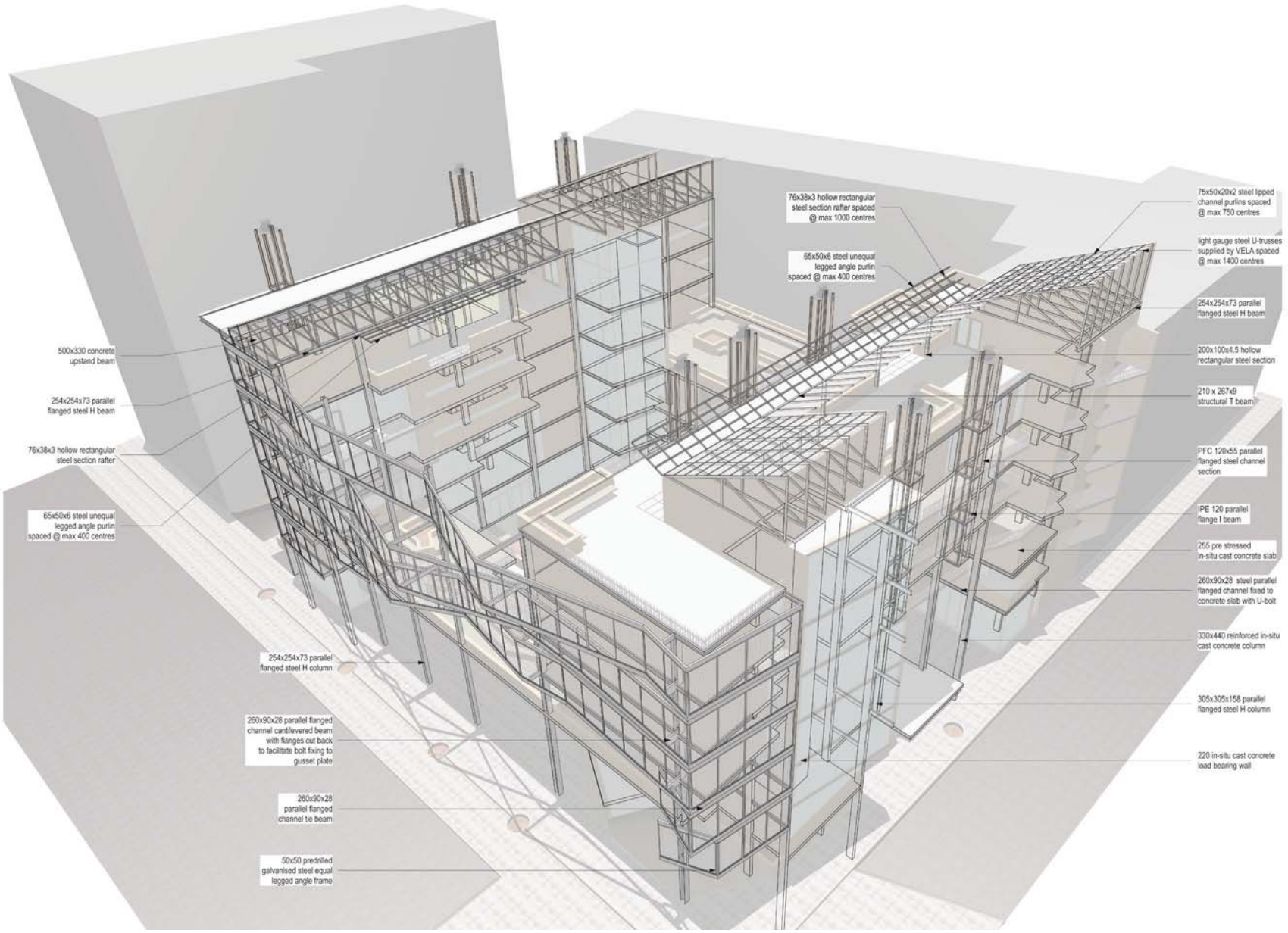


Fig. 7.9: Structural diagram of entire building

Screen Structure

Numerous structural elements have been considered during the technical investigation of the screen. Main design determinates were context, materiality, maintenance, weight and sizing as structural elements supporting the screen are not to hamper light and air moving through the shading device. During the investigation process it has been found that vierendeel girders and wide flanged rolled steel sections could not be used due to inadequate required depth, causing the supporting structure to reduce space available for the shading device drastically. Deep rolled steel sections have therefore been used for all horizontal support elements.

The structure used to support the screen are 254x254x73 Parallel flanged steel H columns for vertical support with 260x90x28 parallel flanged steel channel cantilevered beams which allows the screen to step away from the rigid column grid in order to facilitate gateway formation and way finding. The cantilevered beams then have cut back flanges to facilitate bolt fixing to gusset plates, factory welded to steel parallel flanged tie beams.

Where the cantilevered beams are required to connect directly to the building envelope without the use of columns, beams are bolted to gusset plates that are connected to a purpose made parallel flanged channel fixed to the concrete slab. The channel allows the fixing of two cantilevered beams due to the lack of shared structure to allow independent screen placement between different storeys.

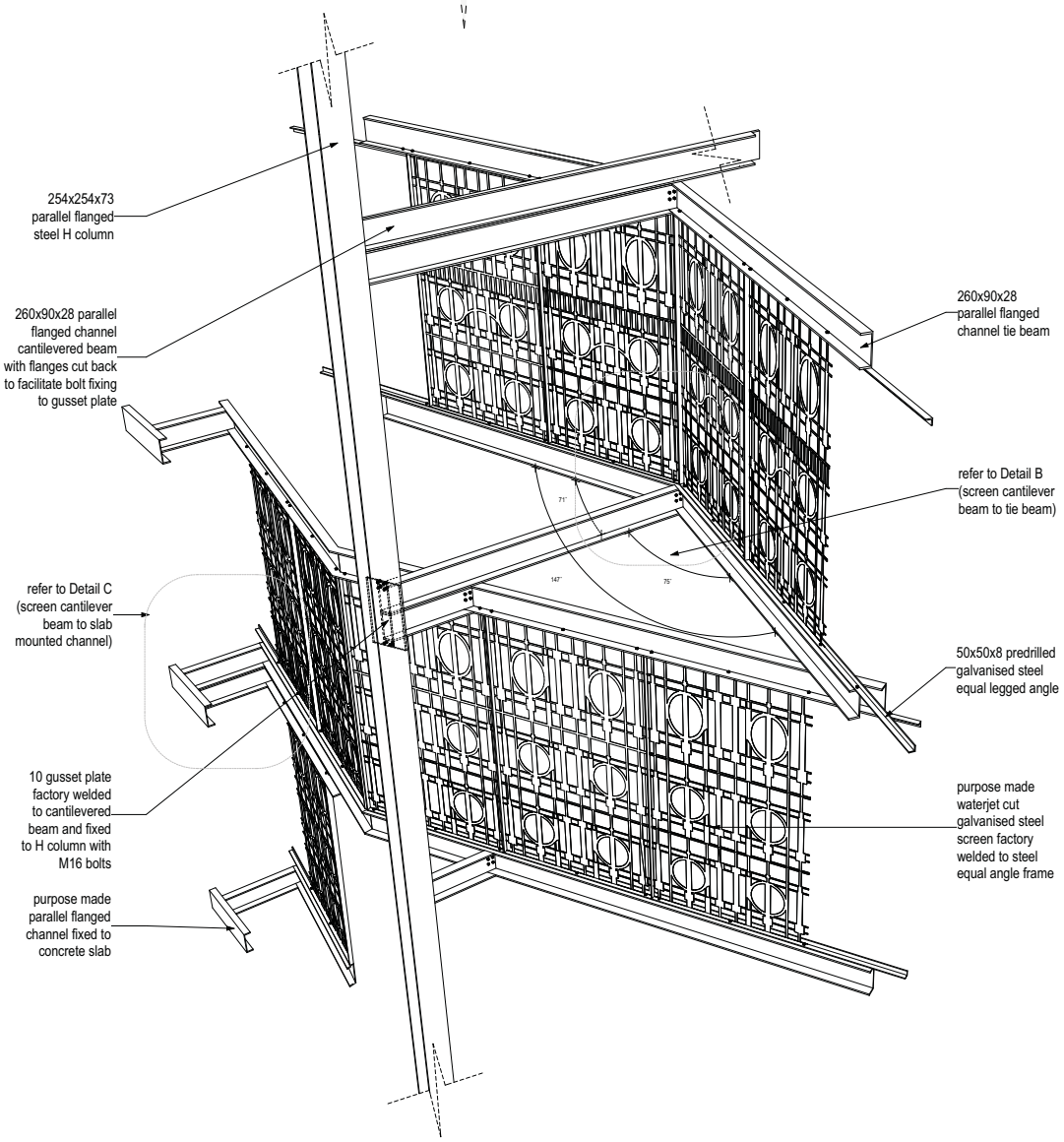


Fig. 7.10: Detail: screen construction

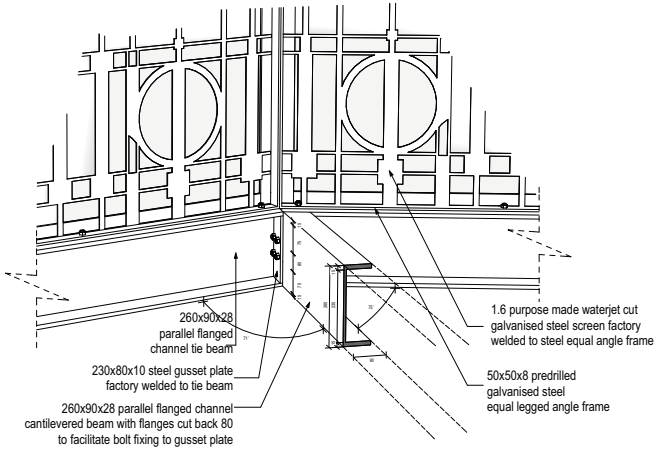


Fig.7.11: Detail: cantilever beam to tie beam

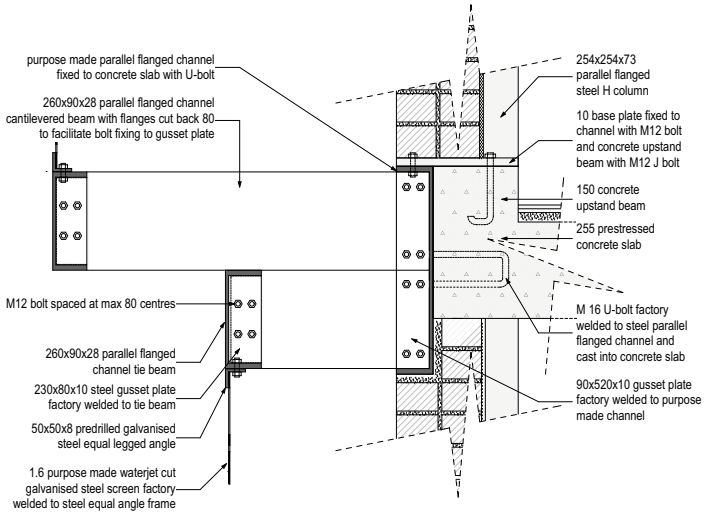


Fig. 7.12: Detail: cantilever beam to slab mounted channel

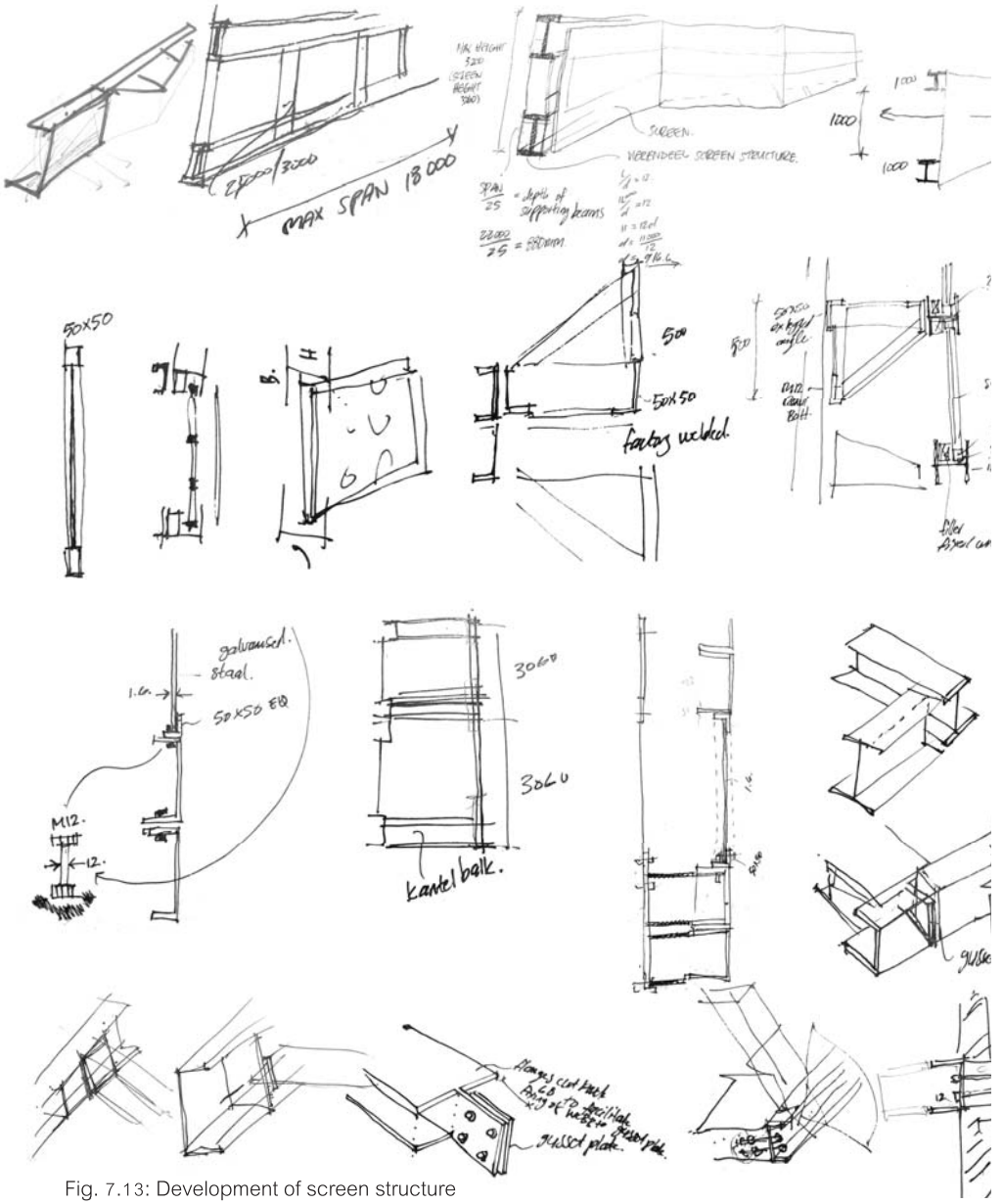


Fig. 7.13: Development of screen structure

Solar Studies + Response

Comparative solar studies has been done in order to determine shading conditions on site and serve to illustrate improvement on current conditions.

The new design provides 5 times the amount of public external space currently available to pedestrians. During summer, shaded space per m² on site is increased by 240% while in winter external public sunlit space is increased by 5020%

From the solar studies it can be seen that shade created by the ten storey residential building neighbouring the site to the north completely eliminates direct sun on the northern facade during winter thereby reducing natural light within the building and negating the use of numerous sustainable strategies with regards to heating and cooling.

Lack of northern sun during cold months influenced decision making during the roof design and selection as well as placement of sustainable heating and cooling systems. Low light conditions during winter months led to the introduction of an atrium in the northern wing which allows natural light to enter the building from the roof.

In response to context and shading conditions on site a combined roof has been decided upon. The roof is in part an accessible flat roof with mono pitched sections orientated north. Mono pitched roofs are placed to miss shadows created by the neighbouring building in order to facilitate the use of passive solar strategies and are angled at 25˚ in order to ensure proper functioning of sun driven systems. Clerestory windows have been added to the mono pitched roof sections to allow diffused southern light to enter spaces thereby increasing natural light within the building.

Current conditions during Summer solstice

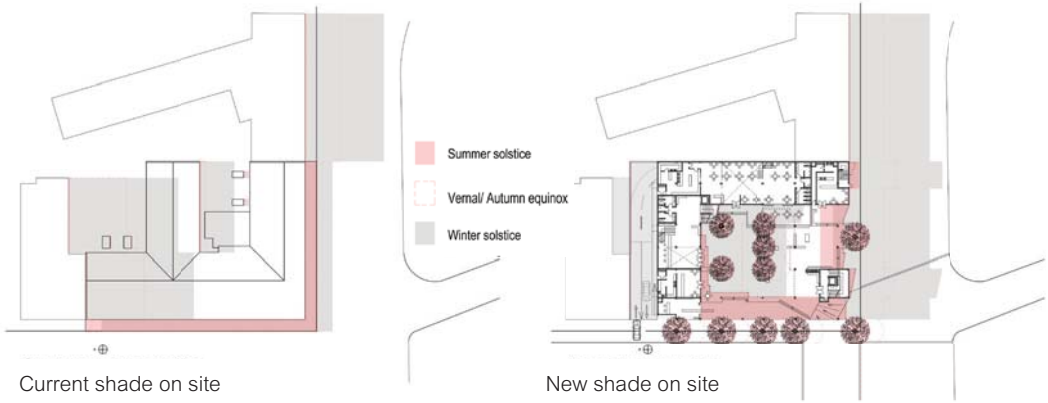
New conditions during Summer solstice

Current conditions during equinox

New conditions during equinox

Current conditions during Winter solstice

New conditions during Winter solstice



Current shade on site

New shade on site

Fig. 7.14: Solar study

Sustainability

The local ambient environment is known to have both a direct physical and emotional effect on man and is therefore of central importance in building design and development (Rabah & Mito 2003).

Buildings incorporating passive systems have indicated a decrease in energy use of up to 90% and an increase in worker productivity by 6-15%. Apart from decreased energy consumption and increased productivity, buildings making use of passive systems have indicated an increase in occupant health and social interaction (Stitt, 1999).

System Selection

Ecosystemic thinking is to think of systems as nested. Each system is seen as part of a larger system (Fisher and Clarke, [2010]). The passive design strategy follows an ecosystemic approach where different passive strategies are combined in order to increase their functionality and make them better suited for the Pretoria climate.

Pretoria is characterised by calm winds. The city has 41.1% wind still days during summer and 57.2% wind still days during winter (Wegelin, 2009). Pretoria CBD is therefore not suited for passive strategies that are wind driven. High insolation rates and a relatively low amount of cloud cover however, makes Pretoria a suitable environment for passive solar driven systems. These systems can be used in conjunction with wind based strategies in order to cool buildings during summer and heat them during winter as well as increase wind intake.

With Pretoria having an average relative humidity between 29 and 75% (BBC, 2011) evaporative cooling systems making use of exposed water are not always functional within the environment due to unfavourable levels of humidity (Air & Water, 2011). It has therefore been decided to use indirect evaporative cooling that does not increase humidity, thereby increasing levels of functionality during summer months when air needs to be cooled. During winter months, air will be treated using the same ducts and pipes while diverting them through an evacuated-tube solar collector system in order to generate heat.

During the technical development of sustainable systems mechanical engineer Peet Pelser has been consulted in order to ensure functionality of the selected systems.

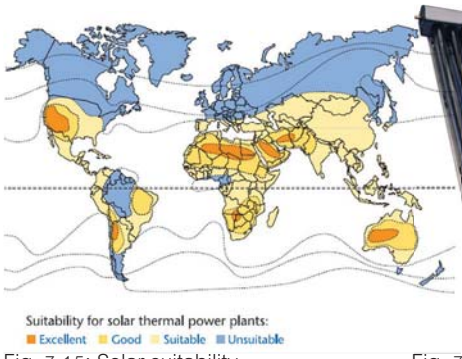


Fig. 7.15: Solar suitability

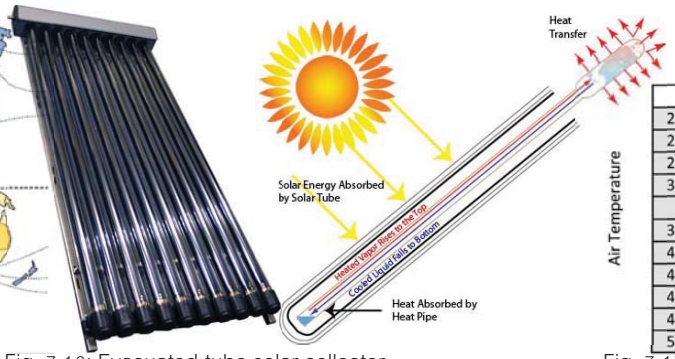


Fig. 7.16: Evacuated-tube solar collector

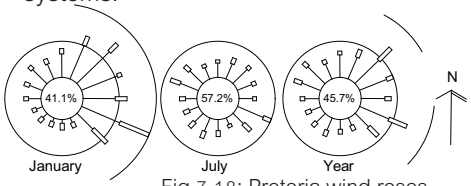


Fig.7.18: Pretoria wind roses

% Relative Humidity

Air Temperature	2	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
23.8	12.2	12.7	13.8	14.4	15	16.1	16.6	17.2	17.7	18.3	18.8	19.4	20	20.5	21.1	21.6	22.2
26.6	13.8	14.4	15.5	16.6	17.2	17.7	18.8	19.4	20	20.5	21.6	22.2	22.7	23.3	24.4	24.4	25
29.4	16.1	16.6	17.2	18.3	19.4	20	21.1	21.6	22.2	22.7	23.3	23.8	24.4	25	26.1	27.2	
32.2	17.7	18.3	19.4	20.5	21.1	22.2	23.3	24.4	25	25.5	26.1	27.2	27.7	28.3	28.8	30	
35	19.4	20	21.1	22.2	23.3	24.4	25.5	26.1	27.2	27.7	28.8	29.4	30.5				
37.7	20.5	21.6	22.7	24.4	25.5	26.6	27.7	28.3	29.4	30.5	31.1						
40.5	22.2	23.3	25	26.1	27.2	28.8	30	31.1	31.6								
43.3	23.8	25	26.6	28.3	29.4	30.5	32.2	33.3									
46.1	25.5	26.6	28.3	30	31.6	32.7	34.4										
48.8	27.2	28.3	30	32.2	33.8	35											
51.6	28.3	30	32.2	33.8	35.5												

	optimum conditions for evaporative coolers
x	temperatures derived from use of an evaporative cooling tower in Pretoria

Fig. 7.17: Evaporative cooling effectiveness

Cross Ventilation

Yeang (1998) states that in order to ensure adequate cross ventilation the width of a building should not exceed 15m and obstructions should be avoided. In order to facilitate cross ventilation the building footprint is 10m with a maximum depth of 12.8m where the footprint is extended. Where obstructions are necessary, these obstructions either allow air movement through openable windows or are not floor to ceiling height thereby allowing the building to ventilate freely.

Adaptability

As part of the passive design strategy, the need for adaptable systems was noted. Different groups of people and programs have different climatic needs that the building needs to respond to. Additionally, systems incorporated within the design must be able to cool during summer and heat the building during winter.

A displacement ventilation system where treated air is provided through a raised floor has been used for circulation of treated air in the northern and eastern wings of the building where occupants spend large amounts of time. This system allows air to be stratified within the internal space where treated air is lower – closer to where building occupants function - and warmer air higher within the interior space (Green Building Council of South Africa, 2011). Twist outlet floor diffusers allows for climatic control within small groups of occupants, thereby allowing the building occupants to have control over the amount of treated air they wish to receive.

In the southern wing of the building which is occupied sporadically and mostly at night, treated air is distributed though ducts in the ceiling.

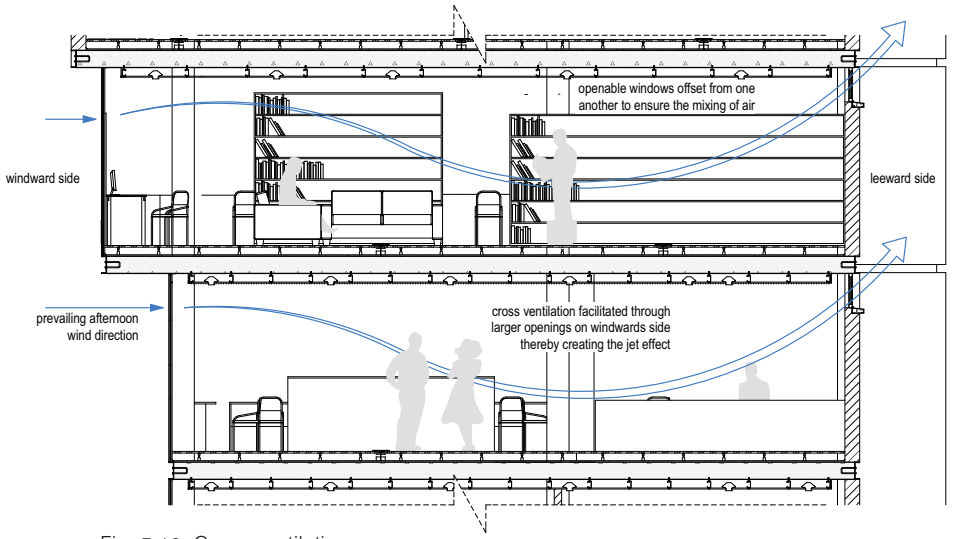


Fig. 7.19: Cross ventilation

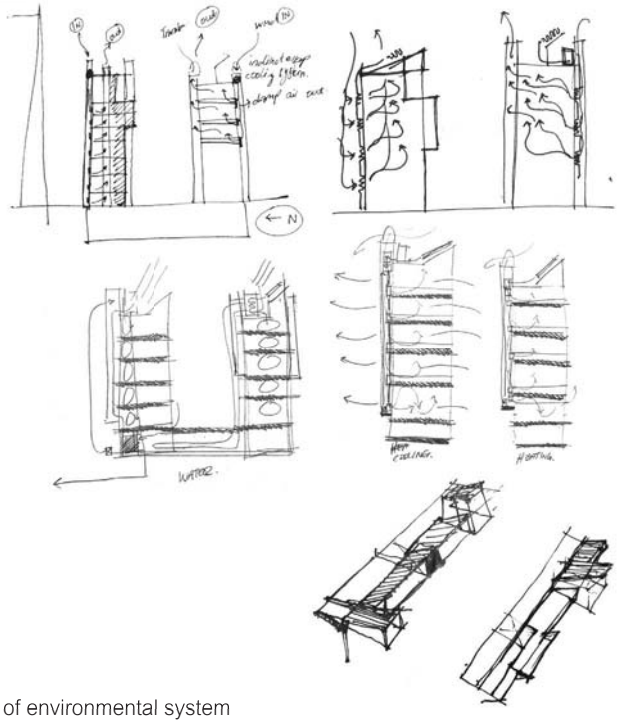


Fig. 7.20: Development of environmental system

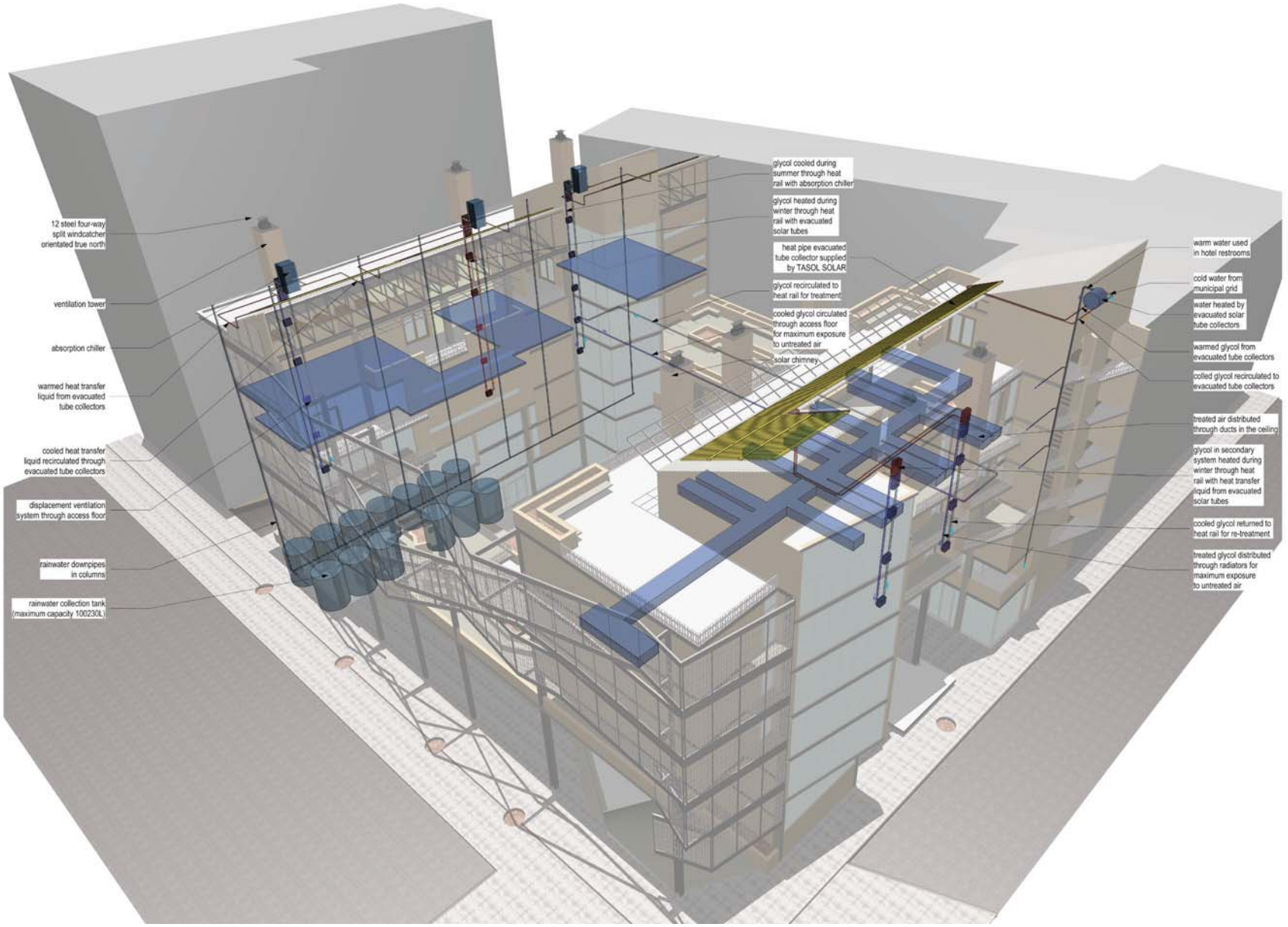


Fig. 7.21: Sustainability diagram

Summer Systems

During summer months a series of heat pipe evacuated-tube solar collectors are used to heat glycol up to 150˚C (Apricus, 2011). The evacuated tube collectors forms a closed system where individual tubes can be replaced without draining the entire system of its heat transferring liquid should one be damaged (GreenTerraFirma, 2007).

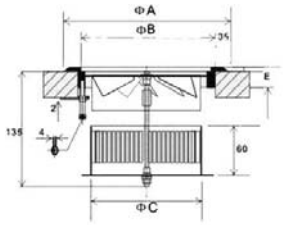
The system is mounted at 25˚ in order to allow optimal functionality within the climate of Pretoria where an angle of 25-30˚ is required to make adequate use of solar collectors. A passive tracking effect is achieved through the rounded surface of the tube, allowing it to function throughout the day (Apricus, 2011).

The warmed glycol is then used to transfer heat to a secondary closed system containing a solution of lithium bromide and water in a solar powered absorption chiller through a heat rail. The lithium bromide is liberated from the solution through the application of heat after which it produces a refrigerating effect (Yazaki energy systems, 2010). The refrigerating effect is then used to cool glycol in a third closed system encased within the ventilation ducts on the northern side of the northern wing.

Wind enters the building from the roof through a series of four way split ventilators. Air is then cooled through indirect evaporative cooling by moving over copper extruded low fin tubes in the tertiary closed system from where it enters the building and is dispersed throughout the interior space with the use of twist outlet floor diffusers. The air is then heated by office equipment and building occupants that causes it to rise due to the venturi effect from where it escapes through the atrium and is evacuated from the building through ventilation grills on the roof.

The southern wing, being inhabited for fewer hours of the day does not make use of an absorption chiller. Indirect evaporative cooling caused by air moving over the closed glycol system encased in the southern ventilation intake ducts lowers the internal temperature slightly after which it is distributed through ducts in the ceiling and is evacuated from the space though ventilation grills.

From the ventilation grills, heated air then enters a series of solar chimneys that are isolated from the habitable space and uses solar radiation through tinted glass to further heat the air thereby causing it to rise and exit the building above the roof. As the temperature in the solar chimney increase throughout the day, air is exhausted faster causing fresh air intake through the ventilation ducts to increase to accommodate the pressure difference (Rabah & Mito, 2003). Functioning of the system therefore increase throughout the day as external ambient temperatures increase.



Size	ΦA	ΦB	ΦC	ΦE
150	190	140	124	14
200	240	190	160	19

Fig. 7.22: Twist outlet floor diffuser

Fig. 7.23: Posi lock access floor

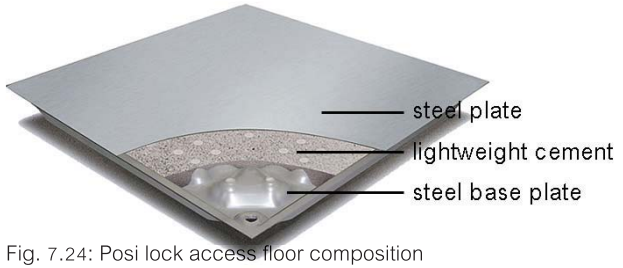


Fig. 7.24: Posi lock access floor composition

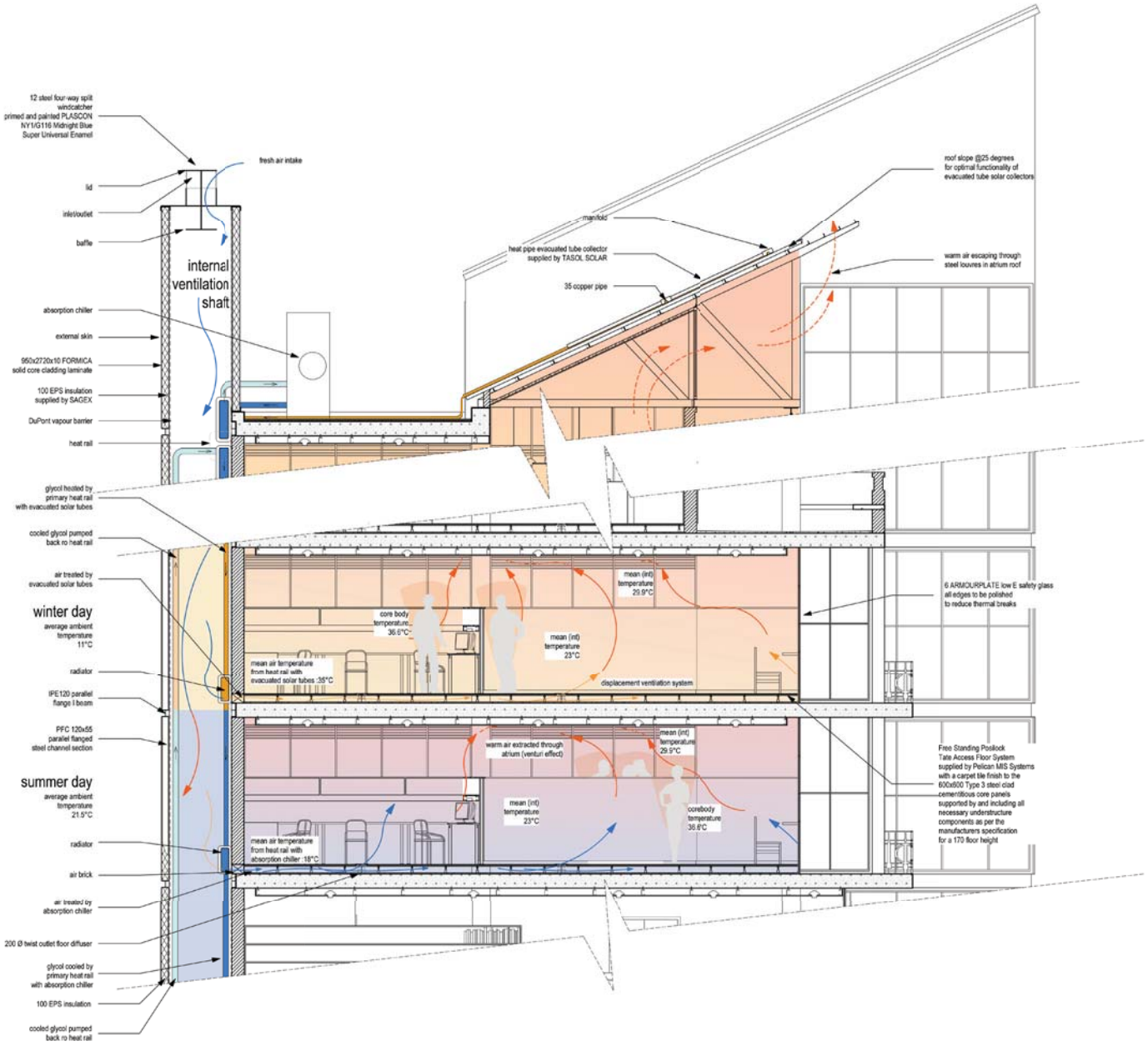


Fig. 7.25: Detail section indicating functioning of systems

Winter Systems

During winter months the absorption chiller is bypassed. Warmed heat transferring liquid from the evacuated tube collectors are used to heat the tertiary closed system encased in the ducts directly after which cold air is heated by moving over the radiators and distributed to internal spaces in a similar fashion as in summer months and evacuated from the building.

Additionally trombe walls are incorporated at the back of the solar chimneys. These walls will be heated throughout the day and radiated into the building at a suitable time due to the flywheel effect.

Ventilation Ducts

Ventilation ducts and solar chimneys are attached to the exterior of the building thereby reducing the amount of floor space lost to vertical ducts needed for distribution of treated air within the building and incorporating green design into the building aesthetic.

Steel construction has been used for external duct supports to keep the structure as light as possible and allow suspension from the side of the building. This allows the ducts not to extend to ground floor to still allow the passage of cars to the basement and preventing ducts from diminishing the connection between the new square and Station Square.

The primary duct structure consists of IPE120 parallel flange I beam bottom and top rails with PFC 120x55 parallel flanged steel channel section studs bolted to the top and bottom rail. The structure is cladded with exterior grade Formica SolidCore and filled with 100 expanded polystyrene insulation to prevent loss of heat and cold from treated air. A DuPont vapour barrier is inserted between the cladding and insulation to prevent vapour from moving into the building should condensation occur.

Ventilation ducts are connected to the structure by cutting back flanges of the top and bottom rail and fixing the webb to gusset plates welded to the steel channel incorporated with the floor slab. With the I - beam being smaller than the channel it is connected to, the gusset plate closes the duct where connected to the channel and serves to prevent treated air from escaping before entering the building.

The ducts are topped with four way split ventilators. The ventilators are orientated 45 degrees to the prevailing wind direction as this orientation creates the highest pressure difference between windward and leeward sides and results in the highest duct speeds (Gage & Graham 2000:234-244). On wind still days, air supply is provided by low energy fans which turn off when adequate pressure difference has been created between intakes and exhaust points for the system to function without mechanical aid.

Natural Light

In order to decrease the experience of crowding and promote occupant comfort, high levels of natural light is allowed to penetrate the building.

Natural light is maximised through floor to ceiling windows, curtain walls and celestory windows and controlled through the use of horisontal solar screens along the northern facade.

Solar screens are fixed to gusset plates that are factory welded to the steel channel fixed to the floor slab.

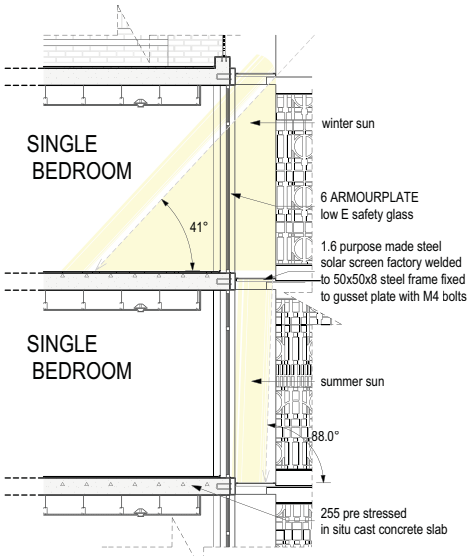


Fig. 7.26: Strip section illustrating day lighting on northern facade

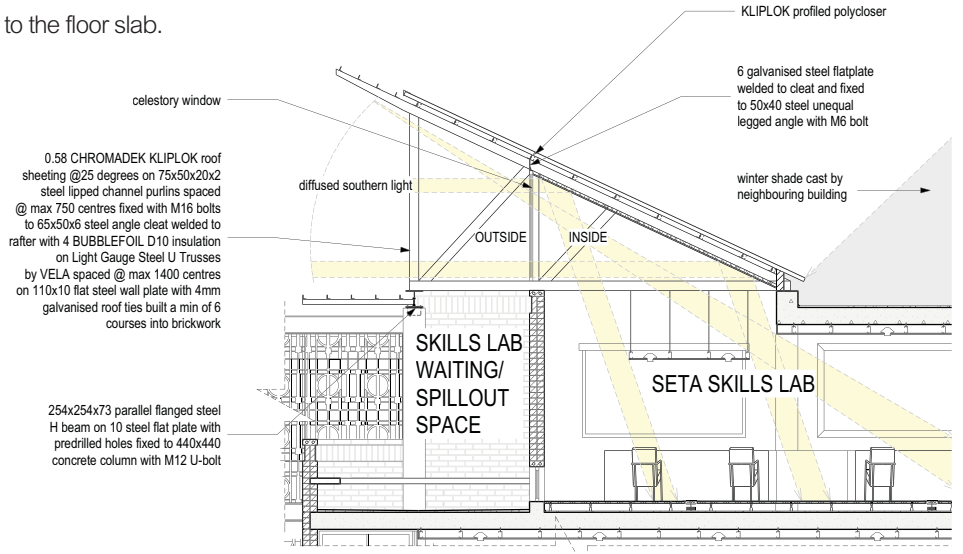


Fig. 7.27: Detail: roof construction and southern light through celestory window

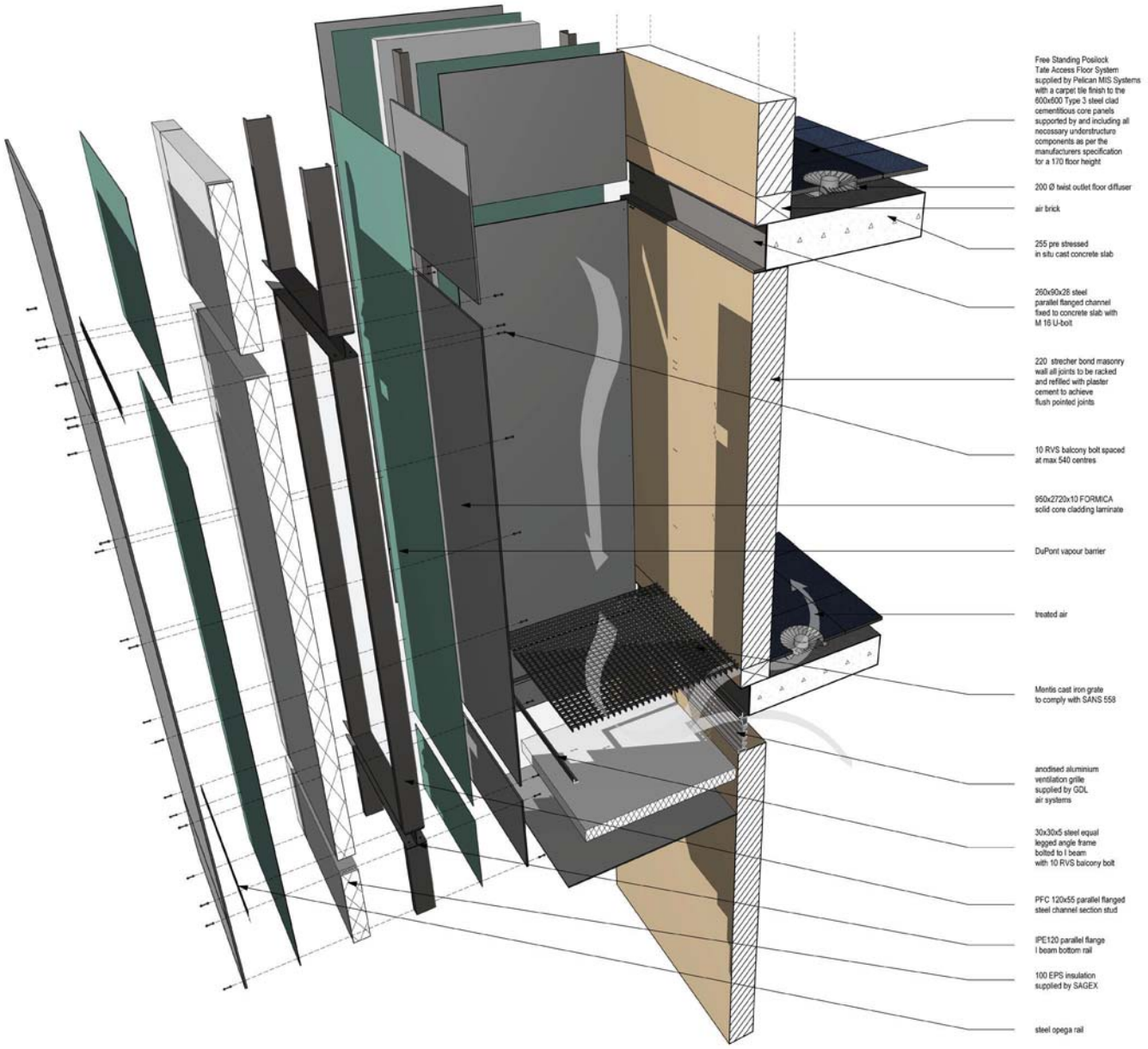


Fig.7.28: Exploded axonometric of ventilation tower

Water

Water is collected from the catchment area on the roof of the building as well as from the public square. The water is then filtered and stored in the basement from where it re circulated within the building.

Collected rainwater is distributed to restrooms, where it is used to re fill depleted water cisterns for the flushing of water closets and urinals. Rainwater used, reduces municipal water supply by 100230L per month for seven months of the year after which it is used to supplement the water provided by the municipality.

	Runoff	v.	130kL	Overflow
December	179841.6	79611.6	79611.6	0
January	212630.4	192012	130000	62012
February	130161.6	221943.6	130000	91943.6
March	113270.4	234984	130000	104984
April	25833.6	160587.6	130000	30587.6
May	32788.8	93146.4	93146.4	0
June	22852.8	15769.2	15769.2	0
July	7948.8	-76512	-76512	0
August	8942.4	-91287.6	-91287.6	0
September	13910.4	-86319.6	-86319.6	0
October	38750.4	-61479.6	-61479.6	0
November	88430.4	-11799.6	-11799.6	0

Fig.7.29: Rain water calculations

Material selection

Material selection has been influenced by the context as well as material attributes and environmental considerations such as the flywheel effect. The flywheel effect indicates the ability of high mass materials to radiate heat into a space at a later time when it is better suited (Bothma, 2004: 74).

Material choice has therefore been made in order to promote identity within the area, further *entopia* and respond to environmental considerations.

Building Envelope

Contextual and environmental considerations led to the choice of 220 masonry walls for all northern facades as well as southern facades as determined by tectonic response to hierarchy.

Masonry construction is used throughout the precinct and is suitable to Pretoria's climate. 220 Masonry walls will retain heat during the day and radiate stored heat roughly 5.5 hours later due to the time lag of the flywheel effect, thereby increasing internal temperatures slightly during cooler evenings and preventing overheating of internal space during the day. Use of 110 brick or untreated glass for the building envelope would result in a time lag of 2.3 and 0.0 hours respectively leading to stored heat being radiated during the warmest part of the day when it is most undesirable.

Glass curtain walls are constructed from Armourclad low-e safety glass. Low emissivity glass provides enhanced insulation to the glass facade in a single glazing application which prevents treated air within the building to escape though the envelope while still allowing high levels of light transmission and visual connectivity to the public square (Smartglass, 2011).

Glass curtain walls are placed on the southern facade of the building where heat gain due to the greenhouse effect will be less severe. Glass envelopes on the western side of the building, where the sun is more severe, is protected by the screen shading the western side of the building.
Both materials contributing to the main building envelope is manufactured locally thereby reducing energy consumption by lowering embodied energy attributed to transportation.

Formica SolidCore

Formica SolidCore has been specified for the cladding of the ventilation ducts. This material is a rigid, self supporting, lightweight laminated sheet with an acrylic overlay for UV protection (PG Bison, 2009). The

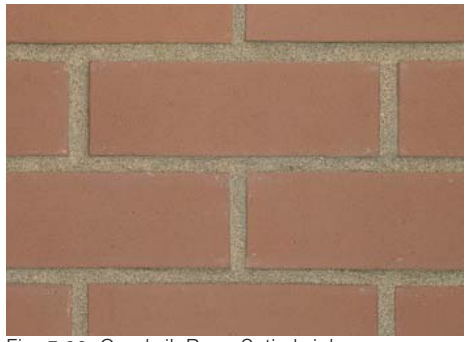


Fig. 7.30: Corobrik Roan Satin brick

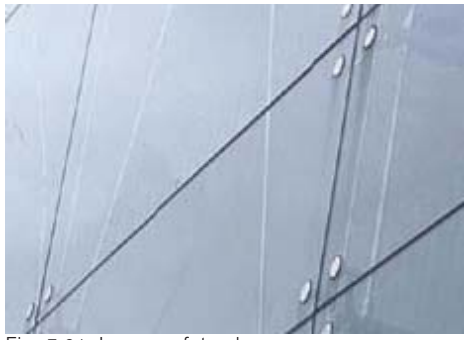


Fig. 7.31: Low e safety glass

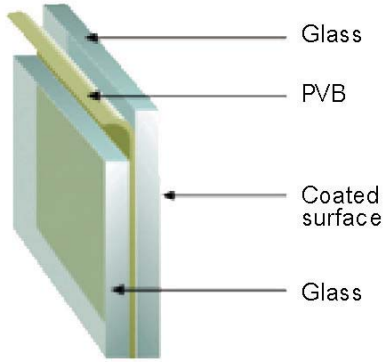


Fig. 7.32: Low e safety glass composition

Fig. 7.33: Formica SolidCore

Steel

material has been selected to contrast with other materials within the context, thereby accentuating green interventions within the building and is suitable for its application due to its lightweight nature, self supporting rigidity and in built UV protection.

Maximum panel sizes are 2050x1300 and have been considered during detailing of the ducts. Cladding sheets are factory cut and fit within panel sizes available leading to less material used and reduced wastage on site. Additionally the material is manufactured locally thereby reducing embodied energy and transportation cost.

Steel has been used for the construction of the screen, pergolas and shading devices to fit contextually and promote identity formation within the liminal space.

Other metals such as Aluminium have been considered but it has been found that steel is more advantageous for the application. Embodied energy density by mass for aluminium is 227 MJ/Kg in comparison with galvanised steel which is 34.8 MJ/Kg (Victoria University of Wellington, 2011).

Although aluminium is lighter and lower in maintenance, cost and embodied energy associated with aluminium renders it unsuitable when considering the amount of material needed.

Light Gauge Steel Trusses

Light gauge steel U-trusses supplied by Vela have been used in preference to timber trusses. Light steel trusses offer numerous benefits and fits contextually where exposed due to the preference of steel within the liminal space.

These trusses are fully recyclable, non combustible and galvanised in order to protect the material from the climate (Specifile, 2011). Steel trusses are fabricated according to profiles needed and reduces the amount of wasted material.

Timber is a natural resource with a low embodied energy of 2.0 MJ/Kg (Victoria University of Wellington, 2011) but is rarely recycled and needs to be transported fully assembled to site (Specifile, 2011). Light steel trusses can be assembled on site and is 30% lighter than timber thereby reducing transport costs by 60% and allows on site training opportunities.

Fig. 7.34: Light gauge steel trusses

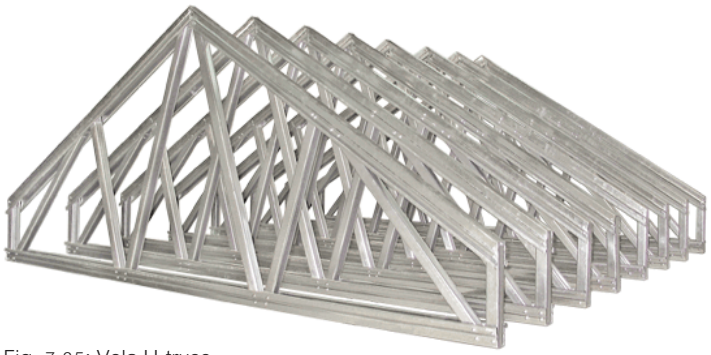


Fig. 7.35: Vela U-truss

Building Element	Width or description	Time lag of heat flow (h)
Brick wall	101.6mm	2.3
	203.2mm	5.5
	304.8mm	8.0
Concrete	50.8mm	1.0
	101.6mm	2.6
	152.4mm	3.8
	203.2mm	5.1
	254mm	6.4
	304.8mm	7.6
Glass	window	0.0
	block	2.0
Stone	203.2mm	5.4
	304.8mm	8.0
Frame	wood, plaster - no insulation	0.8
	wood, plaster & insulation	3.0
Roofs	light construction	0.7-1.3
	medium construction	1.4-2.4
	heavy contruction	2.5-5.0

Fig. 7.36: Material time lag due to the flywheel effect

Services

Services are distributed vertically within the building through service shafts. The shafts contain wet services as well as electrical cables and information lines.

Electrical and information cables are encased within separate 150 diameter fibre cement sleeves to protect them from wet services should problems occur and to prevent disruption to information services due to the proximity of the electrical cables.

Pipes for the removal of black and grey water are included within the service shafts except for the northern wing where pipes are allowed to run down the external envelope of the building. These pipes are hidden from public view by placing them behind a screen.

Services are distributed horizontally within the internal space through access floors and ceilings. Services distributed through access floor include electrical cables and information lines with electrical cables for lights being distributed through the ceiling as well as electrical supply and information lines where access floors are not provided.

Fig. 7.37: Service distribution: fourth floor

Fig. 7.38: Service distribution

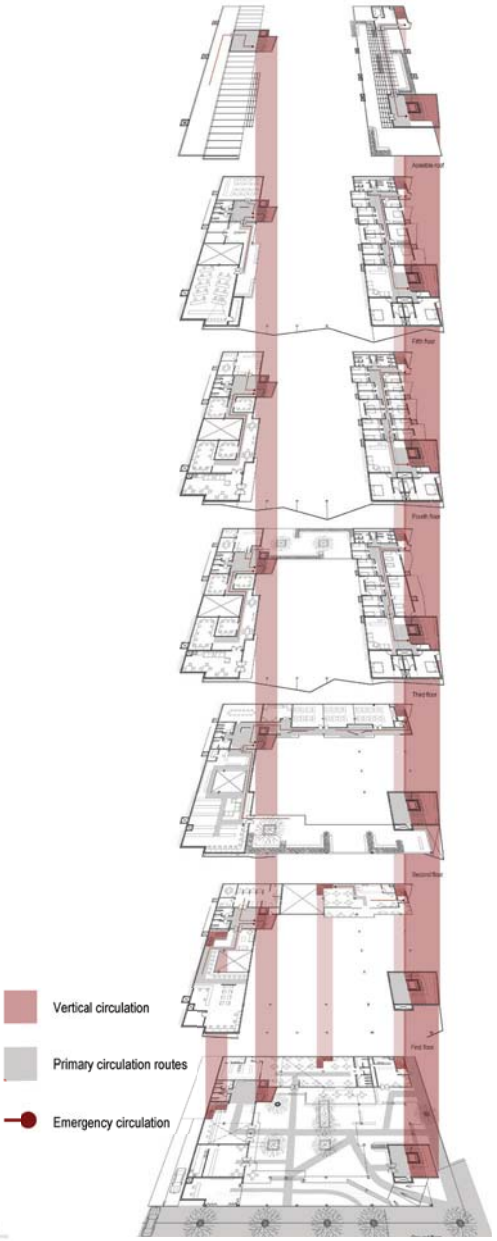


Fig. 7.39: Circulation

Fig. 7.40: Fire plan: fourth floor

Fire

In Accordance with Part TT 16.4 of SABS 0400 no fire escape is more than 45m away from the edges of the building. Three staircases run the full height of the structure and serve as fire escapes.

The escape route from classrooms housed within the eastern wing of the building allow for two options of escape with the south eastern fire escape end northern main staircase serving as exit points.

Fixed hose reels are provided for every 500 m² and portable fire extinguishers for every 200 m² as required by section TT of the building regulations.

In case of fire, smoke is evacuated from internal spaces through ventilation grills located within the atrium for the northern block and extract air grilles located within the ceiling of the southern wing from where it is evacuated through the celestory windows and solar chimneys respectively.

Chapter 8

Conclusion

Conclusion

This study is aimed at identifying ways in which architecture can promote social cohesion and desegregation. The preindustrial vernacular, which has failed to adapt from apartheid ideologies, has been proposed to include social integration as opposed to the creation of segregated environments.

The investigation can be summarised as creating *entopia*, which focus on architecture of the every day, cater to real world needs of city users and address problems unique to place and setting - and in the context of Pretoria, includes social integration.

To successfully establish *entopia* and create socially responsive architecture, three principal factors emerged. Firstly, that extension of public space is paramount in the creation of socially conscious architecture by providing space that can be appropriated by city users and serve as a platform for integration and communication. Secondly, architecture needs to function as a communication activator through the creation of space that will encourage communication since the mere provision of public space does not guarantee interaction. Community formation can not be forced and needs to be encouraged through the provision of spaces and opportunities where accidental meeting may take place. The third factor, is the acknowledgement of the importance of context which throughout this study has been concerned with the creation of a pedestrianised gateway to the city as is needed within the context in which the project is located. Contextual response is of utmost importance in the creation of *entopia* end socially responsive architecture to allow the new design to respond to specific problems on site and interpret ways in which social integration may be achieved.

Programmatic response and the creation of mixed use environments has been found to facilitate integration as it responds to all three factors mentioned above and proved to be vital during the design process. The design serves to illustrate how the three factors mentioned can be implemented to facilitate socially responsive architecture.

In conclusion architecture and the built environment has a direct influence on social cohesion, community formation and desegregation, and it is the authors belief that architecture is pivotal in the realisation thereof.

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